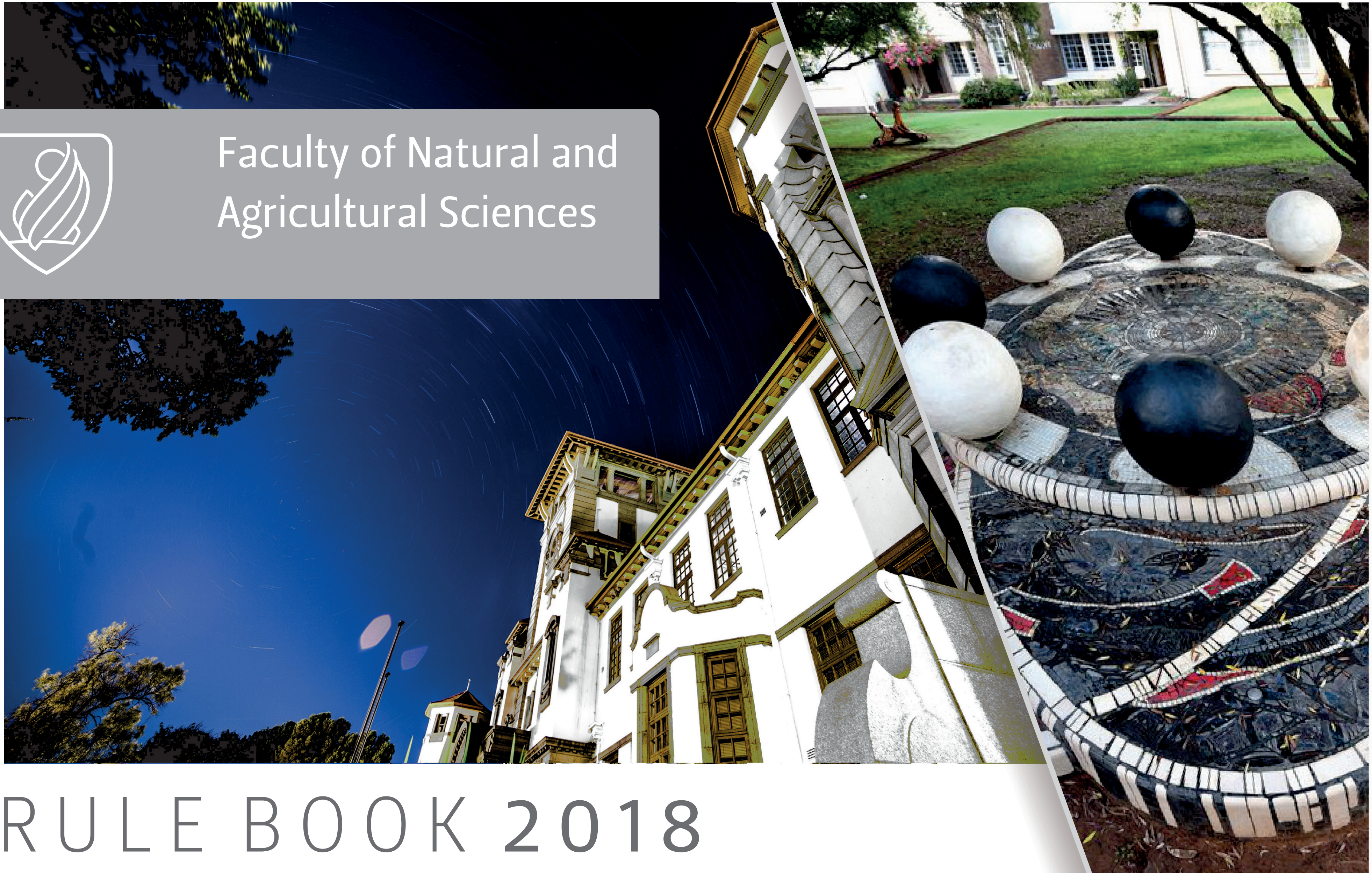
Faculty of Natural and Agricultural Sciences



RULE BOOK 2018

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UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
NATURAL AND AGRICULTURAL SCIENCES
NATUUR- EN LANDBOUWETENSKAPPE

FACULTY OF
NATURAL AND AGRICULTURAL
SCIENCES

RULE BOOK 2018

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
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Content

Content

1. USING THE RULE BOOK

The Rule Book contains information that will enable students to plan their undergraduate as well as postgraduate studies in the Faculty of Natural and Agricultural Sciences, University of the Free State (UFS). The information can be divided into three sections, namely general administrative information, academic learning programmes and module content.

In the first section students will find:

- Contact details of the academic administration officials in the Dean's office and at the student administration in the George du Toit Administration Building.
- Contact details of the different programme directors where students can get academic advice and assistance when choosing an appropriate learning programme. Consultations outside registration periods
- during first and second semester registration January and July.
- Qualification types, the structure and the constitution of the qualifications.
- Core competencies for graduates.

The second section consists of:

- Faculty rules.
- Qualifications offered by the Faculty.
- Learning programmes for different qualifications.
- Transitional Rules.

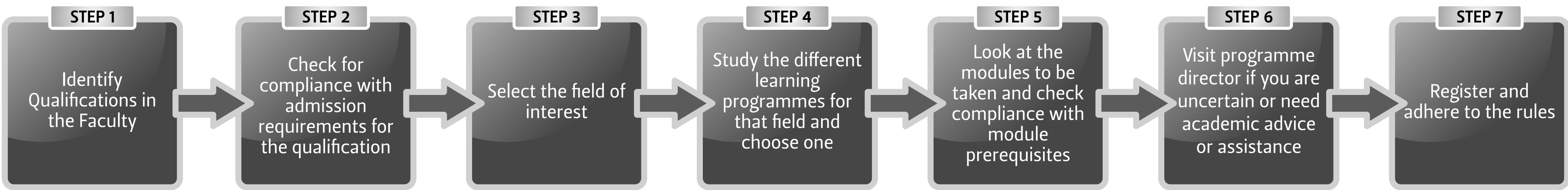
The third section contains module content information:

- Department in which modules are offered.
- Module code, NQF Level, number of credits and CESM categories.
- Prerequisites, module name and contact sessions.
- Content of the module and the method of assessment.

The Rule Book describes students' rights and obligations. The academic programmes must be regarded as part of the agreement between the Faculty and the students. Students registering for a programme in the Faculty must adhere to the General Rules For Undergraduate Qualifications, Postgraduate Diplomas, Bachelor Honours Degrees, Master's Degrees, Doctoral Degrees, Higher Doctorates, Honorary Degrees and the Convocation (General Rules) as well as the Rules of the Faculty of Natural and Agricultural Sciences. Students will only be allowed to register if they comply with all the admission requirements.

It is important to note that even though the outcomes of academic programmes will remain unchanged from the first time of registration, minor changes to learning programmes, modules and module content may occur so that the Faculty of Natural and Agricultural Sciences can ensure the relevance of the degrees. Students must therefore consult the new Rule Book every academic year before registration to ensure alignment with updated curricula, as the Faculty updates the Rule Book to keep abreast of the latest scientific developments as well as national directives. It is the student's **responsibility** to be fully conversant with these rules.

Students need to follow these steps when determining the modules for which they have to register:

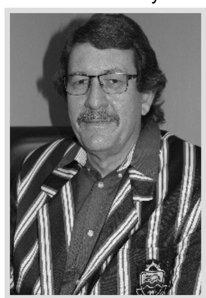
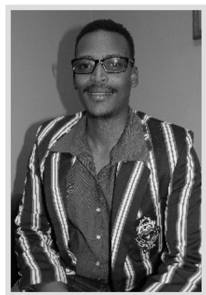
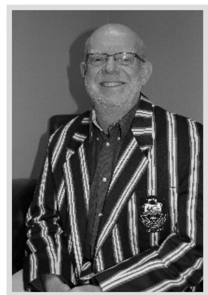
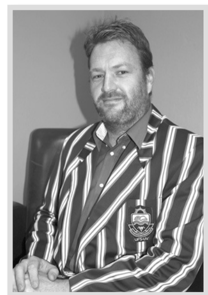


2. CONTACT DETAILS: OFFICE OF THE DEAN AND ACADEMIC ADMINISTRATION – BLOEMFONTEIN CAMPUS

POSITION	DEAN	FACULTY MANAGER	LEARNING AND TEACHING MANAGER	MARKETING MANAGER	OFFICER MANAGER TO THE DEAN	PERSONAL ASSISTANT TO THE FACULTY MANAGER	PERSONAL ASSISTANT TO THE LEARNING & TEACHING MANAGER	NATURAL SCIENCES UNDERGRADUATE
Name	Prof. Danie Vermeulen 	Mrs. Lee-Ann Frazenburg 	Ms. Elzmarie Oosthuizen 	Ms. Elfrieda Lötter 	Mrs. Tracy Isaacs 	Ms. Heidiry White 	Mrs. Sally Visagie 	
Buildiing	Room 9A, Biology Building	Room 9A, Biology Building	Room 9A, Biology Building	Room 9A, Biology Building	Room 9A, Biology Building	Room 9A, Biology Building	Room 9A, Biology Building	George du Toit Administration Building
Telephone Number	051 401 2482	051 401 3199	051 401 2934	051 401 2531	051 401 2322	051 401 3236	051 401 3855	051 401 9666
E-mail	dean@ufs.ac.za	damonsle@ufs.ac.za	oosthuizenem@ufs.ac.za	lottere@ufs.ac.za	isaacstl@ufs.ac.za	whitehj@ufs.ac.za	visagier@ufs.ac.za	

3. CONTACT DETAILS

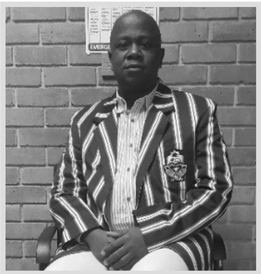
3.1 PROGRAMME DIRECTORS – BLOEMFONTEIN CAMPUS

PROGRAMME	ARCHITECTURE	AGRICULTURAL SCIENCES	EXTENDED PROGRAMMES	BIOCHEMISTRY	BOTANY, PLANT BREEDING, PLANT HEALTH ECOLOGY, PLANT PATHOLOGY	COMPUTER SCIENCE & INFORMATICS	CONSUMER SCIENCE	DISASTER MANAGEMENT
Name	Mr. Jako Olivier 	Dr. Antonie Geyer 	Mr. Elrich Jacobs 	Dr. Frans O'Neill 	Dr. Botma Visser 	Mr. Jaco Marais 	Dr. Ismari van der Merwe 	Ms. Olivia Kunguma 
Building	Room 26 ARG111, Architecture Building	Room 11, Biology Building	Room G19.1, Agricultural building	Room 5, Biotechnology Building	Room 134, Biology Building	Room WWG212, Mathematical Sciences Building	Room LG 9.106, Agriculture Building	Room LG3.105, Agriculture Building
Telephone Nr	051 401 2332	051 401 3199	051 401 7936	051 401 7553	051 401 3278	051 401 2929	051 401 2598	051 401 2721
E-mail	olivierji@ufs.ac.za	geyerac@ufs.ac.za	jacobses@ufs.ac.za	oneillFH@ufs.ac.za	visserb@ufs.ac.za	maraisj@ufs.ac.za	IvnMerwe@ufs.ac.za	KungumaO@ufs.ac.za

PROGRAMME	ENVIRONMENTAL MANAGEMENT	EXTENDED AND UPP AGRICULTURAL SCIENCES	FORENSIC SCIENCE	GENETICS AND BEHAVIORAL GENETICS	GEOGRAPHY	GEOLOGY	GEOHYDROLOGY	MATHEMATICAL SCIENCES
Name	Mrs. Marinda Avenant 	Ms. Elzmarie Oosthuizen 	Dr. Karen Ehlers 	Mrs. Zurika Murray 	Mrs. Eldalize Kruger 	Mrs. Justine Magson 	Mrs. Amy Allwright 	Mr. Christiaan Venter 
Building	Room LG10.103, Agriculture Building	Room 10, Biology Building	Room BL.169, Biology Building	Room 6, Genetics Building	Room GEO 2.2, Geography Building	Room GG 305, Geology Building	Room 21, Institute for Groundwater studies(IGS)	Room WWG 121, Mathematical Sciences Building
Telephone Nr	051 401 2863	051 401 2934	051 401 3878	051 401 2776	051 401 2185	051 401 2373	051 401 3481	051 401 2320
E-mail	avenantmf@ufs.ac.za	oosthuizenem@ufs.ac.za	ehlersk@ufs.ac.za	MurrayZ@ufs.ac.za	krugere@ufs.ac.za	MarkramJ1@ufs. ac.za	AllwrightAJ@ufs.ac.za	venterc@ufs.ac.za

MATHEMATICAL STATISTICS AND ACTUARIAL SCIENCE	MICROBIOLOGY, MICROBIAL BIOTECHNOLOGY	PHYSICS, CHEMISTRY	QUANTITY SURVEYING AND CONSTRUCTION MANAGEMENT	QUANTITY SURVEYING AND CONSTRUCTION MANAGEMENT	SUSTAINABLE AGRICULTURE	URBAN AND REGIONAL PLANNING	UPP AND EXTENDED NATURAL SCIENCES	ZOOLOGY AND ENTOMOLOGY
Dr. Michael J. von Maltitz 	Prof. Koos Albertyn 	Dr. Johan Venter 	Mrs. Tascha Bremer 	Mrs. Esti Jacobs 	Dr. Johan van Niekerk 	Prof. Verna Nel 	Mr. Pieter Bothma 	Dr. Candice J van Rensburg 
Room W102, Mathematical West Block	Room C101, Biotechnology Building	Room CEM 101, Chemistry Building	Room 12, Quantity Surveying and Construction Management	Room 8, Quantity Surveying and Construction Management	Room LG 3.107, Agriculture Building	Room ARG2, Architecture building	Dean's Office: Natural and Agricultural Sciences	Room D119A, Biology Building
051 401 2609	051 401 2223	051 401 3336	051 401 2996	051 401 3394	051 401 3765	051 401 2499	083 542 9995	051 401 9357
vmaltitzmj@ufs.ac.za	albertynj@ufs.ac.za	venterja@ufs.ac.za	BremerT@ufs.ac.za	JacobsE1@ufs.ac.za	vNiekerkJA@ufs.ac.za	NelVJ@ufs.ac.za	BothmaPJ@ufs.ac.za	JvRensC@ufs.ac.za

3.2 ACADEMIC ADMINISTRATION AND PROGRAMME DIRECTORS – QWAQWA CAMPUS

PROGRAMME	ASSISTANT DEAN QWAQWA	FACULTY OFFICER: QWAQWA	UPP AND EXTENDED NATURAL SCIENCES	BIOLOGICAL SCIENCES	MATHEMATICS AND COMPUTER SCIENCE AND INFORMATICS	PHYSICS, CHEMISTRY
Name	Dr. Tom Ashafa 		Mrs. Lea Koenig 	Dr. Tom Okello 	Mr. Teboho Lesesa 	Mr. Richard Ocaya 
Building	Room 1008, Old Natural Science Building		Room NAS111, New Natural Science Building	Room 109, New Natural Science Building	Room LB 2014, Library Building	Room 0009, New Science Building
Telephone Number	058 718 5313/5314	058 718 5132	058 718 5207	058 718 5478	058 718 5235	058 718 5301
E-mail	ashafaaot@ufs.ac.zz		koenigL@ufs.ac.za	okellotw@ufs.ac.za	lesesaT@ufs.ac.za	ocayaRO@ufs.ac.za

4. ACADEMIC STAFF

	AGRICULTURAL ECONOMICS (051 401 2824)	**ANIMAL, WILDLIFE AND GRASSLAND SCIENCES** (051 401 2211)	**SOIL, CROP AND CLIMATE SCIENCES** (051 401 2212)	**CONSUMER SCIENCE** (051 401 2572)
Professor	Prof. B.J. Willemse	Prof. G.N. Smit, Prof. H.A. Snyman, Prof. J.B. van Wyk, **Prof. F.W.C. Neser***	***Prof. C.C. du Preez** Prof. L.D. van Rensburg, Prof. C.W. van Huyssteen	
Professors Extraordinary		Prof. M.M. Scholtz		
Associate Professor	Prof. B. Grové			***Prof. H.J.H. Steyn**
Affiliated Professors			Prof. S. Walker	
Affiliated Associate Professor		Prof. F.B. Bercovitch, Prof. V.P Ducrocq, Prof. J.P.C Greyling	Prof. M. Tsubo, Prof. R. van Antwerpen	
Senior Lecturer	***Dr H. Jordaan (Acting)** Dr N. Matthews,Dr PC Cloete, Dr A.A. Ogundeji, Mr JJ van Staden	Dr M.D. Fair, Dr F. Deacon	Dr J. Allemann, Dr J.H. Barnard , Dr G.M. Ceronio, Dr G.M. Coetzer, Dr A.C. Franke, Dr E. Kotzé, Dr E.van der Watt, Dr J.J. Van Tol	
Lecturers	Mr F.A. Maré, Mr J.I.F. Henning, Mr W.A. Lombard, Ms M. Venter, Mr P. Mokhatla, Mr H.N. van Niekerk	Dr P.J. Malan, Mr F.H. de Witt, Mr O.B. Einkamerer, Mr M.B Raito, Dr A.Y Chulayo, Dr B.B. Janecke	Ms M.P Aghoghovwia, Ms L. de Wet Mr A.S. Steyn, Dr W.A Tesfhuneg, Mr P.C. Tharaga	Dr I. van der Merwe, Dr J.F. Vermaas, Dr N. Cronje
Junior Lecturers	Ms Z. Coka	Mr G. Jense van Rensburg		Ms J.S. van Zyl, Ms P.Z. Swart, Ms N. Tinta
Lecturers Units	Ms P. Madende		Ms V.N. Mathinya	
Research Associate			Prof. J.C. Pretorius	
Junior Researcher	Dr Y.T. Batha			
Agricultural Engineering	Mr J.J. van Staden			

	ARCHITECTURE (051 401 2332)	**QUANTITY SURVEYING AND CONSTRUCTION MANAGEMENT** (051 401 3322)	**URBAN AND REGIONAL PLANNING** (051 401 2486)	**ENGINEERING SUBJECTS** (051 401 7665)
Professor	Prof. J. Noble		Prof. V.J. Nel	
Associate Professor	Prof. G. Bosman	***Prof. K. Kajimo-Shakantu**		Prof H.J. Marx
Affiliated Professor	Prof. W. Peters		Prof. J.J. Steyn	
Senior Lecturers	Ms M. Bitzer, Ms A. Wagener Mr J. L. du Preez		***Dr M.M. Campbell,** Dr T. Mphambukeli	***Mr L.F. Lagrange**
Lecturers	Mr J.W. Ras, Mr J. H. Nel, Mr H. Raubenheimer, Mr Z.G. Wessels	Mr P.M. Oosthuizen, Ms M. Els, Ms T. Bremer, Ms E. Jacobs, Mr H. du Plessis, Mr R. Seedat	Mr T. Stewart, Mr S. Denoon-Stevens, Mr K.S. Mocwagae	Mr B.J. Swart, Mr R.J. Homann
Junior Lecturers	***Mr H.B. Pretorius**, Mr J.I. Olivier, Mr D.P.G. van der Merwe, Mrs K.S. McDonald	Ms C. Greyling, Ms T. van Schalkwyk, Mr A. Deacon		Mr N.C. Bernstein
Research Fellow			Dr Y.B. Mashalaba	

	CHEMISTRY (051 401 9212)	**COMPUTER SCIENCE AND INFORMATICS** (051 401 2754)	**GENETICS** (051 401 2595)	**GEOGRAPHY** (051 401 2255)	**GEOLOGY** (051 401 2515)	**MATHEMATICS AND APPLIED MATHEMATICS** (051 401 2691)	**MATHEMATICAL STATISTICS AND ACTUARIAL SCIENCE** (051 401 2311)
Distinguished Professor							
Senior Professor						***Prof. J.H. Meyer**	Prof. M.S. Finkelstein
Adjunct Professor		Prof E. Nel					Prof. J.M. van Zyl
Professor Researcher							
Professors Extraordinary	Prof. A. Roodt						
Professors	**Prof. W. Purcell*** Prof. J.C. Swarts, Prof. B.C.B. Bezuidenhoudt, Prof. J. Conradie, Prof. V. Azov, Prof. H.G. Visser	***Prof. P.J. Blignaut**	***Prof. J.P. Grobler**		Prof. W.A. van der Westhuizen		Prof. R. Schall
Associate Professors	Prof. K. von Eschwege, Prof. L. Moskaleva, Prof. E. Erasmus	Prof. T. Stott			**Prof. F. Roelofse***	Prof. T.M. Acho, Prof. T. Vetrik	
Affiliated Professors	Prof. D. Ferreira, Prof. K. Swart, Prof. T. van der Merwe, Prof. S. Otto, Prof. J.M. Botha		Prof. T.E. Turner		Prof. D.E. Miller, Prof. R. Scheepers, Prof. G.Germs		
Affiliated Associate Professors	Prof. G. Fouché, Prof. G.Steyl		Prof. A. Kotzé		Prof. L. Jacobson, Prof. R. Schouwstra, Prof. W.P. Colliston, Prof. M. Tredoux		
Senior Lecturers	Dr S.L. Bonnet, Dr J.A. Venter, Dr E.H.G. Langner, Dr A. Wilhelm	Dr L. de Wet, Dr J.E. Kotze	Dr K. Ehlers, Dr G.M. Marx, Dr M. Gryzenhout	***Dr C.H. Barker,** Dr J.J. le Roux, Dr R.T. Massey	Dr M. Huber, Dr H. Minnaar	Ms J.S. van Niekerk, Dr S. Dorfling	Dr L. van der Merwe, ***Mr F.F. Koning,** Dr D. Chikobvu, Dr A. Verster
Senior Lecturer-researcher	Dr A. Brink, Dr M. Schutte-Smith, Dr E. Müller						
Lecturers	Dr L. Twigge, Dr R. Shago	Dr A.J. Burger, Mr W. Nel, Mr R. Brown, Mr R.C. Fouché. Mr W.S.J. Marais. Mr J-P. du Plessis, Mr D. Wium, Ms T. Nkalai	Mr M.F. Maleka, Mr J.A. Viljoen, Ms S. Schneider, Ms Z. Murray, Ms H. Bindeman, Ms L. Wessels, Dr S. Brink	Ms E. Kruger, Ms T.C. Mehlomakhulu, Dr R.T. Massey, Mr A.J. van der Walt, Ms L. Rudolph, Ms E. Nkoee, Ms A. Pretorius	Mr A.I. Odendaal, Dr R. Hansen, Ms J. Magson	Ms A.F. Kleynhans, Mr C. Venter, Mnr M. Fasondini, Dr B.E de Klerk, Dr A. Kriel, Dr E. Ngounda	Mr A.M. Naudé, Dr M.J. von Maltitz, Mr S. van der Merwe, Ms E. Girmay, Ms W. Oosthuizen, Ms Z. Ludick, Dr M. Sjölander, Mr J. Blomerus, Mr J. Venter
Affiliated Lecturers			Dr D.L. Dalton, Lt.-Col. A. Lucassen Dr E. Mwenesongole				
Junior Lecturers		Ms M.J.F. Botha, Ms M. Thakaso	Ms Z. Raffie		Ms T. Mapholi, Mr R. Rentel, Ms R. Makhadi	Ms A. Swart	
Subject Coordinators	Dr C. Marais, Ms R. Meintjes						
Academic Facilitators	Ms M. du Plessis, Ms B. van Tonder, Ms C. de Klerk						

QWAQWA-CAMPUS

	CHEMISTRY (058 718 5130)	COMPUTER SCIENCE AND INFORMATICS (058-718 5216)	GEOGRAPHY (058-718 5476)	MATHEMATICS AND APPLIED MATHEMATICS (058-718 5204)
Affiliated Professors	Prof. A.S. Luyt			
Associate Professors			Prof G. Mukwada,	
Senior Lecturers		***Dr R.D. Wario**	***Dr S.A. Adelabu,** Dr T.W. Okello	
Lecturers	***Mr K. Mpitso**, Dr N.F. Molefe, Mr T.A. Tsotetsi, Ms M.A. Malimabe, Dr J. Mofokeng, Dr M. Mngomezulu	Mr A.G. Musa, Mr M.B. Mase, Mr G.J. Dollman, Mr F.M. Radebe	Ms M. Naidoo, Mr P.S. Mahasa, Dr MM Hansen	***Mr S.P. Mbambo,** Dr N.R. Loufouma Makala, Dr S. Nkonkobe
Junior Lecturers	Mr R.G. Moji	Mr B. Sebastian, Mr T. Lesesa	Ms N.M. Sekhele	Ms H.C. Faber

	MICROBIAL, BIOCHEMICAL AND FOOD BIOTECHNOLOGY (051 401 2396)		PHYSICS (051 401 2321)	PLANT SCIENCES (051 401 2514)			ZOOLOGY AND ENTOMOLOGY (051 401 2427)
	Division of Microbiology and Biochemistry	**Division of Food Science**		**Division of Plant Pathology**	**Division of Botany**	**Division of Plant Breeding**	
Senior Professor			Prof. H.C. Swart, Prof. P.J. Meintjes				
Professor	*** Prof. M.S. Smit,** Prof.J.Albertyn, Prof. R.R. Bragg, Prof. E. van Heerden, Prof. B.C. Viljoen, Prof. C.H. Pohl-Albertyn	Prof.G.Osthoff	, ***Prof. J.J. Terblans,** Prof. W.D. Roos	Prof. N.W. McLaren Prof. W.J. Swart		Prof. M.T. Labuschagne	***Prof. L. Basson,** Prof. N.J. Heideman
Professors Extraordinary							Prof. L.J. Fourie
Associate Professors	Prof. H.G. O'Neill, Prof. D. Opperman	Prof. A. Hugo, Prof. C.J. Hugo	Prof. M.J.H. Hoffman Prof. R.E. Kroon		Prof. B. Visser	***Prof. L. Herselman**	Prof. L.L. van As, Dr C.R. Haddad
Affiliated Professors	Prof. M.F. DeFlaun			Prof. P. Crous		Prof. P. Ng	
Affiliated Associate Professors	Prof. E.J. Lodolo		Prof. K.T. Hillie			Prof. R. Prins	
Senior Lecturers	Dr F.H. O'Neill, Dr O.M. Sebolai, Dr C.E. Boucher	Dr J. Myburgh, Dr M. de Wit, Dr C. Bothma	Dr R.A. Harris, Dr B. van Soelen	Dr W.H.P. Boshoff, Dr G.J. Marais	Dr G.P. Potgieter,	Dr A. van Biljon, Dr N.G. Lebaka, Dr S. Ramburan	Dr M. Ndlovu
Lecturers			Dr A. Odendaal		Dr M. Cawood, Dr M. Jackson, Dr L. Joubert, Dr L. Mohase, Dr A. van Aardt	Dr A. Minnaar-Ontong, Dr R. van der Merwe	Ms E.M.S.P. van Dalen, Mr H.J.B. Butler, Dr C. Jansen van Rensburg, Mr V.R. Swart, Ms L. Heyns
Junior Lecturers							Mr D Fourie
Research Associates				Prof. Z.A. Pretorius	Prof P.J. du Preez, Dr S. Ramburan, Dr L. Rossouw, Dr A.M. Venter, Prof H.J.T. Venter		Prof. J.G. van As, Dr L.M. Barkhuizen, Dr K.W. Christison, Dr L. Coetzee, Dr L.Hugo-Coetzee, Dr Y. Masurik, Dr N. Rayner
Senior Researcher	Dr G. Kemp		Dr E. Coetsee-Hugo		Prof. L. Scott		
Researcher	Ms L. Steyn		Dr M. Duvenhage				

QWAQWA-CAMPUS

	PHYSICS (058 718 5302)	PLANT SCIENCES (058 718 5332)	ZOOLOGY AND ENTOMOLOGY (058 7185324)
		Botany	
Professor	Prof. B.F. Dejene		
Associate Professor			Prof A. le Roux
Senior Lecturers	Dr L.F. Koao	Dr A.O.T. Ashafa, Dr L.V. Komoreng, Dr S.L. Steenhuisen	Dr P. Voua Otomo
Lecturers	***Dr K.G. Tshabalala,** Mr R.O. Ocaya, Mr S.J. Motloung	***Dr R. Ngara,** Mr T.R. Pitso	***Dr M. Leeto,** Dr J. van As, Dr E. Bredenhand, Ms M. van As
Associate Researchers		Dr A.O. Aiyegoro, Prof. R.O. Moffett	
Affiliated Researcher		Prof. D.A. Akinpelu	
Academic Facilitator		Ms D. Mosea	

	DiMTEC (051 401 2721)	CENTRE FOR MICROSCOPY (051 401 2264)	CENTRE FOR ENVIRONMENTAL MANAGEMENT (051 401 2863)	CENTRE FOR SUSTAINABLE AGRICULTURE, RURAL DEVELOPMENT AND EXTENSION (051 401 2163)	INSTITUTE FOR GROUNDWATER STUDIES (051 401 2175)
Director	***Prof A. Jordaan**		***Ms M.F. Avenant (acting)**	***Dr J.A. van Niekerk**	***Mr E Lukas (acting)**
Professor	Prof. R. Bragg				Prof. P.A.L. le Roux
Associate Professor	Prof. B. Grové	***Prof. P.W.J. van Wyk**			Prof. A Atangana
Affiliated Professors			Prof. A. Turton		
Affiliated Associate Professors	Dr J.G. Szarzynski, Prof. F.G. Renaud		Prof. N.A. Kgabi		Prof. K.T. Witthüser
Affiliated Researchers					Prof. J.F. Botha, Ms Y.L. Kotze
Senior Lecturer	Dr D. Chikobvu, Dr C. Barker, Dr. A.O. Ogundeji, Dr H. Booysen, Dr M. Schutte-Smith, Dr J. Belle		Dr F.T. Buschke, Dr O.O. Ololade	Dr J.W. Swanepoel, Me J.H.. Ngwenya	Dr F.D Fourie
Lecturers	Dr M. Coetzee, Dr A. Ncube, Ms O. Kunguma, Ms. L. de Wet, Dr E. du Plessis, Mr S. Carstens, Mr A. Kesten, Mr W.F Ellis, Mr M. Procter, Ms. J. Swanepoel, Mr H. Ababio		Ms S. Esterhuyse, Ms M. F. Avenant		Mr S.S. de Lange, Mr P.H. Lourens
Junior Lecturers	Ms L. Nogabe, Ms M. Joubert				Ms A. Allwright
Lecturers/Researchers					Dr M. Gomo
Research Associate			Dr N.L. Avenant, Dr H. Bezuidenhout, Dr J. Brink, Dr D. Codron, Dr N.B. Collins, Dr P. Grundlingh, Dr J.R. Henschel, Dr S. Mitchell, Dr T. Pinceel, Prof. M.T. Seaman, Dr D.F. Toerien, Dr P.C. Zietsman	Prof. A.E. Nesumvuni, Dr. B.D. Nkosi, Dr. E.M. Zwane, Dr. P Tirivanhu	

*** Academic Departmental Head**

5. REVISED QUALIFICATION TYPES AND DEGREE CODES

Higher Education Qualifications Sub-Framework (HEQSF) contains eleven qualification types mapped on to the six levels of the National Qualifications Framework (NQF) offered by higher education institutions. Some levels have more than one qualification type. The following qualification types are presented at the Faculty of Natural and Agricultural Sciences, UFS:

UNDERGRADUATE QUALIFICATIONS				POSTGRADUATE QUALIFICATIONS			
Type of qualification	**Exit level**	**Minimum total credits**	**Credits and level**	**Type of qualification**	**Exit Level**	**Minimum total credits**	**Credits and level**
Advanced Diploma	7	120	Minimum 120 credits at Level 7	Postgraduate Diploma	8	120	Minimum 120 credits at Level 8
Bachelor's Degree	7	360	Minimum 120 credits at Level 7	Bachelor Honours Degree	8	120	Minimum 120 credits at Level 8
Professional Bachelor's Degree	8	480	Minimum 120 credits at Level 8	Master's Degree	9	180	Minimum 180 credits at Level 9
				Doctoral Degree	10	360	Minimum 360 credits at Level 10

Each of these qualifications are registered with SAQA and DHET and are linked to a unique degree code on the Programme and Qualification Mix (PQM) of the University of the Free State.

Table 1: Degree Codes

First	Second				Third				Fourth
Faculty	Exit level qualifier				Faculty specific				
4 - Natural Sciences 5 – Agriculture Science	1-4 Undergraduate		5-9 Postgraduate		**Natural Sciences**				Degrees with designator 0 = old and 1 = reviewed.
	*Certificates (Higher/ Advanced)	1	*Honours degree	6	Biological Sciences	1	Computer Science and Informatics	6	
	*Diplomas (360-credits/240-credits/ Advanced)	2	*Master's degree (Course work/ Professional)	7	Mathematical Sciences	2	Consumer Science	7	
	*B-degree (360-credit)	3	*Master's degree (Dissertation)	8	Chemical and Physical Sciences	3	Agricultural Sciences	8	
	*B-degree (480-credit)	4	*Doctorate (Research)	9	Geosciences	4	Building Sciences	9	
	*Postgraduate Diploma	5	*Doctorate (Professional)	0	Agricultural Economics	5	Other	0	

6. CONSTITUTION OF QUALIFICATIONS AND PROGRAMME CODES

The majority of the Bachelor's Degrees on offer at the Faculty of Natural and Agricultural Sciences consists of three years of study. The first year of study provides students with the opportunity to develop a broad scientific foundation and students are normally required to complete eight modules (at least 120 credits per year, four modules per semester). These modules serve as the foundation for specialisation in the subsequent years. In the second year of study, majors are selected (at NQF Level 6), supplemented with modules from supportive disciplines. Learning programmes provide students with the opportunity to select modules from related supportive disciplines to ensure purposeful qualifications. In the third year of study, students must specialise in two major fields of study, for example Physics and Chemistry, or Microbiology and Biochemistry, or Genetics and Botany (at NQF Exit Level 7), with a total of at least 60 credits completed for each major. Furthermore, students may also be required to complete other modules to ensure that they have the necessary knowledge and literacy required to function in a demanding academic environment. The diagram below indicates how degrees are constituted and how one qualification provides entry into a qualification at the next NQF Level.

The Bachelor's Degree (B) makes provision for three fields of study, namely:	The Bachelor of Science (BSc) and the Bachelor of Science Honours Degree make provision for seven fields of study, namely:		The Bachelor of Science in Agricultural BSc (Agriculture) Degree makes provision for four fields of study, namely:
• Architecture • Agricultural Sciences • Consumer Sciences • Computer Information Systems	• Biological Sciences • Building Sciences • Chemical and Physical Sciences • Consumer Science	• Geosciences • Computer Science and Informatics • Mathematical Sciences	• Animal, Grassland and Wildlife Sciences • Food Science • Plant Breeding and Plant Pathology • Soil, Crop and Climate Sciences

In each field of study different modules can be combined as majors. The different combinations of majors, minors and supportive modules are referred to as learning programmes. The combination of modules are known as the curriculum for the specific learning programme and must comply with the minimum credits as indicated under the heading *5. Revised Qualification Types and Degree Codes.* Each learning programme has a unique Programme Code, which refers to a qualification on the UFS PQM, accredited by the CHE, and registered with SAQA and DHET and link to a specific Degree Code.

Table 2: Programme codes

First Digit	**Second Digit**	**Third Digit**					
Campus	**Faculty**	**Exit level qualifier**					
		1-4 Undergraduate		**5-9 Postgraduate**			
B – Bloemfontein Q – Qwaqwa	4 – Natural Sciences 5 – Agricultural Science	Certificates (Higher/ Advanced)	1	Postgraduate Diploma	5	Master's Degree (Dissertation)	8
		Diplomas (360-credits/240-credits/ Advanced)	2	Honours Degree	6	Doctorate (Research)	9
		B-degree (360-credit)	3	Master's Degree (Course work/ Professional)	7	Doctorate (Professional)	0
		B-degree (480-credit)	4				

Fourth Digit								**Fifth Digit**	
Natural Sciences fields of study				**Agriculture fields of study**				**Detail qualifiers**	
Biological Sciences	1	Computer Science and Informatics	6	Animal, Grassland and Wildlife Sciences	1	Agricultural Economics	5	All degrees except the ones listed below are zero (0)	0
Mathematical Sciences	2	Consumer Science	7	Food Science	2	Agricultural Management	6	Selection programmes with different admission requirements	1
Chemical and Physical Sciences	3	Agricultural Sciences	8	Plant Breeding and Plant Pathology	3	Agricultural Extension	7		
Geosciences	4	Building Sciences	9	Soil, Crop and Climate Sciences	4				
Agricultural Economics	5	Other	0						

7. ACADEMIC PLAN CODES

The coding system links to another level, the Academic Plan Code. This code consists of eight digits. The first four digits respond directly with the first four digits of the Degree Code. The last digits link to the different degrees as follows:

Advanced Diploma BC4200xx Advanced Diploma Agric. BC5200XX Bachelor BC4301xx Bachelor of Science BC43xxyy (xx and yy represent the TWO different majors	Bachelor of Science Agriculture BC54xxyy Bachelor Honours BC4600xx Bachelor of Science Honours BC5600xx Postgraduate Diploma BC4500xx Postgraduate Diploma Agric. BC5500xx	Master's by dissertation BC4802xx Master's by course work BC4703xx Master of Science by dissertation BC4800xx Master of Science by course work BC4701xx Master of Agricultural Sciences BC5800xx Master of Agricultural Sciences Structured BC5702xx	Doctor BC4902xx Doctor of Philosophy BC4900xx Doctor of Science BC4901xx

Bachelor of Science Extended Degree Mathematics and Chemistry BC4300E1 Mathematics and Finances BC4300E2	**Bachelor of Science Agricultural Extended Degree** Mathematics and Chemistry BC5480E1	**Bachelor of Agriculture Extended Degree** Agriculture BC5300E1	**University Preparation Programme** Mathematics and Chemistry 40001 Agriculture 50001 **Higher certificate in NAS** HCert in Mathematics and Chemistry BC410001 HCert in Agriculture BC510001

The first digits that indicate the degree can include one of the two digits representing a major. The subsequent digits represent either the selected two majors, or the major and minor in the case of the Bachelor of Science Agriculture degrees, or a single speciality area in the case of Bachelor Honours, Master's and Doctoral degrees. Each subject is identified by a two-digit code as provided in the table below.

Table 3: Identification codes of different disciplines

Actuarial Science	10	Behavioural Genetics	18	Engineering Science	26	Geohydrology	34	Plant Pathology	42
Agricultural Economics	11	Biochemistry	19	Entomology	27	Geology	35	Quantity Surveying	43
Agrometeorology	12	Botany	20	Environmental Geology	28	Grassland Science	36	Soil Science	44
Agronomy	13	Chemistry	21	Food Science	29	Mathematical Statistics	37	Spatial Planning	45
Architecture	14	Computer Science and Informatics	22	Forensic Science	30	Mathematics	38	Statistics	46
Animal Science	15	Consumer Science	23	Genetics	31	Microbiology	39	Sustainable Agriculture	47
Applied Mathematics	16	Construction Management	24	Geochemistry	32	Physics	40	Urban and Regional Planning	48
Astrophysics / Astronomy	17	Disaster Management	25	Geography	33	Plant Breeding	41	Zoology	49

Table 4: Identification codes of specialisation fields

Alternative combination	00	Economics	58	Forensic Sciences Interdiciplinary	68	Microbiotechnology	77	Psychology	86
Program without two majors	1-9	Environmental Geography	59	Geographical Informatics	69	Mineral Resource Management	78	Risk analysis	87
Agricultural Engineering	51	Environmental Management	60			Nano Sciences	79	Soil Science Interdisciplinary	88
Agrometeorology Interdisciplinary	53	Environmental Science	62	Human Settlements	71	Physiology	80	Wildlife	89
Agronomy Interdisciplinary	54	Facilities Management	63	Irrigation Management	72	Plant Breeding Interdisciplinary	81	Wildlife Management	90
Business Management	55	Finance	64	Irrigation Sciences	73	Plant Health Ecology	82	Integrated Water Management	91
Computer Information Systems	56	Forensic Chemistry	65	Land and Property Development Management	74	Plant Pathology Interdisciplinary	83	Tourism	92
Ecology	57	Forensic Genetics	67	Limnology	76	Property Sciences	85		
Economics	58	Forensic Entomology	66	Life Sciences	75	Polymer Sciences	84		

The curricula for the different learning programmes usually consist of three types of modules, namely compulsory, elective and required modules. Compulsory modules must be taken by all the students in the learning programme; elective modules provide students with the opportunity to select modules of interest; and required modules must be followed when a student does not comply with certain requirements. The curricula for the different learning programmes are set out below, starting on p.49.

8. STRUCTURE OF QUALIFICATIONS

COMPOSITION OF THREE AND FOUR YEAR DEGREES

The different blocks represent different modules; if the blocks have the same colour they represent the same discipline.

Three year Bachelor's Degree Exit Level 7		Four year Bachelor's Professional Degree Exit Level 8	
YEAR		YEAR	
1		1	
2		2	
3		3	
4	**One year Bachelor Honours Degree** **Exit Level 8**	4	
One or Two year Master's Degree **Exit Level 9**			
Research project culminating in a dissertation		Course work and a research project culminating in a mini-dissertation	
Two year Doctoral Degree **Exit Level 10** Research project cumulating in a thesis			

MODULE CODES

Undergraduate and postgraduate modules may be presented as semester or year modules. The credits awarded to every module give an indication of the teaching and learning time and volume of work. One module credit equals 10 notional hours which include hours spent in the lecture room and on independent work and study.

A module is indicated with the code ABCDwxyz and this code represents the following:

ABCD	Indicates the discipline
w	A numeral stating the study year, for example first year = 1
x	Indicate NQF Level
y	An odd number indicates the first semester and an even number indicates the second semester. The numerals 0 indicates a year module
z	The number multiplied by four indicate the number of credits

For example, CROP3754 indicates that it is an Agronomy module (CROP), presented during the third academic year at NQF Exit Level 7 (3), that the module is presented during the first semester (odd number 5), and represents 4x4 = 16 teaching credits (4).

The numerical code for Bachelor Honours, Master's and Doctorate modules will start with a 6, 7 for structured or 8 research and 9. If the last number is 0 it indicates that the modules have either more than 36 credits or the credits are not a multiple of four.

9. CORE COMPETENCIES FOR GRADUATES

A Bachelor's or Bachelor of Science Graduate is:

Academically excellent	Adjusted to cultural diversity	An active global citizen
This entails that the student:		
• Attains a strong sense of academic integrity and scholarship. • Becomes self-motivated and self-regulated, with an ability to continuously direct his/her own learning. • Adapts to a changing environment and becomes committed to lifelong learning. • Accepts critical thinking and decision-making as part of the learning process. • Attains an appropriate level of achievement in language proficiency, reading and writing, problem solving, communication and broad research activities. • Becomes competent in information and communication technologies. • Develops cognitive and analytical skills that are flexible and transferable through various learning experiences.	• Acquires an understanding of the social and cultural diversity in our country. • Learns to value and respect different cultures.	• Acquires an appreciation of the global perspective on his/her chosen discipline(s). • Learns to accept social responsibilities. • Works effectively both as a team leader and a team member. • Takes cognissance of existing social, economic, political and environmental issues. • Encourages the improvement and sustainability of the environment. • Respects human rights, attaches importance to equity and values, ethics and ethical standards.

Knowledge	Skills	Values and attitudes
A B or BSc Graduate has the following:		
• Integrated, comprehensive knowledge of the main areas within the two major disciplines of choice. This includes an understanding of, and an ability to apply and evaluate, the key terms, concepts, facts, principles, rules and their theories. • Detailed knowledge of at least one area of specialisation and how that knowledge relates to other fields, disciplines or practices. • An understanding of contested knowledge and an ability to evaluate types of knowledge and explanations typical of the discipline.	• An understanding of a range of enquiry methods in a field, discipline or practice, and their suitability to specific investigations. • An ability to apply a range of methods to resolve problems or introduce change within a practice. • An ability to identify, analyse, critically reflect on and address complex problems, applying evidence-based solutions and theory-driven arguments. • An ability to make decisions and act ethically and professionally, and the ability to justify these decisions and actions drawing on appropriate ethical values and approaches within a supported environment. • An ability to manage processes in unfamiliar and variable contexts, recognising that problem solving is context- and system-bound, and does not occur in isolation.	• An ability to accurately identify, evaluate and address own learning needs in a self-directed manner, and facilitate collaborative learning processes. • An ability to take full responsibility for own work, decision making and use of resources and limited accountability for the decisions and actions of others in varied or ill-defined contexts. • An ability to develop appropriate processes of information gathering for a given context or use. • An ability to independently validate sources of information, and evaluate and manage it. • An ability to develop and communicate own ideas and opinions in well-structured arguments.

10. FACULTY RULES

NAS1 – General Rules

The **General Rules** of the UFS are set out in General Rules for Undergraduate Qualifications, Postgraduate Diplomas, Bachelor Honours Degrees, Master's Degrees, Doctoral Degrees, Higher Doctorates, Honorary Degrees and the Convocation for each year in the Rule Book of the University, and contains the following relevant information:

GENERAL RULES FOR UNDERGRADUATE (NQF Exit Level 7 or 8)			
A1 – General Rules	A2 – Applying for admission	A3 – Admission or re-admission to the University and to an academic qualification	A4 – Submission of documentation required to register as a student
A5 – Duration of study and compiling a curriculum	A6 – Student registration and re-registration	A7 – Switching qualifications and/or modules and/or instructional modes and/or migrating to another university campus/centre	A8 – Credit accumulation and credit transfer
A9 – Assessment rules	A10 – Qualification with distinction	A11 – Qualification certificates, Dean's Medals and Senate Medals	A12 – Results statements, academic records, study records, certified statements, certificates of conduct and certified examination timetables
A13 – Requests on the basis of exceptional circumstances	A14 – Discipline	A15 – Financial support	A16 – Module and venue timetable and examination timetable
A17 – Residence in campus accommodation	A18 – Fees payable	A19 – Information communication and information technology	

GENERAL RULES FOR POSTGRADUATE DIPLOMAS (NQF EXIT LEVEL 8)			
A20 – General Rules	A21 – Applying for admission	A22 – Admission or readmission to the university and to an academic qualification	A23 – Submission of documentation required to register as a student
A24 – Duration of study and compiling a curriculum	A25 – Student registration and re-registration	A26 – Switching qualifications and/or disciplines and/or modules and/or migrating to another university campus/centre	A27 – Credit accumulation and credit transfer
A28 – Assessment rules	A29 – Qualification with distinction	A30 – Qualification certificates	A31 – Intellectual property
A32 – Publication of a research essay	A33 – Results statements, academic records, study records, certified statements, certificates of conduct and certified examination timetables	A34 – Requests on the basis of exceptional circumstances	A35 – Discipline
A36 – Financial support	A37 – Module and venue timetable and examination timetable	A38 – Residence in campus accommodation	A39 – Fees payable
A40 – Information communication and information technology			

GENERAL RULES FOR BACHELOR HONOURS DEGREES (NQF Exit Level 8)			
A45 – General Rules	A46 – Applying for admission	A47 – Admission or readmission to the university and to a Bachelor Honours Degree	A48 – Submission of documentation required to register as a student
A49 – Duration of study and compiling a curriculum	A50 – Student registration and re-registration	A51 – Switching qualifications and/or disciplines and/or modules and/or migrating to another university campus/centre	A52 – Credit accumulation and credit transfer
A53 – Assessment rules	A54 – Qualification with distinction	A55 – Qualification certificates, Dean's Medals and Senate Medals	A56 - Intellectual property
A57 – Publication of a research report	A58 – Results statements, academic records, study records, certified statements, certificates of conduct and certified examination timetables	A59 – Requests on the basis of exceptional circumstances	A60 – Discipline
A61 – Financial support	A62 – Module and venue timetable and examination timetable	A63 – Residence in campus accommodation	A64 - Fees payable
A65 – Information communication and information technology			

GENERAL RULES FOR MASTER'S DEGREES (NQF Exit Level 9)			
A70 – General Rules	A71 – Applying for admission	A72 – Admission or readmission to the university and to a Master's degree	A73 – Submission of documentation required to register as a student
A74 – Mode of presentation	A75 – Requirements in respect of a Master's Degree research dissertation or publishable, interrelated manuscripts/published articles or a coursework Master's Degree mini-dissertation	A76 – Duration of study and compiling a curriculum	A77 – Student registration and re-registration
A78 – Registration of research titles and modifying a research title	A79 – Supervisor(s) and co-supervisor(s)	A80 – Examiners and moderators	A81 – Switching qualifications and/or disciplines and/or modules and/or migrating to another university campus/centre
A82 – Credit accumulation and credit transfer	A83 – Assessment rules	A84 – Qualification with distinction	A85 – Qualification certificates, Dean's Medals and Senate Medals
A86 – Intellectual property	A87 – Publication of a Master's degree research dissertation or a coursework Master's degree dissertation	A88 – Results statements, academic records, study records, certified statements, certificates of conduct and certified examination timetables	A89 – Requests on the basis of exceptional circumstances
A90 – Discipline	A91 – Financial support	A92 – Module and venue timetable and examination timetable	A93 – Residence in campus accommodation
A94 – Fees payable	A95 – Information communication and information technology		
GENERAL RULES FOR DOCTORAL DEGREES (NQF Exit Level 10)			
A100 – General Rules	A101 – Applying for admission	A102 – Admission or readmission to the university and to a Doctoral Degree	A103 – Submission of documentation required to register as a student
A104 – Mode of presentation	A105 – Requirements in respect of a thesis, publishable, interrelated manuscripts/published articles or mini-thesis	A106 – Duration of study and compiling a curriculum	A107 – Student registration and re-registration
A108 – Registration of research title and modifying a research title	A109 – Promoter and co-promoter(s)	A110 – Examiners	A111 – Switching qualifications and/or disciplines and/or modules and/or migrating to another university campus/centre
A112 – Credit accumulation and credit transfer	A113 – Assessment rules	A114 – Qualification with distinction	A115 – Qualification certificates
A116 – Intellectual property	A117 – Publication of a thesis	A118 – Results statements, academic records, study records, certified statements, certificates of conduct and certified examination timetables	A119 – Requests on the basis of exceptional circumstances
A120 – Discipline	A121 – Financial support	A122 – Residence in campus accommodation	A123 – Fees payable
A124 – Information communication and information technology			
GENERAL RULES FOR HIGHER DOCTORATES (NQF Exit Level 10)			
A130 – General Rules	A131 – Applying for admission	A132 – Admission to the Higher Doctorate Degree	A133 – Student registration and re-registration
A134 – Mentor	A135 – Examiners	A136 – Requirements to be met when submitting scientific publications	A137 – Assessment reports
A138 – Pass requirements and qualification with distinction	A139 – Plagiarism	A140 – Qualification certificates	A141 – Fees payable
GENERAL RULES FOR HONORARY DEGREES			
A145 – Honorary-degree proposals	R146 – Qualification certificates		

The General Rules of the UFS apply to this Faculty *mutatis mutandis* (A1 to A147). These **Rules of the UFS** are, with the necessary adjustments, applicable to all the qualifications that are awarded by the Faculty of Natural and Agricultural Sciences. Rules of the **Faculty of Natural and Agricultural Sciences (NAS),** which specifically apply to the degree and other programmes presented in the Faculty, are equally important and relevant. Students must consult the new Rule Book **every academic year before registration** to ensure alignment with updated curricula, as the Faculty updates the Rule Book to keep abreast of the latest scientific developments. It is the student's **responsibility** to be conversant with these rules and the following rules are important.

NAS2 and NAS3 – Entrance and progress requirements

Undergraduate programmes

The Faculty offers various undergraduate qualifications in different categories including Advance Diplomas, University Preparation, Access and Extended Curriculum Programmes, Bachelor's Degrees and Professional Bachelor's Degrees.

Diplomas: Advanced Diploma in Sustainable Agriculture and Rural Development,

University Preparation-, Access- and Extended Curriculum Programmes:

University Preparation Programme: Agricultural Sciences for BAgric; University Preparation Programme: Natural and Agricultural Sciences (Mathematics and Chemistry) for BSc; Bachelor of Agriculture Extended Programme, Bachelor of Agricultural Sciences; Extended Programme, Bachelor of Science Extended Programme (Mathematics and Chemistry), Bachelor of Science Extended Programme (Mathematics and Finances).

Bachelor's Degrees:

Bachelor of:

- Architecture;
- Agriculture:
  Agricultural Economics, Agricultural Extension, Agricultural Management, Animal Production, Production Management, Crop Production Management, Irrigation Management, Mixed Farming Management, Wildlife Management, Agricultural Economics,
- Computer Information Systems,
- Consumer Sciences;

Bachelor of Science majoring in:

- Actuarial Sciences;
- Agricultural Economics;
- Biological Sciences:
  Behavioural Genetics, Biochemistry and Botany, Biochemistry and Entomology, Biochemistry and Food Science, Biochemistry and Genetics, Biochemistry and Microbiology, Biochemistry and Physiology, Biochemistry and Statistics, Biochemistry and Zoology, Botany and Entomology, Botany and Genetics, Botany and Microbiology, Botany and Plant Breeding, Botany and Plant Pathology, Botany and Zoology, Entomology and Genetics, Entomology and Microbiology, Entomology and Zoology, Forensic Sciences, Genetics and Microbiology, Genetics and Physiology, Genetics and Zoology, Microbiology and Food Science, Microbiology and Statistics, Microbiology and Zoology, Plant Health Ecology.
- Chemical and Physical Science:
  Chemistry and Biochemistry, Chemistry and Botany, Chemistry and Food Science, Chemistry and Microbiology, Chemistry and Physics, Physics and Agrometeorology, Physics and Astrophysics, Physics and Engineering Subjects.
- Geosciences:
  Geo-Informatics, Geography and Agrometeorology, Geography and Environmental Sciences, Geography and Statistics, Environmental Geology, Geochemistry, Geology and Chemistry, Geology and Geography, Geology and Physics, Geology Specialisation.
- Mathematical Sciences:
  Mathematical Statistics and Statistical Sciences: Climate Science, Econometrics, Investment Sciences, Psychometrics, Statistics and Accounting, Statistics and Economics, Statistics and Psychology; Mathematics: Mathematics and Applied Mathematics, Mathematics and Chemistry, Mathematics and Finances, Mathematics and Mathematical Statistics, Mathematics and Physics.
- Building Sciences:
  Bachelor of Science in Construction Management (Residential and Compact Learning), Bachelor of Science in Quantity Surveying (Residential and Compact Learning);
- Consumer Science:
  Bachelor of Science in Consumer Science
- Information Technology:
  Bachelor of Science in Information Technology majoring in:
  Computer Science and Business Management, Computer Science and Chemistry, Computer Science and Mathematical Statistics, Computer Science and Mathematics, Computer Science and Physics.

Professional Bachelor's Degrees:

Bachelor of Science in Agriculture majoring in:
Agrometeorology, Agronomy, Animal Sciences, Food Science, Grassland Sciences, Plant Breeding, Plant Pathology, Soil Sciences, Wildlife Production.

The Faculty offers various undergraduate qualifications in different categories including Diplomas, Access and Extended Curriculum Programmes and Bachelor's Degrees. The following fields of study are covered in each of the categories at the **Qwaqwa campus.**

Access and Extended Curriculum Programmes: University Preparation Programme: Natural and Agricultural Sciences (Mathematics and Chemistry) for BSc, Access: Natural and Agricultural Sciences (Mathematics and Chemistry) for BSc, Bachelor of Science Extended Programme (Mathematics, Chemistry and

Biology), Bachelor of Science Extended Programme (Mathematics, Geography and Biology) Bachelor of Science Extended Programme (Mathematics and Computer Science).

Bachelor's Degrees:
Bachelor of Science majoring in:

- Biological Sciences:
  Botany, Zoology, Life Sciences
- Chemical and Physical Sciences:
  Chemistry and Botany, Chemistry and Physics
- Geosciences:
  Environmental Geography, Geography and Life Sciences, Geography and Tourism
- Information Technology:
  Bachelor of Science in Information Technology majoring in: Computer Science and Chemistry, Computer Science and Management, Computer Science and Physics
- Mathematical Sciences:
  Mathematics and Computer Science, Mathematics and Chemistry, Mathematics and Physics.

NAS2.1 – Admission requirements

In addition to the requirements contained in General Rules(2018) A1-A19, a student has to comply with the additional Faculty requirements:

a) Students should apply for admission to the programmes listed above on the prescribed form before the closing date.

b) The following Bachelor's and Bachelor of Science Degrees require selection: Architecture, Construction Management, Forensic Sciences, Geology, Physics and Engineering Sciences and Quantity Surveying.

c) Applications to these programmes, on the prescribed form, must reach Director: Student Academic Services on or before 31 July the year before intended registration for Architecture, Quantity Surveying and Construction Management, or 30 September for the rest, the year before the intended registration. Students will be notified of preliminarily selection before the end of November, but the final selection will only be confirmed after the National Senior Certificate (NSC) or National Certificate (Vocational) (NCV) examination results are available.

d) Admission depends on Admission Point (AP) or the M Scores (MS) as well as the performance in Mathematics (M), Physical Science (PS) and Life Sciences (LS). The AP or the MS are calculated as indicated in Table 3:

e) The admission requirements in Table 4 below are a broad indication for entrance to the Faculty of Natural and Agricultural Sciences and applicable to prospective students. It is important to note that some programmes have higher requirements or the requirements are adjusted as indicated in Table 5.

Table 3: Values to be used for all individual or all individual NSC or NCV subjects completed to calculate AP and M Scores

Calculation of the AP with regard to students who passed Grade 12 in 2008 onwards:

NSC or NCV Performance level for subjects	UFS Admission Point (AP)	NSC or NCV Performance level for subjects	UFS Admission Point (AP)
7 (90% – 100%)	8	4 (50% - 59%)	4
7 (80% – 89%)	7	3 (40% – 49%)	3
6 (70% – 79%)	6	2 (30% – 39%)	2
5 (60% – 69%)	5		

If the performance level in Life Orientation is 5 or above, it contributes 1 to the AP Score. If students include more than the required 7 subjects, select the best 6 to calculate the AP Score.

Calculation of the M Score with regard to students who passed Grade 12 prior to 2008:

M Scores are calculated using the symbols of the six (6) best matriculation subjects (regardless of whether they are higher or standard grade) passed in one examination.

Symbol	A	B	C	D	E	F
HG	8	7	6	5	4	3
SG	6	5	4	3	2	1

Table 4: Broad Admission requirements (These requirements must be read with Table NAS2.2)

The following is applicable to students who matriculated before or during 2007:	The following is applicable to students who completed the National Senior Certificate during or after 2008:
(i) Senior certificate with matriculation endorsement (matriculation exemption) or an equivalent qualification. (ii) A minimum MS of 30. (iii) HG = E or SG = C in an official tuition language. (iv) (iv) Mathematics HG = D or SG = B. Alternatively at least a pass mark of 60% in MATD1564 or MATD1534 or MATM1584. If STSM1614 or MATM1614 is included in the learning programme at least a level 6 (70%) required for Mathematics. (v) Both Biology and Physical Science will be required. **Take note that not all BSc programmes require both Life and Physical Sciences. See NAS 2.2 – table 5 for more detail.** (vi) Biology HG = D or SG = B and Physical Science HG = E or SG = C. (vii) Participation in the National Benchmark (NBT) tests for Language. (viii) Participation in the National Benchmark (NBT) tests for Mathematics.	(i) NSC or NCV with an endorsement that allows entrance to degree studies or an equivalent qualification. (ii) A minimum AP of 30, as calculated from Table 3 (iii) A performance level 4 (50%) in an official tuition language. (iv) Mathematics on level 5 (60%). Alternatively, at least a pass mark in MATD1564 or MATD1534 or MATM1584 is required. If STSM1614 or MATM1614 is included in the learning programme a level 6 (70%) required for Mathematics. Alternatively, a pass mark of at least 80% in MATD1564 or at least 70% in MATM1584 or a pass in MATM1534 is required and 60% in the Departmental Admission test. (v) Both Life Science and Physical Science must be included. Take note that not all BSc programmes require both Life and Physical Sciences. See NAS 2.2 – table 5 for more detail. (vi) Life Sciences level 5 (60%) and Physical Science level 4 (50%). Alternatively, at least 60% is required in the modules CHEM1552, CHEM1532, CHEM1622 and CHEM1642. (vii) Participation in the National Benchmark (NBT) tests for Language. (viii) Participation in the National Benchmark (NBT) tests for Mathematics.

f) If students wish to transfer from other higher education institutions or another UFS Faculty's programme before they have completed their undergraduate studies they must provide evidence of their academic progress, in the form of an academic record and module content discription. These records will be used to determine which modules could be recognised in the UFS prescribed curriculum and at which level the student will be placed.

NAS2.2 – Specific undergraduate programme requirements

Specific admission requirements:

(a) Advanced Diploma in Sustainable Agriculture and Rural Development
- A related Diploma or qualification at NQF Level 6.
- Applicants with different qualifications can be admitted if their qualifications are judged equivalent by a designated UFS panel through the Recognition of Prior Learning process. Applicants should have sound and proven experience relevant to the agricultural environment. Practical experience in agriculture and/or rural development, and appropriate prior learning are prerequisites for admission.
- This qualification is not envisaged for the individual passing directly on from the National Senior Certificate to subsequent NQF Exit Levels.

(b) University Preparation Programme (Natural Sciences and Mathematics)
- Requires a National Senior Certificate (NSC) or National Certificate (Vocational) (NCV) that allows entrance to diploma or higher certificate*.
- Minimum AP of 20.
- Official tuition language with a minimum achievement level 3 (40%).
- Mathematics with a minimum achievement level 3 (40%).
- Life Sciences with a minimum achievement level 3 (40%) OR Physical Science with a minimum achievement level 3 (40%).

(c) University Preparation Programme (Agricultural Sciences)
- National Senior Certificate (NSC) or National Certificate (Vocational) (NCV) that allows entrance to diploma or higher certificate* studies.
- Minimum AP of 20.
- Official tuition language with a minimum achievement level 3 (40%).
- Mathematical Literacy with a minimum achievement level 5 (60%) OR Mathematics with a minimum achievement level 2 (30%).

(d) BAgric extended four-year
- Requirement (i) in Table 4 above.
- A minimum AP of 24.
- Official tuition language with a minimum achievement level 4 (50%).
- Mathematics on performance level 2 (30%) or Mathematical Literacy at least at level 5 (60%) if the AP score is above 26.

(e) BSc extended four-year (Chemistry and Mathematics) (Chemistry, Mathematics and Biology), (Geography, Mathematics and Biology) (Qwaqwa only)
- Requirement (i) in table 4 above.
- A minimum AP of 24.
- Official tuition language with a minimum achievement level 4 (50%).
- Mathematics on performance level 3 (40%).
- Life Sciences at performance level 3 (40%) or Physical Science on performance level 3.

(f) (i) BSc extended four-year (Mathematics and Finances)
- Students from this programme can only transfer to BScQS or CM or BScMathemtical Sciences if they are selected)
- Requirement (i) in table 4 above.
- A minimum AP of 24.
- Official tuition language with a minimum achievement level 4 (50%).
- Mathematics at performance level 3 (40%).

(ii) BSc extended four-year (Computer Science and Mathematics) QWAQWA only
- Requirement (i) in table 4 above.
- A minimum AP of 24.
- Official tuition language with a minimum achievement level 4 (50%).
- Mathematics at performance level 3 (40%).
- If students want to major in Physics or Chemistry together with Computer Science they need to Physical Science at performance level 3 (50%)

(g) BSc (Agriculture) extended five-year
- Requirement (i) in table 4 above.
- A minimum AP of 24 and a performance level 4 (50%) in an official tuition language.
- Mathematics at performance level 3 (40%).
- Life Sciences or Agricultural Science at performance level 3 (40%) or Physical Science at performance level 3 (40%).

(h) BAgric(Management)
- Requirements (i)-(iii) & (vii) in table 4 above.
- Mathematics at performance level 3 (40%) or Mathematical Literacy at least at level 7 (80%) if the AP is 31 or above.
- BAgric(Agricultural Economics)
- Requirements (i)-(iii) & (vii) in table 4 above.
- Mathematics at performance level 4 (50%)

(i) BSc majoring in Actuarial Science
- Requirements (i), (iii)-(iv), (vii) & (viii) in table 4 above.
- A minimum AP of 34.
- Mathematics at performance level 6 (70%).
- If students transfer from foundational programmes or other degree programmes they must have an average of at least 70%, and at least 65% for each individual module.

(j) BSc (Agriculture)
- Requirements (i)-(iv), (vii) & (viii) in table 4 above.
- Either Life Sciences or Agricultural Sciences or Physical Science.
- Performance level 5 (60%) for Life Sciences or Agricultural Sciences and Performance level 4 (50%) for Physical Science.

(k) BSc majoring in Agricultural Economics
- Requirements (i)-(iv), (vii) & (viii) in table 4 above.
- Modules AGEC3714, AGEC3724, AGEC3734, AGEC3744, AGMA3714, AGMA3724, AGMA3734 and AGMA3744 might only be presented in English in which case translation services will be available from English to Afrikaans depending on student numbers and availability of resources.

(l) BConSc (Consumer Sciences)
- Requirements (i)-(iii) & (vii) in table 4 above. Mathematics at performance level 2 (40%) or Mathematical Literacy at least at level 5 (80%)

(m) BArch
- A selection process takes place before admission. Applications must reach the UFS before the 31 July the year before intended registration.
- A maximum number of 45 students are admitted.
- A student registered for a programme at the UFS and wishing to change to the BArch-programme, must contact the department on or before 31 July the year before intended registration.
- Requirements (i)-(iii), (vii) & (viii) in table 4 above.
- Mathematics at performance level 4 (50%).
- All information pertaining to the selection process is available on the departmental website:
- www.ufs.ac.za/architecture; see 'Academic Information'.
- Applicants have to pass a preliminary selection process. Applicants must start with the creative excercises before 31 May and submit it before or on 31 July.
- Applicants who passed the preliminary selection will be invited to a selection interview at which a portfolio of creative work has to be presented. .
- Students will be notified of the outcome not later than the end of November of the year before intended registration.

(n) BSc majoring in Biological Sciences with:
- Biochemistry and Microbiology
- Modules MCBG3714, MCBP3714, MCBE3724, MCBC3724, BOCM3714, BOCE3714, BOCP3724, and BOCS3724 might only be presented in English in which case translation services will be available from English to Afrikaans depending on student numbers and availability of resources.
- Students wishing to continue with MCBP2616 must take note that a maximum of 160 students will be accepted due to laboratory constraints. Students will be admitted based on academic performance.
- Students wishing to continue with BOCB2616 must take note that a maximum of 210 students will be accepted due to laboratory and equipment constraints. Students will be admitted based on academic performance.
- Genetics
- Please note a selection process is required for: GENE2616, GENE2626, GENE3714, GENE3724, GENE3734, GENE3744. Only 150 students will be accepted based on academic performance. Students wishing to continue with any of these modules must apply for selection (genetics@ufs.ac.za).
- Modules in the 3rd year GENE3714, FORS3714 and HMBG3714 might only be presented in English in which case translation services will be available from English to Afrikaans depending on student numbers and availability of resources

(o) BSc majoring in Chemical and Physical Science
- Requirements (i)-(iv), (vii) & (viii) in table 4 above.
- Physical Science at performance level 4 (50%) or Physical Science HG = E or SG = C.
- If Biological modules is the second major Life Sciences at performance level 5 (60%) is required.
- Please note a selection process is required for: CHEM26XX and CHEM37XX. Only 80 second year students and a maximum of 60 third year students (Bloemfontein campus) and 70 second year students and a maximum of 45 third year students for the Qwaqwa

campus will be admitted owing to laboratory constraints. These students will be admitted based on academic performance.

- Students intending to register for engineering modules must take note that limited space is available.
- BSc majoring in Physics and Engineering Subjects:
- AP score of ≥34
- Cumulative AP ≥ 13 for Mathematics and Physical Science, at least performance level 6 (70%) for Mathematics.

(p) BSc majoring in Forensic Sciences

- A selection process takes place before admission. A maximum number of 80 students will be admitted. NBT tests results will also be used for selection purposes.
- Applications close on 30 September the year before intended registration.
- Requirements (i), (iii)-(iv), (vii) & (viii) in table 4 above.
- A minimum AP ≥ 34 (with cumulative AP ≥ 17 for Mathematics, Life Science and Physical Science).
- No person with a criminal record will be allowed into this programme.

(q) BSc majoring in Geography

- Requirements (i)-(iv) and (vii) & (viii) in Table 4 above.
- Physical Science at performance level 4 (50%) to register for the Geo-Informatics programme.
- Life Sciences at performance level 5 (60%) is required for Environmental Sciences and Agrometeorology programmes.
- Life Science performance level 5 (60%) or Physical Science performance level 4 (50%) for the Statistics programme.

(r) BSc majoring in Geology

- A selection process takes place before admission. In the first year a maximum number of 80 students will be admitted to GLGY1614 owing to laboratory constraints. In the second and third year a maximum number of 60 students will be admitted due to laboratory constraints. These students will be admitted based on academic performance. Students who have not obtained an average of at least 55% for GLGY1614 + GLGY1624 or failing GLGY1614 or GLGY1624 or any other prescribed first year module will not be able to continue their studies in any of the Geology programmes.
- Applications to the BSc Geology programme, on the prescribed form, must reach the Registrar, Academic Student Services, UFS, Bloemfontein, on or before 30 September of the year before the intended registration. Students will be notified of the outcome as soon as examination results are available and no later than January.
- The selection process will be based on academic performance.
- Requirements (i)-(iv), (vii) & (viii) in table 4 above.
- Physical Science and Mathematics at performance level 5 (60%) or Physical Science HG = E or SG = C. Alternatively, at least 65% is required in the modules CHEM1552, CHEM1532, CHEM1622 and CHEM1642, and in MATD1564/MATD1534.
- An AP of 34 or higher is highly recommended.
- No occasional study students will be allowed.
- Modules in the 3rd year might only be presented in English.

(s) BSc (Information Technology)

- Requirements (i)-(iii) and (vii) & (viii) in table 4 above.
- At least performance level 4 (50%) in Mathematics to register for BCIS or any BSc(IT) degree. A higher performance level might be required (see below).
- Mathematics at performance level 4 (50%) in order to register for MATM1574.
- Mathematics at performance level 5 (60%) to register for MATM1534.
- Mathematics at performance level 6 (70%) to register for STSM1614.
- Mathematics at performance level 6 (70%) in order to register for MATM1614. Alternatively,(senior students) a pass mark of 80% for MATD1534/1564 or 70% for MATM1584 or 50% for MATM1534 and 60% for the Departmental Admission Test.
- If Chemistry or Physics is the second major, Physical Science at performance level 4 (50%) is required.
- BSc (Information Technology) QWAQWA
- Requirements (i)-(iii) and (vii) & (viii) in table 4 above.
- At least performance level 4 (50%) in Mathematics to register for any BSc(IT) degree. A higher performance level might be required (see below).
- Mathematics at performance level 4 (50%) in order to register for IT and Management
- Mathematics at performance level 5 (60%) to register for MATM1534.
- Mathematics at performance level 6 (70%) in order to register for MATM1614. Alternatively,(senior students) a pass mark of 80% for MATD1534/1564 or 70% for MATM1584 or 50% for MATM1534 and 60% for the Departmental Admission Test.
- If Chemistry or Physics is the second major, Physical Science at performance level 4 (50%) is required.

(t) BSc majoring in Mathematical Sciences

- Requirements (i)-(iv), (vii) & (viii) in table 4 above.
- Mathematics at performance level 6 (70%). Alternatively, (senior students) a mark of at least 70% in MATD1564/MATD1534 or at least 60% in MATM1584 or 50% in MATM1534 is required.
- If Agrometeorology or Chemistry or Physics is the second major Physical Science with a performance level of 4 (50%) is required.
- If enrolling for Applied Statistics degrees only level 5(60%) for Mathematics is required.

(u) BSc majoring in Quantity Surveying and BSc majoring in Construction Management

- NSC or NCV with an endorsement that allows entrance to degree studies or an equivalent qualification.
- A minimum AP of 32.
- A performance level 4 (50%) in an official tuition language.
- Mathematics on level 5 (60%).
- One of Economics, Business Studies, Accounting or Physical Science on level 4 (50%) is recommended.
- A maximum of 10 students of the extended programme who passes Mathematics development modules and mainstream modules of at least 70% average.
- BTech QS/CM degree with an average of 65% and an AP 31 and above.
- National Diploma in QS with an average of 75% and an AP 31 and above.
- Other degrees: BCom with Economics III (60%) or Accounting II (60%), with a maximum of 80 credits will be considered; all other relevant degrees with an average of 60% in the exit year will be considered.
- A maximum number 80 students are selected.
- Application must be submitted before or on 31 July, the year before intended registration to the programme.
- Compact learning students must be 23 years or older and must be fulltime employed in the sector.

NAS2.3 – Other requirements: Note to students applying for any programme in this faculty

a) Students who score below 65% in the language NBT must register for the language module EALN1508 or AGAN1508.

b) First-time entering students with a performance level 5 in Mathematics or with a NBT mathematics score lower than 50% will have to attend compulsory extra Mathematics tutorial classes for three hours per week.

c) First-time entering students with a performance level of 4 for Physical Science will have to attend compulsory tutorials in Chemistry and Physics if those modules are included in their curriculum.

d) Registration for extra modules has financial implications, and the extra modules do not contribute to the total number of credits required to obtain a degree.

e) Students who have registered for the extra language module and more than one additional tutorial will not be able to register for the full curriculum and will only be allowed to register for three required modules per semester as prescribed in the learning programme.

Postgraduate programmes

The Faculty offers various postgraduate qualifications including Postgraduate Diplomas, Bachelor Honours, Master's, and Doctoral Degrees on the **Bloemfontein Campus.**

The following Postgraduate Diplomas are presented:

Postgraduate Diploma in:

Disaster Management, Integrated Water Resource Management, Sustainable Agriculture.

The Honours Degrees are divided into two categories namely, Bachelor Honours Degrees and Bachelor of Science Honours Degrees. The following fields of study are overed in each of the categories:

Bachelor Honours in:

Architecture

Agriculture:

Agricultural Management, Animal Production, Irrigation Management, Wildlife Management

Spatial Planning, Spatial Planning (specialising in Human Settlements)

Bachelor of Science Honours in Agriculture:

Agrometeorology, Agronomy, Animal Sciences, Grassland Science, Plant Breeding, Plant Pathology, Soil Science and Wildlife.

Bachelor of Science Honours:

Actuarial Sciences, Agricultural Economics, Agrometeorology, Applied Statistics, Astrophysics, Behavioural Genetics, Biochemistry, Botany, Chemistry, Computer Science and Informatics, Entomology, Environmental Geography, Environmental Geology, Food Science, Forensic Genetics, Genetics, Geochemistry, Geography, Geography and Ecology, Geography and Environmental Science, Geohydrology, Geology, Limnology, Mathematics and Applied Mathematics, Mathematical Statistics, Microbiology, Physics, Plant Breeding, Plant Health Ecology, Plant Pathology, Soil Science, and Zoology.

Bachelor of Science Honours in:

Consumer Science, Construction Management, Quantity Surveying.

The Master's Degrees are divided into three categories, namely; Master's Degrees, Master of Science Degrees, and Master of Science in Agriculture Degrees. The following fields of study are covered in each of the categories:

Master's Degrees in:

Animal Production, Architecture, Architecture (Professional), Agricultural Management, Disaster Management, Environmental Management, Human Settlements, Irrigation Management, Sustainable Agriculture, Land and Property Development Management, Urban and Regional Planning (Professional) and Urban and Regional Planning, Wildlife Management

Master of Science in:

Agricultural Economics, Actuarial Sciences, Agrometeorology, Applied Mathematics, Applied Statistics, Astrophysics, Behavioural Genetics, Geo-Informatics, Biochemistry, Botany, Chemistry, Computer Information Systems, Computer Science and Informatics, Construction Management, Consumer Science, Entomology, Environmental Geology, Environmental Management, Environment Sciences, Food Science, Forensic Genetics, Forensic Sciences, Forensic Sciences Interdisciplinary, Genetics, Geochemistry, Geography, Geography and Environmental Science, Geohydrology, Geology, Grassland Science, Limnology, Mathematics, Mathematical Statistics, Microbial Biotechnology, Microbiology, Mineral Resource Management, Nano Science Physics, Plant Breeding, Plant Breeding Interdisciplinary, Plant Health Ecology, Plant Pathology, Plant Pathology Interdisciplinary, Polymer Science, Risk Analysis, Property Science, Soil Science, Quantity Surveying, Zoology.

Master of Science in Agriculture in:

Agrometeorology, Agrometeorology Interdisciplinary, Agronomy, Agronomy Interdisciplinary, Animal Sciences, Food Science, Grassland Science, Plant Breeding, Plant Breeding Interdisciplinary, Plant Pathology, Plant Pathology Interdisciplinary, Soil Science Interdisciplinary, Wildlife.

Doctoral Degrees are offered in the following fields of study:

Actuarial Sciences, Animal Production, Architecture, Agricultural Economics, Agricultural Management, Agrometeorology, Agrometeorology Interdisciplinary, Agronomy, Agronomy Interdisciplinary, Animal Production, Animal Sciences, Astrophysics, Applied Mathematics, Applied Statistics, Behavioural Genetics, Biochemistry, Botany, Chemistry, Computer Information Systems, Computer Science and Informatics, Construction Management, Consumer Science, Disaster Management, Environmental Management, Entomology, Environmental Geology, Food Science, Forensic Genetics, Forensic Sciences, Forensic Science, Interdisciplinary, Forensic Sciences, Genetics, Geochemistry, Geo-Informatics, Geography, Geography and Environmental Science, Geohydrology, Geology, Grassland Science, Human Settlements, Irrigation Management, Land and Property Development Management, Limnology, Mathematics, Mathematical Statistics, Microbiology, Microbial Biotechnology, MineralResource Management, Nanoscience, Physics, Plant Breeding, Plant Breeding Interdisciplinary, Plant Health Ecology, Plant Pathology, Plant Pathology Interdisciplinary, Polymer Science, Property Science, Quantity Surveying, Risk Analysis, Spatial Planning (specialising in Human Settlements), Soil Science, Soil Science Interdisciplinary, Statistics, Sustainable Agriculture, Urban and Regional Planning, Wildlife, Wildlife Management and Zoology.

Doctor of Science Degrees are offered in the following fields of study:

Actuarial Sciences, Agricultural Economics, Agrometeorology, Agrometeorology, Interdisciplinary Agronomy, Agronomy Interdisciplinary, Animal Sciences, Astrophysics, Applied Mathematics, Behavioural Genetics, Biochemistry, Botany, Chemistry, Computer Information Systems, Computer Science and Informatics, Construction Management, Consumer Science, Environmental Management, Entomology, Environmental Geology, Food Science, ForensicGenetics, Forensic Sciences, Forensic Sciences Interdisciplinary, ForensicSciences, Genetics, Geochemistry, Geographical Information Systems Geography, Geography and Environmental Science, Geohydrology, Geology, Grassland Science, Limnology, Mathematics, Mathematical Statistics, Microbiology, Microbial Biotechnology, Mineral Resource Management, Nanoscience, Physics, Plant Breeding, Plant Breeding Interdisciplinary, Plant Health Ecology, Plant Pathology, Plant Pathology Interdisciplinary, Polymer Science, Quantity Surveying, Risk Analysis, Soil Science, Soil Science Interdisciplinary, Statistics, Wildlife and Zoology.

The Faculty offers various postgraduate qualifications in different categories including Postgraduate Diplomas, Bachelor Honours, Master's and Doctoral Degrees The following fields of study are covered in each of the categories at the **Qwaqwa campus.**

The Honours Degrees

Bachelor of Science Honours degree is awarded in the following fields of study: Botany, Computer Science and Informatics, Environmental Geography, Physics, Polymer Science and Zoology.

The Master's Degrees

Master of Science is awarded in the following fields of study: Botany, Chemistry, Computer Science and Informatics, Mathematics, Physics, Polymer Science, Geography, Environmental Geography, Zoology.

The Doctoral Degrees

Doctoral Degrees are offered in the following fields of study: Botany, Chemistry, Computer Science and Informatics, Mathematics, Physics, Polymer Science, Geography, Environmental Geography, Zoology.

NAS3.1 Admission requirements for the Postgraduate Diploma

In addition to the requirements contained in General Rules A20-39, a student has to comply with the additional Faculty requirements:
(a) An applicant must have at least a minimum three-year degree (at NQF Exit Level 7) from any applicable field of study.
(b) A minimum average of 60% must be obtained in the final year of study.
(c) The student must prove to the Academic Departmental Head that he/she has adequate knowledge to justify admission to the programme.
(d) Applicants who do not have the formal minimum requirements must apply through Recognition of Prior Learning.
(e) Admission is subject to a selection process. Qualification and experience in the disaster management field will be an added advantage. It is a 1 year full-time and up to 2 years part-time programme.

1. Postgraduate Diploma in Disaster Management	• Admission depends on previously acquired knowledge and experience in the disaster management field, as well as an appropriate NQF Exit Level 7 qualification
2. Postgraduate Diploma in Integrated Water Management	• An appropriate NQF 7 qualification • Appropriate work experience will be an added advantage.
3. Postgraduate Diploma in Sustainable Agriculture	• An appropriate NQF 7 qualification • Appropriate work experience will be an added advantage.

NAS3.2 Admission requirements for Bachelor Honours Degrees

In addition to the requirements contained in General Rules A47, a student has to comply with the additional Faculty requirements:
(a) A Bachelor's Degree or equivalent NQF Exit Level 7 qualification including one of the following: BArch, BAgric, BConsumer Sciences, BSc (Information Technology), BSc majoring in Quantity Surveying or Construction Management and the following additional requirements per discipline.
(b) A deserving applicant in possession of a BSc degree with the required major modules may be permitted by the Academic Departmental Head and with the approval of the Dean to receive postgraduate training in Agriculture. Such a student registers for BScHons (Agriculture), during which prescribed honours modules as well as certain additional undergraduate Agriculture modules may be taken in consultation with the departmental chair.
(c) All Honours Degrees are selection courses and admission to these degrees is subject to approval of the departmental chair/Programme Director.
(d) Applicants should apply for admission to the Honours Degrees on the prescribed form. These forms should be completed and handed to the relevant Programme Director at the beginning of the second semester. Selection will take place when results are available. The honours programmes start on a date as determined by the relevant department. All modules in the learning programme must be successfully completed.

NAS3.2.1 – Admission requirements for a Honours Degree

In addition to the requirements contained in General Rules A47, a student has to comply with the additional Faculty requirements:
(a) A Bachelor's Degree or equivalent NQF Exit Level 7 qualification
(b) Appropriate work experience

4. Architecture	• Application must reach the UFS before 31 July the year before intended registration. • A selection process takes place before admission. A maximum of 45 students will be admitted. • All information pertaining to the selection process is available on the departmental website: www.ufs.ac.za/architecture; see 'Academic Information'. • To be eligible for BArchHons selection, a student must have obtained a BArch degree or equivalent qualification from any other Architectural Learning Site with a collective average mark in his/her final year of 55% for the following modules or their equivalent, CONS3706, HARC3704 and TARC3704, as well as a subminimum of 60% for DESN3700 or its equivalent. Students who do not comply with the above prerequisite must either repeat (only once) selected module(s) or work on the recommendation of the Academic Departmental Head, in an architect's office for a year in order to be eligible for BArchHons selection the following year. • Students may be required to attend a personal interview, present a portfolio and provide verified academic records. The final discretion on whether the student can enroll for the programme will rest with the selection panel. • Language proficiency will be part of selection.

5.	**Actuarial Science**	• A student must have a BSc or BCom degree in Actuarial Science, as well as being qualified for at least four exemptions in the modules of the Faculty / Institute of Actuaries, of which at least one exemption has to be for CT1, CT4, CT6 or CT8.
6.	**Agricultural Economics**	**BScHons (Agricultural Economics)** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head. The following criteria are required: o BSc degree in Agricultural Economics o An average mark of 65% for all undergraduate Agricultural Economics modules over the full period of the BSc degree. • Additional modules /modules may be required before admission to the BScHons study. **BAgricHons (Agricultural Economics)** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head. The following criteria are required: o BAgric degree in Agricultural Economics o An average mark of 60% for all undergraduate Agricultural Economics modules over the full period of the BAgric degree. • Additional modules / may be required before admission to the BAgricHons study.
7.	**Agriculture**	**Agricultural Management** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head. The following criteria are required: o BAgric degree in Agricultural Management o An average mark of 65% for all undergraduate Agricultural Economics and Agricultural Management modules over the full period of the BAgric degree. • Additional modules may be required before admission to the BAgricHons study. **Wildlife Management** • A minimum of 60% in Agricultural Management and/or Agricultural economics or equivalent modules at NQF 7 level. • economics or equivalent modules at NQF 7 level. **Irrigation Management** • A minimum of 60% in Agricultural Engineering or equivalent at NQF 7 level. • Apart from the above mentioned requirements, the Academic Departmental Head may expect a student to complete certain additional modules.
8.	**Agrometeorology**	• Agrometeorology at third-year (NQF 7) level.
9.	**Behavioural Genetics**	• Admission into BScHons majoring in Behavioural Genetics for students who majored in Genetics and Psychology or Zoology is subject to selection. A minimum of 60% in Genetics at third-year (NQF 7) level is required.
10.	**Biochemistry**	• At least 64 credits in Biochemistry at third-year (NQF 7) level. An average of 65% in undergraduate Biochemistry modules.
11.	**Botany**	• A minimum of 60% in Botany at third-year (NQF 7) level and in consultation with the Academic Departmental Head.
12.	**Chemistry**	• To be considered for BScHons in Chemistry, a student must have a BSc degree. Other prerequisites include MATM1614 or MATM1534, plus MATM1624 or MATM1544. An average mark of 60% in CHEM3713+CHEM3711, CHEM3733+ CHEM3731, CHEM3723+ CHEM3721 and CHEM3743+ CHEM3741or equivalent NQF Exit Level 7 modules. Note also that the programme starts annually on 15 January.
13.	**Computer Science and Informatics**	• A minimum average of 60% for the relevant Computer Science modules at third-year (NQF 7) level. In exceptional cases students may be allowed in consultation with the Programme Director or Academic Departmental Head.
14.	**Consumer Sciences**	• Consumer Science or relevant NQF at Level 7 level with at least 60%.
15.	**Construction Management**	• A selection process takes place before admission. A maximum number of 40 students are admitted owing to classroom constraints. • Application must be submitted before or on 31 August, the year before intended registration to the Bachelor Honours programme. • Bachelor's/BSc degree in Construction Management at NQF Exit Level 7 at an accredited institution with an average of 60% in exit year, excluding BTech.
16.	**Entomology**	• A minimum of 60% in Entomology at third-year (NQF 7) level and in consultation with the Programme Director.
17.	**Food Science**	• At least 64 credits in Food Science at third-year (NQF 7) level. An average of 65% in undergraduate Food Science modules.
18.	**Forensic Sciences**	• Admission into BScHons in Forensic Sciences is subject to selection. A minimum of 60% in relevant modules at third-year (NQF 7) level or equivalent modules are required.
19.	**Genetics and Forensic Genetics**	• Admission into BScHons majoring in Genetics is subject to selection. A minimum of 60% in Genetics at third-year (NQF 7) level or equivalent modules are required.

20.	**Geography**	• A student must achieve an average pass mark of 60% for all Geography modules (64 credits) at third-year (NQF 7) level to be admitted to the Bachelor Honours Degree. In exceptional cases the department may grant admission by virtue of an oral or written assessment in which the student displays relevant knowledge of the theory and principles of the subject. Depending on a student's academic background, additional modules may be prescribed by the department. Proof of computer literacy is a prerequisite. A student's skills in English will be assessed (Proficient performance in the TALPS Test) and if the required standard is not met, additional modules will be prescribed.
21.	**Geology, Geochemistry and Environmental Geology**	• Students who did not receive their BSc Geology Degree at the University of the Free State, need to have achieved a combined average pass mark of 65% for at least 64 credits in their final year Geology modules • For admission to the Bachelor Honours Degree in Geology, Geochemistry or Environmental Geology a student must achieve a combined average pass mark of 60% in four Geology modules (64 credits) at third-year (NQF 7) level (two modules in the first semester and two in the second semester, including GLGY3714 and GLGY3724 or equivalent modules). Students must complete all required NQF Exit Level 7 Geology modules in a maximum of two years. Students who have completed their Geology modules in the first attempt will be given preference. Thirty students will be admitted to the Geology Bachelor Honours programme. However, the Geochemistry and the Environmental Geology programme can only accommodate a maximum of five students each.
22.	**Geographical Information Systems**	• Geography at third-year (NQF 7) level or equivalent Geography at NQF 7 at another university with at least 64 credits in total in this subject area. Minimum average of 60% in the third-year. BSc in Geography with an average of 60% of 3 year modules.
23.	**Geohydrology**	• A BSc, BScAgriculture, BEng degree or BTech(Geology) degree. An average of 60% in the final year of a BSc degree calculated from the major subject, as well as Geology, Chemistry, and Mathematics or Statistics on first-year level is required for admission to the degree. A selection process takes place before admission. A maximum of 38 students can be admitted. Application close 30 September the year before intended registration. Proficient performance in the TALPS Test is required. Repeaters will only be allowed if space is available.
24.	**Grassland Science**	• Grassland Science at third-year (NQF 7) level.
25.	**Consumer Science**	• BSc Consumer Science, B Consumer Science or an equivalent qualification.
26.	**Life Sciences**	• A person must pass with an average of 60% for all third-year and second-year Life Science modules.
27	**Limnology**	• A BSc or BScAgriculture degree with at least one of the following as major: Biochemistry, Botany, Chemistry, Entomology, Mathematics, Microbiology, Physics, Soil Science, Zoology. • A mimimum of 60% in relevant modules at third year (NQF 7) level and in consultation with the Academic Departmental Head. • A selection process takes place before admission.
28.	**Mathematics and Applied Mathematics**	• At least four Mathematics and Applied Mathematics or equivalent modules, at third-year (NQF 7) level, completed with an average mark of 60%. In addition, all applicants will have to write and pass an admission examination to verify sufficient background and foundational mathematics knowledge. If necessary, students may be required to take additional undergraduate modules as supplementary prerequisites for certain Bachelor Honours modules. Proficient performance in the TALPS Test is also required before enrolment. The Academic Departmental Head grants admission and consults on the compilation of the curriculum. Students will do an oral presentation for their final selection.
29.	**Mathematical Statistics**	• A minimum average pass mark of 60% in STSM3714, STSM3724, STSM3734 and STSM3744 or equivalent NQF 7 level modules
30.	**Microbiology**	• At least 64 credits in Microbiology at third-year (NQF 7) level. An average of 65% in undergraduate Microbiology modules.
31.	**Physics**	• An average mark of 60% in PHYS3714, PHYS3732, PHYS3752, PHYS3724, PHYS3742 and PHYS3762. The Academic Departmental Head may grant permission for admission to the Bachelor Honours Degree in exceptional cases. The programme commences in middle January and students must apply for admission to the Academic Departmental Head before that date.
32.	**Plant Breeding**	• A minimum of 60% average for all the Plant Breeding modules on third-year (NQF 7) level is required with following as major: Plant Breeding or related subject field of equivalent NQF 7 modules and in consultation with the Academic Departmental Head. Students may be required to take additional undergraduate courses based on their academic background.
33.	**Plant Health Ecology**	• Plant Health or equivalent modules at third-year (NQF 7) level.
34.	**Plant Pathology**	• An average of 60% for the third-year in a BSc or BScAgriculture Degree with the following as major: Plant Pathology or equivalent NQF Level 7 modules. Students may be required to take additional undergraduate courses based on their academic background.
35.	**Polymer Science**	• A minimum of 60% average for all the Chemistry modules on third-year (NQF 7) level is required.
36.	**Soil Science**	• Soil Science at third-year (NQF 7) level.
37.	**Statistics**	• MATM1614 and MATM1624, as well as a minimum average mark of 65% in STSA2616, STSA2626, STSA3716 and STSA3726.

38.	**Spatial Planning and BSPHons (specializing in Human Settlements)**	• Closing date for applications is 31 July prior to intended year of registration. • An appropriate qualification at NQF Level 7 (SAQA certificate must accompany the qualification when requested), as approved by the academic departmental head and an average of at least 60% in previous qualifications. • Applicants have to write selection tests if they are considered suitable for selection. These tests will be conducted online at a pre-arranged time and date. • If a student does not entirely meet the admission requirements, the academic departmental head and the Recognition of Prior Learning office, in consultation with the dean may, in meritorious cases, recommend that some concessions be made in respect of the requirements. The final decision shall rest with the dean. Supplementary courses, as determined by the head of the department, may be required.
39.	**Quantity Surveying**	• A selection process takes place before admission. A maximum number of 40 students are admitted owing to classroom constraints. • Application must be submitted before or on 31 August, the year before intended registration to the Bachelor Honours programme. • Bachelor's/BSc degree in Quantity Surveying on NQF Exit Level 7 at an accredited institution with an average of 60% in exit year, excluding BTech.
40.	**Wildlife**	• Grassland Science at third-year (NQF 7) level or equivalent modules and in consultation with the Academic Departmental Head.
41.	**Zoology**	• A minimum of 60% in Zoology at third-year (NQF 7) level and in consultation with the Programme Director.

NAS3.3 – Admission requirements for Master's Degrees

In addition to the requirements contained in General Rules A72, a student has to comply with the additional Faculty requirements:

(a) All Master's Degrees are selection programmes and admission to these degrees is subject to approval of the Academic Departmental Head.

(b) Applicants must apply for admission to the Master's Degree on the prescribed form. These forms are completed and submitted to the Programme Director at the beginning of the second semester. Selection will take place when the results are ready. The Master's programmes start on a date as determined by the relevant department. Each module in the learning programmes must be successfully completed.

(c) Applicants must have an applicable Bachelor Honours Degree or equivalent NQF Exit Level 8 qualification and the additional requirements per discipline (see Reg. NAS3.5).

(d) If a student does not entirely meet the admission requirements, the Dean may, in consultation with the Academic Departmental Head, in meritorious cases, recommend that some concessions be made in respect of the requirements.

(e) Bachelor of Science Honours or relevant Honours Degree on NQF Exit Level 8 with an average of 60% in the exit year of the relevant degree may be recognized as meeting the minimum entry requirements for a Master's Degree programme.

NAS3.4 – Specific programme requirements for Master's Degrees

1.	**Master of Architecture** *(for Professional registration)*	• Application must reach the UFS before 31 July the year before intended registration. • A selection process takes place before admission. A maximum number of 45 students will be admitted. • All information pertaining to the selection process is available on the departmental website: www.ufs.ac.za/architecture; see 'Academic Information'. • To be eligible for MArch selection a student must have obtained a BArchHons degree or equivalent qualification from any other Architectural learning site with a joint average mark in his/her final year of 55% for the following modules or their equivalent: CONS6808, HURB6804 and RARC6808, as well as a subminimum of 60% for DESN6800 or its equivalent. • Students who do not comply with the above prerequisite must either repeat (only once) selected module(s) or work,on the recommendation of the Academic Departmental Head, in an architect's office for a year in order to be eligible for MArch selection the following year. • Students may be required to attend a personal interview, present a portfolio and provide verified academic records. • Qualifying students must submit a research proposal as part of the selection process. • The final discretion whether the student is regarded as ready for the programme will rest with the selection panel.

2.	**Master of Architecture** *(for extended research)*	• Apart from the General Rules the following is applicable: • Students must have obtained either the postgraduate professional qualification, BArch or an equivalent thereof OR the BArchHons or its equivalent. • Students who are in possession of the BArchHons must prove that a Design Dissertation formed part of the requirements for the conferment of such degree. • Students who are in possession of the BArchHons must have obtained a minimum of 60% in THREE of the following modules or their equivalent: DESN6800, CONS6808, HURB6804 and RARC6808. • Qualifying students must submit a dissertation proposal as determined and communicated by the Academic Departmental Head. The final discretion whether the student can enrol for the programme will be the selection panel's.
3.	**Master of Agriculture**	Apart from the General Rules, the following apply: • Students must convince the specific Academic Departmental Head that he/she has sufficient knowledge of the subject to be admitted to the programme. **MAgric (Agricultural Management)** • Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required: • Bachelor Honours majoring in Agricultural Management • Proof of successful completion of: o AGMA6800 OR o equivalent module for the above mentioned module. • Registration is only allowed after the research proposal was presented and approved by the postgraduate selection committee. • Additional modules /modules may be required before admission to the MAgric study. • It may be required that some modules be successfully completed by the end of the first year of study for the M Agric degree as a prerequisite for registration of the second year of study for the MAgric degree. • It is required from the student to submit one (1) publishable scientific article when submitting the final dissertation for examination.
4.	**Master of Disaster Management**	Apart from the General Rules the following is applicable:: • A student must in order to be admitted to this Master's programme have: o Appropriate NQF Exit Level 8 Qualification • A student must prove to the Academic Departmental Head that he/she has: o adequate knowledge to justify admission to this study. o practical and/or preparatory experience which will be an added advantage.
5.	**Master of Environmental Management**	Apart from the General Rules the following is applicable: • A four-year degree (on NQF Exit Level 8) or an equivalent qualification with appropriate experience in the environmental field will be considered by the University for admission. Depending on the academic background of the student, additional modules may be prescribed. • Where a student with merit does not comply fully with the admission requirements, the Dean, in conjunction with the Selection committee at the Centre for Environmental Management, may recommend that the requirements be partially waived. • As only a limited number of students can be accepted, an application form available from the Centre for Environmental Management (cem@ufs.ac.za) must be submitted by the end of September of the preceding year, after which selection will take place.
6.	**Master of Human Settlements**	Apart from the General Rules the following is applicable: • A student who wishes to enrol for the degree must have a 60% average in one of the following: - an applicable four-year degree plus applicable practical experience and/or applicable preparatory studies, OR - an appropriate Honours Honours Degree or a 4 year Bachelors degree e.g. MURP
7.	**Master of Land and Property Development Management**	In addition to the requirements contained in General Rules, a student has to comply with the additional Faculty requirements: • Students should apply for admission to the programme listed above on the prescribed form before the closing date, 31 August the year before intended registration. • Bachelor of Science Honours or relevant Bachelor Honours Degree on NQF Exit Level 8 with an average of 60% in the exit year of the relevant degree and included at least 30 credits of research may be recognised as meeting the minimum entry requirements to this Master's Degree programme. • A selection process takes place before admission. A maximum number of 30 students are admitted owing to classroom constraints.

8.	**Master of Sustainable Agriculture**	Apart from the General Rules the following is applicable: • A student who wishes to enrol for the degree must have one of the following: - an applicable four-year degree plus applicable practical experience and/or applicable preparatory studies, OR - an applicable Honours Degree, or an Honours Degree and applicable studies, and/or practical experience. **NB: The scope, nature and applicability of practical experience and preparatory study in Reg. NAS3.4 (a) and (b) above will be determined by the Director of the Centre for Sustainable Agriculture**
9.	**Master of Urban and Regional Planning** *(for extended research)*	Apart from the General Rules the following is applicable: • A student who wishes to enrol for the degree, must have a 60% average in one of the following: - an applicable four-year degree plus applicable practical experience and/or applicable preparatory studies OR - an applicable Honours Degree, or a Bachelor Honours Degree and applicable studies, and/or practical experience.
10.	**Master of Urban and Regional Planning** *(for Professional registration)*	Apart from the General Rules the following is applicable: • A person may be admitted to the programme in Urban and Regional Planning if he/she is in possession of one of the following qualifications with an average pass • mark of at least 60% and has the necessary academic background: Bachelor Honours in Urban and Regional Planning. • A degree similar to a Bachelor Honours in Urban and Regional Planning (missing modules for the Bachelor Honours in Spatial Planning must be completed). Applicants may have to write selection tests if they are considered to be suitable for selection. These tests, and possible interviews, may be conducted on the Bloemfontein Campus, at a pre-arranged time and date. • Supplementary courses, as determined by the Academic Departmental Head, after consultation with the Dean and/or the Recognition of prior Learning Office, may be required; or a student may be expected to undergo an extra year of study in order to complete the programme if a he/she does not entirely meet the admission requirements.

11. Master of Science

Apart from the General Rules the following is applicable to the different fields of study:

Agricultural Economics

- Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required:
  - Bachelor Honours Degree in Agricultural Economics
  - Proof of successful completion of:
    – AGEC6815, AGEC6825, AGEC6835, AGEC6874, AGEC6865 OR
    – equivalent modules for the above mentioned modules.
  - Registration is only allowed after the research proposal was presented and approved by the postgraduate selection committee.
  - Additional modules may be required before admission to the MSc study.
  - It may be required that some modules be successfully completed by the end of the first year of study for the MSc degree as a prerequisite for registration of the second year of study.
  - It is required from the student to submit one (1) publishable scientific article when submitting the final dissertation for examination.

Computer Science and Informatics

- An applicable Honours Degree with a minimum average pass mark of 60% is required.

Construction Management

In addition to the requirements contained in General Rules, a student has to comply with the additional Faculty requirements:

- Bachelor of Science Honours or relevant Bachelor Honours Degree on NQF Exit Level 8 with an average of 60% in the exit year of the relevant degree and included at least 30 credits of research, may be recognised as meeting the minimum entry requirements to the Master's Degree programme.
- In addition to these requirements the General Rules, Rules for Master's Degree of the UFS as well as the additional Natural and Agricultural Sciences Faculty requirements per discipline.

Environmental Management

- An applicable Bachelor Honours Degree
- A candidate must submit a research proposal together with the application.

Geohydrology

- An applicable Bachelor Honours Degree with a minimum average pass mark of 60% is required. Additional coursework may be prescribed where students do not have the required background in Geohydrology. In special cases admission may be allowed in consultation with the Director of Institute for Groundwater Studies.

Geology, Geochemistry and Environmental Geology

- An applicable BScHons degree with a minimum average pass mark of 60% is required

Limnology

- Students in possession of a BScHons degree in Limnology are admitted to this course for which a dissertation (LIMG8900 – 180 credits) is required. For students in possession of a BScHons or BScAgricultureHons degree in a related field of study additional coursework may be prescribed where students do not have the required background in Limnology. In special cases admission may be allowed in consultation with the Director of the Centre for Environmental Management.

Mathematics or Applied Mathematics

- For admission to a Master's Degree in Mathematics or Applied Mathematics, the student needs Mathematics or Applied Mathematics, or the equivalent at Bachelor Honours level. In addition, all applicants will have to write and pass an admission examination to verify sufficient background and foundational mathematics knowledge. If necessary, students may be required to take additional undergraduate modules as supplementary prerequisites for certain Masters' modules. Proficient performance in the TALPS Test is required before enrolment.

Mathematical Statistics

- An appropriate Bachelor Honours Degree and mathematical background is required. Admission is subject to the approval of the Academic Departmental Head.

Mineral Resource Management

- An applicable BScHons degree with a minimum average pass mark of 60% is required
- Proficient performance in the TALPS Test is required.

Property Science

In addition to the requirements contained in General Rules, a student has to comply with the additional Faculty requirements:

- Bachelor of Science Honours or relevant Bachelor Honours Degree on NQF Exit Level 8 with an average of 60% in the exit year of the relevant degree and included at least 30 credits of research may be recognised as meeting the minimum entry requirements to the Master's Degree programme.
- In addition to these requirements the General Rules, Rules for Master's Studies of the UFS as well as the additional Natural and Agricultural Sciences Faculty requirements per discipline.

Quantity Surveying

In addition to the requirements contained in General Rules, a student has to comply with the additional Faculty requirements:

- Bachelor of Science Honours or relevant Bachelor Honours Degree on NQF Exit Level 8 with an average of 60% in the exit year of the relevant degree and included at least 30 credits of research may be recognised as meeting the minimum entry requirements to the Master's Degree programme.
- In addition to these requirements the General Rules, Rules for Master's Studies of the UFS as well as the additional Natural and Agricultural Sciences Faculty requirements per discipline.

12. Master of Science in Agriculture	Apart from the General Rules the following is applicable: • The students must provide evidence that he/she has adequate knowledge of the subject to justify admission to the study. • In the case of Animal, Grassland Sciences and Food Science admission to the study is subject to the approval of a postgraduate selection committee and Academic Departmental Head. Approval will be based on a satisfactory study record and appropriate qualification, or experience obtained. Additional modules may be required before admission to the MScAgric study is granted. **MSc.Agric (Food Science):** Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required: • An average of 65% in second and third year Food Science modules and a weighted average of 60% in 4th year Food Science modules. At least 120 credits in Food Science at fourth-year level.

NAS3.5 – Admission requirements for a Doctoral Degree

In addition to the admission requirements contained in General Rules A106, a student has to comply with the following additional Faculty requirements apply:

(a) All PhD degrees are selection programmes and admission to these degrees is subject to approval by the Academic Departmental Head.

(b) The PhD student must show that he/she has sufficient knowledge of the subject prior to admission. Students should apply for admittance to the Doctoral Degree on the prescribed form. These forms should be completed and submitted to the Academic Departmental Head.

(c) The PhD student must have a Master's Degree or equivalent NQF Exit Level 9 qualification. Master's Degrees include: MArch, MArch, MLPM (M.Prop), MSc, MAgric, MSc (Agriculture), MEM, MSA, MSc (Construction Management), MSc (Quantity Surveying), MURP, or MDM. The following additional requirements for specifics disciplines apply:

NAS3.6 – Specific programme requirements for Doctoral Degrees:

1. Agricultural Economics	Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required: • Master's Degree majoring in Agricultural Economics registration is only allowed after the research proposal was presented and approved by the postgraduate selection committee. • Additional modules may be required before admission to the PhD study. • It may be required that some modules be successfully completed by the end of the first year of study for the PhD degree as a prerequisite for registration of the secondyear of study for the PhD degree.
2. Agricultural Management	Admission to the study is subject to the discretion and approval of the Academic Departmental Head and a postgraduate selection committee. The following criteria are required: • Master's Degree majoring in Agricultural Management • Registration is only allowed after the research proposal was presented and approved by the postgraduate selection committee. • Additional modules may be required before admission to the PhD study. • It may be required that some modules be successfully completed by the end of the first year of study for the PhD degree as a prerequisite for registration of the second year of study for the PhD degree.
3. Disaster Management	• In order to be admitted to the PhD, a student must be in possession of an relevant Master's Degree and specific/relevant modules in the Postgraduate Diploma in Disaster Management. Depending on the background and knowledge that the applicant has, some core disaster management modules may be required in order to equip the student with adequate disaster management knowledge.
4. Environmental Management	• In order to comply with the admission requirements, a student must possess a Master's of Environmental Management Degree before registering for the PhD degree. Individuals holding another Master's Degree may be considered for admission, but could be required to register for additional modules. • Registration is only allowed after the research proposal was presented and approved by the research committee at the Center for Environmental Management.
5. Limnology	• In order to be admitted to the PhD, a student must be in possession of an MSc (Limnology). • Registration is only allowed after the research proposal was presented and approved by the research committee at the Center for Environmental Management.
6. Microbial Biotechnology	• A student must be in possession of a Master's Degree in Microbiology, Biochemistry, Food Science, Microbial Biotechnology or related disciplines. Students in possession of a Master's Degree in related modules (e.g. Botany, Zoology, Chemistry, Chemical Engineering) can be requested by the Programme Director to complete additional theoretical work, work assignments, and/or modules before the thesis is submitted for examination.
7. Geology/Geochemistry and Environmental Geology	• An applicable MSc with a pass mark of at least 60%.

NAS4 – Progress requirements

Rules A5(a) indicates that a student must complete his/her studies in the minimum prescribed study period plus two years. This is known as the residential period. Most of the undergraduate programmes in this Faculty thus have a residential period of five years, except BScAgriculture and BSc Extended Curriculum Programmes which have a six-year residential period.

a) Students must successfully complete a minimum of 64 mainstream credits per year to be allowed to register the following year. Students who do not obtain a minimum of 64 credits per year will automatically be **BLOCKED FOR REGISTRATION** in the Faculty. They will be expected to re-apply in order to be re-admitted to this Faculty.
Students must therefore pass a minimum of 32 credits per semester to be allowed to register the following semester. Students who fail to obtain 32 credits after the first semester will automatically be blocked for registration. They can appeal to the Faculty Appeal Committee for re-admission. The appeal form must be completed and submitted to the Office of the Dean two days after the results of the supplementary examination are available.
b) Students will only be allowed to repeat a module once if they meet the minimum requirements for repetition.
If a student only requires 32 credits to obtain a qualification and has not exceeded the residential period, special permission may be granted to repeat a module for the **SECOND** time. No first-year module can be repeated more than once.
c) In order to repeat a module, a student must have completed that module and obtained a semester mark of at least 30 %. Students can follow the appeal process and the Appeal Committee could consider the matter on the basis of merit.
d) Students in the Faculty of Natural and Agricultural Sciences will only be allowed to repeat 9 modules in their three-year study programme or repeat 12 modules in their four-year study programme.
e) Class attendance is required for students who have to register for the same module a second time. In the event of timetable clashes between repeated and new modules, preference must be given to the module being repeated. In such cases, students may not register for the new module.
f) Students who do not pass all their required first-year modules (at least 120 main stream credits) in three years, and have at least obtained 48 second-year credits, will not be allowed to re-register to the Faculty of Natural and Agricultural Sciences.
g) Students must pass a minimum of 80 credits to be able to register for modules in a subsequent study year of a learning programme.
h) Students cannot register for third-year modules if any first-year modules are outstanding.
i) Students must complete their degrees within the residential period. If it becomes evident that the student will not be able to comply with this rule, the student can be deregistered even if the residential period has not been reached.
j) Students who do not comply with i), but have a maximum of 4 modules outstanding, will only be allowed to conditionally register for one more semester. The student must then pass all the modules that they are registered for in that semester. Approval by the Faculty Admissions Committee is needed. Applications for conditional registration close on 31 August of their fifth study year for outstanding first semester modules and 31 January after completion of their fifth year for outstanding second semester modules.
k) Students repeating modules can only register for a maximum of 64 credits per semester. Special permission may be granted for adding one 16-credit module.
l) Students may only register for one additional 16-credit module per semester, over and above the number of prescribed modules required in the learning programme. Approval will depend on the academic record of the student.
m) Opportunity exists in the Faculty of Natural and Agricultural Sciences to appeal against the decision made by the Programme Director and/or delegated representative. A student may submit an appeal to a decision, which must contain supporting documentation that substantiates the situation, to the Appeals Committee of the Faculty. The Appeals Committee consists of the Teaching and Learning Manager and at least two other senior academics within the faculty. The Appeals Committee deliberates the cases before the semester starts. Appeal applications must be submitted to the Office of the Dean five working days before the semester starts. Results of the appeal will be available before the semester starts.
n) Students must obtain at least 45% for a semester mark to participate in the examination.

NAS5 – Module requirements

(a) Students must comply with the requirements of the specific programme and specific modules. All prerequisites for modules presented in the learning programmes in the Faculty are provided in the study guides as well as the rulebook at MODULE LIST WITH PREREQUISITES PER DEPARTMENT on page 106.
(b) Some modules require selection and students will only be allowed to register for that specific module after approval of the Programme Director.

(c) Students who passed Grade 12 Information Technology at performance level 5 or Computer Application Technology (CAT) at performance level 6 are exempted from CSIQ1531/CSIL1551/CSIL1511 and CSIQ1541/CSIL1561/CSIL1521.

(d) For some modules a minimum prerequisite applies. The requirement is a semester/year mark or an examination mark of 40% in the relevant module. It is indicated as, for example, Min. (MATM1614), if MATM1614 is the relevant module.

(e) If a co-requisite is required and the modules are taken for the first time, the module prescribed as co-requisite must be taken simultaneously with the relevant module. For example, to take GLGY2642, the prerequisites are 55% average for GLGY1614 and GLGY1624 and the co-requisite with GLGY2644.

NAS6 – Students from other faculties

(a) Students from other faculties who register for modules in the Faculty of Natural and Agricultural Sciences must comply with the minimum regulation requirements, as set out in NAS2.1 and NAS2.2.

NAS7 – Learning programme

Students have to:

- Select a learning programme.
- Follow the specific prescribed curriculum.
- Select one of the Biological Sciences, Mathematical Sciences, Chemical and Physical Science, Geosciences, Computer Science and Informatics, Computer Information Systems and Consumer Sciences fields of study for BSc degrees; or Soil Crop and Climate, Animal Wildlife and Grassland, Agricultural Economics, or Food Science for one of BScAgriculture degrees; or Crop Production, or Animal Production fields of study for the BAgric degrees.
- Verify that all the selected modules are included in the **class and examination timetable**.
- Verify that the **prerequisites** prescribed for every module are met.
- Be aware that elective modules can be exchanged with each other, but all compulsory modules must be successfully completed.

NAS7.1 – The selection of a learning programme

a) Students are only allowed to change to different fields of study or degrees within the Faculty at the end of their first year of study. If a student changes from one field of study to another, the total degree residential period must not exceed a maximum of five or six years, depending on the field of study.

b) Students can change within fields of study only up to the second year of study; this does not grant them permission to extend the duration of study beyond five years.

c) Students who change from one major within a complementary learning programme could have an extension on their study duration.

NAS7.2 – Minimum credit allocation

A degree cannot be conferred if the minimum credit requirements are not met and the prescribed curriculum are not fully completed:

(a) **All three-year Degrees:**
If a student wants endorsement with **two majors,** at least 60 credits per major discipline at NQF Exit Level 7 is required. This only apply to specific qualifications that allow for two majors.

(b) **BArch, BAgric, BConsumer Sciences, BCompInfoSys, BSc, BSc (Information Technology), BSc in Quantity Surveying or BSc in Construction Management:**
A total of at least 360 credits, with a maximum of 120 credits at NQF Level 5 and 120 credits on Level 6 and Level 7 respectively, must be obtained over three years. At least 60 credits must be from one discipline and at NQF Exit Level 7. For BSc (Quantity Surveying) and BSc (Construction Management) the 60 credits at NQF Exit Level 7 will not be from one discipline.

(c) **BSc Extended Curriculum Programme (four years):**
A total of at least 464 credits of which at least 104 credits must be developmental modules and at least 120 credits at NQF Exit Level 7 must be obtained over four study years.

(d) **BSc (Agriculture), BSc (Consumer Science) (four years):**
A total of at least 480 credits, with a maximum of 96 credits at NQF Level 5 and at least 120 credits at NQF Exit Level 8 for the degree must be obtained over four years. At least 60 credits must be from the minor discipline at NQF Exit Level 7.

(e) **BSc (Agriculture) Extended Curriculum Programme (five years):**
A total of at least 592 credits, of which at least 108 credits must be developmental modules, a maximum of 208 credits at NQF Level 5 and at least 120 credits at NQF Exit Level 8 must be obtained over five study years.

NAS8 – Assessment examination and promotion
NAS8.1 – Examination and promotion system

In addition to the requirements contained in General Rule A28, a student has to comply with the additional Faculty requirements:

(a) The guidelines as set out in the study guide for assessment method and calculation of semester and final marks apply.

(b) The promotion system only applies to specific modules as indicated in the study guides. Students who obtain a semester mark of 70% or higher in a specific module can be promoted if the promotion system applies to the module. The module mark becomes the final mark for the module.

(c) The degree is awarded with distinction to a student who obtained a weighted average of 75% in the prescribed final year modules and if the programme was completed in the prescribed minimum study years.

NAS8.2 – Assessment for Departments of Architecture, and Urban and Regional Planning

(a) For most of the modules presented by the Department of Architecture, Urban and Regional Planning, assessment of the student's academic progress will take place on a continuous basis by means of assignments, tests and/or design tasks as specified in the module guide. The acknowledgment of a year/ semester mark obtained will be subject to satisfactory attendance at lectures, studio periods and seminars. A final mark which will be taken as the student's examination mark will be compiled from the marks obtained in the assessments mentioned above.

(b) Modules presented by departments other than Architecture will be subject to the assessment procedure of those departments.

(c) Students in the Department of Architecture must meet the prescribed sub-minimum of 30% for all assignments and design tasks as specified in the module guides to pass a module.

NAS8.3

In addition to the requirements contained in General Rule: A9, A28, A53, A83, A113 a student has to comply with the additional Faculty requirements:

(a) To gain admission to the examination in a module in the Faculty of Natural and Agricultural Sciences, a module mark of at least 45% is required.

11. QUALIFICATIONS IN THE FACULTY

	11.1 BACHELOR'S DEGREES AND DIPLOMAS	MINIMUM PERIOD OF STUDY	NQF EXIT LEVEL	NUMBER OF LEARNING PROGRAMMES	ABBREVIATION	PAGE
	DIPLOMA					
1	Advanced Diploma in Sustainable Agriculture and Rural Development	18 months	7	1	AdvDip(ASARD)	48
	ACCESS PROGRAMMES AND EXTENDED CURRICULUM PROGRAMMES – South Campus first year of study					
1	University Preparation Programme: Agricultural Sciences for BAgric	1 year	5	1	UPP Agric	49
2	University Preparation Programme: Natural and Agricultural Sciences for BSc	1 year	5	1	UPP Mathematics & Chemistry	49
3	Bachelor of Agriculture Extended	4 years	7	1	BAgric	50
4	Bachelor of Science in Agriculture Extended Curriculum Programme	5 years	8	1	BSc (Agriculture)	50
5	Bachelor of Science Extended Curriculum Programme (Mathematics and Chemistry)	4 years	7	1	BSc	51
6	Bachelor of Science Extended Curriculum Programme (Mathematics and Finances)	4 years	7	1	BSc	51
	BACHELOR'S DEGREES					
1	Bachelor of Architecture	3 years	7	1	BArch	52
2	Bachelor of Agriculture	3 years	7	7	BAgric	53–54
3	Bachelor of Consumer Sciences	3 years	7	2	BConsumer Science	55
4	Bachelor of Computer Information Systems	3 years	7	1	BCompInfoSys	54
5	Bachelor of Science	3 years	7	6 (68)	BSc	56–62
6	Bachelor of Science in Information Technology	3 years	7	5	BSc (Information Technology)	64–65
7	Bachelor of Science in Construction Management (Residential and Compact learning)	4 years	7	2	BSc in Construction Management	67–71
8	Bachelor of Science in Quantity Surveying (Residential and Compact learning)	4 years	7	2	BSc in Quantity Surveying	63
9	Bachelor of Science in Agriculture	4 years	8	4 (31)	BSc (Agriculture)	57–61
10	Bachelor of Science in Consumer Science	4 years	8	1	BSc (Consumer Science)	72–77

11.2	POSTGRADUATE DIPLOMAS, BACHELOR, HONOURS, MASTER'S AND DOCTORAL DEGREES	MINIMUM PERIOD OF STUDY	NQF EXIT LEVEL	NUMBER OF LEARNING PROGRAMMES	ABBREVIATION	PAGE
	POSTGRADUATE DIPLOMA					
1	Postgraduate Diploma in Disaster Management	1 year	8	1	PGDip (Disaster Management)	79
2	Postgraduate Diploma in Integrated Water Management	1 year	8	1	PGDip(IWM)	
3	Postgraduate Diploma in Sustainable Agriculture	1 1/2 years	8	1	PGDip(SA)	
	BACHELOR HONOURS DEGREES					
1	Bachelor of Architecture Honours	1 year	8	1	BArchHons	79
2	Bachelor of Agriculture Honours	1 year	8	3	BAgricHons	79
3	Bachelor of Science Honours in Agricultural Economics					
4	Bachelor of Science Honours in Consumer Science	1 year	8	1	BScHons (Consumer Science)	79–80
5	Bachelor of Science Honours	1 year	8	35	BScHons	81-86
6	Bachelor of Science Honours majoring in Construction Management (Residential and Compact learning)	2 year	8	1	BScHons majoring in Construction Management	83
7	Bachelor of Science Honours majoring in Quantity Surveying (Residential and Compact learning)	2 year	8	1	BScHons majoring in Quantity Surveying	83
8	Bachelor of Spatial Planning Honours	1 year	8	1	BSPHons	81
9	Bachelor of Spatial Planning Honours (specialising in Human Settlements)	1 year	8	1	BSPHons	81
	MASTER'S DEGREES					
1	Master of Architecture	2 years	9	1	MArch	87
2	Master of Architecture (Professional)	1 year	9	1	MArch	87
3	Master of Agriculture	1 year	9	1	MAgric	87
4	Master of Disaster Management	1 years	9	1	MDM	88
5	Master of Environmental Management	2 years	9	1	MEM	88
6	Master of Land and Property Development in Human Settlements	1 year	9	1	MLPD (Housing)	89
7	Master of Land and Property Development Management	2 years	9	1	MLPM	90
8	Master of Science in Property Science	1 year	9	1	MSc (Property Science)	
8	Master of Sustainable Agriculture	1 years	9	1	MSA	91
9	Master of Science	2 years	9	37	MSc	92
10	Master of Science in Agriculture	2 years	9	14	MSc (Agriculture)	95
11	Master of Science in Consumer Science	1 year	9	1	MSc (Consumer Science)	80
12	Master of Science in Construction Management	1 year	9	1	MSc (Construction Management)	80
13	Master of Science in Quantity Surveying	1 year	9	1	MSc (Quantity Surveying)	80
14	Master of Urban and Regional Planning (Professional)	2 years	9	1	MURP	81
15	Master of Urban and Regional Planning (Research)	1 year	9	1	MURP	82
	DOCTORAL DEGREES					
1	Doctor of Philosophy	2 years	10	57	PhD	97
2	Doctor of Science	2 years	10	50	DSc	98

11.3 LEARNING PROGRAMMES AND REQUIREMENTS

DIPLOMAS AND ADVANCE DIPLOMAS

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC PLAN CODE	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS
UGRD	B5250	52501	BC520047	Advanced Diploma in Sustainable Agriculture and Rural Development	Dr J van Niekerk	A related diploma or qualification at NQF Level 6.

UNIVERSITY PREPARATION PROGRAMMES, ACCESS PROGRAMMES AND EXTENDED CURRICULUM PROGRAMMES

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC PLAN CODE	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
						AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	B43E1	43001	BC4300E1	Bachelor of Science Extended Degree Mathematics and Chemistry	Mr P Bothma	24	40%	40%	40% or	40%
UGRD	B43E2	43001	BC4300E2	Bachelor of Science Extended Degree Mathematics and Finances	Mr P Bothma	24	40%	40%	N/A	N/A
UGRD	B54E1	54801	BC5480E1	Bachelor of Science Extended Degree Agriculture	Miss E Oosthuizen	24	40%	40%	40% or	40%
UGRD	B53E1	53001	BC5300E1	Bachelor of Agriculture Extended Degree	Miss E Oosthuizen	24	40%	30% for Maths or 60% for Maths Lit	N/A	N/A
UGRD	M4001	NA	40001	University Preparation Programme in Mathematics and Chemistry	Mr P Bothma	20	40%	40%	40% or	40%
UGRD	M5001	NA	50001	University Preparation Programme in Agriculture	Miss E Oosthuizen	20	40%	30% for Maths or 60% for Maths Lit	NA	NA

BACHELOR DEGREE PROGRAMMES

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC PLAN CODE	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
						AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	B4391	43911	BC430114	Bachelor of Architecture	Mr J Olivier	30	50%	50%	N/A	N/A
UGRD	B5350	53501	BC530111	Bachelor of Agriculture majoring in Agricultural Economics	Dr A Geyer	30	50%	50%	N/A	N/A
UGRD	B5350	53501	BC530147	Bachelor of Agriculture majoring in Agricultural Extension	Dr A Geyer	30	50%	40% of maths Lit 80% AP>31	N/A	N/A
UGRD	B5350	53501	BC530152	Bachelor of Agriculture majoring in Agricultural Management	Dr A Geyer	30	50%		N/A	N/A
UGRD	B5300	53501	BC530101	Bachelor of Agriculture majoring in Animal Production Management	Dr A Geyer	30	50%		N/A	N/A
UGRD	B5300	53501	BC530102	Bachelor of Agriculture majoring in Crop Production Management	Dr A Geyer	30	50%		N/A	N/A
UGRD	B5300	53501	BC530103	Bachelor of Agriculture majoring in Mixed Farming Management	Dr A Geyer	30	50%		N/A	N/A
UGRD	B5300	53501	BC530172	Bachelor of Agriculture majoring in Irrigation Management	Dr A Geyer	30	50%		N/A	N/A
UGRD	B5300	53501	BC530190	Bachelor of Agriculture majoring in Wildlife Management	Dr A Geyer	30	50%		N/A	N/A
UGRD	B4363	43610	BC430156	Bachelor of Computer Information Systems	Mr J Marais	30	50%	50%	N/A	N/A
UGRD	B4371	43710	BC430123	Bachelor of Consumer Science	Dr I van der Merwe	30	50%	30% for Maths or 60% for Maths Lit	N/A	N/A
UGRD	B4370	43701	BC432300	Bachelor of Science in Consumer Science	Dr I van der Merwe	30	50%	60%	50%	60%
UGRD	B4350	43001	BC431100	Bachelor of Science majoring in Agricultural Economics	Dr A Geyer	30	50%	60%	N/A	N/A
UGRD	B4310	43001	BC431920	Bachelor of Science majoring in Biochemistry and Botany	Dr B Visser	30	50%	60%	50%	60%
UGRD	B4310	43001	BC431927	Bachelor of Science majoring in Biochemistry and Entomology	Dr C Jansen van Rensburg	30	50%	60%	50%	60%
UGRD	B4310	43001	BC431929	Bachelor of Science majoring in Biochemistry and Food Science	Dr F O'Neill	30	50%	60%	50%	60%
UGRD	B4310	43001	BC431931	Bachelor of Science majoring in Biochemistry and Genetics	Dr F O'Neill	30	50%	60%	50%	60%

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC PLAN CODE	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
						AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	B4310	43001	BC431939	Bachelor of Science majoring in Biochemistry and Microbiology	Prof.J Albertyn	30	50%	60%	50%	60%
UGRD	B4310	43001	BC431980	Bachelor of Science majoring in Biochemistry and Physiology	Dr F O'Neill	30	50%	60%	50%	60%
UGRD	B4310	43001	BC431946	Bachelor of Science majoring in Biochemistry and Statistics	Dr F O'Neill	30	50%	60%	50%	60%
UGRD	B4310	43001	BC431949	Bachelor of Science majoring in Biochemistry and Zoology	Dr C Jansen van Rensburg	30	50%	60%	50%	60%
UGRD	B4310	43001	BC432027	Bachelor of Science majoring in Botany and Entomology	Dr C Jansen van Rensburg	30	50%	60%	50%	60%
UGRD	B4310	43001	BC432031	Bachelor of Science majoring in Botany and Genetics	Dr B Visser	30	50%	60%	50%	60%
UGRD	B4310	43001	BC432039	Bachelor of Science majoring in Botany and Microbiology	Dr B Visser	30	50%	60%	50%	60%
UGRD	B4310	43001	BC432041	Bachelor of Science majoring in Botany and Plant Breeding	Dr B Visser	30	50%	60%	50%	60%
UGRD	B4310	43001	BC432042	Bachelor of Science majoring in Botany and Plant Pathology	Dr B Visser	30	50%	60%	50%	60%
UGRD	B4310	43001	BC432049	Bachelor of Science majoring in Botany and Zoology	Dr B Visser	30	50%	60%	50%	60%
UGRD	B4310	43001	BC432082	Bachelor of Science majoring in Plant Health Ecology	Dr B Visser	30	50%	60%	50%	60%
UGRD	B4310	43001	BC432731	Bachelor of Science majoring in Entomology and Genetics	Dr C Jansen van Rensburg	30	50%	60%	50%	60%
UGRD	B4310	43001	BC432739	Bachelor of Science majoring in Entomology and Microbiology	Dr C Jansen van Rensburg	30	50%	60%	50%	60%
UGRD	B4310	43001	BC432749	Bachelor of Science majoring in Entomology and Zoology	Dr C Jansen van Rensburg	30	50%	60%	50%	60%
UGRD	B4311	43001	BC433031	Bachelor of Science majoring in Forensic Science	Dr K Ehlers	34	50%	Maths 60% and a cumulative score for Maths, Physical Science and Life Science > 17		
UGRD	B4310	43001	BC433118	Bachelor of Science majoring in Behavioural Genetics	Mrs Z Murray	30	50%	60%	50%	60%
UGRD	B4310	43001	BC433139	Bachelor of Science majoring in Genetics and Microbiology	Prof. J Albertyn	30	50%	60%	50%	60%
UGRD	B4310	43001	BC433180	Bachelor of Science majoring in Genetics and Physiology	Mrs Z Murray	30	50%	60%	50%	60%
UGRD	B4310	43001	BC433149	Bachelor of Science majoring in Genetics and Zoology	Dr C Jansen van Rensburg	30	50%	60%	50%	60%
UGRD	B4310	43001	BC433929	Bachelor of Science majoring in Microbiology and Food Science	Prof.J Albertyn	30	50%	60%	50%	60%
UGRD	B4310	43001	BC433946	Bachelor of Science majoring in Microbiology and Statistics	Prof.J Albertyn	30	50%	60%	50%	60%
UGRD	B4310	43001	BC433949	Bachelor of Science majoring in Microbiology and Zoology	Dr C Jansen van Rensburg	30	50%	60%	50%	60%
UGRD	B4393	43901	BC432401	Bachelor of Science in Construction Management (compact learning)	Mrs E Jacobs	32	50%	60%	50% in one of Economics, Business Studies, Accounting or Physical Science	
UGRD	B4392	43901	BC432400	Bachelor of Science in Construction Management	Mrs T Bremer	32	50%	60%		
UGRD	B4392	43902	BC434300	Bachelor of Science in Quantity Surveying	Mrs T Bremer	32	50%	60%		
UGRD	B4393	43902	BC434301	Bachelor of Science in Quantity Surveying (compact learning)	Mrs E Jacobs	32	50%	60%		
UGRD	B4330	43001	BC432119	Bachelor of Science majoring in Chemistry and Biochemistry	Dr J Venter	30	50%	60%	50%	60%
UGRD	B4330	43001	BC432120	Bachelor of Science majoring in Chemistry and Botany	Dr J Venter	30	50%	60%	50%	60%
UGRD	B4330	43001	BC432129	Bachelor of Science majoring in Chemistry and Food Science	Dr J Venter	30	50%	60%	50%	60%
UGRD	B4330	43001	BC432139	Bachelor of Science majoring in Chemistry and Microbiology	Dr J Venter	30	50%	60%	50%	60%
UGRD	B4330	43001	BC432140	Bachelor of Science majoring in Chemistry and Physics	Dr J Venter	30	50%	60%	50%	N/A
UGRD	B4331	43001	BC434012	Bachelor of Science majoring in Physics and Agrometeorology	Dr J Venter	30	50%	60%	50%	N/A
UGRD	B4331	43001	BC434017	Bachelor of Science majoring in Physics and Astrophysics	Dr J Venter	30	50%	60%	50%	N/A
UGRD	B4332	43001	BC434026	Bachelor of Science majoring in Physics and Engineering Subjects	Dr J Venter	34	50%	Maths (70%) and Physical Science cumulative score > 13		N/A
UGRD	B4360	43601	BC432221	Bachelor of Science in Information Technology majoring in Computer Science and Chemistry	Mr J Marais	30	50%	60%	50%	N/A
UGRD	B4362	43601	BC432237	Bachelor of Science in Information Technology majoring in Computer Science and Mathematical Statistics	Mr J Marais	30	50%	70%	N/A	N/A
UGRD	B4361	43601	BC432238	Bachelor of Science in Information Technology majoring in Computer Science and Mathematics	Mr J Marais	30	50%	70%	50%	N/A

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC PLAN CODE	ENGLISH TITLE	PROGRAMME DIRECTOR	REQUIREMENTS				
						AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	B4360	43601	BC432240	Bachelor of Science in Information Technology majoring in Computer Science and Physics	Mr J Marais	30	50%	60%	50%	N/A
UGRD	B4364	43601	BC432255	Bachelor of Science in Information Technology majoring in Computer Science and Business Management	Mr J Marais	30	50%	50%	N/A	N/A
UGRD	B4342	43001	BC433369	Bachelor of Science majoring in Geo-Informatics	Miss E Kruger	30	50%	60%	50%	N/A
UGRD	B4340	43001	BC433312	Bachelor of Science majoring in Geography and Agrometeorology	Miss E Kruger	30	50%	60%	50%	60%
UGRD	B4342	43001	BC433346	Bachelor of Science majoring in Geography and Statistics	Miss E Kruger	30	50%	60%	50%	N/A
UGRD	B4340	43001	BC433362	Bachelor of Science majoring in Geography and Environmental Science	Miss E Kruger	30	50%	60 %	50%	60%
UGRD	B4341	43001	BC433521	Bachelor of Science majoring in Geology and Chemistry	Mrs J Magson	30	50%	60%	60%	N/A
UGRD	B4341	43001	BC433528	Bachelor of Science majoring in Environmental Geology	Mrs J Magson	30	50%	60%	60%	N/A
UGRD	B4341	43001	BC433532	Bachelor of Science majoring in Geochemistry	Mrs J Magson	30	50%	60%	60%	N/A
UGRD	B4341	43001	BC433533	Bachelor of Science majoring in Geology and Geography	Mrs J Magson	30	50%	60%	60%	N/A
UGRD	B4341	43001	BC433535	Bachelor of Science majoring in Geology Specialisation	Mrs J Magson	30	50%	60%	60%	N/A
UGRD	B4341	43001	BC433540	Bachelor of Science majoring in Geology and Physics	Mrs J Magson	30	50%	60%	60%	N/A
UGRD	B4324	43001	BC431000	Bachelor of Science majoring in Actuarial Sciences	Dr M von Maltitz	34	50%	70%	N/A	N/A
UGRD	B4323	43001	BC433712	Bachelor of Science majoring in Climate Sciences	Dr M von Maltitz	30	50%	70%	50%	N/A
UGRD	B4322	43001	BC433758	Bachelor of Science majoring in Econometrics	Dr M von Maltitz	30	50%	70%	N/A	N/A
UGRD	B4322	43001	BC433701	Bachelor of Science majoring in Investment Sciences	Dr M von Maltitz	30	50%	70%	N/A	N/A
UGRD	B4321	43001	BC433816	Bachelor of Science majoring in Mathematics and Applied Mathematics	Mr C Venter	30	50%	70%	50%	N/A
UGRD	B4321	43001	BC433821	Bachelor of Science majoring in Mathematics and Chemistry	Mr C Venter	30	50%	70%	50%	N/A
UGRD	B4322	43001	BC433864	Bachelor of Science majoring in Mathematics and Finances	Mr C Venter	30	50%	70%	N/A	N/A
UGRD	B4321	43001	BC433837	Bachelor of Science majoring in Mathematics and Mathematical Statistics	Mr C Venter	30	50%	70%	50%	N/A
UGRD	B4321	43001	BC433840	Bachelor of Science majoring in Mathematics and Physics	Mr C Venter	30	50%	70%	50%	60%
UGRD	B4322	43001	BC433786	Bachelor of Science majoring in Mathematical Statistics and Psychometrics	Dr M von Maltitz	30	50%	70%	NA	N/A
UGRD	B4325	43001	BC434650	Bachelor of Science majoring in Statistics and Accounting	Dr M von Maltitz	30	50%	60%	N/A	N/A
UGRD	B4325	43001	BC434658	Bachelor of Science majoring in Statistics and Economics	Dr M von Maltitz	30	50%	60%	N/A	N/A
UGRD	B4325	43001	BC434686	Bachelor of Science majoring in Statistics and Psychology	Dr M von Maltitz	30	50%	60%	N/A	N/A
UGRD	B4320	43001	BC434686	Bachelor of Science majoring in Statistics and Psychology	Dr M von Maltitz	30	50%	60%	N/A	N/A
PROFESSIONAL BACHELOR'S DEGREE PROGRAMMES										
UGRD	B5480	54801	BC540012	Bachelor of Science in Agriculture majoring in Agrometeorology	Dr A Geyer	30	50%	60%	50% for Physical Science or 60% for Life Science or 60% for Agricultural Sciences	
UGRD	B5480	54801	BC540013	Bachelor of Science in Agriculture majoring in Agronomy	Dr A Geyer	30	50%	60%		
UGRD	B5480	54801	BC540015	Bachelor of Science in Agriculture majoring in Animal Sciences	Dr A Geyer	30	50%	60%		
UGRD	B5480	54801	BC540029	Bachelor of Science in Agriculture majoring in Food Science	Dr A Geyer	30	50%	60%		
UGRD	B5480	54801	BC540036	Bachelor of Science in Agriculture majoring in Grassland Science	Dr A Geyer	30	50%	60%		
UGRD	B5480	54801	BC540041	Bachelor of Science in Agriculture majoring in Plant Breeding	Dr. B. Visser	30	50%	60%		
UGRD	B5480	54801	BC540042	Bachelor of Science in Agriculture majoring in Plant Pathology	Dr. B. Visser	30	50%	60%		
UGRD	B5480	54801	BC540044	Bachelor of Science in Agriculture majoring in Soil Science	Dr A Geyer	30	50%	60%		
UGRD	B5480	54801	BC540089	Bachelor of Science in Agriculture majoring in Wildlife Production	Dr A Geyer	30	50%	60%		

POSTGRADUATE DIPLOMAS

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC PLAN CODE	ENGLISH TITTLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	B4550	45501	BC450025	Postgraduate Diploma in Disaster Management	Ms O Kunguma	Selection for PGDip
PGRD	B4551	45511	BC450091	Postgraduate Diploma in Integrated Water Management	Mrs M Avenant	Selection for PGDip
PGRD	B5547	55047	BC550047	Postgraduate Diploma in Sustainable Agriculture	Dr J van Niekerk	Selection for PGDip

BACHELOR HONOURS PROGRAMMES

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC PLAN CODE	ENGLISH TITTLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	B5600	56001	BC560011	Bachelor of Agriculture Honours majoring in Agricultural Economics	Dr A Geyer	Selection for Honours Degree
PGRD	B5600	56001	BC560052	Bachelor of Agriculture Honours majoring in Agricultural Management	Dr A Geyer	Selection for Honours Degree
PGRD	B5600	56001	BC560015	Bachelor of Agriculture Honours majoring in Animal Production	Dr A Geyer	Selection for Honours Degree
PGRD	B5600	56001	BC560072	Bachelor of Agriculture Honours majoring in Irrigation Management	Dr A Geyer	Selection for Honours Degree
PGRD	B5600	56001	BC560090	Bachelor of Agriculture Honours majoring in Wildlife Management	Dr A Geyer	Selection for Honours Degree
PGRD	B4691	46901	BC460114	Bachelor of Architecture Honours	Mr J Olivier	Selection for Honours Degree
PGRD	B5680	56801	BC560012	Bachelor of Science Honours in Agriculture majoring in Agrometeorology	Dr A Geyer	Selection for Honours Degree
PGRD	B5680	56801	BC560013	Bachelor of Science Honours in Agriculture majoring in Agronomy	Dr A Geyer	Selection for Honours Degree
PGRD	B5680	56801	BC560015	Bachelor of Science Honours in Agriculture majoring in Animal Sciences	Dr A Geyer	Selection for Honours Degree
PGRD	B5680	56801	BC560036	Bachelor of Science Honours in Agriculture majoring in Grassland	Dr A Geyer	Selection for Honours Degree
PGRD	B5680	56801	BC560041	Bachelor of Science Honours in Agriculture majoring in Plant Breeding	Dr B Visser	Selection for Honours Degree
PGRD	B5680	56801	BC560042	Bachelor of Science Honours in Agriculture majoring in Plant Pathology	Dr B Visser	Selection for Honours Degree
PGRD	B5680	56801	BC560044	Bachelor of Science Honours in Agriculture majoring in Soil Science	Dr A Geyer	Selection for Honours Degree
PGRD	B5680	56801	BC560089	Bachelor of Science Honours in Agriculture majoring in Wildlife Science	Dr A Geyer	Selection for Honours Degree
PGRD	B4690	46911	BC460024	Bachelor of Science Honours in Construction Management	Mrs T Bremer	Selection for Honours Degree
PGRD	B4670	46701	BC460023	Bachelor of Science Honours in Consumer Science	Dr I. van der Merwe	Selection for Honours Degree
PGRD	B4690	46921	BC460043	Bachelor of Science Honours in Quantity Surveying	Mrs T Bremer	Selection for Honours Degree
PGRD	B4620	46001	BC460010	Bachelor of Science Honours majoring in Actuarial Science	Dr M von Maltitz	Selection for Honours Degree
PGRD	B4650	46001	BC460011	Bachelor of Science Honours majoring in Agricultural Economics	Dr A Geyer	Selection for Honours Degree
PGRD	B4630	46001	BC460012	Bachelor of Science Honours majoring in Agrometeorology	Dr J Venter	Selection for Honours Degree
PGRD	B4620	46001	BC460046	Bachelor of Science Honours majoring in Applied Statistics	Dr M von Maltitz	Selection for Honours Degree
PGRD	B4630	46001	BC460017	Bachelor of Science Honours majoring in Astrophysics	Dr J Venter	Selection for Honours Degree
PGRD	B4610	46001	BC460018	Bachelor of Science Honours majoring in Behaviour Genetics	Mrs Z Murray	Selection for Honours Degree
PGRD	B4610	46001	BC460019	Bachelor of Science Honours majoring in Biochemistry	Dr F O'Neill	Selection for Honours Degree
PGRD	B4610	46001	BC460020	Bachelor of Science Honours majoring in Botany	Dr B Visser	Selection for Honours Degree
PGRD	B4620	46001	BC460021	Bachelor of Science Honours majoring in Chemistry	Dr J Venter	Selection for Honours Degree
PGRD	B4660	46001	BC460022	Bachelor of Science Honours majoring in Computer Science and Informatics	Mr J Marais	Selection for Honours Degree
PGRD	B4610	46001	BC460027	Bachelor of Science Honours majoring in Entomology	Dr C Jansen van Rensburg	Selection for Honours Degree
PGRD	B4640	46001	BC460062	Bachelor of Science Honours majoring in Environment Sciences	Miss E Kruger	Selection for Honours Degree
PGRD	B4640	46001	BC460028	Bachelor of Science Honours majoring in Environmental Geology	Mrs J Magson	Selection for Honours Degree
PGRD	B4610	46001	BC460029	Bachelor of Science Honours majoring in Food Science	Dr F O'Neill/Prof. J Albertyn	Selection for Honours Degree
PGRD	B4610	46001	BC460067	Bachelor of Science Honours majoring in Forensic Genetics	Dr K Ehlers	Selection for Honours Degree
PGRD	B4610	46001	BC460030	Bachelor of Science Honours majoring in Forensic Science	Dr K Ehlers	Selection for Honours Degree
PGRD	B4610	46001	BC460031	Bachelor of Science Honours majoring in Genetics	Mrs Z Murray	Selection for Honours Degree
PGRD	B4640	46001	BC460032	Bachelor of Science Honours majoring in Geochemistry	Mrs J Magson	Selection for Honours Degree
PGRD	B4640	46001	BC460033	Bachelor of Science Honours majoring in Geography	Miss E Kruger	Selection for Honours Degree
PGRD	B4640	46001	BC460034	Bachelor of Science Honours majoring in Geohydrology	Mrs J Magson	Selection for Honours Degree
PGRD	B4640	46001	BC460069	Bachelor of Science Honours majoring in Geo-informatics	Miss E Kruger	Selection for Honours Degree
PGRD	B4640	46001	BC460035	Bachelor of Science Honours majoring in Geology	Mrs J Magson	Selection for Honours Degree
PGRD	B4610	46001	BC460076	Bachelor of Science Honours majoring in Limnology	Mrs M Avenant	Selection for Honours Degree
PGRD	B4620	46001	BC460037	Bachelor of Science Honours majoring in Mathematical Statistics	Dr M von Maltitz	Selection for Honours Degree

PGRD	B4620	46001	BC460038	Bachelor of Science Honours majoring in Mathematics and Applied Mathematics	Mr C Venter	Selection for Honours Degree
PGRD	B4610	46001	BC460039	Bachelor of Science Honours majoring in Microbiology	Prof. J Albertyn	Selection for Honours Degree
PGRD	B4630	46001	BC460040	Bachelor of Science Honours majoring in Physics	Dr J Venter	Selection for Honours Degree
PGRD	B4610	46001	BC560041	Bachelor of Science Honours majoring in Plant Breeding	Dr B Visser	Selection for Honours Degree
PGRD	B4610	46001	BC460082	Bachelor of Science Honours majoring in Plant Health Ecology	Dr B Visser	Selection for Honours Degree
PGRD	B4610	46001	BC560042	Bachelor of Science Honours majoring in Plant Pathology	Dr B Visser	Selection for Honours Degree
PGRD	B4620	46001	BC460087	Bachelor of Science Honours majoring in Risk Analysis	Dr M von Maltitz	Selection for Honours Degree
PGRD	B4640	46001	BC460044	Bachelor of Science Honours majoring in Soil Science	Prof. van Wyk	Selection for Honours Degree
PGRD	B4610	46001	BC460049	Bachelor of Science Honours majoring in Zoology	Dr C Jansen van Rensburg	Selection for Honours Degree
PGRD	B4693	46931	BC460145	Bachelor of Spatial Planning Honours and Spatial Planning Honours (specialising in Human Settlements)	Prof. V Nel	Selection for Honours Degree
PGRD	B4693	46931	BC460145	Bachelor of Spatial Planning Honours and Spatial Planning Honours	Prof. V Nel	Selection for Honours Degree
PGRD	B4693	46931	BC460145	Bachelor of Spatial Planning Honours and Spatial Planning Honours (specialising in Human Settlements)	Prof. V Nel	Selection for Honours Degree

MASTER PROGRAMMES

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC PLAN CODE	ENGLISH TITTLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	B5800	58301	BC580111	Master of Agriculture majoring in Agricultural Economics	Dr A Geyer	Selection for Master's Degree
PGRD	B5800	58301	BC580152	Master of Agriculture majoring in Agricultural Management	Dr A Geyer	Selection for Master's Degree
PGRD	B5800	58301	BC580115	Master of Agriculture majoring in Animal Production Management	Dr A Geyer	Selection for Master's Degree
PGRD	B5800	58301	BC580172	Master of Agriculture majoring in Irrigation Management	Dr A Geyer	Selection for Master's Degree
PGRD	B5800	58301	BC580190	Master of Agriculture majoring in Wildlife Management	Dr A Geyer	Selection for Master's Degree
PGRD	B4791	47901	BC470314	Master of Architecture (for professional registration)	Mr J Olivier	Selection for Master's Degree
PGRD	B4891	48011	BC480214	Master of Architecture (Research)	Mr J Olivier	Selection for Master's Degree
PGRD	B4750	47501	BC470325	Master of Disaster Management	Miss O Kunguma	Selection for Master's Degree
PGRD	B4892	48021	BC480271	Master of Human Settlements	Prof. V Nel	Selection for Master's Degree
PGRD	B4792	47921	BC470374	Master of Land and Property Development Management	Mrs T Bremer	Selection for Master's Degree
PGRD	B5880	58001	BC580012	Master of Science in Agriculture majoring in Agrometeorology	Dr A Geyer	Selection for Master's Degree
PGRD	B5880	58001	BC580053	Master of Science in Agriculture majoring in Agrometeorology Interdisciplinary	Dr A Geyer	Selection for Master's Degree
PGRD	B5880	58001	BC580013	Master of Science in Agriculture majoring in Agronomy	Dr A Geyer	Selection for Master's Degree
PGRD	B5880	58001	BC580054	Master of Science in Agriculture majoring in Agronomy Interdisciplinary	Dr A Geyer	Selection for Master's Degree
PGRD	B5880	58001	BC580015	Master of Science in Agriculture majoring in Animal Science	Dr A Geyer	Selection for Master's Degree
PGRD	B5880	58301	BC580029	Master of Science in Agriculture majoring in Food Science	Dr F O'Neill/Prof. J Albertyn	Selection for Master's Degree
PGRD	B5880	58301	BC580036	Master of Science in Agriculture majoring in Grassland Science	Dr A Geyer	Selection for Master's Degree
PGRD	B5880	58001	BC580041	Master of Science in Agriculture majoring in Plant Breeding	Dr B Visser	Selection for Master's Degree
PGRD	B5880	58001	BC580081	Master of Science in Agriculture majoring in Plant Breeding Interdisciplinary	Dr B Visser	Selection for Master's Degree
PGRD	B5880	58001	BC580042	Master of Science in Agriculture majoring in Plant Pathology	Dr B Visser	Selection for Master's Degree
PGRD	B5880	58001	BC580083	Master of Science in Agriculture majoring in Plant Pathology Interdisciplinary	Dr B Visser	Selection for Master's Degree
PGRD	B5880	58001	BC580044	Master of Science in Agriculture majoring in Soil Science	Dr A Geyer	Selection for Master's Degree
PGRD	B5880	58001	BC580088	Master of Science in Agriculture majoring in Soil Science Interdisciplinary	Dr A Geyer	Selection for Master's Degree
PGRD	B5880	58001	BC580089	Master of Science in Agriculture majoring in Wildlife Science	Dr A Geyer	Selection for Master's Degree
PGRD	B4820	48001	BC480010	Master of Science majoring in Actuarial Science	Dr M von Maltitz	Selection for Master's Degree
PGRD	B4720	47201	BC470110	Master of Science majoring in Actuarial Sciences	Dr M von Maltitz	Selection for Master's Degree
PGRD	B5840	48001	BC480011	Master of Science majoring in Agricultural Economics	Dr A Geyer	Selection for Master's Degree
PGRD	B5840	48001	BC480012	Master of Science majoring in Agrometeorology	Dr A Geyer	Selection for Master's Degree
PGRD	B4720	47201	BC470116	Master of Science majoring in Applied Mathematics	Mr C Venter	Selection for Master's Degree
PGRD	B4820	48001	BC480016	Master of Science majoring in Applied Mathematics	Mr C Venter	Selection for Master's Degree
PGRD	B4720	47201	BC470146	Master of Science majoring in Applied Statistics	Dr M von Maltitz	Selection for Master's Degree
PGRD	B4820	48001	BC480046	Master of Science majoring in Applied Statistics	Dr M von Maltitz	Selection for Master's Degree
PGRD	B4730	47001	BC470117	Master of Science majoring in Astrophysics	Dr J Venter	Selection for Master's Degree

PGRD	B4840	48001	BC480017	Master of Science majoring in Astrophysics	Dr J Venter	Selection for Master's Degree
PGRD	B4810	48001	BC480018	Master of Science majoring in Behavioural Genetics	Ms Z Murray	Selection for Master's Degree
PGRD	B4810	48001	BC480019	Master of Science majoring in Biochemistry	Dr F O'Neill	Selection for Master's degree
PGRD	B4810	48001	BC480020	Master of Science majoring in Botany	Dr B Visser	Selection for Master's Degree
PGRD	B4830	48001	BC480021	Master of Science majoring in Chemistry	Dr J Venter	Selection for Master's Degree
PGRD	B4860	48001	BC480056	Master of Science majoring in Computer Information Systems	Mr J Marais	Selection for Master's Degree
PGRD	B4860	48001	BC480022	Master of Science majoring in Computer Science and Informatics	Mr J Marais	Selection for Master's Degree
PGRD	B4760	47001	BC470122	Master of Science majoring in Computer Science and Informatics	Mr J Marais	Selection for Master's Degree
PGRD	B4890	48001	BC480024	Master of Science majoring in Construction Management	Mrs E Jacobs	Selection for Master's Degree
PGRD	B4770	47001	BC470123	Master of Science majoring in Consumer Science	Dr I van der Merwe	Selection for Master's Degree
PGRD	B4870	48001	BC480023	Master of Science majoring in Consumer Science	Dr I van der Merwe	Selection for Master's Degree
PGRD	B4810	48001	BC480027	Master of Science majoring in Entomology	Dr C Jansen van Rensburg	Selection for Master's Degree
PGRD	B4840	48001	BC480028	Master of Science majoring in Environmental Geology	Mrs J Magson	Selection for Master's Degree
PGRD	B4810	48001	BC480029	Master of Science majoring in Food Science	Dr F O'Neill/Prof. J Albertyn	Selection for Master's Degree
PGRD	B4810	48001	BC480065	Master of Science majoring in Forensic Chemistry	Dr K Ehlers	Selection for Master's Degree
PGRD	B4810	48001	BC480027	Master of Science majoring in Forensic Entomology	Dr K Ehlers	Selection for Master's Degree
PGRD	B4810	48001	BC480067	Master of Science majoring in Forensic Genetics	Dr K Ehlers	Selection for Master's Degree
PGRD	B4810	48001	BC480068	Master of Science majoring in Forensic Interdisciplinary	Dr K Ehlers	Selection for Master's Degree
PGRD	B4810	48001	BC480030	Master of Science majoring in Forensic Sciences	Dr K Ehlers	Selection for Master's Degree
PGRD	B4810	48001	BC480031	Master of Science majoring in Genetics	Mrs Z Murray	Selection for Master's Degree
PGRD	B4840	48001	BC480032	Master of Science majoring in Geochemistry	Mrs J Magson	Selection for Master's Degree
PGRD	B4840	48001	BC480033	Master of Science majoring in Geography	Miss E Kruger	Selection for Master's Degree
PGRD	B4840	48001	BC480034	Master of Science majoring in Geohydrology	Mrs J Magson	Selection for Master's Degree
PGRD	B4840	48001	BC480069	Master of Science majoring in Geo-Informatics	Miss E Kruger	Selection for Master's Degree
PGRD	B4840	48001	BC480035	Master of Science majoring in Geology	Mrs J Magson	Selection for Master's Degree
PGRD	B4880	48001	BC480036	Master of Science majoring in Grassland Sciences	Dr A Geyer	Selection for Master's Degree
PGRD	B4810	48001	BC480076	Master of Science majoring in Limnology	Mrs M Avenant	Selection for Master's Degree
PGRD	B4720	47201	BC470137	Master of Science majoring in Mathematical Statistics	Dr M von Maltitz	Selection for Master's Degree
PGRD	B4820	48001	BC480037	Master of Science majoring in Mathematical Statistics	Dr M von Maltitz	Selection for Master's Degree
PGRD	B4720	47201	BC470138	Master of Science majoring in Mathematics	Mr C Venter	Selection for Master's Degree
PGRD	B4820	48001	BC480038	Master of Science majoring in Mathematics	Mr C Venter	Selection for Master's Degree
PGRD	B4810	48001	BC480077	Master of Science majoring in Microbial Biotechnology	Prof. J Albertyn	Selection for Master's Degree
PGRD	B4810	48001	BC480039	Master of Science majoring in Microbiology	Prof. J Albertyn	Selection for Master's Degree
PGRD	B4810	48001	BC470178	Master of Science majoring in Microbiology	Prof. J Albertyn	Selection for Master's Degree
PGRD	B4840	48001	BC480078	Master of Science majoring in Mineral Resource Management	Mrs C van der Vyver	Selection for Master's Degree
PGRD	B4830	48001	BC480040	Master of Science majoring in Physics	Dr J Venter	Selection for Master's Degree
PGRD	B4880	48001	BC480041	Master of Science majoring in Plant Breeding	Dr B Visser	Selection for Master's Degree
PGRD	B4880	48001	BC480081	Master of Science majoring in Plant Breeding Interdisciplinary	Dr B Visser	Selection for Master's Degree
PGRD	B4810	48001	BC480082	Master of Science majoring in Plant Health Ecology	Dr B Visser	Selection for Master's Degree
PGRD	B4880	48001	BC480042	Master of Science majoring in Plant Pathology	Dr B Visser	Selection for Master's Degree
PGRD	B4880	48001	BC480083	Master of Science majoring in Plant Pathology Interdisciplinary	Dr B Visser	Selection for Master's Degree
PGRD	B4890	48001	BC480085	Master of Science majoring in Property Science	Mrs E Jacobs	Selection for Master's Degree
PGRD	B4890	48001	BC480043	Master of Science majoring in Quantity Surveying	Mrs E Jacobs	Selection for Master's Degree
PGRD	B4720	47201	BC470187	Master of Science majoring in Risk Analysis	Dr M von Maltitz	Selection for Master's Degree
PGRD	B4820	48001	BC480087	Master of Science majoring in Risk Analysis	Dr M von Maltitz	Selection for Master's Degree
PGRD	B4840	48001	BC480044	Master of Science majoring in Soil Sciences	Miss E Kruger	Selection for Master's Degree
PGRD	B4850	48001	BC480089	Master of Science majoring in Wildlife	Dr A Geyer	Selection for Master's Degree
PGRD	B4810	48001	BC480049	Master of Science majoring in Zoology	Dr C Jansen van Rensburg	Selection for Master's Degree
PGRD	B4739	47301	BC470179	Master of Sciencein Nanoscience	Dr J Venter	Selection for Master's Degree

PGRD	B5781	57847	BC571347	Master of Sustainable Agriculture	Dr J van Niekerk	Selection for Master’s Degree
PGRD	B4893	48901	BC480348	Master of Urban and Regional Planning (For professional registration)		Selection for Master’s Degree
PGRD	B4893	48901	BC470348	Master of Urban and Regional Planning (Research)		Selection for Master’s Degree

DOCTOR OF PHILOSOPHY PROGRAMMES

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC PLAN CODE	ENGLISH TITTLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	B4900	49001	BC490052	Doctor of Philosophy majoring in Agricultural Management	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4900	49001	BC490072	Doctor of Philosophy majoring in Irrigation Management	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4900	49001	BC490090	Doctor of Philosophy majoring in Wildlife Management	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4900	49001	BC490090	Doctor of Philosophy majoring in Animal Production Management	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4910	49001	BC490018	Doctor of Philosophy majoring in Behavioural Genetics	Ms Z Murray	Selection for Doctorate Degree
PGRD	B4910	49001	BC490019	Doctor of Philosophy majoring in Biochemistry	Dr F O’Neill	Selection for Doctorate Degree
PGRD	B4910	49001	BC490020	Doctor of Philosophy majoring in Botany	Dr B Visser	Selection for Doctorate Degree
PGRD	B4910	49001	BC490027	Doctor of Philosophy majoring in Entomology	Dr C Jansen van Rensburg	Selection for Doctorate Degree
PGRD	B4910	49001	BC490030	Doctor of Philosophy majoring in Forensic Science	Dr K Ehlers	Selection for Doctorate Degree
PGRD	B4910	49001	BC490031	Doctor of Philosophy majoring in Genetics	Mrs Z Murray	Selection for Doctorate Degree
PGRD	B4910	49001	BC490039	Doctor of Philosophy majoring in Microbiology	Prof. J Albertyn	Selection for Doctorate Degree
PGRD	B4910	49001	BC490049	Doctor of Philosophy majoring in Zoology	Dr C Jansen van Rensburg	Selection for Doctorate Degree
PGRD	B4910	49001	BC490065	Doctor of Philosophy majoring in Forensic Chemistry	Dr K Ehlers	Selection for Doctorate Degree
PGRD	B4910	49001	BC490066	Doctor of Philosophy majoring in Forensic Entomology	Dr K Ehlers	Selection for Doctorate Degree
PGRD	B4910	49001	BC490067	Doctor of Philosophy majoring in Forensic Genetics	Dr K Ehlers	Selection for Doctorate Degree
PGRD	B4910	49001	BC490068	Doctor of Philosophy majoring in Forensic Interdisciplinary	Dr K Ehlers	Selection for Doctorate Degree
PGRD	B4910	49001	BC490076	Doctor of Philosophy majoring in Limnology	Mrs M Avenant	Selection for Doctorate Degree
PGRD	B4910	49001	BC490077	Doctor of Philosophy majoring in Microbial Biotechnology	Prof. J Albertyn	Selection for Doctorate Degree
PGRD	B4910	49001	BC490082	Doctor of Philosophy majoring in Plant Health Ecology	Dr B Visser	Selection for Doctorate Degree
PGRD	B4920	49001	BC490010	Doctor of Philosophy majoring in Actuarial Science	Dr M von Maltitz	Selection for Doctorate Degree
PGRD	B4920	49001	BC490016	Doctor of Philosophy majoring in Applied Mathematics	Mr C Venter	Selection for Doctorate Degree
PGRD	B4920	49001	BC490037	Doctor of Philosophy majoring in Mathematical Statistics	Dr M von Maltitz	Selection for Doctorate Degree
PGRD	B4920	49001	BC490038	Doctor of Philosophy majoring in Mathematics	Mr C Venter	Selection for Doctorate Degree
PGRD	B4920	49001	BC490046	Doctor of Philosophy majoring in Statistics	Dr M von Maltitz	Selection for Doctorate Degree
PGRD	B4930	49001	BC490017	Doctor of Philosophy majoring in Astrophysics	Dr J Venter	Selection for Doctorate Degree
PGRD	B4930	49001	BC490021	Doctor of Philosophy majoring in Chemistry	Dr J Venter	Selection for Doctorate Degree
PGRD	B4930	49001	BC490040	Doctor of Philosophy majoring in Physics	Dr J Venter	Selection for Doctorate Degree
PGRD	B4930	49001	BC490079	Doctor of Philosophy majoring in Nanoscience	Dr J Venter	Selection for Doctorate Degree
PGRD	B4940	49001	BC490028	Doctor of Philosophy majoring in Environmental Geology	Mrs J Magson	Selection for Doctorate Degree
PGRD	B4940	49001	BC490032	Doctor of Philosophy majoring in Geochemistry	Mrs J Magson	Selection for Doctorate Degree
PGRD	B4940	49001	BC490033	Doctor of Philosophy majoring in Geography	Miss E Kruger	Selection for Doctorate Degree
PGRD	B4940	49001	BC490034	Doctor of Philosophy majoring in Geohydrology	Mrs J Magson	Selection for Doctorate Degree
PGRD	B4940	49001	BC490035	Doctor of Philosophy majoring in Geology	Mrs J Magson	Selection for Doctorate Degree
PGRD	B4940	49001	BC490069	Doctor of Philosophy majoring in Geo-Informatics	Miss E Kruger	Selection for Doctorate Degree
PGRD	B4940	49001	BC490078	Doctor of Philosophy majoring in Mineral Resource Management	Mrs J Magson	Selection for Doctorate Degree
PGRD	B4950	49001	BC490025	Doctor of Philosophy Disaster Management	Miss O Kunguma	Selection for Doctorate Degree
PGRD	B4950	49001	BC490060	Doctor of Philosophy Environmental Management	Ms M Avenant	Selection for Doctorate Degree
PGRD	B4960	49001	BC490022	Doctor of Philosophy majoring in Computer Science and Informatics	Mr J Marais	Selection for Doctorate Degree
PGRD	B4960	49001	BC490056	Doctor of Philosophy majoring in Computer Information Systems	Mr J Marais	Selection for Doctorate Degree
PGRD	B4970	49001	BC490023	Doctor of Philosophy majoring in Consumer Sciences	Prof. H Steyn	Selection for Doctorate Degree
PGRD	B4980	49001	BC490011	Doctor of Philosophy majoring in Agricultural Economics	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4980	49001	BC490012	Doctor of Philosophy majoring in Agrometeorology	Dr A Geyer	Selection for Doctorate Degree

PGRD	B4980	49001	BC490013	Doctor of Philosophy majoring in Agronomy	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4980	49001	BC490015	Doctor of Philosophy majoring in Animal Sciences	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4980	49001	BC490029	Doctor of Philosophy majoring in Food Science	Dr F O'Neill/Prof. J Albertyn	Selection for Doctorate Degree
PGRD	B4980	49001	BC490036	Doctor of Philosophy majoring in Grassland Science	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4980	49001	BC490041	Doctor of Philosophy majoring in Plant Breeding	Dr B Visser	Selection for Doctorate Degree
PGRD	B4980	49001	BC490042	Doctor of Philosophy majoring in Plant Pathology	Dr B Visser	Selection for Doctorate Degree
PGRD	B4980	49001	BC490044	Doctor of Philosophy majoring in Soil Sciences	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4980	49001	BC490047	Doctor of Philosophy majoring in Sustainable Agriculture	Dr J van Niekerk	Selection for Doctorate Degree
PGRD	B4980	49001	BC490053	Doctor of Philosophy majoring in Agrometeorology Interdisciplinary	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4980	49001	BC490054	Doctor of Philosophy majoring in Agronomy Interdisciplinary	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4980	49001	BC490081	Doctor of Philosophy majoring in Plant Breeding Interdisciplinary	Dr B Visser	Selection for Doctorate Degree
PGRD	B4980	49001	BC490083	Doctor of Philosophy majoring in Plant Pathology Interdisciplinary	Dr B Visser	Selection for Doctorate Degree
PGRD	B4980	49001	BC490088	Doctor of Philosophy majoring in Soil Science Interdisciplinary	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4980	49001	BC490089	Doctor of Philosophy majoring in Wildlife	Dr A Geyer	Selection for Doctorate Degree
PGRD	B4990	49091	BC490014	Doctor of Philosophy in Architecture	Mr J Olivier	Selection for Doctorate Degree
PGRD	B4990	49001	BC490024	Doctor of Philosophy majoring in Construction Management	Mrs E Jacobs	Selection for Doctorate Degree
PGRD	B4990	49001	BC490043	Doctor of Philosophy majoring in Quantity Surveying	Mrs E Jacobs	Selection for Doctorate Degree
PGRD	B4990	49001	BC490048	Doctor of Philosophy majoring in Urban and Regional Planning	Prof. V Nel	Selection for Doctorate Degree
PGRD	B4990	49001	BC490085	Doctor of Philosophy majoring in Property Science	Mrs E Jacobs	Selection for Doctorate Degree
PGRD	B4990	49001	BC490071	Doctor of Philosophy majoring in Human Settlements	Mrs E Jacobs	Selection for Doctorate Degree

QWAQWA CAMPUS

UNDERGRADUATE PROGRAMMES

ACCESS PROGRAMMES AND EXTENDED PROGRAMMES

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC CODE	ENGLISH TITTLE	PROGRAMME DIRECTOR	REQUIREMENTS				
						AP	NSC % IN TUITION LANGUAGE	NSC LEVEL MATHS	NSC LEVEL PHYSICAL SCIENCE	NSC LEVEL LIFE SCIENCE
UGRD	Q43E2	43001	QC4300E1	Bachelor of Science Extended Degree Mathematics, Chemistry and Biology	Mrs L Koenig	24	40%	40%	40% OR	40%
UGRD	Q43E1	43610	QC4301E1	Bachelor of Science Extended Degree Computer Sciences and Information Technology	Mrs L Koenig	24	40%	40%	40% OR	40%
UGRD	Q43E2	43001	QC4300E2	Bachelor of Science Extended Degree Mathematics, Geography and Biology	Mrs L Koenig	24	40%	40%	40% OR	40%
UGRD	M4001	NA	40001	University Preparation Programme in Mathematics and Chemistry (Access-programme)	Mrs L Koenig	20	40%	40%	40% OR	40%
BACHELOR DEGREES										
UGRD	Q4310	43001	QC432075	Bachelor of Science majoring in Botany and Life Sciences	Dr Tom Okella	30	50%	60%	50%	60%
UGRD	Q4310	43001	QC434975	Bachelor of Science majoring in Zoology and Life Sciences	Dr Tom Okella	30	50%	60%	50%	60%
UGRD	Q4310	43001	QC437500	Bachelor of Science majoring in Life Sciences	Dr Tom Okella	30	50%	60%	50%	60%
UGRD	Q4320	43001	QC433821	Bachelor of Science majoring in Mathematics and Chemistry	Mr Teboho Lesesa	30	50%	70%	50%	60%
UGRD	Q4320	43001	QC433840	Bachelor of Science majoring in Mathematics and Physics	Mr Teboho Lesesa	30	50%	70%	50%	60%
UGRD	Q4320	43001	QC433822	Bachelor of Science majoring in Mathematics and Computer Science	Mr Teboho Lesesa	30	50%	70%	NA	NA
UGRD	Q4330	43001	QC432120	Bachelor of Science majoring in Chemistry and Botany	Mr Richard Ocaya	30	50%	60%	50%	60%
UGRD	Q4330	43001	QC432140	Bachelor of Science majoring in Chemistry and Physics	Mr Richard Ocaya	30	50%	60%	50%	60%
UGRD	Q4340	43001	QC433359	Bachelor of Science majoring in Geography and Environmental Geography	Dr Tom Okella	30	50%	60%	50%	60%
UGRD	Q4340	43001	QC433392	Bachelor of Science majoring in Geography and Tourism	Dr Tom Okella	30	50%	60%	NA	NA

UGRD	Q4340	43001	QC433375	Bachelor of Science majoring in Geography and Life Science	Dr Tom Okella	30	50%	60%	50%	60%
UGRD	Q4360	43601	QC432221	Bachelor of Science in Information Technology majoring in Computer Science and Chemistry	Mr Teboho Lesesa	30	50%	60%	50%	
UGRD	Q4360	43601	QC432240	Bachelor of Science in Information Technology majoring in Computer Science and Physics	Mr Teboho Lesesa	30	50%	60%	50%	
UGRD	Q4360	43601	QC432202	Bachelor of Science in Information Technology majoring in Computer Science and Management	Mr Teboho Lesesa	30	50%	50%	NA	NA

POSTGRADUATE PROGRAMMES

BACHELOR OF HONOURS DEGREES

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC CODE	ENGLISH TITTLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	Q4610	46001	QC460021	Bachelor of Science Honours majoring in Botany	Dr Tom Okella	Average of 60% for Botany on NQF-level 7. Selections for a BScHons programme.
PGRD	Q4610	46001	QC460049	Bachelor of Science Honours majoring in Zoology	Dr Tom Okella	Average of 60% for Zoology on NQF-level 7.Selections for a BScHons programme.
PGRD	Q4630	46001	QC460040	Bachelor of Science Honours majoring in Physics	Mr Richard Ocaya	Average of 60% for Physics on NQF-level 7.Selections for a BScHons programme.
PGRD	Q4630	46001	QC460084	Bachelor of Science Honours majoring in Polymer Science	Mr Richard Ocaya	Average of 60% for Chemistry on NQF-level 7.Selections for a BScHons programme.
PGRD	Q4640	46001	QC460033	Bachelor of Science Honours majoring in Environmental Geography	Dr Tom Okella	Average of 60% for Geograhpy on NQF-level 7.Selections for a BScHons programme.
PGRD	Q4660	46001	QC460022	Bachelor of Science Honours majoring in Computer Science and Informatics	Mr Teboho Lesesa	Average of 60% for Computer Science on NQF-level 7.Selections for a BScHons programme.

MASTER'S DEGREES

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC CODE	ENGLISH TITTLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	Q4810	48001	QC480020	Master of Science majoring in Botany	Dr Tom Okella	Selection for a Master in Science degree
PGRD	Q4810	48001	QC480049	Master of Science majoring in Zoology	Dr Tom Okella	Selection for a Master in Science degree
PGRD	Q4830	48001	QC480084	Master of Science majoring in Polymer Sciences	Mr Richard Ocaya	Selection for a Master in Science degree
PGRD	Q4830	48001	QC480021	Master of Science majoring in Chemistry	Mr Richard Ocaya	Selection for a Master in Science degree
PGRD	Q4830	48001	QC480040	Master of Science majoring in Physics	Mr Richard Ocaya	Selection for a Master in Science degree
PGRD	Q4840	48001	QC480059	Master of Science majoring in Environmental Geography	Dr Tom Okella	Selection for a Master in Science degree
PGRD	Q4840	48001	QC480033	Master of Science majoring in Geography	Dr Tom Okella	Selection for a Master in Science degree
PGRD	Q4860	48001	QC480022	Master of Science majoring in Computer Science and Informatics	Mr Teboho Lesesa	Selection for a Master in Science degree

DOCTORATE DEGREES

CAREER	PROGRAMME CODE	DEGREE CODE	ACADEMIC CODE	ENGLISH TITTLE	PROGRAMME DIRECTOR	REQUIREMENTS
PGRD	Q4910	49001	QC490020	Doctor of Philosophy majoring in Botany	Dr Tom Okella	Selection for PhD degree
PGRD	Q4910	49001	QC490049	Doctor of Philosophy majoring in Zoology	Dr Tom Okella	Selection for PhD degree
PGRD	Q4920	49001	QC490038	Doctor of Philosophy majoring in Mathematics	Mr Teboho Lesesa	Selection for PhD degree
PGRD	Q4930	49001	QC490040	Doctor of Philosophy majoring in Physics	Mr Richard Ocaya	Selection for PhD degree
PGRD	Q4930	49001	QC490084	Doctor of Philosophy majoring in Polymer	Mr Richard Ocaya	Selection for PhD degree
PGRD	Q4960	49001	QC490022	Doctor of Philosophy majoring in Computer Science and Informatics	Mr Teboho Lesesa	Selection for PhD degree

12. LEARNING PROGRAMMES AND MODULES REQUIRED

12.1 DIPLOMAS

12.1.1 ADVANCED DIPLOMA IN SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT BC520047

LEARNING PROGRAMMES FOR AGRICULTURE AND RURAL DEVELOPMENT

The main aim of the programme is to afford students, primarily agricultural extensionists, the opportunity to acquire the necessary skills and know-how to teach, demonstrate and facilitate sustainable agriculture and rural developmental (SARD) issues and practices to the benefit of the agricultural community. The exit level outcomes reflect an integration of the specific and critical outcomes. On achieving this qualification a graduate will, within the field of SARD and agricultural extension, be able to:

(a) Manage rural structures and group dynamics.
(b) Design strategies that will create understanding of production, marketing and value adding of agricultural produce by the community.
(c) Apply sustainable plant production practices.
(d) Apply sustainable animal production practices.
(e) Conduct sound and effective communication skills and transfer of knowledge systems.

COMPULSORY YEAR 1 + 2

SARD1716/1726	Fundamentals of Rural Development	SALP1716/1726	Foundational Theories in Animal Production
SAAM1716/1726	Fundamentals of Agriculture Economics	SACT1716/1726	Basic communication skills for Sustainable Agriculture
SACP1716/1726	Foundational theories in Plant Production		

12.2 LEARNING PROGRAMMES FOR UNIVERSITY PREPARATION, ACCESS AND EXTENDED CURRICULUM PROGRAMMES (SOUTH CAMPUS)

Students who do not comply with the Faculty of Natural and Agricultural Sciences entry requirements for main stream BSc studies can gain admission to the university through the University Preparation Programme (UPP) or the BSc Extended Curriculum Programmes. The programme provides students with an opportunity to improve their skills and competencies with aim of gaining access to mainstream studies after successful completion of the first year. These programmes also addresses, through a course in Skills and Competencies in Lifelong Learning, the student’s wider needs with regards to quality of personal life, study and reading skills, self-assertiveness, problem solving, and other generic competencies. These students also attend an academic language course in English to improve their reading and writing skills for higher education purposes.

UNIVERSITY PREPARATION PROGRAMMES 40001, 50001

LEARNING PROGRAMMES FOR UNIVERSITY PREPARATION PROGRAMMES

12.2.1 NATURAL SCIENCES 40001 (CHEMISTRY / MATHEMATICS)

YEAR			Semester 1	Semester 2
1	**Academic Modules**	Mathematics Chemistry Biology	MATD1554 OR MATD1534 CHEM1552 + CHEM1532 BLGY1513	MATD1564 OR MATD1544 CHEM1622 + CHEM1642 BLGY1643
	Development Modules	Academic language course Computer Literacy Life-long Learning – Natural Sciences	EALN1508 CSIL1551 SCNS1508	
	After successful completion of ALL THE MODULES in the first year of the BSc Four-year Curriculum (Extended Programme) with an average of 60 % for Academic modules, the student changes to the first year main fields of study modules of the learning programme of his/her choice on the Bloemfontein/ Qwaqwa campus set out in the Faculty's Rule Book. Students must take note of the following requirements: • Students must pass all academic modules in the June examination to continue their studies in the second semester • To register for CHEM1622 students must have passed CHEM1552 and CHEM1532 • To register for CHEM1642 students must have passed CHEM1552 and MATD1554 or level 4 for NSC or NCV Mathematics. • To register for MATD1564 students must have passed MATD1554. • To register for MATD1534 students must have have a level 4 for NSC or NCV Mathematics. • To register for MATD1544 students must have passed MATD1534 Students who could not complete the first two years of study in three years will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.			
2	In their second year of study students have to register for CHEM1551, CHEM1661 and CSIL1521 as well as all the first year main fields of study modules in the learning programme of choice as set out in the Faculty Rule Book. Students must take note of the following requirements: • To register for CHEM1551 students must have passed CHEM1622 + CHEM1642 as well as MATD1564 or MATD1534. • To register for CHEM1661, students must have passed CHEM1551. • The modules CHEM1552, CHEM1622, CHEM1532, CHEM1642, CHEM1551 and CHEM1661 must be passed to get recognition for CHEM1513+ CHEM1551 and CHEM1623/CHEM1643. • BLGY1513, BLGY1643 will be recognised as mainstream modules in the following academic year. • CSIL1551 and CSIQ1531to get recognition for CSIL1511. (See BSc main fields of study learning programmes).			
3	**Follow <u>second year</u> learning programme of choice in the Faculty Rule Book.** Students must take note of the following requirement: • Students must have pass CHEM1551, CHEM1661 and CSIL1521 to be allowed to change to the programme code of current study.			
4	**Follow the <u>third year</u> learning programme of choice as set out in the Faculty Rule Book.**			

12.2.2 AGRICULTURAL SCIENCES 50001 (AGRICULTURAL MODULES)

		Semester 1	Semester 2
1	Agricultural Economics Biological principles in Agriculture Introduction to Animal Wildlife and Grassland Sciences	AGEC1514 AGRI1514	AGEC1624 ANIG1624
	Academic language skills course English or Afrikaans Computer Literacy Life-long Learning Mathematical Literacy in Agriculture	EALN1508 or AGAN1508 CSIL1551 SCLL1508 MTDA1508	
	After successful completion of ALL THE MODULES in the first year of the UPP AGRIC Sciences with an average of 55 % for the Academic modules, the student changes to the first year main fields of study modules of the learning programme of his/her choice on the Bloemfontein/Qwaqwa campus set out in the Faculty's Rule Book. Students must take note of the following requirements: • Students must pass all academic modules in the June examination to continue their studies in the second semester Students who could not complete the first two years of study in three years will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.		
2	**Follow the main fields of study <u>first year</u> BAgric Learning Programme of choice as set forth in the Faculty Rule Book.** • The modules AGEC1514, AGRI1514, will be recognised as mainstream modules in the following academic year. • CSIL1551 must be passed to get recognition for CSIL1511. (See BSc main fields of study learning programmes).		
3	**Follow <u>second year</u> BAgric Learning Programme of choice as set forth in the Faculty Rule Book.**		
4	**Follow the <u>third year</u> BAgric Learning Programme of choice as set forth in the Faculty Rule Book.**		

LEARNING PROGRAMMES FOR EXTENDED CURRICULUM PROGRAMMES

12.2.3 BSc AGRICULTURE FIVE-YEAR BC5480E1 SOUTH CAMPUS

Year		Semester 1	Semester 2
1	Mathematics Chemistry Biology	MATD1554 OR MATD1534 CHEM1552 + CHEM1532 BLGY1513	MATD1564 OR MATD1544 CHEM1622 +CHEM1642 BLGY1643
	Academic language course Life-long Learning – Natural Sciences Computer Literacy	EALN1508 SCNS1508 CSIL1551	
	After successful completion of ALL THE MODULES in the first year of the BSc Five-year Curriculum (Extended Programme) with an average of 60 % for Academic modules, the student changes to the first year main fields of study modules of the learning programme of his/her choice on the Bloemfontein/Qwaqwa campus set out in the Faculty's Rule Book. • Students must pass all academic modules in the June examination to continue their studies in the second semester • To register for CHEM1622 students must have passed CHEM1552 and CHEM1532 • To register for CHEM1642 students must have passed CHEM1552 and MATD1554 or level 4 for NSC or NCV Mathematics. • To register for MATD1564 students must have passed MATD1554. • To register for MATD1534 students must have a level 4 for NSC or NCV Mathematics. • To register for MATD1544 students must have passed MATD1534 Students who could not complete the first two years of study in three years will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.		
2	In their second year of study students have to register for CHEM1551, CHEM1661 and CSIL1521 as well as all the <u>first year</u> main fields of study modules in the learning programme of choice as set out in the Faculty Rule Book. Students must take note of the following requirements: • To register for CHEM1551 students must have passed CHEM1622 + CHEM1642 as well as MATD1564. • To register for CHEM1661, students must have passed CHEM1551. • The modules CHEM1552, CHEM1622, CHEM1532, CHEM1642, CHEM1551 and CHEM1661 must be passed to get recognition for CHEM1513+ CHEM1551 and CHEM1623/CHEM1643. • BLGY1513 must be passed to get recognition for BLGY4153 and CSIL1551 to get recognition for CSIL1511. (See BSc main fields of study learning programmes).		
3	**Follow main fields of study <u>second year</u> BSc learning programme of choice as set out in the Faculty Rule Book.** Students must take note of the following requirement: • Students must have passed CHEM1551, CHEM1661 and CSIL1521 to be allowed to change to the programme code of current study.		
4	**Follow main fields of study <u>third year</u> BSc learning programme of choice as set out in the Faculty Rule Book.**		
5	**Follow main fields of study <u>fourth year</u> BSc learning programme of choice as set out in the Faculty Rule Book.**		

12.2.4 B AGRICULTURE FOUR-YEAR BC5300E1 SOUTH CAMPUS

		Semester 1	Semester 2
	Agricultural Economics Biological principles in Agriculture Introduction to Animal Wildlife and Grassland Sciences	AGEC1514 AGRI1514	AGEC1624 ANIG1624
	Academic language skills course English or Afrikaans Computer Literacy Life-long Learning Mathematical Literacy in Agriculture	EALN1508 or AGAN1508 CSIL1551 SCLL1508 MTDA1508	
	After successful completion of ALL THE MODULES in the <u>first year</u> of the BSc Four-year Curriculum (Extended Programme) or the UPP AGRIC Sciences with an average of 55 % for the Academic modules, the student changes to the first year main fields of study modules of the learning programme of his/her choice on the Bloemfontein/Qwaqwa campus set out in the Faculty's Rule Book. The student register for the 50901-50907 learning programme code. • Students must pass all academic modules in the June examination to continue their studies in the second semester Students who could not complete the first two years of study in three years will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.		
2	**Follow the main fields of study <u>first year</u> BAgric Learning Programme of choice as set forth in the Faculty Rule Book.** • The modules AGEC1514, AGRI1514, will be recognised as mainstream modules in the following academic year. • CSIL1551 must be passed to get recognition for CSIL1511. (See BSc main fields of study learning programmes).		
3	**Follow the main fields of study <u>second year</u> BAgric learning programme of choice as set forth in the Faculty Rule Book.**		
4	**Follow the main fields of study <u>third year</u> BAgric learning programme of choice as set forth in the Faculty Rule Book.**		

12.2.5 BSc FOUR-YEAR BC4300E1 (MATHEMATICS AND CHEMISTRY)

Year		Semester 1	Semester 2
1	Mathematics	MATD1554 OR MATD1534	MATD1564 OR MATD1544
	Chemistry	CHEM1552 + CHEM1532	CHEM1622 +CHEM1642
	Biology	BLGY1513	BLGY1643
	Academic language course Life-long Learning – Natural Sciences Computer Literacy	EALN1508 SCNS1508 CSIL1551	
	After successful completion of ALL THE MODULES in the first year of the BSc Four-year Curriculum (Extended Programme) with an average of 60 % for Academic modules, the student changes to the first year main fields of study modules of the learning programme of his/her choice on the Bloemfontein/Qwaqwa campus set out in the Faculty's Rule Book. Students must take note of the following requirements: • Students must pass all academic modules in the June examination to continue their studies in the second semester • To register for CHEM1622 students must have passed CHEM1552 and CHEM1532 • To register for CHEM1642 students must have passed CHEM1552 and MATD1554 or level 4 for NSC or NCV Mathematics. • To register for MATD1564 students must have passed MATD1554. • To register for MATD1534 students must have have a level 4 for NSC or NCV Mathematics. • To register for MATD1544 students must have passed MATD1534 Students who could not complete the first two years of study in three years will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.		
2	**In their second year of study students have to register for CHEM1551, CHEM1661 and CSIL1521 as well as all the first year main fields of study modules in the learning programme of choice as set out in the Faculty Rule Book.** Students must take note of the following requirements: • To register for CHEM1551 students must have passed CHEM1622 + CHEM1642 as well as MATD1564. • To register for CHEM1661, students must have passed CHEM1551. • The modules CHEM1552, CHEM1622, CHEM1532, CHEM1642, CHEM1551 and CHEM1661 must be passed to get recognition for CHEM1513+ CHEM1551 and CHEM1623/CHEM1643. • BLGY1513 must be passed to get recognition for BLGY1513 (Bloemfontein campus) and CSIL1551 to get recognition for CSIL1511. (See BSc main fields of study learning programmes).		
3	**Follow second year learning programme of choice in the Faculty Rule Book.** **Students must take note of the following requirement:** • Students must have pass CHEM1551, CHEM1661 and CSIL1521 to be allowed to change to the programme code of current study.		
4	**Follow the third year learning programme of choice as set out in the Faculty Rule Book.**		

12.2.6 BSc FOUR-YEAR BC4300E2 (MATHEMATICS AND FINANCES)
(SOUTH CAMPUS)
(Note: This programme is only presented in English)

Year		Semester 1	Semester 2
1	Mathematics	MATD1554 OR MATD1534	MATD1564 OR MATD1544
	Accounting or Introduction to human resource management Introduction to individual differences Economics	**TWO OF THE FOLLOWING:** EACC1614 **OR** EFHR1515 OR EFEC2614 **OR** EFBCS2514	**TWO OF THE FOLLOWING:** EACC1624 **OR** EFIO1525 EFEC2624 **OR** EFBCS2524
	Academic language course Life-long Learning – Natural Sciences Computer Literacy	EALN1508 SCNS1508 CSIL1551	
	After successful completion of ALL THE MODULES in the first year of the BSc Four-year Curriculum (Extended Programme) with an average of 60 % for Academic modules, the student changes to the first year main fields of study modules of the learning programme of his/her choice on the Bloemfontein/Qwaqwa campus set out in the Faculty's Rule Book. Students must take note of the following requirements: • To register for MATD1564 students must have passed MATD1554. • To register for MATD1534 students must have a level 4 for NSC or NCV Mathematics. • To register for MATD1544 students must have passed MATD1534 Students who could not complete the first two years of study in three years will not be allowed for re-registration to the Faculty of Natural and Agricultural Sciences.		
2	**In their second year of study students have to register for CSIL1521 as well as all the first year main fields of study modules in the learning programme of choice as set out in the Faculty Rule Book.**		
3	**Follow main fields of study second year learning programme of choice in the Faculty Rule Book.**		
4	**Follow main fields of study third year learning programme of choice in the Faculty Rule Book.**		

12.3 LEARNING PROGRAMMES FOR BACHELOR'S DEGREES (NQF EXIT LEVEL 7 & 8)

12.3.1 BACHELOR OF ARCHITECTURE BC430114

The Bachelor of Architecture involves full-time education that extends over six semesters and involves lectures, projects, and continuous assessment.

The purpose of this programme is to educate students who may register in the appropriate category for which they qualify with the South African Council for the Architectural Profession in terms of the provisions of the Architectural Profession Act 44 of 2000. The degree BArch provides access to the BArchHons degree.

Students are strongly advised to work in an architect's office or other approved similar institution during holidays in order to gain practical experience.

The assessments and examinations for the degree BArch are recognised by the minister concerned in terms of the provisions of the Architectural Profession Act (Act 44 of 2000). Training experience after completion of the BArch degree will be controlled by the conditions of the South African Council for the Architectural Profession. The registrar of this Council will provide information in this regard.

2016 CODE	40114	40114
YEAR		**FIRST**
SEMESTER	**FIRST**	**SECOND**
COMPULSORY YEAR	DESN1500 Design CONS1506 Construction HARC1504 History of Architecture PTEC1504 Presentation Techniques	
COMPULSORY SEMESTER	TRIG1512 Trigonometrical Drawing	PHOT1522 Photography
	UFS101 *EALN1508 or AGAN1508	
YEAR		**SECOND**
SEMESTER	**FIRST**	**SECOND**
	DESN2600 Design CONS2600 Construction HARC2604 History of Architecture CDRA2604 Computer Draughting TARC2604 Theory of Architecture	
YEAR		**THIRD**
SEMESTER	**FIRST**	**SECOND**
	DESN3700 Design CONS3706 Construction HARC3704 History of Architecture TARC3704 Theory of Architecture CCMR3704 Building Contracts Law	

12.3.2 BACHELOR OF AGRICULTURE

12.3.2.1 MANAGEMENT SPECIALISATION Fields of study BC530147, BC530152, BC530101, BC530102

LEARNING PROGRAMMES FOR MANAGEMENT SPECIALISATION

The objective of the degree and different learning programmes is to train students to apply agricultural knowledge practically on farm level as well as in agriculturally-related organisations. The BAgric qualification will allow persons to apply their knowledge in the fields of resource utilisation, agricultural production, processing, management and communication.

Learning programmes in this Field of study offer six options. These learning programmes will lead to one of the following qualifications: BAgric Irrigation Management, Animal Production Management, Mixed-farming Management, Crop Production Management, Agricultural Management or Wildlife Management. The programmes consist of the combination of two majors, e.g. combined with management subjects. The table below indicates the combinations for the different qualifications. Each student includes all the compulsory modules (row C1) from the prescribed disciplines for all three study years. Students must select sufficient other modules (other science subjects as supportive electives) from the compulsory row of any other discipline or from their own electives (E) to obtain a total of at least 120 credits for each of the first, the second and the third year of study.

Agricultural Extension is a new specialisation programme and students started in 2017 in any BAgric programme will be able to transfer to this programme in 2018.

DISCIPLINE	AGRICULTURAL EXTENSION	AGRICULTURAL MANAGEMENT	ANIMAL PRODUCTION MANAGEMENT	CROP PRODUCTION MANAGEMENT	AGRICULTURAL EXTENSION	AGRICULTURAL MANAGEMENT	ANIMAL PRODUCTION MANAGEMENT	CROP PRODUCTION MANAGEMENT
2018 CODE	**BC530147**	**BC530152**	**BC530101**	**BC530102**	**BC530147**	**BC530152**	**BC530101**	**BC530102**
YEAR			**FIRST** **FIRST**				**FIRST**	
SEMESTER							**SECOND**	
COMPULSORY C1	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGRI1624 AGRI1664 SCCS1624 ANIG1624	AGRI1624 AGRI1664 SCCS1624 ANIG1624	AGRI1624 AGRI1664 SCCS1624 ANIG1624	AGRI1624 AGRI1664 SCCS1624 ANIG1624
REQUIRED *if NBT < 65%			CSIL1511 UFS101 *EALN1508 or AGAN1508				CSIL1521	
YEAR			**SECOND**				**SECOND**	
SEMESTER			**FIRST**				**SECOND**	
C2	AGEX2614 CROP2614 ANIG2614 **ONE OF:** SOIL2614 GRAS2614	AGEC1634 AGEC2614 ANIG2614 CROP2614	SOIL2614 AGEC2614 ANIG2614 GRAS2614	CROP2614 SOIL2614 AGEC2614 CLIM2614	AGEX2624 CROP2624 ANIG2624 **ONE OF:** SOIL2624 WDMT2624	AGEC1624 AGEC2624 CROP2624 ANIG2624	AGEC1624 AGEC2624 WDMT2624 ANIG2624	CROP2624 SOIL2624 AGEC1624 **ONE OF:** CLIM2624 AGEG2624
YEAR		**THIRD**					**THIRD**	
SEMESTER		**FIRST**					**SECOND**	
C3	AGEX3714 AGEX3734 AGEX3754 **ONE OF:** ANIG3714 ANIG3734 CROP3714 GRAS3714 SOIL3714 WDMT3714	AGMA3714 AGMA3734 CROP3714 **ONE OF:** ANIG3714 ANIG3734	ANIG3714 ANIG3734 GRAS3714 **ONE OF:** AGMA3714 AGMA3734	CROP3714 SOIL3714 CLIM3714 **ONE OF:** AGMA3714 AGMA3734	AGEX3724 AGEX3744 AGEX3764 **ONE OF:** ANIG3724 ANIG3744 CROP3724 GRAS3724 SOIL3724	AGMA3724 AGMA3744 AGMA3762 **ONE OF:** CROP3724 ANIG3724 ANIG3744	ANIG3724 ANIG3744 AGMA3762 GRAS3724 **ONE OF:** AGMA3724 AGMA3744	CROP3724 SOIL3724 CLIM3724 AGMA3762 **ONE OF:** AGMA3724 AGMA3744

DISCIPLINE	IRRIGATION MANAGEMENT	MIXED FARMING MANAGEMENT	WILDLIFE MANAGEMENT	IRRIGATION MANAGEMENT	MIXED FARMING MANAGEMENT	WILDLIFE MANAGEMENT
2018 CODE	**BC530172**	**BC530103**	**BC530190**	**BC530172**	**BC530103**	**BC530190**
YEAR		**FIRST**			**FIRST**	
SEMESTER		**FIRST**			**SECOND**	
COMPULSORY C1	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGRI1514 AGRI1534 AGRI1554 AGEC1514	AGRI1624 AGRI1664 SCCS1624 ANIG1624	AGRI1624 AGRI1664 SCCS1624 ANIG1624	AGRI1624 AGRI1664 SCCS1624 ANIG1624
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 or AGAN1508			CSIL1521		
YEAR		**SECOND**			**SECOND**	
SEMESTER		**FIRST**			**SECOND**	
C2	CROP2614 SOIL2614 AGEC2614 CLIM2614	CROP2614 AGEC2614 ANIG2614 **ONE OF:** SOIL2614 CLIM2614 GRAS2614	SOIL2614 AGEC2614 ANIG2614 GRAS2614	CROP2624 SOIL2624 AGEC1624 AGEG2624	AGEC1624 CROP2624 ANIG2624 **ONE OF:** CLIM2624 SOIL2624 AGEG2624	SOIL2624 AGEC1624 WDMT2624 ANIG2624
YEAR		**THIRD**			**THIRD**	
SEMESTER		**FIRST**			**SECOND**	
C3	CROP3714 SOIL3714 AGEG3714 **ONE OF:** AGMA3714 AGMA3734	CROP3714 **ONE OF:** ANIG3714 ANIG3734 **ONE OF:** SOIL3714 GRAS3714 WDMT3714 **ONE OF:** AGMA3714 AGMA3734	GRAS3714 ANIG3714 WDMT3714 **ONE OF:** AGMA3714 AGMA3734	CROP3724 SOIL3724 AGEG3724 AGMA3762 **ONE OF:** AGMA3724 AGMA3744	CROP3724 AGMA3762 **ONE OF:** AGMA3724 AGMA3744 **ONE OF:** ANIG3724 ANIG3744 **ONE OF:** SOIL3724 GRAS3724	GRAS3724 AGMA3762 **TWO OF:** ANIG3724 ANIN3744 WILD3764 **ONE OF:** AGMA3724 AGMA3744

12.3.2.2 AGRICULTURAL ECONOMICS BC530111

LEARNING PROGRAMMES FOR AGRICULTURAL ECONOMICS

The objective of the degree is to train students to apply agricultural knowledge practically on the farm level as well as in agriculturally-related organisations. The BAgric qualification will allow persons to apply their knowledge in the fields of resource utilisation, agricultural production, processing, management and communication.

Learning programmes in this Field of study offer ONE option. Each student includes all the compulsory modules (row C1) from the prescribed disciplines for all three study years. Students must select sufficient other modules (other science subjects as supportive electives) from the compulsory row of any other discipline or from their own electives (E) to obtain a total of at least 120 credits for each year of study.

YEAR	**FIRST**	**FIRST**		**SECOND**	**SECOND**		**THIRD**	**THIRD**
SEMESTER	**FIRST**	**SECOND**		**FIRST**	**SECOND**		**FIRST**	**SECOND**
COMPULSORY C1	AGEC1634 LMER1514 EACC1614 AGEC1514	AGRI1624 EBUS1624 LMER1524 AGEC1624		AGEC2614 EBUS1614 EECF1614	AGEC2624 AGEG2624 EECF1624		AGEC3714 AGEC3734 EMIC2714	AGEC3724 AGEC3744 EMAC2714 AGMA3762
ELECTIVES		**ONE OF:** ANIG1624 SCCS1624		**ONE OF:** CROP2614 SOIL2614 ANIG2614 GRAS2614 EBEL2614	**TWO OF:** ANIG2624 CROP2624 SOIL2624 WDMT2624		**ONE OF:** ANIG3714 CROP3714 GRAS3714 SOIL3714 WDMT3714	**ONE OF:** ANIG3724 CROP3724 GRAS3724 SOIL3724
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 or AGAN1508	CSIL1521						

12.3.3 BACHELOR OF COMPUTER INFORMATION SYSTEMS BC430156

LEARNING PROGRAMMES IN COMPUTER INFORMATION SYSTEMS

Students need to enrol for all the compulsory modules (C1, C2, C3) for all three study years. Students may also select elective modules (E1, E2).

YEAR	**FIRST**			**SECOND**			**THIRD**	
SEMESTER	**FIRST**	**SECOND**		**FIRST**	**SECOND**		**FIRST**	**SECOND**
COMPULSORY C1	BCIS1513 CSIS1614 EBCS1514 EBUS1514 EHRM1514	BCIS1623 CSIS1624 EBCS1524 EIOP1524	**C2**	BCIS2614 CSIS2634 EBUS1614	BCIS2624 CSIS2624 EBUS1624 ELRM2624 ENOV2624	**C3**	BCIS3714 CSIS3714 EBUS2714 EBUS2715	CSIS3724 CSIS3744 ESBM2724 EBMA3725
ELECTIVES E1		CSIS1683	**E2**		CSIS2642			
REQUIRED ***if NBT < 65%**	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1521						

12.3.4 BACHELOR OF CONSUMER SCIENCE BC430123

LEARNING PROGRAMMES FOR CONSUMER SCIENCE

Consumer science is a study of the need of man regarding housing, clothing and food and the management of resources to satisfy these needs. After completion of this programme, the B Consumer Science student will be capable of following a career as a Consumer Scientist, e.g. consumer consultant, designer, buyer, marketer, or quality control inspector of consumer products. The student should also be capable of advising consumers on the management of time, energy and other resources. The major subjects are Foods, Consumer Science and Textiles. Learning programmes in the CONSUMER SCIENCE Field of study offer two options. Each student includes all the compulsory modules (row C1) from the prescribed disciplines for all three study years and selects sufficient other modules (other science subjects as supportive electives) from the compulsory row to obtain a total of at least 120 credits for each year of study.

	GENERAL						
YEAR		**FIRST**		**SECOND**		**THIRD**	
SEMESTER		**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY **C1**	CONSUMER BEHAVIOUR I-VI FOOD 1-VI FOOD SECURITY 1-IV	CNSB1614 CNSF1614 AGEC1514	CNSB1624 CNSF1624 NUTB1624	CNSB2614 CNSF2614 CNFS2613	CNSB 2624 CNSF2624 CNFS2623	CNSB3714 CNSF3714 CNFS3714	CNSB3724 CNSF3724 CNFS3724
ELECTIVES **Enough credits to obtain together with the compulsory modules 120 credits** (Students may either take the CNCC and CNCI in combination OR EBUS line)	Clothing Construction I-Vi Interior I-Vi Meal Management I	CNCC1612 CNSI1612 EBUS1614 General Management	CNCC1622 CNSI1622 EBUS1624 General management	CNCC2612 CNSI2612 EBUS2714 Entrepreneurship	CNCC2622 CNSI2622 FSCS2644 Food systems **OR** ESBM2724 Small business management	CNCC3712 CNSI3712 FSME3714	CNCC3722 CNSI3722 FSME3724
REQUIRED *if NBT < 65%		CSIL1511 UFS101 *EALN1508 **OR** AGAN1508	CSIL1521			CNCS3732	

12.4 LEARNING PROGRAMMES FOR BACHELOR OF SCIENCE DEGREES (NQF Exit Level 7 & 8)

12.4.1 BACHELOR OF SCIENCE

12.4.1.1 BACHELOR OF SCIENCE BC43XXYY

LEARNING PROGRAMMES FOR BACHELOR OF SCIENCE GENERAL

Each student includes 120 credits per year for three years. In planning their degree they need to consider the prerequisite for the second-year and third-year modules. They can only take modules that do not clash on the official timetable. This degree makes provision for one major with at least 60 NQF Exit Level 7 credits in that major and a combination of different related modules for at least 60 credits also at NQF Exit Level 7.

YEAR	**FIRST**			**SECOND**			**THIRD**	
SEMESTER	**FIRST**	**SECOND**		**FIRST**	**SECOND**		**FIRST**	**SECOND**
COMPULSORY **C1**	**60 CREDITS OF** BLGY1513 CHEM1513+ CHEM1551 PHYS1514 OR PHYS1534 MATM1614 OR MATM1534 GLGY1614	**60 CREDITS OF** BLGY1623 OR BLGY1643 OR BLGY1663 OR BLGY1683 CHEM1623 + CHEM1661 OR CHEM1643+CHEM1661 PHYS1624 OR PHYS1644 MATM1624 OR MATM1544 GLGY1624	C2	**60 CREDITS OF** BOCB2616 CHEM2613+CHEM2611 CHEM2633+ CHEM2631 ZLGY2616 PHYS2614+ PHYS2632 GENE2616 MCBP2616 BTNY2616 MATM2614 MATA2634 MATM2654 ENTO2616 FSCI2613+FSCC2613 GEOP2614 GEOH2614	**60 CREDITS OF** BOCE2626 CHEM2623+ CHEM2621+CHEM2643+ CHEM2641 ZLGY2626 PHYS2624+PHYS2642 GENE2626 MCBP2626 BTNY2626+BTNY2622 MATM2624 MATA2644 MATM2664 ENTO2626 FSCC2622+FSCS2624 GEOP2624 GISC2624 GEOH2624	C3	**60 CREDITS OF** BOCM3714+BOCE3714 CHEM3713+CHEM3711+ CHEM3733+ CHEM3731 ZLGY3714+ZLGY3734 PHYS3714+PHYS3732+PHYS3752 FORS3734+GENE3734 MCBG3714+MCBP3714 BTNY3714+BTNY3712 BTNY3734+BTNY3754 ENTO3714+ENTO3734 FSCA3714+FSCE3714 GEOH3714 GEOP3714	**60 CREDITS OF** BOCP3724+BOCS3724 CHEM3723+ CHEM3721+CHEM3743 + CHEM3741 ZLGY3724+ZLGY3744 PHYS3724+PHYS3742+PHYS3762 GENE3724+GENE3744 MCBC3724+MCBE3724 BTNY3724+BTNY3744 ENTO3724+ENTO3744 FSCP3724+FSCB3724 GEOP3724 GISC3724
REQUIRED *if NBT < 65%	CSIL1511 UFS101 EALN1508 OR AGAN1508	CSIL1521						

12.4.1.2 BACHELOR OF SCIENCE MAJORING IN ACTUARIAL SCIENCE BC431000

LEARNING PROGRAMMES IN ACTUARIAL SCIENCES

Students need to include all the compulsory modules for each year.

YEAR	**FIRST**			**SECOND**			**THIRD**	
SEMESTER	**FIRST**	**SECOND**		**FIRST**	**SECOND**		**FIRST**	**SECOND**
COMPULSORY C1	MATM1614 STSM1614 ACSF1613 EECF1614 ACSG1614	MATM1624 STSM1624 EECF1624 ACSF1623 CSIS1683	C2	ACSF2716 MATM2614 STSM2616 EMIC2714	ACSF2746 MATA2644 STSM2626 EMAC2724 MATM2664	C3	ACSL3706 ACSF3706 ACSS3716 STSM3714 STSM3734	STSM3724 STSM3744
ELECTIVE				MATM2654				
REQUIRED *if NBT < 65%	CSIL1511 UFS101 * EALN1508 and AGAN1508	CSIL1521						

12.4.1.3 BACHELOR OF SCIENCE MAJORING IN AGRICULTURAL ECONOMICS BC431100

LEARNING PROGRAMMES FOR AGRICULTURAL ECONOMICS

The objective is to train scientists who, through research and practically orientated development, can promote a scientific subject in particular or agricultural science in general. After acquiring the BScAgriculture qualification, the person will have the following skills, e.g. problem identification and aim formulation, collecting and verification of data, systematisation and interpretation of data, effective communication of information and making recommendations. **Learning programmes in this Field of study offer ONE option.** Each student includes all the compulsory modules (row C1) from the prescribed disciplines for all three study years. Students must select sufficient other modules (other science subjects as supportive electives) from the compulsory row of any other discipline or from their own electives (E) to obtain at least 120 credits for each year of study.

YEAR	FIRST			SECOND			THIRD	
SEMESTER	FIRST	SECOND		FIRST	SECOND		FIRST	SECOND
COMPULSORY C1	MATM1534 EBCS1514 AGEC1514	AGEC1624 MATM1544 STSA1624	C2	AGEC2614 EECF1614 STSA2616	AGEC2624 STSA2626 CSIS1683 EECF1624	C3	AGEC3714 AGEC3734 STSA3716	AGEC3724 AGEC3744 AGEC3721 STSA3726
ELECTIVE	BLGY1513 AGEC1634	**ONE OF:** SCCS1624 ANIG1624 BLGY1643		**ONE OF:** CROP2614 SOIL2614 ANIG2614 GRAS2614	**ONE OF:** CROP2624 ANIG2624 SOIL2624		**ONE OF:** CROP3714 ANIG3714 ANIG3734 SOIL3714 GRAS3714	**ONE OF:** CROP3724 ANIG3724 SOIL3724 GRAS3724 ANIG3744
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 or AGAN1508	CSIL1521						

12.4.1.4 BACHELOR OF SCIENCE IN CONSUMER SCIENCE BC432300

LEARNING PROGRAMMES FOR CONSUMER SCIENCE

After completion of the BSc Consumer Science programme the student will be capable to follow a career in the food industry. The major subjects are Foods and Food Science. **Learning programmes in the CONSUMER SCIENCE Field of study offer one option,** that takes four years and exits at at NQF Exit Level 8. Each student includes all the compulsory modules (row C1) from the prescribed disciplines for all three study years and select sufficient other modules (other science subjects as supportive electives) from the compulsory row to obtain a total of at least 120 credits for each year of study.

YEAR	FIRST			SECOND			THIRD			FOURTH	
SEMESTER	FIRST	SECOND		FIRST	SECOND		FIRST	SECOND		FIRST	SECOND
COMPULSORY C1	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 OR MATM1534 CNFD1532	BLGY1643 BLGY1683 CHEM1643+CHEM1661 STSA1624 CNCS1622		BOCH2614 MCBP2616 CNFD2614 FSCI2613 FSCC2613	EBMA2624 CNFD2624 FSCS2624 FSCC2622		CNFD3713 CNFD3732 NUTE3714 FSCA3714 CNCS3732	CNFD3744 FSCP3724 CNCS3724 FSCB3724		CNCS4809 Select 84 credits from CNCS4814 CNFD4808 NUTE4808/NUTE6808 FSCP4814 FSCD4814 FSCM4814	CNCS4824 FSCG4826
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1521									

12.4.1.5 BACHELOR OF SCIENCE MAJORING IN BIOLOGICAL SCIENCES
BIOLOGICAL SCIENCES Fields of study 1: BC4319*20, 27, 31, 39, 49;* BC4320*27, 31, 39, 49;* BC4327*31, 39, 49*; BC4331*39, 49*

LEARNING PROGRAMMES BIOLOGICAL SCIENCES Fields of study 1

Learning programmes in the BIOLOGICAL Field of study 1 offer 15 options with a combination of any two of the six disciplines. Learning programmes consist of the combination of any two majors, e.g. Biochemistry and Botany (BC431920), Biochemistry and Entomology(BC431927), Biochemistry and Genetics (BC431931), Biochemistry and Microbiology (BC431939), Biochemistry and Zoology(BC431949), Botany and Entomology(BC432027), Botany and Genetics(BC432031), Botany and Microbiology (BC432039), Botany and Zoology (BC432049) Entomology and Genetics(BC432731), Entomology and Microbiology(BC432739), Entomology and Zoology (BC432749), Genetics and Microbiology(BC433139) Genetics and Zoology(BC433149) Microbiology and Zoology(BC433949).

Students SELECT TWO DISCIPLINES and include all the compulsory modules in row (C1, C2, and **C3) of each of the selected disciplines for all three study years. Students need to SELECT enough modules per semester from the compulsory row (C1, C2, and C3) of any other discipline or from the elective row (E) for their selected disciplines to obtain at least 120 credits for each study year.**

DISCIPLINE	**BIOCHEMISTRY**	**MICROBIOLOGY**	**GENETICS**	**BOTANY**	**ENTOMOLOGY**	**ZOOLOGY**
2018 CODE	BC4319XX	BC4339XX	BC4331XX	BC4320XX	BC4327XX	BC4349XX
YEAR	**FIRST**					
SEMESTER	**FIRST**					
COMPULSORY C1	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 **OR** AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 **OR** AGAN1508	CSIL1511 UFS101 *EALN1508 **OR** AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508
YEAR	**SECOND**					
SEMESTER	**FIRST**					
COMPULSORY C2	BOCB2616	MCBP2616 BOCB2616	GENE2616	BTNY2616	ENTO2616	ZLGY2616
ELECTIVES	CHEM2613+ CHEM2611 CHEM2633+ CHEM2631 PHBG2616 FSCI2613+ FSCC2613	CHEM2613+ CHEM2611 CHEM2633+ CHEM2631 FSCI2613+ FSCC2613	PHBG2616		CROP2614 PLTB2613	
YEAR	**THIRD**					
SEMESTER	**FIRST**					
COMPULSORY C3	BOCM3714 BOCE3714	MCBG3714 MCBP3714	GENE3714 GENE3734	BTNY3712 **TWO OF:** BTNY3714 BTNY3734 BTNY3754	ENTO3714 + ENTO3734 **OR** ENTO3754	ZLGY3714 ZLGY3734
ELECTIVES					CROP3714 PPLG3714 PLTB3714	

DISCIPLINE	**BIOCHEMISTRY**	**MICROBIOLOGY**	**GENETICS**	**BOTANY**	**ENTOMOLOGY**	**ZOOLOGY**
2018 CODE	BC4319XX	BC4339XX	BC4331XX	BC4320XX	BC4327XX	BC4349XX
YEAR	**FIRST**					
SEMESTER	**SECOND**					
COMPULSORY C1	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661 **OR** CHEM1623+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661 **OR** CHEM1623+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661 **OR** CHEM1623+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661
REQUIRED *if NBT < 65%	CSIL1521	CSIL1521	CSIL1521	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**					
SEMESTER	**SECOND**					
COMPULSORY C2	BOCE2626	MCBP2626 BOCE2626	GENE2626	BTNY2626 BTNY2622	ENTO2626	ZLGY2626
ELECTIVES	CHEM2623+ CHEM2621 CHEM2643+ CHEM2641 PHBG2626 FSCC2622+ FSCS2624	CHEM2623+ CHEM2621 CHEM2643+ CHEM2641 FSCC2622+ FSCS2624	PHBG2626		CROP2624 PLTB2623	
YEAR	**THIRD**					
SEMESTER	**SECOND**					
COMPULSORY C3	BOCP3724 BOCS3724	MCBE3724 MCBC3724	GENE3744 GENE3764	**TWO OF** BTNY3724 BTNY3744 BTNY3764	ENTO3724+ ENTO3744	ZLGY3724 ZLGY3744
ELECTIVES			**ONE OF:** FORS3744 HMBG3744 GENE3764		CROP3724 PPLG3724 PLTB3724	

BIOLOGICAL SCIENCES Fields of study 2: BC433118, BC433130, BC433180

LEARNING PROGRAMMES IN BIOLOGICAL SCIENCES Fields of study 2

Learning programmes in the BIOLOGICAL SCIENCES Fields of study 2 offer 4 options with a Behavioural Genetics (Genetics and Psychology), Human Molecular Biology, Forensics Sciences or Genetics & Physiology. Students **select one of the options** and include all the compulsory modules in row (C1, C2, and C3) of each of the selected disciplines for all three study years. Students need to SELECT enough elective modules per semester from the compulsory row (C1, C2, and C3) of any other discipline or from the elective row (E) for their selected disciplines to obtain at least 120 credits for each study year.

DISCIPLINE	**BEHAVIOURAL GENETICS**	**FORENSIC SCIENCES**	**GENETICS & PHYSIOLOGY**	**BEHAVIOURAL GENETICS**	**FORENSICS SCIENCES**	**GENETICS & PHYSIOLOGY**
2018 CODE	**BC433118**	**BC433031**	**BC433180**	**BC433118**	**BC433031**	**BC433180**
YEAR		**FIRST**			**FIRST**	
SEMESTER		**FIRST**			**SECOND**	
COMPULSORY C1	BLGY1513 CHEM1513+CHEM1551 PSIN1514 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+CHEM1551 PHYS1534 **OR** PHYS1514 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1534	PSDE1624 BLGY1623 BLGY1663 BLGY1683 STSA1624 CHEM1623+CHEM1661 **OR** CHEM1643+CHEM1661	BLGY1623 BLGY1663 CHEM1623+CHEM1661 PHYS1644 **OR** PHYS1624 MATM1544	BLGY1623 BLGY1643 BLGY1663 BLGY1683 CHEM1643+CHEM1661 STSA1624
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1521	ANBG1524	CSIL1521
YEAR		**SECOND**			**SECOND**	
SEMESTER		**FIRST**			**SECOND**	
COMPULSORY C2	GENE2616 PSSO2614	FORS2616 GENE2616	GENE2616 PHBG2616	GENE2626 PSIH2724	FORS2626 GENE2626	GENE2626 PHBG2626
ELECTIVES (E)	ZLGY2616 PHBG2616	CHEM2613+CHEM2611 CHEM2633+CHEM2631 ENTO2616 ANBG2616	BOCB2616 ZLGY2616 MCBP2616	ZLGY2626 PHBG2626	CHEM2623+CHEM2621 CHEM2643+CHEM2641 ENTO2626 ANBG2626	BOCE2626 ZLGY2626 MCBP2626
YEAR		**THIRD**			**THIRD**	
SEMESTER		**FIRST**			**SECOND**	
COMPULSORY C3	GENE3714 GENE3734 PSPA3714 PSRM3714	FORS3714 FORS3734	GENE3714 GENE3734 PHBG3716 PHBN3712	GENE3744 PSPE3724 PSTH3724	FORS3724 FORS3744	GENE3744 PHBG3726 PHBE3722
ELECTIVES (E)	ZLGY3714 ZLGY3734 PHBG3716 PHBN3712	GENE3714+GENE3734 CHEM3713+CHEM3711 + CHEM3733+CHEM3731 ENTO3714+ENTO3734 ANBA3716+ANBT3704		ZLGY3724 ZLGY3744 PHBG3726 PHBE3722 **ONE OF:** FORS3744 HMBG3744 GENE3764	GENE3764+GENE3744 CHEM3723+CHEM3721+ CHEM3743+CHEM3741 ENTO3724+ENTO3744 ANBE3726	**ONE OF:** GENE3764 FORS3744 HMBG3744

BIOLOGICAL SCIENCES Fields of study 3: BC432082, BC432041, BC432042, BC432061

LEARNING PROGRAMMES BIOLOGICAL SCIENCES Fields of study 3

Learning programmes in the BIOLOGICAL SCIENCES Fields of study 3 offer 4 options, Plant health Ecology, Botany and Plant Pathology, Botany and Plant Breeding, Environmental Rehabilitation with Botany as a major in combination with other modules. Each student selects all the compulsory modules (rows C1, C2, C3) for each study year and chooses modules as supportive electives (E) per semester to obtain at least 120 credits for each study year.

DISCIPLINE`	**PLANT HEALTH ECOLOGY**	**BOTANY AND PLANT PATHOLOGY**	**BOTANY AND PLANT BREEDING**	**PLANT HEALTH ECOLOGY**	**BOTANY AND PLANT PATHOLOGY**	**BOTANY AND PLANT BREEDING**
2018 CODE	**BC432082**	**BC432042**	**BC432041**	**BC432082**	**BC432042**	**BC432041**
YEAR		**FIRST**			**FIRST**	
SEMESTER		**FIRST**			**SECOND**	
COMPULSORY C1	BLGY1513 CHEM1513+CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+CHEM1551 PHYS1534 MATM1614 OR MATM1534	BLGY1513 CHEM1513+CHEM1551 PHYS1534 MATM1614 OR MATM1534	BLGY1663 BLGY1643 CHEM1643+ CHEM1661 STSA1624 SCCS1624 ANIG1624	BLGY1623 BLGY1643 CHEM1643+ CHEM1661 STSA1624 BLGY1683 SCCS1624	BLGY1623 BLGY1643 BLGY1663 BLGY1683 CHEM1643+ CHEM1661 STSA1624
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 OR AGAN1508			CSIL1521		
YEAR		**SECOND**			**SECOND**	
SEMESTER		**FIRST**			**SECOND**	
COMPULSORY C2	ENTO2616 **AT LEAST 40 CREDITS OF:** BTNY2616 CLIM2614 GRAS2614 SOIL2614	BTNY2616 SOIL2614 MCBP2616 PLTB2613	BTNY2616 GENE2616 PLTB2613	ENTO2626 PPLG2624 **AT LEAST 24 CREDITS OF:** BTNY2622 BTNY2626 CROP2624 CLIM2624	BTNY2626 BTNY2622 PLTB2623 PPLG2624	BTNY2622 BTNY2626 PLTB2623 GENE2626
YEAR		**THIRD**			**THIRD**	
SEMESTER		**FIRST**			**SECOND**	
COMPULSORY	ENTO3714 PPLG3714 PPLG3734 **ONE OF:** ENTO3754 BTNY3734	BTNY3712 BTNY3714 BTNY3754 PPLG3714 PPLG3734	BTNY3712 BTNY3714 BTNY3734 BTNY3754 PLTB3714	ENTO3724 PPLG3724 PPLG3744 **ONE OF:** CLIM3724 BTNY3744	BTNY3724 BTNY3744 PPLG3724 PPLG3744	BTNY3724 BTNY3744 PLTB3724 PLTB3744

12.4.1.8 BACHELOR OF SCIENCE MAJORING IN BUILDING SCIENCES

BUILDING SCIENCES Fields of study 1: BC432400, BC434300, BC432401, BC434301

A degree for the academic preparation of a student for the profession of Quantity Surveying and Construction Management. Learning programmes in the BUILDING SCIENCES Fields of study 1 offer 4 options. Each student selects all the compulsory modules (rows C1, C2, C3) for each study year and chooses modules as supportive electives (E) per semester to obtain at least 120 credits for each study year.

	1		2		3		4	
DISCIPLINE	**BSc MAJORING IN CONSTRUCTION MANAGEMENT (RESIDENTIAL)**		**BSc MAJORING IN QUANTITY SURVEYING (RESIDENTIAL)**		**BSc MAJORING IN CONSTRUCTION MANAGEMENT (COMPACT LEARNING)**		**BSc MAJORING IN QUANTITY SURVEYING (COMPACT LEARNING)**	
2018 CODE	**BC432400**		**BC434300**		**BC432401**		**BC434301**	
	392 CREDITS		**392 CREDITS**		**392 CREDITS**		**392 CREDITS**	
YEAR	**FIRST**				**FIRST**			
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY **C1**	BDQR1504 BBSR1514 PHYS1512 EBCS1514 EBUS1514	BBER1524 BPDR1522 BARR1522 MATM1542	BDQR1504 BBSR1514 PHYS1512 EBCS1514 EBUS1514	BBER1524 BPDR1522 BARR1522 MATM1542	BDQD1504 (BUILD) PHYS1502 (BUILD) BBSD1514 (BUILD) EBCS1514 (EOFF) EBUS1514 (BUILD) MATM1502 (BUILD)	BBED1524 (BUILD) BPDD1522 (BUILD) BARD1522 (BUILD)	BDQD1504 (BUILD) BBSD1514 (BUILD) PHYS1502 (BUILD) EBCS1514 (EOFF) EBUS1514 (BUILD) MATM1502 (BUILD)	BBED1524 (BUILD) BPDD1522 (BUILD) BARD1522 (BUILD)
ELECTIVES	EACC1614 **OR**	EMAC2624	EACC1614 **OR**	EMAC2624	EACC1614		EACC1614	
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 or AGAN1508	CSIL1521	CSIL1511 UFS101 *EALN1508 or AGAN1508	CSIL1521				
YEAR	**SECOND**				**SECOND**			
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY **C2**	BDQR2604 BBSR2614 BCSR2612 BBER2612 BPDR2614	BPDR2624 BBER2622 BCSR2622 LLBR2624	BDQR2604 BBSR2614 BCSR2612 BBER2612 BPDR2614	BPDR2624 BBER2622 BCSR2622 LLBR2624	BDQD2604 (BUILD) BBSD2614 (BUILD) BCSD2612 (BUILD) BBED2612 (BUILD) BPDD2614 (BUILD) LMER2604	BPDD2624 (BUID) BBED2622 (BUILD) BCSD2622 (BUILD) LLBR2624	BDQD2604 (BUILD) BBSD2614 (BUILD) BCSD2612 (BUILD) BBED2612 (BUILD) BPDD2614 (BUILD) LMER2604 (EOFF)	BPDD2624 (BUILD) BBED2622 (BUILD) BCSD2622 (BUILD) LLBR2624
ELECTIVES	EECF1614 **OR**	EECF1624	EECF1614 **OR**	EECF1624	EECF1614 **OR**	EECF1624 OR	EECF1614 **OR**	EECF1624
YEAR	**THIRD**				**THIRD**			
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY **C3**	BDQR3706 BBSR3712 BCCR3712 BBER3712 BQPR3704 BPOR3706	BCCR3722 BIRR3722 BBSR3722 BBER3722	BDQR3706 BBSR3712 BCCR3712 BBER3712 BQPR3704 BPOR3706	BCCR3722 BIRR3722 BBSR3722 BBER3722	BDQD3706 (BUILD) BBSD3712 (BUILD) BCCD3712 (BUILD) BBED3712 (BUILD) BQPD3704 (BUILD) BPOD3706 (BUILD)	BCCD3722 (BUILD) BIRD3722 (BUILD) BBSD3722 (BUILD) BBED3722 (BUILD)	BDQD3706 (BUILD) BBSD3712 (BUILD) BCCD3712 (BUILD) BBED3712 (BUILD) BQPD3704 (BUILD) BPOD3706 (BUILD)	BCCD3722 (BUILD) BIRD3722 (BUILD) BBSD3722 (BUILD) BBED3722 (BUILD)

BIOLOGICAL SCIENCES Fields of study 4: BC431980, BC431929, BC431946, BC433929, BC433946

LEARNING PROGRAMMES IN THE BIOLOGICAL SCIENCES Fields of study 4

LEARNING PROGRAMMES BIOLOGICAL SCIENCES Fields of study 3 offer 5 options with a Food Science and Statistics in combination with Biochemistry and Microbiology as well as Biochemistry in combination with Physiology Microbiology and Biochemistry and Physiology. Students select one of the options and include all the compulsory modules in row (C1, C2, and C3) of each of the selected disciplines for all three study years. Students need to SELECT enough elective modules per semester from the compulsory row (C1, C2, and C3) or Electives.
of any other discipline or from

DISCIPLINE	**BIOCHEMISTRY & PHYSIOLOGY**	**BIOCHEMISTRY & FOOD SCIENCE**	**BIOCHEMISTRY & STATISTICS**	**MICROBIOLOGY & FOOD SCIENCE**	**MICROBIOLOGY & STATISTICS**	**BIOCHEMISTRY & PHYSIOLOGY**	**BIOCHEMISTRY & FOOD SCIENCE**	**BIOCHEMISTRY & STATISTICS**	**MICROBIOLOGY & FOOD SCIENCE**	**MICROBIOLOGY & STATISTICS**
2018 CODE	**BC431980**	**BC431929**	**BC431946**	**BC433929**	**BC433946**	**BC431980**	**BC431929**	**BC431946**	**BC433929**	**BC433946**
YEAR	**FIRST**					**FIRST**				
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C1	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1513 CHEM1513+ CHEM1551 PHYS1534 MATM1614 **OR** MATM1534	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661 **OR** CHEM1623+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661 **OR** CHEM1623+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661 **OR** CHEM1623+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+ CHEM1661 **OR** CHEM1623+ CHEM1661	BLGY1623 BLGY1643 BLGY1663 BLGY1683 STSA1624 CHEM1643+CHEM1661 **OR** CHEM1623+CHEM1661
REQUIRED * if NBT < 65%	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1521	CSIL1521	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**					**SECOND**				
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C2	BOCB2616 PHBG2616	BOCB2616+ FSCI2613 FSCC2613	BOCB2616 STSA2616	MCBP2616 FSCI2613 FSCC2613 BOCB2616	MCBP2616 STSA2616 BOCB2616	BOCE2626 PHBG2626	BOCE2626 FSCC2622 FSCS2624	BOCE2626 STSA2626	MCBP2626 FSCC2622 FSCS2624 BOCE2626	MCBP2626 STSA2626 BOCE2626
ELECTIVES E2	CHEM2613+ CHEM2611 CHEM2633+ CHEM2631	CHEM2613+ CHEM2611 CHEM2633+ CHEM2631	CHEM2613+ CHEM2611 CHEM2633+ CHEM2631			CHEM2623+ CHEM2621 CHEM2643+ CHEM2641	CHEM2623+ CHEM2621 CHEM2643+ CHEM2641	CHEM2623+ CHEM2621 CHEM2643+ CHEM2641		
YEAR	**THIRD**					**THIRD**				
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C3	BOCM3714 BOCE3714 PHBG3716 PHBN3712	BOCM3714 BOCE3714 FSCA3714 FSCE3714	BOCM3714 BOCE3714 STSA3732 STSA3716	MCBG3714 MCBP3714 FSCA3714 FSCE3714	MCBG3714 MCBP3714 STSA3732 STSA3716	BOCP3724 BOCS3724 PHBG3726 PHBE3722	BOCP3724 BOCS3724 FSCP3724 FSCB3724	BOCP3724 BOCS3724 STSA3742 STSA3726	MCBE3724 MCBC3724 FSCP3724 FSCB3724	MCBE3724 MCBC3724 STSA3742 STSA3726

12.4.1.9 BACHELOR OF SCIENCE MAJORING IN CHEMICAL AND PHYSICAL SCIENCES
PHYSICAL AND CHEMICAL SCIENCES Fields of study BC434017, BC434012, BC434026, BC432140, BC432119, BC432129, BC432129,BC432139

LEARNING PROGRAMMES PHYSICAL AND CHEMICAL SCIENCES FIELDS OF STUDY

Learning programmes in chemical and physical sciences offer EIGHT main options with either:

- Physics and Chemistry as the two majors
- Physics and Engineering Subjects, as the two majors
- Physics and Astrophysics, as the two majors
- Chemistry in combination Biological Subjects with one of the following: Biochemistry, Botany, Food Science or Microbiology as the other major.
- Physics and Agrometeorology, as the two majors

Each student choose at least one option and enrol for or all compulsory modules in compulsory rows (C1, C2, C3). If electives are available the students need to choose enough elective modules (E) per semester to obtain at least 120 credits in each study year.

Physics can also be in combination with Mathematics, Geology and Computer Science. Chemistry can also be in combination with Forensic Science, Mathematics, Geology and Computer Science.

DISCIPLINE	PHYSICS & CHEMISTRY	PHYSICS & ASTROPHYSICS	PHYSICS & AGROMETEOROLOGY	PHYSICS & ENGINEERING SUBJECTS	CHEMISTRY & BIOLOGICAL SUBJECTS	PHYSICS & CHEMISTRY	PHYSICS & ASTROPHYSICS	PHYSICS & AGROMETEOROLOGY	PHYSICS & ENGINEERING SUBJECTS	CHEMISTRY & BIOLOGICAL SUBJECTS
2018 CODE	**BC432140**	**BC434017**	**BC434012**	**BC434026**	**BC432119, BC432120, BC432129, BC432139**	**BC432140**	**BC434017**	**BC434012**	**BC434026**	**BC432119, BC432120, BC432129, BC432139**
YEAR	**FIRST**					**FIRST**				
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C1	PHYS1514 CHEM1513+ CHEM1551 MATM1614 **OR** MATM1534	PHYS1514 PHYA1554 MATM1614 OR MATM1534	PHYS1514 MATM1614 **OR** MATM1534	PHYS1514 MATA1614 MATM1614 CHEM1513+ CHEM1551 CSIE1606 QALC1513	CHEM1513+ CHEM1551 BLGY1513 PHYS1534 OR PHYS1514 MATM1614 **OR** MATM1534	PHYS1624 CHEM1623+ CHEM1661 MATM1624 **OR** MATM1544	PHYS1624 PHYA1664 MATM1624 **OR** MATM1544	PHYS1624 MATM1624 **OR** MATM1544 SCCS1624	PHYS1624 MATA1624 MATM1624 QEDR1524 QEFO1520	CHEM1623+ CHEM1661 BLGY1683 BLGY1643 STSA1624 MATM1544
ELECTIVES E1	CSIS1614 STSM1614 PHYA1554	CSIS1614 STSM1614 GLGY1614 CHEM1513+ CHEM1551	CSIS1614 STSM1614 PHYA1554 CHEM1513+ CHEM1551 BLGY1513			CSIS1624 STSM1624 STSA1624 SCCS1624 PHYA1664	CSIS1624 STSM1624 STSA1624 CHEM1623 CHEM1661	CSIS1624 STSM1624 STSA1624 PHYA1664 CHEM1623+ CHEM1661		PHYS1644 OR PHYS1624
REQUIRED *if NBT < 65%	CSIL1511 & UFS101 *EALN1508 OR AGAN1508					CSIL1521	CSIL1521	CSIL1521		CSIL1521
YEAR	**SECOND**					**SECOND**				
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C2	PHYS2614 PHYS2632 CHEM2613+ CHEM2611 CHEM2633+ CHEM2631	PHYS2614 PHYS2632 PHYA2614	PHYS2614 PHYS2632 CLIM2614	PHYS2614 PHYS2632 MATA2614 MATM2614 QSTR2614 **ONE OF:** QMSC2613 CSIE2613 QMAT2613	CHEM2613+CHEM2611 CHEM2633+CHEM2631 **AT LEAST ONE OF:** BOCB2616 BTNY2616 FSCI2613+FSCC2613 MCBP2616+BOCB2616	PHYS2624 PHYS2642 CHEM2623+ CHEM2621 CHEM2643+ CHEM2641	PHYS2624 PHYS2642 PHYA2624	PHYS2624 PHYS2642 CLIM2624	PHYS2624 PHYS2642 MATA2644 MATM2664 QELT2723 QWOR2520 QVAC2520 QMAD2623 **ONE OF:** GLGY2643 + GLGY2641	CHEM2623+ CHEM2621 CHEM2643+ CHEM2641 **AT LEAST ONE OF:** BOCE2626 BTNY2626 FSCC2622+ FSCS2624 MCBP2626+ BOCE2626

DISCIPLINE	PHYSICS & CHEMISTRY	PHYSICS & ASTROPHYSICS	PHYSICS & AGROMETEOROLOGY	PHYSICS & ENGINEERING SUBJECTS	CHEMISTRY & BIOLOGICAL SUBJECTS	PHYSICS & CHEMISTRY	PHYSICS & ASTROPHYSICS	PHYSICS & AGROMETEOROLOGY	PHYSICS & ENGINEERING SUBJECTS	CHEMISTRY & BIOLOGICAL SUBJECTS
2018 CODE	**BC432140**	**BC434017**	**BC434012**	**BC434026**	**BC432119, BC432120, BC432129, BC432139**	**BC432140**	**BC434017**	**BC434012**	**BC434026**	**BC432119, BC432120, BC432129, BC432139**
ELECTIVES E2	MATM2614 MATA2634 MATM2654 STSM2616 PHYM2613	MATA2634 MATM2654 STSM2616 PHYM2613 CHEM2633 CHEM2631 CHEM2613 CHEM2611 MATM2614	MATA2634 MATM2654 STSM2616 MATM2614 PHYM2613 CHEM2633 CHEM2631 CHEM2613 CHEM2611 MATM2614	PHYM2613	PHYM2613	MATA2644 MATM2624 MATM2664 STSM2626 PHYC2623	MATM2624 MATA2644 MATM2664 STSM2626 PHYC2623	MATA2644 MATM2624 MATM2664 STSM2626 PHYC2623	PHYC2623	PHYC2623 BTNY2622
YEAR	**THIRD**					**THIRD**				
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C3	PHYS3714 PHYS3732 PHYS3752 CHEM3713+ CHEM3711 CHEM3733+ CHEM3731	PHYS3714 PHYS3732 PHYS3752 PHYA3772 PHYA3709	PHYS3714 PHYS3732 PHYS3752 CLIM3714	PHYS3714 PHYS3732 PHYS3752 MATM2654 MATA3774 **ONE OF:** QSTR3714 + QFLO3724 **OR** QCLO3714 + QSIG3714	CHEM3713+CHEM3711 CHEM3733+ CHEM3731 **ONE OF:** BOCM3714+BOCE3714 MCBG3714 + MCBP3714 BTNY3714+BTNY3734 **OR** BTNY3754 FSCA3714+FSCE3714	PHYS3724 PHYS3742 PHYS3762 CHEM3723+ CHEM3721 CHEM3743+ CHEM3741	PHYS3724 PHYS3742 PHYS3762 PHYA3782	PHYS3724 PHYS3742 PHYS3762 CLIM3724	**CHOOSE ONE OF: STREAM A OR B** **STREAM A (PHYS)** QVAC3520 PHYS3724+ PHYS3742+ PHYS3762 **TWO OF** MATA3784 MATM3744 CSIS3744 **STREAM B (ENG)** QVAC3520 QTHE3724 QENV3724 **ONE OF:** QSTR3724 + QCIV3624 **OR** QMPR3724 + QPOW3724	CHEM3723+ CHEM3721 CHEM3743+ CHEM3741 **ONE OF:** BOCP3724+ BOCS3724 MCBE3724+ MCBC3724 FSCP3724+ FSCB3724 BTNY3724+ BTNY3744
ELECTIVES E3	CLNS3702 DATA3712	CLNS3702 GLGY3754 DATA3712 STSA3716	CLNS3702 MATM3714 MATM3734 MATA3774 DATA3712 STSA3716 PHYA3772	DATA3712	CLNS3702 BTNY3702 BTTNY3722 DATA3712		MATA3784 STSA3726	MATM3724 MATM3744 MATA3764 MATA3784 PHYA3782 STSA3726		

12.4.1.10 BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY
COMPUTER SCIENCE AND INFORMATICS FIELDS OF STUDY: BC432221, BC432237, BC432238, BC432240, BC432255

LEARNING PROGRAMMES IN COMPUTER SCIENCE AND INFORMATICS BSc(IT)

Learning programmes in Computer Science and Informatics offer 5 main fields with either:

- Computer Science and Chemistry
- Computer Science and Mathematics
- Computer Science and Mathematical Statistics
- Computer Science and Physics
- Computer Science in Business and Management

Each student selects ONE field and enrols for all the compulsory modules, in the compulsory rows (C1, C2, C3), for all three study years. Students also need to select enough elective modules per semester, in their field of study, from the electives row (E1, E2), to obtain a combined amount of credits from the compulsory and elective modules of at least a 120 credits in each study year.

DISCIPLINE	CHEMISTRY	MATHEMATICS	MATHEMATICAL STATISTICS	PHYSICS	BUSINESS & MANAGEMENT	CHEMISTRY	MATHEMATICS	MATHEMATICAL STATISTICS	PHYSICS	BUSINESS & MANAGEMENT
2018 CODE	**BC432221**	**BC432238**	**BC432237**	**BC432240**	**BC432255**	**BC432221**	**BC432238**	**BC432237**	**BC432240**	**BC432255**
YEAR			**FIRST**					**FIRST**		
SEMESTER			**FIRST**					**SECOND**		
COMPULSORY C1	CSIS1614 CSIS1553 CHEM1513+ CHEM1551 **ONE OF:** MATM1614 MATM1534	CSIS1614 CSIS1553 MATM1614 **ONE OF:** CHEM1513+ CHEM1551 PHYS1534 PHYS1514	CSIS1614 CSIS1553 STSM1614 MATM1614	CSIS1614 CSIS1553 PHYS1514 **ONE OF:** MATM1614 MATM1534	CSIS1614 CSIS1553 BCIS1513 **TWO OF:** EHRM1514 EBUS1514 EBCS1514 MATM1534	CSIS1624 CSIS1664 CHEM1623+ CHEM1661 **ONE OF:** MATM1544 MATM1624	CSIS1624 CSIS1664 MATM1624 **ONE OF:** CHEM1623+ CHEM1661 CHEM1643+ CHEM1661 PHYS1644 PHYS1624	CSIS1624 CSIS1664 STSM1624 MATM1624	CSIS1624 CSIS1664 PHYS1624 **ONE OF:** MATM1544 MATM1624	CSIS1624 CSIS1664 **TWO OF:** BCIS1623 EBCS1524 EIOP1524 EACC1624 MATM1544
ELECTIVES E1	BCIS1513	BCIS1513	BCIS1513	BCIS1513		CSIS1683	CSIS1683	CSIS1683	CSIS1683	CSIS1683
REQUIRED *if NBT < 65%	CSIL1511 & UFS101 *EALN1508 OR AGAN1508					CSIL1521				
YEAR			**SECOND**					**SECOND**		
SEMESTER			**FIRST**					**SECOND**		
COMPULSORY C2	CSIS2614 CSIS2634 CHEM2613+ CHEM2611 CHEM2633+ CHEM2631	CSIS2614 CSIS2634 MATM2654 MATM2614	CSIS2614 CSIS2634 STSM2616	CSIS2614 CSIS2634 PHYS2614 PHYS2632	CSIS2614 CSIS2634 **TWO OF:** STSA2616 BCIS2614 EECF1614 EBUS1614	CSIS2624 CSIS2664 CHEM2623+ CHEM2621 CHEM2643+ CHEM2641	CSIS2624 CSIS2664 MATM2664 **ONE OF:** MATM2624 MATA2644	CSIS2624 CSIS2664 STSM2626	CSIS2624 CSIS2664 PHYS2624 PHYS2642	CSIS2624 CSIS2664 **TWO OF:** STSA2626 BCIS2624 EBUS1624 EBMA2624 EECF1624
ELECTIVES E2	MATM2654 MATA2634	MATA2634	MATM2654 MATM2614 MATA2634	MATM2654 MATM2614 MATA2634		MATA2644 CSIS2642	CSIS2642	MATA2644 MATM2664 CSIS2642	MATA2644 CSIS2642	CSIS2642
YEAR			**THIRD**					**THIRD**		
SEMESTER			**FIRST**					**SECOND**		
COMPULSORY C3	CSIS3714 CSIS3734 CHEM3713+ CHEM3711 CHEM3733+ CHEM3731	CSIS3714 CSIS3734 MATA3774 ONE OF: MATM3714 MATM3734	CSIS3714 CSIS3734 STSM3714 STSM3734	CSIS3714 CSIS3734 PHYS3714 PHYS3732 PHYS3752	CSIS3714 CSIS3734 **TWO OF:** EBUS2714 STSA3716 ETRM3714 STSA3732	CSIS3724 CSIS3744 CHEM3723+ CHEM3721 CHEM3743+ CHEM3741	CSIS3724 CSIS3744 MATM3724 **ONE OF:** MATM3744 MATA3784	CSIS3724 CSIS3744 STSM3724 STSM3744	CSIS3724 CSIS3744 PHYS3724 PHYS3742 PHYS3762	CSIS3724 CSIS3744 **TWO OF:** EBMA3725 STSA3726 ESBM2724 STSA3742

12.4.1.11 BACHELOR OF SCIENCE MAJORING IN GEOSCIENCES
GEOGRAPHY FIELD OF STUDY 1: BC433360, BC433346, BC433354, BC433312

LEARNING PROGRAMMES IN GEOSCIENCES FIELD OF STUDY I

The learning programmes in Geography and the Environmental sciences are studies of the properties and processes in the earth and on the surface and encompass a holistic study of the human environment and accompanying interactions and relationships. The programme is aimed at students who are interested in various aspects of the environment and can lead to specialisation as environmentalists. Careers in these sciences are divergent because all institutions that are involved with resource utilisation are legally obliged to examine the impact of their activities on the environment. The connection of geographical information and computer technology simplifies the storage, processing, modelling and presentation of information and expedites decision making.

Each student selects all the compulsory modules (rows C1, C2, C3) for all three study years and chooses modules as supportive electives (E) per semester to obtain at least 120 credits for each year of study.

DISCIPLINE	GEO-INFORMATICS	GEOGRAPHY AND STATISTICS	GEOGRAPHY AND ENVIRONMENTAL SCIENCES	GEOGRAPHY AND AGROMETEOROLOGY	GEO-INFORMATICS	GEOGRAPHY AND STATISTICS	GEOGRAPHY AND ENVIRONMENTAL SCIENCES	GEOGRAPHY AND AGROMETEOROLOGY
2018 CODE	**BC433369**	**BC433346**	**BC433362**	**BC433312**	**BC433369**	**BC433346**	**BC433362**	**BC433312**
YEAR	**FIRST**				**FIRST**			
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY **C1**	GEOP1514 CSIS1614 MATM1534 PHYS1514 EBUS1514	GEOP1514 EBUS1514 MATM1534 **ONE OF:** CSIS1614 CSIS1553	GEOP1514 EBUS1514 BLGY1513 **ONE OF:** CHEM1513+CHEM1551 MATM1534	GEOP1514 EBUS1514 MATM1534 **ONE OF:** BLGY1513 CHEM1513+CHEM1551 PHYS1514	GEOH1624 CSIS1624 CSIS1664 MATM1544 STSA1624	GEOH1624 STSA1624 SCCS1624 **ONE OF:** CSIS1624 CSIS1683	GEOH1624 STSA1624 SCCS1624 BLGY1643 BLGY1663	GEOH1624 STSA1624 SCCS1624 **ONE OF:** BLGY1643+BLGY1663 CHEM1643+CHEM1661 MATM1544 PHYS1624
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1511 UFS101 *EALN1508 OR AGAN1508	CSIL1521	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**				**SECOND**			
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY **C2**	GEOH2614 GEOP2614 CSIS2634 CSIS2614	GEOH2614 GEOP2614 STSA2616 EBUS2714	GEOH2614 GEOP2614 SOIL2614	GEOH2614 GEOP2614 SOIL2614 CLIM2614	GEOP2624 GISC2624 CSIS2664 SURV2622	GEOP2624 GISC2624 STSA2626	GEOP2624 GISC2624 SOIL2624 GLGY2643	GEOP2624 GISC2624 SOIL2624 CLIM2624
ELECTIVES E1	EBUS2714 CSIS1553		BTNY2616 OR ZLGY2616				BTNY2626+BTNY2622 OR ZLGY2626	
YEAR	**THIRD**				**THIRD**			
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY **C3**	GEOP3714 GISC3704 CSIS3734 CSIS3714	GEOP3714 STSA3716 STSA3732 GEOH3714	GEOP3714 SOIL3714 EBUS2714	GEOP3714 GEOH3714 SOIL3714 CLIM3714	GEOP3724 GISC3724 CSIS3744 CSIS3724	GEOP3724 GISC3724 STSA3726 STSA3742	GEOP3724 GISC3724 SOIL3724	GEOP3724 GISC3724 SOIL3724 CLIM3724
ELECTIVES E1	GEOH3714 MATM2654		BTNY3712+BTNY3714+ BTNY3734 **OR** ZLGY3734+ZLGY3714					

12.4.1.12 BACHELOR OF SCIENCE MAJORING IN GEOSCIENCES
GEOLOGY FIELD OF STUDY 2: BC433535, BC433528, BC433532, BC433521, BC433533, BC433540

LEARNING PROGRAMMES IN GEOSCIENCES FIELD OF STUDY 2

Learning programmes in GEOLOGY Field of study 1 offer SIX main options with either: Geology specialisation, Geochemistry, Environmental Geology, Geology and Chemistry as the two majors, Geology and Geography as the other majors, Geology and Physics as the two majors. Each student enrols for or all compulsory modules in compulsory rows (C1, C2, C3). If electives are available the students need to choose enough elective modules (E) per semester to obtain at least 120 credits in each study year.

DISCIPLINE	**GEOLOGY**	**GEOCHEM-ISTRY**	**ENVIRONMENTAL GEOLOGY**	**CHEMISTRY**	**GEOGRAPHY**	**PHYSICS**	**GEOLOGY**	**GEOCHEMISTRY**	**ENVIRONMENTAL GEOLOGY**	**CHEMISTRY**	**GEOGRAPHY**	**PHYSICS**
2018 CODE	**BC433535**	**BC433532**	**BC433528**	**BC433521**	**BC433533**	**BC433540**	**BC433535**	**BC433532**	**BC433528**	**BC433521**	**BC433533**	**BC433540**
YEAR	**FIRST**						**FIRST**					
SEMESTER	**FIRST**						**SECOND**					
COMPULSORY C1	GLGY1614 CHEM1513+ CHEM1551	GLGY1614 CHEM1513+ CHEM1551 PHYS1514	GLGY1614 CHEM1513+ CHEM1551 GEOP1514	GLGY1614 CHEM1513+ CHEM1551	GLGY1614 CHEM1513+ CHEM1551 GEOP1514	GLGY1614 CHEM1513+ CHEM1551 PHYS1514	GLGY1624	GLGY1624 CHEM1623+ CHEM1661 OR CHEM1643+ CHEM1661 MATM1544	GLGY1624 SCCS1624 EBUS1624	GLGY1624 CHEM1623+ CHEM1661	GLGY1624 GEOH1624	GLGY1624 PHYS1624
	MATM1534	MATM1534	MATM1534	MATM1534	MATM1534	MATM1534	STSA1624	STSA1624	STSA1624	STSA1624 MATM1544	STSA1624	STSA1624 MATM1544
ELECTIVES E	**ONE OF:** PHYS1514 PHYS1534 GEOP1514			**ONE OF:** PHYS1514 PHYS1534 GEOP1514			**TWO OF** GEOH1624 CHEM1643+ CHEM1661 CHEM1623+ CHEM1661 PHYS1644 PHYS1624 MATM1544				**ONE OF:** CHEM1623+ CHEM1661 CHEM1643+ CHEM1661 SCCS1624	
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 OR AGAN1508						CSIL1521					
YEAR	**SECOND**						**SECOND**					
SEMESTER	**FIRST**						**SECOND**					
COMPULSORY C2	GLGY2612 GLGY2614 GLGY2632 GLGY2652 **ONE OF:** CHEM2613+ CHEM2611 GEOP2614 PHYS2614	GLGY2612 GLGY2614 GLGY2632 GLGY2652 CHEM2633+ CHEM2631 CHEM2613+ CHEM2611	GLGY2612 GLGY2614 GLGY2632 GLGY2652 SOIL2614	GLGY2612 GLGY2614 GLGY2632 GLGY2652 CHEM2633+ CHEM2631 CHEM2613+ CHEM2611	GLGY2612 GLGY2614 GLGY2632 GLGY2652 GEOH2614 GEOP2614	GLGY2612 GLGY2614 GLGY2632 GLGY2652 PHYS2614 PHYS2632	GLGY2662 GISC2624 GLGY2626 GLGY2646	GLGY2662 CHEM2643+ CHEM2641 GLGY2626 GLGY2646	GLGY2662 SOIL2624 GISC2624 GLGY2626 GLGY2646	GLGY2662 CHEM2643+ CHEM2641 CHEM2623+ CHEM2621 GLGY2626 GLGY2646	GLGY2662 GEOP2624 GISC2624 GLGY2626 GLGY2646	GLGY2662 PHYS2624 PHYS2642 GLGY2626 GLGY2646
YEAR	**THIRD**						**THIRD**					
SEMESTER	**FIRST**						**SECOND**					
COMPULSORY C3	GLGY3714 GLGY3734 GLGY3754 GLGY3774	CHEM3713+ CHEM3711 GLGY3714 GLGY3754 GLGY3774	SOIL3714 GLGY3714 GLGY3754 GLGY3774	CHEM3713+ CHEM3711 CHEM3733+ CHEM3731 GLGY3714 **ONE OF:** GLGY3754 GLGY3774	GEOH3714 GEOP3714 GLGY3714 **ONE OF:** GLGY3754 GLGY3774	PHYS3714 PHYS3732 PHYS3752 GLGY3714 **ONE OF:** GLGY3754 GLGY3774	GLGY3724 GLGY3744 GLGY3764 GLGY3784	GLGY3724 GLGY3764 GLGY3784 **ONE OF:** GLGY3744 CHEM3723+ CHEM3721	SOIL3724 GLGY3724 GLGY3764 GLGY3784	CHEM3723+ CHEM3721 CHEM3743+ CHEM3741 GLGY3724 **ONE OF:** GLGY3784 GLGY3764	GEOP3724 GISC3724 GLGY3724 **ONE OF:** GLGY3744 GLGY3784	PHYS3724 PHYS3742 PHYS3762 GLGY3724 **ONE OF:** GLGY3764 GLGY3784

12.4.1.13 BACHELOR OF SCIENCE MAJORING IN MATHEMATICAL SCIENCES
MATHEMATICAL SCIENCES FIELDS OF STUDY 1: BC433816, BC433821, BC433837, BC433840, BC433864

LEARNING PROGRAMMES IN MATHEMATICAL SCIENCES FIELDS OF STUDY 1

Learning programmes in Mathematics offer FIVE main options with a combination of disciplines:

- **Mathematics** and Applied Mathematics
- **Mathematics** and Physics
- **Mathematics** and Chemistry
- **Mathematics** and Finances
- **Mathematics** and Mathematical Statistics

Students SELECT Mathematics and one other DISCIPLINE and include all the compulsory modules in row (C1, C2, C3) of each of the selected disciplines for all three study years. Students need to SELECT enough elective modules per semester from the compulsory row (C1, C2, and C3) of any other discipline or from the elective row (E) for their selected disciplines to obtain at least 120 credits for each study year.

DISCIPLINE	MATHEMATICS & APPLIED MATHEMATICS	MATHEMATICS & CHEMISTRY	MATHEMATICS & MATHEMATICAL STATISTICS	MATHEMATICS & PHYSICS	MATHEMATICS & FINANCE	MATHEMATICS & APPLIED MATHEMATICS	MATHEMATICS & CHEMISTRY	MATHEMATICS & MATHEMATICAL STATISTICS	MATHEMATICS & PHYSICS	MATHEMATICS & FINANCE
2018 CODE	**BC433816**	**BC433821**	**BC433837**	**BC433840**	**BC433864**	**BC433816**	**BC433821**	**BC433837**	**BC433840**	**BC433864**
YEAR	**FIRST**					**FIRST**				
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C1	MATM1614 MATA1614	MATM1614 CHEM1513+ CHEM1551	MATM1614 STSM1614	MATM1614 PHYS1514 PHYA1554	MATM1614 EECF1614 STSM1614 EACC1614	MATM1624 MATA1624 CSIS1683	MATM1624 CHEM1623+ CHEM1661	STSM1624 CSIS1683 MATM1624	MATM1624 PHYS1624 PHYA1664	MATM1624 EECF1624 STSM1624 EACC1624
ELECTIVES E1	CHEM1513+ CHEM1551 PHYS1514 PHYA1554 STSM1614	PHYS1514 PHYA1554 STSM1614	CHEM1513+ CHEM1551 PHYS1514 PHYA1554	CHEM1513+ CHEM1551 STSM1614		CHEM1623+ CHEM1661 PHYS1624 PHYA1664 STSM1624	PHYS1624 PHYA1664 CSIS1683 STSM1624	CHEM1623+ CHEM1661 PHYS1624 PHYA1664	CHEM1623+ CHEM1661 CSIS1683 STSM1624	CSIS1683
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALN1508 **OR** AGAN1508					CSIL1521				
YEAR	**SECOND**					**SECOND**				
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C2	MATM2614 MATA2614 MATA2634 MATM2654	MATM2614 CHEM2613+ CHEM2611 CHEM2633+ CHEM2631	MATM2614 STSM2616	MATM2614 PHYS2614 PHYS2632	MATM2614 EACC2608 EFES2714 ACSF2716	MATA2624 MATM2664 MATA2644	MATM2624 MATM2664 CHEM2623+ CHEM2621 CHEM2643+ CHEM2641	MATM2624 MATM2664 STSM2626	MATM2624 MATM2664 PHYS2624 PHYS2642	MATM2624 MATM2664 EACC2608 EFES2724 ACSF2726 **OR** ACSF2746
ELECTIVES E2	STSM2616 PHYS2614	PHYS2614 PHYS2632 STSM2616 MATA2634 MATM2654	CHEM2613+ CHEM2611 CHEM2633+ CHEM2631 PHYS2614 PHYS2632 MATA2634 MATM2654	CHEM2613+ CHEM2611 CHEM2633+ CHEM2631 STSM2616 MATA2634 MATM2654		STSM2626	STSM2626 PHYS2624 PHYS2642 MATA2644	CHEM2623+ CHEM2621 CHEM2643+ CHEM2641 PHYS2624 PHYS2642 MATA2644	CHEM2623+ CHEM2621 CHEM2643+ CHEM2641 STSM2626 MATA2644	STSM2626
YEAR	**THIRD**					**THIRD**				
SEMESTER	**FIRST**					**SECOND**				
COMPULSORY C3	MATM3714 MATM3734 MATA3774	MATM3714 MATM3734 CHEM3713+ CHEM3711 CHEM3733+ CHEM3731	MATM3714 MATM3734 STSM3714 STSM3734	MATM3714 MATM3734 PHYS3714 PHYS3732 PHYS3752	MATM3714 MATM3734 EFET3714	MATM3724 MATM3744 MATA3764 MATA3784	MATM3724 MATM3744 CHEM3723+ CHEM3721 CHEM3743 + CHEM3741	MATM3724 MATM3744 STSM3724 STSM3744	MATM3724 MATM3744 PHYS3724 PHYS3742 PHYS3762	MATM3724 MATM3744 EFET3724

MATHEMATICAL SCIENCES FIELDS OF STUDY 2: BC433712, BC433758, BC433701, BC433773

LEARNING PROGRAMMES IN MATHEMATICAL SCIENCES FIELDS OF STUDY 2

Learning programmes in Mathematical Statistics offer four main options with a combination of disciplines:

- **Mathematical Statistics** and Agrometeorology (**Climate Sciences)**
- **Mathematical Statistics** and Investment Sciences (**Investment Science**)
- **Mathematical Statistics** and Economics **(Econometrics)**
- **Mathematical Statistics** and Psychology **(Psychometrics)**

Students SELECT Mathematical Statistics and one other DISCIPLINE and include all the compulsory modules in row (C1, C2, C3) of each of the selected disciplines for all three study years. Students need to SELECT enough elective modules per semester from the compulsory row (C1, C2, and C3) of any other discipline or from the elective row (E) for their selected disciplines obtain of at least 120 credits for each study year.

DISCIPLINE	CLIMATE SCIENCE	ECONOMETRICS	INVESTMENT SCIENCE	PSYCHOMETRICS	CLIMATE SCIENCE	ECONOMETRICS	INVESTMENT SCIENCE	PSYCHOMETRICS
2018 CODE	**BC433712**	**BC433758**	**BC433701**	**BC433786**	**BC433712**	**BC433758**	**BC433701**	**BC433786**
YEAR			**FIRST**				**FIRST**	
SEMESTER			**FIRST**				**SECOND**	
COMPULSORY **C1**	STSM1614 GEOP1514 PHYS1534 MATM1614	STSM1614 EECF1614 MATM1614 **ONE OF:** EACC1614 AGEC1514 ACSG1614 ACSF1613	STSM1614 EECF1614 ACSF1613 MATM1614 **ONE OF:** EACC1614 EFIN1614	STSM1614 PSIN1514 EHRM1514 MATM1614	STSM1624 CSIS1683 SCCS1624 MATM1624	STSM1624 EECF1624 MATM1624 **ONE OF:** EACC1624 AGEC1624 CSIS1644 ACSF1623	STSM1624 EECF1624 EFIN1624 ACSF1623 MATM1624	STSM1624 PSDE1624 EIOP1524 MATM1624
REQUIRED *if NBT < 65%	CSIL1511 UFS101 EALN1508 or AGAN1508	CSIL1511 UFS101 EALE1508 or AGAM1508	CSIL1511 UFS101 EALE1508 or AGAM1508	CSIL1511 UFS101 EALN1508 or AGAN1508	CSIL1521	CSIL1521	CSIL1521	CSIL1521
YEAR			**SECOND**				**SECOND**	
SEMESTER			**FIRST**				**SECOND**	
COMPULSORY **C2**	STSM2616 CLIM2614 MATA2634 **ONE OF:** MATM2614 MATM2654	STSM2616 MATM2654 EMIC2714 **ONE OF:** MATM2614 MATA2634 EFES2714	STSM2616 ACSF2716 EMIC2714	PSSO2614 MATA2634 **ONE OF:** MATM2614 MATM2654	STSM2626 CLIM2624 **ONE OF:** MATM2624 MATA2644 MATM2664	STSM2626 EMAC2724 **ONE OF:** EFES2724 MATM2624 MATA2644 MATM2664	STSM2626 EMAC2724 ACSF2746 MATA2644	STSM2626 PSIH2724 **ONE OF:** MATA2644 MATM2664
ELECTIVES			EFIN2708					
YEAR			**THIRD**				**THIRD**	
SEMESTER			**FIRST**				**SECOND**	
COMPULSORY **C3**	STSM3714 STSM3734 CLIM3714 **ONE OF:** MATM3714 MATM3734 MATA3774	STSM3714 STSM3734 EFET3714 EINT3715	STSM3714 STSM3734 ACSF3706 **ONE OF:** EFET3714 EINT3715	PSPA3714 STSM3714 STSM3734 PSRM3714	STSM3724 STSM3744 CLIM3724 **ONE OF:** MATM3724 MATM3744 MATA3764 MATA3784	STSM3724 STSM3744 EECM3724 **ONE OF:** EFET3724 EECT3725 EMNF2724	STSM3724 STSM3744 **ONE OF:** EECT3725 EFET3724 EECM3724 EMNF2724	PSPE3724 STSM3724 STSM3744 PSTH3724

MATHEMATICAL SCIENCES FIELDS OF STUDY 3: BC434650, BC434658, BC434686

LEARNING PROGRAMMES IN MATHEMATICAL SCIENCES FIELDS OF STUDY 3

Learning programmes in Statistics offers 2 main options with a combination of disciplines:

- **Statistics** and Accounting
- **Statistics** and Economics
- **Statistics** and Psychology

Students Students SELECT Statistics and one other DISCIPLINE and and include all the compulsory modules in row (C1, C2, C3) of each of the selected disciplines for all three study years.
Students need to SELECT enough elective modules per semester from the compulsory row (C1, C2 and C3) to obtain at least 120 credits for each study year.

DISCIPLINE	**ACCOUNTING**	**ECONOMICS**	**PSYCHOLOGY**	**ACCOUNTING**	**ECONOMICS**	**PSYCHOLOGY**
NEW CODE	**BC434650**	**BC434658**	**BC434686**	**BC434650**	**BC434658**	**BC434686**
YEAR	**FIRST**			**FIRST**		
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	EBCS1514 MATM1614 OR MATM1534 EACC1614 **ONE OF:** ACSG1614 ASCF1613 EECF1614 AGEC1514	EBCS1514 MATM1614 OR MATM1534 EECF1614 **ONE OF:** EACC1614 AGEC1514 ACSG1614 ASCF1613	EBCS1514 MATM1614 OR MATM1534 PSIN1514 EHRM1514	EBCS1524 MATM1624 OR MATM1544 EACC1624 **ONE OF:** ACSF1623 EECF1624 AGEC1624	EBCS1524 MATM1624 OR MATM1544 EECF1624 **ONE OF:** EACC1624 AGEC1624 ACSF1623	EBCS1524 MATM1624 OR MATM1544 PSDE1624 EIOP1524
REQUIRED *if NBT < 65%	CSIL1511 UFS101 *EALE1508 or AGAM1508	CSIL1511 UFS101 *EALE1508 or AGAM1508	CSIL1511 UFS101 *EALN1508 or AGAN1508	CSIL1521	CSIL1521	CSIL1521
YEAR	**SECOND**			**SECOND**		
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C2	STSA2616 MATA2634 EACC2608 **ONE OF:** EFES2714 EMIC2714 AGEC2614	STSA2616 MATA2634 EMIC2714 **ONE OF:** EFES2714 AGEC2614	STSA2616 MATA2634 PSSO2614 ECAP2614	STSA2626 **ONE OF:** EMAC2724 EFES2724 AGEC2624	STSA2626 EMAC2724 **ONE OF:** EFES2724 AGEC2624	STSA2626 ELRM2624 PSIH2724
YEAR	**THIRD**			**THIRD**		
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C3	STSA3716 STSA3732 EACC3708 **ONE OF:** EFET3714 EINT3715 AGEC3714	STSA3716 STSA3732 **TWO OF:** EINT3715 AGEC3714 EFET3714	STSA3716 STSA3732 **TWO OF:** PSPA3714 PSRM3714 ETRM3714	STSA3726 STSA3742 **ONE OF:** EFET3724 EECT3725 AGEC3724 EECM3724 EMNF2724	STSA3726 STSA3742 **TWO OF:** EFET3724 EECT3725 AGEC3724 EECM3724 EMNF2724	STSA3726 STSA3742 **TWO OF:** PSPE3724 PSTH3724 EPFM3724

12.4.2 BACHELOR OF SCIENCE IN AGRICULTURE

The following 9 Agricultural fields of study include almost a fixed curriculum for the first year of study to ensure portability after the first year.

12.4.2.1 AGRICULTURAL SCIENCES FIELD OF STUDY 1: AGROMETEOROLOGY BC540012

LEARNING PROGRAMMES IN BACHELOR OF AGRICULTURAL SCIENCES AND THE AGROMETEOROLOGY FIELD OF STUDY 1

Learning programmes in the Agrometeorology as main field of study offer one major with 6 options with a minor from one of the following sub disciplines Agricultural Economics, Agricultural Engineering, Agronomy, Grassland Science, Soil Science or Plant Pathology. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together. If a student wants to register for the Agricultural Economics minor, two extra modules for the first year is compulsory.

	SEMESTER 1		**SEMESTER 2**	
	COMPULSORY	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**	**COMPULSORY**	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**
YEAR 1	BLGY1513 CHEM1513+CHEM1551 MATM1534 PHYS1534	AGEC1514 (compulsory for Agricultural Economic minor) **REQUIRED *IF NBT <65%** CSIL1511 UFS 101 *EALN1508 OR AGAN1508	ANIG1624 BLGY1643 CHEM1643+ CHEM1661 SCCS1624	AGEC1624 (compulsory for Agricultural Economic minor) **REQUIRED *IF NBT <65%** CSIL1521
YEAR 2	CLIM2614 CROP2614 OR SOIL2614 (The module not selected here can be selected under the electives as well)	**ONE OF:** AGEC2614 (compulsory for Agricultural Economic minor) BOCH2614 CROP2614 (compulsory for Agronomy minor) ENTO2614 GRAS2614 (compulsory for Grassland Sciences minor) PLTB2613 (compulsory for Plant Plant Breeding minor) SOIL2614(compulsory for Soil Science minor)	CLIM2624 CROP2624 OR SOIL2624 (The module not selected here can be selected under the electives as well)	**TWO OF:** AGEC2624 (compulsory for Agricultural Economic minor) AGEG2624 (compulsory for Agricultural Engineering minor) CROP2624(compulsory for Agronomy minor) PLTB2623 (compulsory for Plant Pathology minor) PPLG2624 (compulsory for Plant Pathology minor) SOIL2624 (compulsory for Soil Science minor) WDMT2624(compulsory for Grassland Sciences minor)
YEAR 3	DATA3712 CLIM3714 CROP3714 OR SOIL3714 (The module not selected here can be selected under the electives as well)	**TWO OF:** AGEC3714 (compulsory for Agricultural Economic minor) AGEG3714 (compulsory for Agricultural Engineering minor) CROP3714 (compulsory for Crop Science minor) GRAS3714 (compulsory for Grassland Sciences minor) PLTB3714 PPLG3714(compulsory for Plant pathology minor) PPLG3734 (compulsory for Plant pathology minor) SOIL3714 (compulsory for Soil Science minor) WDMT3714	CLIM3724 CROP3724 OR SOIL3724 (The module not selected here can be selected under the electives as well)	**TWO OF:** AGEC3724 (compulsory for Agricultural Economic minor) AGEG3724 (compulsory for Agricultural Engineering minor) CROP3724 (compulsory for Crop Science minor) GRAS3724 (compulsory for Grassland Sciences minor) PLTB3724 PLTB3744 PPLG3724(compulsory for Plant pathology minor) PPLG3744 (compulsory for Plant pathology minor) SOIL3724 (compulsory for Soil Science minor)
YEAR 4	CLIM4814 CLIM4834 SCCS4808	**ONE OF:** AGEC4834 (compulsory for Agricultural Economic minor) AGEG4814 (compulsory for Agricultural Engineering minor) CROP 4814 OR CROP4834 (compulsory for Crop Science minor) GRAS4814 OR GRAS4834 (compulsory for Grassland Sciences minor) PPLG4834 (compulsory for Plant pathology minor) SOIL4814 OR SOIL 4834 (compulsory for Soil Science minor)	CLIM4824 CLIM4844 or	**ONE OF:** AGEC4824 OR AGEC4844 (compulsory for Agricultural Economic minor) AGEG4824 (compulsory for Agricultural Engineering minor) CROP4824 OR CROP4844 (compulsory for Crop Science minor) GRAS4824 OR GRAS4844 (compulsory for Grassland Sciences minor) PPLG4824 OR PPLG4844 (compulsory for Plant pathology minor) SOIL4824 OR SOIL4844 (compulsory for Soil Science minor)

12.4.2.2 AGRICULTURAL SCIENCES FIELD OF STUDY 1: AGRONOMY BC540013

LEARNING PROGRAMMES IN BACHELOR OF AGRICULTURAL SCIENCES AND THE AGROMETEOROLOGY FIELD OF STUDY 2

Learning programmes in the Agronomy as main field of study offer one major with 8 options with a minor from one of the following sub disciplines Agricultural Economics, Agrometeorology, Animal Science, Entomology Food Science, Plant Breeding, Plant Pathology or Soil Sciences. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together. If a student wants to register for the Agricultural Economics minor, two extra modules for the first year is compulsory.

	SEMESTER 1		**SEMESTER 2**	
	COMPULSORY	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**	**COMPULSORY**	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**
YEAR 1	BLGY1513 CHEM1513+CHEM1551 MATM1534 PHYS1534	AGEC1514 (compulsory for Agricultural Economic minor) **REQUIRED *IF NBT <65%** CSIL1511 UFS 101 *EALN1508 OR AGAN1508	ANIG1624 BLGY1643 CHEM1643+CHEM1661 SCCS1624	AGEC1624 (compulsory for Agricultural Economic minor) **REQUIRED *IF NBT <65%** CSIL1521 BLGY1663 (compulsory for Entomology minor)
YEAR 2	CLIM2614 CROP2614 SOIL2614	**ONE OF:** AGEC2614(compulsory for Agricultural Economic minor) ANIP2614 AND ANIG2614(compulsory for Animal Science minor) BOCH2614 ENTO2614 OR ENTO2616 (compulsory for Entomology minor) FSCC2613 + FSCI2613 (compulsory for Food Science minor) GRAS2614 (compulsory for Grassland Sciences minor) PLTB2613 (compulsory for Plant Breeding and Plant Pathology minor)	CROP2624 CLIM2624 OR SOIL2624 (The module not selected here can be selected under the electives as well)	**TWO OF:** AGEC2624 (compulsory for Agricultural Economic minor) AGEG2624 ANIG2624(compulsory for Animal Science minor) CLIM2624(compulsory for Agrometeorology minor) CROP2624(compulsory for Crop Science minor) ENTO2626 (compulsory for Entomology minor) FSCC2622 + FSCS2624 (compulsory for Food Science minor) PLTB2623 (compulsory for Plant Breeding and Plant Pathology minor) PPLG2624 (compulsory for Plant Pathology minor) SOIL2624 (compulsory for Soil Science minor) WDMT2624(compulsory for Grassland Sciences minor)
YEAR 3	DATA3712 CROP3714 CLIM3714 OR SOIL3714 (The module not selected here can be selected under the electives as well)	**TWO OF:** AGEC3714 (compulsory for Agricultural Economic minor) AGEG3714 ANIP3714 OR ANIB3714 OR ANIN3734 (compulsory for Animal Science minor) CLIM3714(compulsory for Agrometeorology minor) ENTO3714 +ENTO3734 (compulsory for Entomology minor) FSCA3714+ FSCE3714 + NUTE3714 (compulsory for Food Science minor) PLTB3714 (compulsory for Plant Breeding minor) PPLG3714 OR PPLG3734 (compulsory for Plant pathology minor) SOIL3714 (compulsory for Soil Science minor)	CROP3724 CLIM3724 OR SOIL3724 (The module not selected here can be selected under the electives as well)	**TWO OF:** AGEC3724 (compulsory for Agricultural Economic minor) AGEG3724 ANIP3724 OR ANIB3724 OR ANIN3744 (compulsory for Animal Science minor) CLIM3724(compulsory for Agrometeorology minor) ENTO3724 +ENTO3744 (compulsory for Entomology minor) FSCP3724+ FSCB3724 (compulsory for Food Science minor) PLTB3724 OR PLTB3744(compulsory for Plant pathology minor) PPLG3724 OR PPLG3744 (compulsory for Plant pathology minor) SOIL3724 (compulsory for Soil Science minor)
YEAR 4	CROP4814 CROP4834 SCCS4808	**ONE OF:** AGEC4834 (compulsory for Agricultural Economic minor) ANIP4814 OR ANIB4814 OR ANIN4834 (compulsory for Animal Science minor) CLIM4814 OR CLIM4834 (compulsory for Agrometeorology minor) ENTO6854 (compulsory for Entomology minor) FSCP4814 OR FSCD4814(compulsory for Food Science minor) PLTB4814 OR PLTB4834 OR PLTB4854 (compulsory for Plant Breeding minor) PPLG4834 (compulsory for Plant pathology minor) SOIL4814 OR SOIL 4834 (compulsory for Soil Science minor	CROP4824 CROP4844	**ONE OF:** AGEC4824 OR AGEC4844 (compulsory for Agricultural Economic minor) ANIP4824 OR ANIB4824 OR ANIN4864 (compulsory for Animal Science minor) CLIM4824 OR CLIM4844 (compulsory for Agrometeorology minor) ENTO6884 (compulsory for Entomology minor) FSCG4826 (compulsory for Food Science minor) PLTB4824 compulsory for Plant Breeding minor) PPLG4824 OR PLGG4844 (compulsory for Plant pathology minor) SOIL4824 OR SOIL 4844 (compulsory for Soil Science minor)

12.4.2.3 AGRICULTURAL SCIENCES FIELD OF STUDY 3: SOIL SCIENCE BC540044

LEARNING PROGRAMMES IN BACHELOR OF AGRICULTURAL SCIENCES AND THE SOIL SCIENCE FIELD OF STUDY 3

Learning programmes in the Soil Sciences as main field of study offer one major with 6 options with a minor from one of the following sub disciplines Agricultural Economics, Agricultural Engineering, Agrometeorology, Agronomy, Grassland Science or Plant Pathology. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together. If a student wants to register for the Agricultural Economics minor, two extra modules for the first year is compulsory.

	SEMESTER 1		**SEMESTER 2**	
	COMPULSORY	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**	**COMPULSORY**	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**
YEAR 1	BLGY1513 CHEM1513+CHEM1551 MATM1534 PHYS1534	AGEC1514 (compulsory for Agricultural Economic minor) **REQUIRED *IF NBT <65%** CSIL1511 UFS 101 *EALN1508 OR AGAN1508	ANIG1624 BLGY1643 CHEM1643 + CHEM1661	AGEC1624 (compulsory for Agricultural Economic minor) **REQUIRED *IF NBT <65%** CSIL1521
YEAR 2	CLIM2614 CROP2614 SOIL2614	**ONE OF:** AGEC2614 (compulsory for Agricultural Economic minor) BOCH2614 ENTO2614 OR GRAS2614 (compulsory for Grassland Sciences minor) PLTB2613 (compulsory for Plant Breeding minor)	CROP2624 CLIM2624 OR SOIL2624 (The module not selected here can be selected under the electives as well)	**TWO OF:** AGEC2624 (compulsory for Agricultural Economic minor) AGEG2624 (compulsory for Agricultural Engineering minor) CLIM2624(compulsory for Agrometeorology minor) CROP2624(compulsory for Crop Science minor) PLTB2623 (compulsory for Plant Breeding minor) PPLG2624 (compulsory for Plant Pathology minor) WDMT2624(compulsory for Grassland Sciences minor)
YEAR 3	DATA3712 SOIL3714 CLIM3714 OR CROP3714 (The module not selected here can be selected under the electives as well)	**TWO OF:** AGEC3714 (compulsory for Agricultural Economic minor) AGEG3714 (compulsory for Agricultural Engineering minor) CLIM3714(compulsory for Agrometeorology minor) CROP3714 (compulsory for Agronomy minor) GRAS3714 (compulsory for Grassland Sciences minor) PLTB3714 (compulsory for Plant Pathology minor) PPLG3714 AND PPLG3734 (compulsory for Plant Pathology minor)	SOIL3724 CLIM3724 OR CROP3724 (The module not selected here can be selected under the electives as well)	**TWO OF:** AGEC3724 (compulsory for Agricultural Economic minor) AGEG3724 (compulsory for Agricultural Engineering minor) CLIM3724(compulsory for Agrometeorology minor) CROP3724 (compulsory for Agronomy minor) GRAS3724 (compulsory for Grassland Sciences minor) PLTB3724 OR PLTB3744(compulsory for Plant pathology minor) PPLG3724 AND PPLG3744 (compulsory for Plant pathology minor)
YEAR 4	SOIL4814 SOIL4834 SCCS4808	**ONE OF:** AGEC4834 (compulsory for Agricultural Economic minor) AGEG4814 (compulsory for Agricultural Engineering minor) CLIM4814 OR CLIM4834 (compulsory for Agrometeorology minor) CROP4814 OR CROP4834 (compulsory for Crop Science minor) GRAS4814 OR GRAS4834 (compulsory for Grassland Sciences minor) PPLG4834 (compulsory for Plant pathology minor)	SOIL4824 SOIL4844	**ONE OF:** AGEC4824 OR AGEC4844 (compulsory for Agricultural Economic minor) AGEG4824 (compulsory for Agricultural Engineering minor) CLIM4824 OR CLIM4844 (compulsory for Agrometeorology minor) CROP48248 OR CROP4844 (compulsory for Crop Science minor) GRAS4824 OR GRAS4844 (compulsory for Grassland Sciences minor) PPLG4824 OR PLGG4844 (compulsory for Plant pathology minor)

12.4.2.4 AGRICULTURAL SCIENCES FIELD OF STUDY 4: ANIMAL, WILDLIFE AND GRASSLAND SCIENCES BC540015

LEARNING PROGRAMMES IN BACHELOR OF AGRICULTURAL SCIENCES IN THE ANIMAL, WILDLIFE AND GRASSLAND SCIENCES FIELD OF STUDY 4

Learning programmes in the Animal Science as main field of study offer one major with 2 options with a minor from one of the following sub disciplines Agricultural Economics and Animal Science Specialisation. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, credit from the compulsory and elective modules together.

	SEMESTER 1		**SEMESTER 2**	
	COMPULSORY	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**	**COMPULSORY**	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**
YEAR 1	AGEC1514 BLGY1513 CHEM1513+CHEM1551 MATM1534 PHYS1534	 **REQUIRED *IF NBT <65%** CSIL1511 UFS 101 *EALN1508 OR AGAN1508	ANIG1624 BLGY1623 BLGY1643 CHEM1643+CHEM1661 SCCS1624	AGEC1624 **REQUIRED *IF NBT <65%** CSIL1521
YEAR 2	ANIP2614 ANIG2614	**ENOUGH OF:** AGEC2614 (compulsory for Agricultural Economic minor) BOCH2614 ENTO2614 GRAS2614 (compulsory for Grassland Sciences minor)	ANIG2624 ANIB2624 STSA1624	**ENOUGH OF:** AGEC1624(If not already selected in the first year) AGEC2624 (compulsory for Agricultural Economic minor) AGEG2624 WDMT2624(compulsory for Grassland Sciences minor)
YEAR 3	ANIP3714 ANIB3714 ANIN3734 DATA3712	**ENOUGH OF:** AGEC3714 OR AGEC3734 (compulsory for Agricultural Economic minor) GRAS3714 WDMT3714	ANIP3724 ANIB3724 ANIN3744	**ENOUGH OF:** AGEC3724 OR AGEC3744 (compulsory for Agricultural Economic minor) GRAS3724 WILD3764
YEAR 4	ANIP4814 ANIB4814 ANIN4834 ANIG4808	**NONE**	ANIP4824 ANIB4824 ANIN4864	**NONE**

12.4.2.5 AGRICULTURAL SCIENCES FIELD OF STUDY 4: ANIMAL, WILDLIFE AND GRASSLAND SCIENCES BC540036

LEARNING PROGRAMMES IN BACHELOR OF AGRICULTURAL SCIENCES IN THE GRASSLAND SCIENCES FIELD OF STUDY 5

Learning programmes in the Grassland Science as main field of study offer one major with 2 options with a minor from one of the following sub disciplines Animal Science and Soil Science. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, credit from the compulsory and elective modules together.

	SEMESTER 1		**SEMESTER 2**	
	COMPULSORY	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**	**COMPULSORY**	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**
YEAR 1	AGEC1514 BLGY1513 CHEM1513+CHEM1551 MATM1534 PHYS1534	**REQUIRED *IF NBT <65%** CSIL1511 UFS 101 *EALN1508 OR AGAN1508	AGEC1624 ANIG1624 BLGY1623 BLGY1643 CHEM1643+ CHEM1661 SCCS1624	**REQUIRED *IF NBT <65%** CSIL1521
YEAR 2	GRAS2614	**ENOUGH OF:** ANIP2614 (compulsory for Animal Science minor) ANIG2614 (compulsory for Animal Science minor) SOIL2614 (compulsory for Soil Science minor) AGEC2614 BOCH2614 CLIM2614(compulsory Soil Science for minor) CROP2614	WDMT2624	**ENOUGH OF:** AGEC2624 (compulsory for Agricultural Economic minor) AGEG2624 ANIG2624(compulsory for Animal Science minor) CROP2614 STSA1624
YEAR 3	GRAS3714 DATA3712	**ENOUGH OF:** AGEC3714 AND/OR AGEC3734 ANIG3714 OR ANIG3734 ANIP3714(compulsory for Animal Science minor) CLIM3714 CROP3714 SOIL3714 (compulsory for Soil Science minor) WDMT3714	GRAS3724	**ENOUGH OF:** AGEC3724 AND/OR AGEC3734 ANIG3724 OR ANIG3744(compulsory for Animal Science minor) ANIP3724 OR ANIB3724 OR ANIN3744 (compulsory for Animal Science minor) CLIM3724 CROIP3724 SOIL3724 (compulsory for Soil Science minor) WILD3764
YEAR 4	GRAS4814 GRAS4834 GRAS4808	**ONE OF:** ANIP4814(compulsory for Animal Science minor) SOIL4814 OR SOIL 4834 (compulsory for Soil Science minor	GRAS4824 GRAS4834	**ONE OF:** WILD4826(compulsory for Animal Science minor) SOIL4824 OR SOIL 4844 (compulsory for Soil Science minor ONE

12.4.2.6 AGRICULTURAL SCIENCES FIELD OF STUDY 4: ANIMAL, WILDLIFE AND GRASSLAND SCIENCES BC540089

LEARNING PROGRAMMES IN BACHELOR OF AGRICULTURAL SCIENCES IN THE ANIMAL, WILDLIFE AND GRASSLAND SCIENCES FIELD OF STUDY 6

Learning programmes in the Wildlife Production as main field of study offer one major with 1 option. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, credit from the compulsory and elective modules together.

	SEMESTER 1		SEMESTER 2	
	COMPULSORY	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**	**COMPULSORY**	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**
YEAR 1	BLGY1513 CHEM1513+CHEM1551 MATM1534 PHYS1534	AGEC1514 (compulsory for Agricultural Economic minor) **REQUIRED *IF NBT <65%** CSIL1511 UFS 101 *EALN1508 OR AGAN1508	ANIG1624 BLGY1623 BLGY1643 CHEM1643+CHEM1661 SCCS1624	AGEC1624 (compulsory for Agricultural Economic minor) **REQUIRED *IF NBT <65%** CSIL1521
YEAR 2	ANIP2614 ANIG2614	**ENOUGH OF:** AGEC2614 (compulsory for Agricultural Economic minor) BOCH2614 ENTO2614 GRAS2614 (compulsory for Grassland Sciences minor)	ANIG2624 ANIB2624 STSA1624	**ENOUGH OF:** AGEC1624(If not already selected in the first year) AGEC2624 (compulsory for Agricultural Economic minor) AGEG2624 WDMT2624(compulsory for Grassland Sciences minor)
YEAR 3	WDMT3714 ANIP3714 ANIB3714 DATA3712 GRAS3714	**NONE**	WILD3764 ANIP3724 GRAS3724	**ENOUGH OF:** ANIB3724 GENE3744 ANIN3744
YEAR 4	WILD4814 WILD4834 WILD4808	**ONE OF:** GRAS4814 GRAS4834	ANIB4824 WILD6826	**ONE OF:** GRAS4824 GRAS4834

12.4.2.7 AGRICULTURAL SCIENCES FIELD OF STUDY 7: FOOD SCIENCE BC540029

LEARNING PROGRAMMES IN BACHELOR OF AGRICULTURAL SCIENCES AND THE FOOD SCIENCE FIELD OF STUDY 7

Learning programmes in the Food Science as main field of study offer one major with 2 options with a minor from one of the following sub disciplines Agronomy or Animal Science. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together.

	SEMESTER 1		SEMESTER 2	
	COMPULSORY	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**	**COMPULSORY**	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**
YEAR 1	BLGY1513 CHEM1513+CHEM1551 MATM1534 PHYS1534	AGEC1514 **REQUIRED *IF NBT <65%** CSIL1511 UFS 101 *EALN1508 OR AGAN1508	ANIG1624 BLGY1683 BLGY1643 CHEM1643+CHEM1661 SCCS1624	AGEC1624 **REQUIRED *IF NBT <65%** CSIL1521
YEAR 2	FSCC2613 FSCI2613 BOCH2614	**ONE OF:** ANIP2614 AND ANIG2614(compulsory for Animal Science minor) CROP2614 (compulsory for Crop Science minor)	FSCC2622 FSCS2624	**ENOUGH OF:** ANIG2624(compulsory for Animal Science minor) ANIB2624 CROP2624(compulsory for Crop Science minor)
YEAR 3	DATA3712 FSCA3714 FSCE3714	**TWO OF:** ANIP3714 OR ANIN3734 (compulsory for Animal Science minor) CROP3714 (compulsory for Crop Science minor)	FSCP3724+ FSCB3724	**TWO OF:** ANIP3724 OR ANIN3744 (compulsory for Animal Science minor) CROP3724 (compulsory for Crop Science minor)
YEAR 4	FSCP4814 FSCD4814 FSCM4814 FSCR4808 FSCL4806	**NONE**	FSCG4826	**NONE**

12.4.2.8 AGRICULTURAL SCIENCES FIELD OF STUDY: PLANT BREEDING BC540041

LEARNING PROGRAMMES IN BACHELOR OF AGRICULTURAL SCIENCES AND THE PLANT BREEDING FIELD OF STUDY 8

Learning programmes in the Plant Breeding as main field of study offer one major with 2 options with a minor from one of the following sub disciplines Agronomy or Plant Pathology. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together.

	SEMESTER 1		**SEMESTER 2**	
	COMPULSORY	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**	**COMPULSORY**	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**
YEAR 1	BLGY1513 CHEM1513+CHEM1551 MATM1534 PHYS1534	**REQUIRED *IF NBT <65%** CSIL1511 UFS 101 *EALN1508 OR AGAN1508	ANIG1624 BLGY1623 BLGY1643 CHEM1643+ CHEM1661 SCCS1624	**REQUIRED *IF NBT <65%** CSIL1521
YEAR 2	BTNY2616 PLTB2613 SOIL2614	**ONE OF:** CROP2614 (compulsory for Crop Science minor)	BTNY2626 + BTNY2622 PLTB2623 ANIB2624	**ONE OF:** CROP2624(compulsory for Crop Science minor) PPLG2624 (compulsory for Plant Pathology minor
YEAR 3	DATA3712 PLTB3714	**TWO OF:** CROP3714 (compulsory for Crop Science minor) PPLG3734 OR PPLG3734 (compulsory for Plant pathology minor) SOIL3714 (compulsory for Soil Science minor)	PLTB3724 PLTB3744	**TWO OF:** BTNY3754(compulsory for Crop Science minor) CROP3724 (compulsory for Crop Science minor) PPLG 3724 OR PPLG3744 (compulsory for Plant pathology minor)
YEAR 4	PLTB4814 PLTB4834 PLTB4854 PLTB4808 PLTB4806	**NONE**	PLTB4824	**NONE**

12.4.2.9 AGRICULTURAL SCIENCES FIELD OF STUDY: PLANT PATHOLOGY BC540042

LEARNING PROGRAMMES IN BACHELOR OF AGRICULTURAL SCIENCES AND THE PLANT PATHOLOGY FIELD OF STUDY 9

Learning programmes in the Plant Pathology as main field of study offer one major with 1 options with a minor from one of the following sub disciplines Plant Breeding. Each student registers for all the compulsory modules during the four years of study and combines them with all the compulsory modules for the minor from the selected sub discipline. The student must obtain at least 480 credits, 120 credits for each year, from the compulsory and elective modules together.

	SEMESTER 1		**SEMESTER 2**	
	COMPULSORY	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**	**COMPULSORY**	**ELECTIVES BUT REQUIRED FOR CERTAIN MINORS**
YEAR 1	BLGY1513 CHEM1513+CHEM1551 MATM1534 PHYS1534	**REQUIRED *IF NBT <65%** CSIL1511 UFS 101 *EALN1508 OR AGAN1508	ANIG1624 BLGY1623 BLGY1643 CHEM1643+ CHEM1661 SCCS1624	**REQUIRED *IF NBT <65%** CSIL1521
YEAR 2	BTNY2616 CROP2614 PLTB2613 SOIL2614	**NONE**	ANIB2624 CROP2624 PLTB2623 PPLG2624	**NONE**
YEAR 3	CROP3714 DATA3712 PLTB3714 PPLG3734 PPLG3734	**NONE**	PLTB3724 CROP3724 PPLG 3724 PPLG3744	**NONE**
YEAR 4	PPLG4834 PPLG4808 PPLG4806 PLTB4854	**NONE**	PPLG4824 PPLG4844	**NONE**

12.5 LEARNING PROGRAMMES FOR POSTGRADUATE DIPLOMAS

12.5.1 POSTGRADUATE DIPLOMA IN DISASTER MANAGEMENT BC450025

The Postgraduate Diploma in Disaster Management contains 120 credits and is presented in a minimum period of one year plus another year. The Dean may, however, give special permission that another additional year be granted to complete the qualification.

The programme consists of eight compulsory modules and a field visit in one of the modules . The programme requires practical assignments to be completed by students and submitted at predetermined dates. Assignments will be marked and graded by the lecturers, who will give students feedback in a written format and also orally during contact sessions. Assignments will be part of a continual assessment process. Apart from the assignments, a formal examination assessment (written) will take place at the end of each semester, normally during June and November.

First Semester	Credits	Second Semester	Credits
DIMI5810 Introduction to disaster management	15	DIMS5820 Strategic Disaster Management	20
DIMR5810 Research Design and Methodology	15	DIMN5820 Management of Natural and Human-made Disasters	15
DIML5810 Legal and Institutional arrangements for Disaster Managers	15	DIMT5820 Information Technology in Disaster management	10
DIMM5810 Theoretical Models for disaster risk reduction	15	DIMP5820 Public Health in Disaster Management	15

12.5.2 POSTGRADUATE DIPLOMA IN INTEGRATED WATER MANAGEMENT BC450091

Upon completion of the qualification students will be able to:

- Apply a holistic, integrated approach to solving complex environmental problems relating to water by making use of social and ecological assessment and project management tools;
- Identify, interpret and implement the theory and applied knowledge related to water resources and processes and environmental sustainability and assessment practices;
- Critically analyse the relationships between human development and the environment and to discriminate between beneficial and detrimental environmental practices as they relate to water; and
- Make informed decisions, guided by ethical standards, scientific evidence and societal needs within the context of integrated water management.
- The programme offered is interdisciplinary and will be presented by the Faculty of Natural and Agricultural Sciences in conjunction with the Faculties of Economic and Management Sciences, Law and the Humanities under the control of the Centre for Environmental Management and a management committee. It is offered over a minimum period of one year with a total of 120 credits

First Semester		Credits	Second Semester		Credits
IWRM5810	Introduction to Water Resources	48	IWRM5826	Integrated Water Resource Management and Legislation	24
			IWRM5820	Integrated Water Resources Science	48

12.5.3 POSTGRADUATE DIPLOMA IN SUSTAINABLE AGRICULTURE BC550047

LEARNING PROGRAMMES FOR POSTGRADUATE DIPLOMA IN SUSTAINABLE AGRICULTURE

The Postgraduate Diploma in Sustainable Agriculture contains 136 credits and is presented in a minimum period of one year. This degree will develop agricultural specialists that could support sustainable agricultural practice, and in return support food security and socio-economic development.

The programme consists of six compulsory modules. The programme requires assignments to be completed by students and submitted at predetermined dates. Assignments will be marked and graded by the lecturers, who will give students feedback in a written and oral format during contact sessions. Assignments will be part of a continual assessment process. Apart from the assignments, a continuous examination evaluation assessment (written) will take place at the end of each year, normally during November.

First Semester		Credits	Second Semester		Credits
SANR5806	Assessment and Management of Natural Resources	24	SARP5826	Research Methods for Sustainable Agriculture	24
SALS5806	Livestock Production for Sustainable Agriculture	24			
SAIT5814	Introduction to Sustainable Agriculture	16			
SAEX5806	Extension for Sustainablility	24			
SAEC5806	Economics for Sustainable Agriculture	24			

12.6 LEARNING PROGRAMMES FOR BACHELOR HONOURS DEGREES (NQF LEVEL 8)

12.6.1 BACHELOR OF ARCHITECTURE HONOURS BC460114

The Bachelor of Architecture Honours [BArchHons] is a full-time postgraduate degree by coursework and involves lectures, projects, and continuous assessment. The purpose of the qualification is to educate students who may register for the degree Master of Architecture (Professional) that will enable successful students to register as “Candidate Architect” with the South African Council for the Architectural Profession in terms of the provisions of the Architectural Profession Act 44 of 2000. The degree BArch provides access to the Master of Architecture (Professional) Degree.

The assessments and examinations for the degree BArchHons are recognised by the minister concerned in terms of the provisions of the Architectural Profession Act (Act 44 of 2000). Training experience after completion of the BArchHons degree will be controlled by the conditions of the South African Council for the Architectural Profession. The registrar of this Council will provide information in this regard.

YEAR	FIRST	SECOND
COMPULSORY	DESN6800 Design CONS6808 Construction HURB6804 History of Urban Settlement RARC6808 Research in Theory of Architecture EOKR6804 Property economics	
	DMET6812 Design methodology	RMET6822 Research methodology

12.6.2 BACHELOR OF AGRICULTURE HONOURS BC460152, BC460172, BC460190

BACHELOR OF AGRICULTURE HONOURS

The aims of this degree are:

(a) to give the student the opportunity to do in-depth specialisation of his/her choice to broaden his/her knowledge with respect to agriculture, rural development and agricultural management;

(b) to prepare the student for further postgraduate study;

(c) to lead the student in independent study of the main subject or field of specialisation; and

(d) to develop, through the Honours Degree in Agricultural Management, the student's managerial skills in a variety of functional areas in agricultural enterprise management and development and the management of agricultural businesses.

A minimum of 120 credits must be obtained over the year and the department will announce the starting dates for classes.

BACHELOR OF AGRICULTURE HONOURS

	Agricultural Management	Irrigation Management	Wildlife Management	Animal Production Management
2018 CODE	**BC560052**	**BC560072**	**BC560090**	**BC560115**
CREDITS	**120 credits**	**124 credits**	**124 credits**	**132 credits**
	AGMA6800 AGMA6815 AGMA6835 AGMA6825 AGMA6845	AGMA6835 IRRI6808 IRRI6816 IRRI6826 IRRI6846	AGMA6835 WDMT6816 WDMT6846 WDMT6826 WDMT6808	AGMA6835 AGRI6808 AGRI6834 AGRI6814 AGRI6844 AGRI6864 AGRI6884

BACHELOR OF AGRICULTURE HONOURS MAJORING IN AGRICULTURAL ECONOMICS BC560011

	FIRST SEMESTER	SECOND SEMESTER
COMPULSORY	AGEC6800 Agricultural Economics Research project AGEC6815 Advanced production and natural resource economics AGEC6835 Macro economics and finance	AGEC6825 Agribusiness management and marketing AGEC6845 Policy and Development

12.6.3 BACHELOR OF SCIENCE HONOURS IN CONSUMER SCIENCE BC460023

To obtain a Bachelor Honours Degree a minimum study period of one year is required. The composition of the student's curriculum and optional courses will be determined at the beginning of each year in consultation with the Academic Departmental Head. A minimum of 120 credits must be presented. The Academic Departmental Head determines how the modules must be distributed over the year and when the department will announce the starting dates for classes.

After completing the Honours learning programmes the graduates will possess the following skills:

- Knowledge of and engagement in an area at the forefront of a field, discipline or practice.

- An understanding of the theories, research methodologies, methods and techniques relevant to the field, discipline or practice; and an understanding of how to apply this knowledge in a particular context.
- An ability to interrogate multiple sources of knowledge in an area of specialisation, and to evaluate knowledge and processes of knowledge production.
- An understanding of the complexities and uncertainties of selecting, applying or transferring appropriate standard procedures, processes or techniques to unfamiliar problems in a specialised field, discipline or practice.
- An ability to critically review information gathering, assessment and management processes in specialised contexts in order to develop creative responses to problems and issues.
- An ability to present and communicate academic, professional or occupational ideas and texts effectively to a range of audiences, offering creative insights, rigorous interpretations and solutions to problems and issues appropriate to the context.

A student must register for the compulsory research modules of 36 credits and do research on an approved topic in consultation with the Academic Departmental Head. More modules must be selected from the possible electives to obtain at least 120 credits.

FIRST	SECOND
COMPULSORY	
CNCS6809	
ELECTIVES	CNCS6824
CNCS6814	CNST6824
CNST6814	CNST6844
CNST6834	CNST6864
CNFD6808	
NUTE6808	
CNST6854	

12.6.4 BACHELOR OF SPATIAL PLANNING HONOURS

12.6.4.1 BACHELOR OF SPATIAL PLANNING HONOURS BC460145

After completing the programme, the graduates will possess the following skills:

- A thorough knowledge of the aims and purpose of urban and regional planning as well as planning theory, urban planning theory, regional planning theory, philosophy and ethics.
- The ability to practically apply theory in urban and regional planning projects e.g. the capacity to analyse issues from a theoretical and/or empirical perspective and to recommend suitable alternatives.
- The ability to apply and understand economics for planners, socio-cultural aspects in planning and environmental planning; and link these to the everyday tasks and activities of urban and regional planners.
- The capacity to communicate clearly and logically, write good planning and research reports and debate these with stakeholders.

A minimum of 140 credits must be presented for the BSPHons programme. To obtain the Honours in Spatial Planning a minimum study period of one year is required. Residential and Compact Learning can be conducted full-time over 12 months or 24 months part-time or in block weeks where attendance take place in 4-5 block weeks in a year.

Compact learning students must attend compulsory workshop weeks at the department for the duration of the programme at times as determined by the Academic Departmental Head. Students who register as full-time or part-time will also be expected to attend some classes, sessions, guest lectures, field trips, site visits, tours, tests and examinations during the block weeks. During classes, lectures, tutorials, practicals and discussions will take place. Assignments will be done and tests and examinations may also be written during the block weeks.

The Academic Departmental Head determines how the modules must be distributed over the years of study and in all programmes (full-time, part-time and compact learning). The modules may be spread over an additional year if a student does not have the necessary academic background.

This degree does not enable registration at the South African Council for Planners (SACPLAN).

FULL TIME	URRE 6813/URRE6823	Research in Environmental Planning	12
	URSC6813/ URSC6823	Research in Socio-Cultural Aspects in Planning	12
	UREP 6813UREP/6823	Research in Economics for Planners	12
	URLM6813/ URLM6823	Land Use Management	12
	URHS6813/URHS6823	Human Settlements Planning	12
	URUT6803	Research in Urban Development Theory	12
	URBP6805	Basic Practice in Urban and Regional Planning	20
	URDT6804	Human Settlement Development Management	16
	URMD6808	Urban and Regional Planning Research Report	32
COMPACT LEARNING AND PART TIME	**YEAR 1**		
	URRE 6813/URRE6823	Research in Environmental Planning	12
	URSC6813/ URSC6823	Research in Socio-Cultural Aspects in Planning	12
	UREP 6813UREP/6823	Research in Economics for Planners	12
	URLM6813/ URLM6823	Land Use Management	12
	URHS6813/URHS6823	Human Settlements Planning	12
	YEAR 2		
	URUT6803	Research in Urban Development Theory	12
	URBP6805	Basic Practice in Urban and Regional Planning	20
	URDT6804	Human Settlement Development Management	16
	URMD6808	Urban and Regional Planning Research Report	32

12.6.4.2 BACHELOR OF SPATIAL PLANNING HONOURS SPECIALISATION MAJORING IN HUMAN SETTLEMENTS BC460171

The Specialisation in Human Settlements combines urban planning and human settlement modules to enable graduates to function effectively in planning sustainable human settlements with focus on the development and management of human settlements as well as the theory related to human settlements and housing.

FULL TIME	URRE 6813/6823	Research in Environmental Planning	12
	UREP 6813/6823	Research in Economics for Planners	12
	URHT6814/6824	Human Settlements Theory	16
	URMD6808	Urban and Regional Planning Research Report	32
	URBP6805	Basic Practice in Urban and Regional Planning	20
	URDT6804	Human Settlement Development Management	16
	URRT6803	Research in Regional Planning Theory	12
	URUT6803	Research in Urban Development Theory	12
COMPACT LEARNING AND PART TIME	**YEAR 1**		
	URRE 6813/6823	Research in Environmental Planning	12
	UREP 6813/6823	Research in Economics for Planners	12
	URHT6814/6824	Human Settlements Theory	16
	YEAR 2		
	URUT 6803	Research in Urban Development Theory	12
	URBP6805	Basic Practice in Urban and Regional Planning	20
	URHA6804	Human Settlement Management and Administration	16
	URDT6804	Human Settlement Development Management	16
	URRR6808	Research Report in Human Settlements	32

12.6.5 BACHELOR OF SCIENCE HONOURS

12.6.5.1 BACHELOR OF SCIENCE HONOURS MAJORING IN AGRICULTURAL ECONOMICS BC460011

Students must register for all compulsory modules plus enough others to obtain at least 120 credits.

	FIRST SEMESTER	SECOND SEMESTER
COMPULSORY	AGEC6800 Applied econometrics and research project AGEC6815 Advanced production and natural resource economics AGEC6835 Macro economics and finance	AGEC6825 Agribusiness management and marketing AGEC6865 Operational research

12.6.5.2 BACHELOR OF SCIENCE HONOURS BC460018, BC460019, BC460020, BC460027, BC460061, BC460029, BC560029, BC460030, BC460067, BC460065, BC460031, BC460076, BC460039, BC460041, BC460082, BC460042, BC460089, BC460049

Students must register for all compulsory modules plus enough others to obtain at least 120 credits. This degree is awarded in the following fields: * Modules not always presented

DISCIPLINE	BEHAVIOURAL GENETICS	BIOCHEMISTRY	BOTANY	ENTOMOLOGY	FOOD SCIENCE	FORENSIC SCIENCES	
					2016 FOR BSc FOOD SCIENCE STUDENTS	FORENSIC SCIENCES	FORENSIC GENETICS
2018 CODE	**BC460018**	**BC460019**	**BC460020**	**BC460027**	**BC460029**	**BC460030**	**BC460067**
COMPULSORY	GENE6816 GENE6808 GENH6814/GENH6824 GENB6814/GENB6824	BOCT6814 BOCO6822 BOCL6826 BOCR6828	PLTB6854 BTNY6806 BTNY6808	ENTO6814 ENTO6822/ENTO6852 ENTO6832/ENTO6862 ENTO6842 ENTO6808	FSCL6806 FSCR6808	FORS6816 FORS6808 FORS6814/FORS6824 FORC6824	FORG6816 FORG6808 *FORG6814/FORG6824 *FORG6834/FORG6844 *FORG6854/FORG6864 *GENP6814/GENP6824
ELECTIVES	GENP6814/6824 GENE6834/6844	BOCM6824 BOCB6824 BOCE6824 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ ADH.	BTNY6814 BTNY6824 BTNY6834 BTNY6844 BTNY6854 BTNY6864 BTNY6874 BTNY6884 BTNY6894 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ ADH.	ENTO6854 ENTO6864 ENTO6874 ENTO6884 ENTO6894/ENTO6844 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ ADH.	FSCP6814 FSCD6814 FSCM6814 FSCG6826 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ ADH.	FORS6834/FORS6844 FORS6854/FORS6864 CHEM6873 CHEM6883 FORG6814/FORG6824	

DISCIPLINE	GENETICS	MICROBIOLOGY	PLANT BREEDING	PLANT HEALTH ECOLOGY	PLANT PATHOLOGY	WILDLIFE	ZOOLOGY
2018 CODE	**BC460031**	**BC460039**	**BC560041**	**BC460082**	**BC560042**	**BC460089**	**BC460049**
COMPULSORY	GENE6816 GENE6808 GENE6814/GENE6824	MCBT6814 MCBO6822 MCBL6826 MCBR6828	PLTB6814 PLTB6824 PLTB6834 PLTB6854 PLTB6806 PLTB6808	PPLG6806 PPLG6808 PLTB6854 SOIL6844 PPLG6824	PLTB6854 PPLG6806 PPLG6808 PPLG6844 PPLG6824 PPLG6834	WILD6816 WILD6856 WILD6826 WILD6808 WILD6806	ZLGY6814 ZLGY6822/ZLGY6852 ZLGY6832/ZLGY6862 ZLGY6842 ZLGY6808
ELECTIVES	GENE6834/GENE6844 GENM6814/GENM6824 GENH6814/GENH6824 GENP6814/GENP6824 GENB6814/GENB6824 FORG6834/FORG6844 GENS6814/GENS6824	MCBD6834 MCBP6844 MCBM6814 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ADH.		CROP6814 CROP6844 ENTO6854 ENTO6884 CLIM6824 PPLG6834 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ADH.			ZLGY6834 ZLGY6854 ZLGY6864 ZLGY6874 ZLGY6884 ZLGY6894/ZLGY6844 One 16-credit NQF Exit Level 8 module from any other discipline in the biological field of interest. Subject to approval PD/ADH.

12.6.5.3 BACHELOR OF SCIENCE HONOURS IN CONSTRUCTION MANAGEMENT BC460024, BC460043

LEARNING PROGRAMMES FOR CONSTRUCTION MANAGEMENT HONOURS Each student complete all the compulsory modules (row C1/C2) and select enough electives to obtain at least 120 credits.				
YEAR	**FIRST**		**FIRST**	**SECOND**
CREDITS	**136**		**56**	**80**
MODE	**RESIDENTIAL**		**COMPACT LEARNING**	**COMPACT LEARNING**
2018 CODE	BC460024		BC460024	BC460024
COMPULSORY SEMESTER 1	BIPR6804 BPDR6812 BPMR6804 BPPR6812 CPOR6804 COMR6804 CRPR6808		BPDD6812 BPPD6812 CPOD6804	BIPD6804 BPMD6804 COMD6804 CRPD6808
COMPULSORY SEMESTER 2	BCFR6822 BPCR6822 CTIR6822		BCFD6822 BPCD6822 CTID6822	

BACHELOR OF SCIENCE HONOURS IN QUANTITY SURVEYING BC460024, BC450043

LEARNING PROGRAMMES FOR QUANTITY SURVEYING HONOURS (PROGRAM CODE: M4091)

Each student select all the compulsory modules (row C1/C2) from the prescribed discipline for one study year. Students must select sufficient module credits from the electives (E) to obtain the credits for each year of study as indicated.

YEAR	**FIRST**		**FIRST**	**SECOND**
CREDITS	**128**		**56**	**72**
MODE	**RESIDENTIAL**		**COMPACT LEARNING**	**COMPACT LEARNING**
2018 CODE	BC460043		BC460043	BC460043
COMPULSORY SEMESTER 1	BIPR6804 BPDR6812 BPMR6804 BPPR6812 QBER6812 QDQR6804 QRPR6808		BIPD6804 QBED6812 QDQD6804	BIPD6804 BPDD6812 BPMD6804 QRPD6808
COMPULSORY SEMESTER 2	BCFR6822 BPQR6822 QBER6822		BCFD6822 BPQD6822 QBED6822	

12.6.5.4 BACHELOR OF SCIENCE HONOURS LEARNING PROGRAMMES IN PHYSICAL AND CHEMICAL SCIENCES

Students must register for all compulsory modules plus enough others to obtain at least 120 credits. This degree is awarded in the following fields:

DISCIPLINE	CHEMISTRY	PHYSICS		ASTROPHYSICS	AGROMETEOROLOGY (from 2016)	ENGINEERING SUBJECTS
	FIRST & SECOND	FIRST	SECOND	FIRST & SECOND	FIRST & SECOND	FIRST & SECOND
2018 CODE	**BC460021**	**BC460040**		**BC460017**	**BC460012**	**BC460026**
COMPULSORY	CHEM6813 CHEM6833 CHEM6853 CHEM6873 CHEM6823 CHEM6843 CHEM6883 CHEM6863 CHEM6808	PHYS6808		Note that students will only be allowed to this programme if they comply with the extra admission requirements related to undergraduate astrophysics modules specified by the ADH. PHYA6808/PHYA6818 PHYA6814/PHYA6824 PHYA6854/PHYA6864 PHYA6874/PHYA6884	**COMPULSORY** SCCS6808 CLIM6814 CLIM6824 CLIM6834 CLIM6844 Note: Students who wish to pursue a career meteorologist are advised to complete the following modules: MATM1544 MATM2654 MATA2644	No Honours registered and students registering for the Bachelor of Science's Engineering Sciences cannot transfer directly to a Bachelor of Honours Degree; they would have to do at least three physics modules to make the migration possible.
ELECTIVES		**EIGHT OF:** (in consultation with the Academic Departmental Head) PHYS6814* PHYS6834* PHYS6854 PHYS6874* PHYR6814 PHYE6814 PHYE6834* PHYI6814 PHYI6834* PHYI6854* PHYI6874* PHYA6814 PHYA6834 PHYA6854 PHYA6874 PHYC6814 PHYC6834 PHYS6894*	PHYS6824* PHYS6844* PHYS6864 PHYS6884* PHYR6824 PHYE6824 PHYE6844* PHYI6824 PHYI6844* PHYI6864* PHYI6884* PHYA6824 PHYA6844 PHYA6864 PHYA6884 PHYC6824 PHYC6844 (Not all these modules are offered in a given year. This degree can be studied over more than one year.)	PHYS6814/PHYS6824 PHYS6834/PHYS6844 PHYE6814/PHYS6824 PHYS6854/PHYS6864 PHYI6814/PHYS6824 PHYE6834/PHYS6844 PHYA6834/PHYS6844 PHYC6814/PHYS6824 PHYC6834/PHYS6844 PHYI6874/PHYS6884 Note that students will only be allowed to this programme if they comply with the extra admission requirements related to undergraduate astrophysics modules specified by the ADH.	Two 16-credit NQF Exit Level 8 modules from any related discipline (s)	
		* Students wanting to do an MSc in Surface Physics are strongly recommended to register for these courses.				

12.6.5.5 BACHELOR OF SCIENCE HONOURS IN AGRICULTURE
HONOURS LEARNING PROGRAMMES BC560012, BC560013, BC560015, BC560019, BC560036, BC560044, BC560073

Depending on the previous qualification and in consultation with the Academic Departmental Head, the students will follow one of the following curriculums in Agrometeorology, Agronomy, Animal Science, Grassland Science, Soil Science and Irrigation Science.

The objectives of the study for this degree are:
(a) to deepen and extend the student's knowledge in modules of their choice in the context of research and extension;
(b) to prepare the student for further post-graduate study;
(c) to develop independent study capability in the student;
(d) to train the student how to collect, compile, collate, interpret and report subject literature and the effective communication thereof.
A minimum of 120 credits must be obtained over the year and the department will announce the starting dates for classes.

DISCIPLINE	**AGROMETEOROLOGY**	**AGRONOMY**	**ANIMAL SCIENCE**			**GRASSLAND SCIENCE**	**SOIL SCIENCE**	**IRRIGATION SCIENCE**	**WILDLIFE**
2018 CODE	BC560012	BC560013	BC560015			BC560036	BC560044	BC560073	
SUB DISCIPLINE		**Crop Production**	**Animal Breeding**	**Animal Nutrition**	**Animal Physiology**				
COMPULSORY	CLIM6814 CLIM6824 CLIM6834 CLIM6844 SCCS6808 **OR** CLIM6854 CLIM6864 Two 16 credits NQF Exit Level 8 modules from other related disciplines Note: Students who wish to pursue a career meteorologist are advised to complete the following modules: MATM1544 MATM2654 MATA2644	CROP6814 CROP6824 CROP6834 CROP6844 SCCS6808 Two 16 credits NQF Exit Level 8 modules from other related disciplines	ANIB6814 ANIB6824 ANIB6826 ANIG6808 **ONE OF:** ANIP6814 ANIP6824	ANIG6808 ANIN6815 ANIN6825 ANIN6834 ANIN6864 **ONE OF:** ANIP6816 ANIP6814 ANIP6824 ANIB6814 ANIB6824 ANIB6826	ANIP6816 ANIP6814 ANIP6824 ANIG6808 **ONE OF:** ANIB6814 ANIB6834 ANIB6826	GRAS6805 GRAS6808 GRAS6814 GRAS6824 GRAS6834 GRAS6844 Two 16 credits NQF Exit Level 8 modules from other related disciplines	SOIL6814 SOIL6824 SOIL6834 SOIL6844 SCCS6808 Two 16 credits NQF Exit Level 8 modules from other related disciplines	AGEG6814 AGEG6824 CROP6834 CLIM6824 SOIL6824 SCCS6808 **ONE OF:** CROP6814 CLIM6814 SOIL 6814	WILD6808 WILD6806 WILD6816 WILD6846 ZLGY6864

12.6.5.6 BACHELOR OF SCIENCE HONOURS LEARNING PROGRAMMES IN COMPUTER SCIENCE AND INFORMATICS AND MATHEMATICAL SCIENCES

Students must register for all compulsory modules plus enough others to obtain at least 120 credits. This degree is awarded in the following fields:

DISCIPLINE	COMPUTER SCIENCE AND INFORMATICS	ACTUARIAL SCIENCE		MATHEMATICS AND APPLIED MATHEMATICS		MATHEMATICAL STATISTICS	RISK ANALYSIS	APPLIED STATISTICS
2018 CODE	**BC460022**	**BC460010 (Option 1)**	**BC460010 (Option 2)**	**BC460038**		**BC460037**		**BC460046**
CREDITS	All compulsory modules plus enough others to obtain at least 120 credits							
COMPULSORY	CSIS6809 CSIS6813/CSIS6823	ACSR6808 ACSG6800 ACSL6815	ACSR6808 ACSL6815 ACSG6890	MATM6819/MATM6829		STSR6808 STSB6810 STSE6815 STSP6815 STSM6825	STSR6808 STSE6815 STSS6810 STSF6825 STSF6845	STSR6808 STSF6815 STSS6810 STSC6825 STSS6825
ELECTIVES	CSIC6813/CSIC6823 CSIC6833/CSIC6843 CSIC6853/CSIC6863 CSID6813/CSID6823 CSID6833/CSID6843 CSID6853/CSID6863 CSIE6813/CSIE6823 CSIE6833/CSIE6843 CSIE6853/CSIE6863 CSIE6873/CSIE6883 CSII6813/CSII6823 CSII6833/CSII6843 CSII6853/CSII6863 CSIM6813/CSIM6823 CSIM6833/CSIM6843 CSIN6813/CSIN6823 CSIN6833/CSIN6843 CSIP6813/CSIP6823 CSIP6833/CSIP6843 CSIP6853/CSIP6863 CSIP6873/CSIP6883 CSII6873/CSII6883 Maximum of two approved modules from any other department within the faculty.	Special additional requirements: 5 ASSA subject Exemptions **ONE OF:** STSE6815 STSP6815 STSF6825 STSM6825	Special additional reguirements: 4 ASSA subject exemptions **TWO OF:** STSE6815 STSP6815 STSF6825 STSM6825	MATA6814/MATA6824 MATB6814/MATB6824 MATC6814/MATC6824 MATD6814/MATD6824 MATE6814/MATE6824 MATF6814/MATF6824 MATG6814/MATG6824 MATH6814/MATH6824 MATI6814/MATI6824 MATJ6814/MATJ6824 MATK6814/MATK6824 MATL6814/MATL6824 MATM6814/MATM6824 One approved module from another discipline	MATN6814/MATN6824 MATO6814/MATO6824 MATP6814/MATP6824 MATQ6814/MATQ6824 MATR6814/MATR6824 MATS6814/MATS6824 MATT6814/MATT6824 MATU6814/MATU6824 MATV6814/MATV6824 MATW6814/MATW6824 MATX6814/MATX6824 MATY6814/MATY6824 MATZ6814/MATZ6824 MATZ6834/MATZ6844 MATZ6854/MATZ6864			

12.6.5.7 HONOURS LEARNING PROGRAMMES IN GEOSCIENCES

Students must register for all compulsory modules plus enough others to obtain at least 120 credits. This degree is awarded in the following fields:

DISCIPLINE	GEOGRAPHY	GEO-INFORMATICS	ENVIRONMENTAL SCIENCES*	SOIL SCIENCE
2018 CODE	**BC460033**	**BC460069**	**BC460062**	**BC460044**
SEMESTER	FIRST			FIRST
COMPULSORY	GEOF6816 GEOR6808	GEOF6816 GEOR6808 GISC6816 CSID6853	GEOR6808 + GEOF6816	SOIL6814 SOIL6834 SCCS6808
ELECTIVES	GEOH6816 GEOP6816 GISC6816 GEOH 6836		BTNY6814 GISC6816 GEOP6816 ZLGY6832 ZLGY6834 ZLGY6894	One 16 credits NQF Exit Level 8 modules from other related disciplines
SEMESTER	SECOND			SECOND
COMPULSORY		CSID6843 GISR6826	ENVG6826 ENVG6846	SOIL6824 SOIL6844
ELECTIVES	ENVG6826 ENVG6846 GISR6826		BTNY6864 ZLGY6842	One 16 credits NQF Exit Level 8 modules from other related disciplines

*This programme is only available for students who graduated in the B.Sc. Geography and Environmental Sciences programme.

HONOURS LEARNING PROGRAMMES IN GEOLOGY (BC460035, BC460028, BC460032) AND GEOHYDROLOGY (BC460034)

The study starts either in January or July on a date as determined by the Department of Geology and Geohydrology respectively. Modules marked by an asterisk (*) contain a research component.

These courses starts on a date as determined by the subject head. Each module must be independently passed. Students compile their own curricula in consultation with the ADH and the programme director to obtain 120 credits for the year. Students intending to register with SACNASP following completion of their studies are strongly encouraged to enrol for GLGY6808. Students entering the porgramme with the July intake will only be able to complete in 18 months, if they want to do GLGY6808*.

DISCIPLINE	GEOLOGY	ENVIRONMENTAL GEOLOGY	GEOCHEMISTRY	GEOHYDROLOGY	GEOLOGY	ENVIRONMENTAL GEOLOGY	GEOCHEMISTRY	GEOHYDROLOGY
2018 CODE	BC460035	BC460028	BC460032	**BC460034**	BC460035	BC460028	BC460032	**BC460034**
	FIRST SEMESTER				SECOND SEMESTER			
COMPULSORY	GLGY6816*	GLGY6816* GLGY6836* GLGY6873*	GLGY6816* GLGY6836* GLGY6873*	GEHR6808 GEOH6815 GEOH6835 GEOH6855			GLGY6846*	GEOH6865 GEOH6845 GEOH6825
ELECTIVES	GLGY6836* GLGY6853* GLGY6856* GLGY6873* GLGY6808*	GLGY6808*	GLGY6808*		GLGY6823* GLGY6826* GLGY6843* GLGY6846* GLGY6863* GLGY6883*	GLGY6823* GLGY6826* GLGY6843* GLGY6846* GLGY6863* GLGY6883*	GLGY6823* GLGY6826* GLGY6843* GLGY6863* GLGY6883*	

12.7 MASTER'S DEGREES (NQF Exit Level 9)

12.7.1 MASTER OF ARCHITECTURE BC480214, BC470314

MASTER OF ARCHITECTURE BC480214	MASTER OF ARCHITECTURE BC470314
LEARNING PROGRAMMES FOR MASTER OF ARCHITECTURE • The minimum term of this study is two years and a total of 180 credits are allocated for this degree. A student must do research on an approved topic in consultation with the Academic Departmental Head, for at least one year in preparation for a dissertation that shall be submitted as the only requirement for the degree.	**LEARNING PROGRAMMES FOR MASTER OF ARCHITECTURE (PROFESSIONAL) (For professional registration)** The Master of Architecture (Professional) is a one year full-time Master's Degree by coursework and involves lectures, projects, and an investigated design thesis with an advanced design project. The purpose of the qualification is to educate students who may register as a candidate architect with the South African Council for the Architectural Profession in terms of the provisions of the Architectural Profession Act 44 of 2000. The assessments and examinations for the degree MArch(Professional) are recognised by the minister concerned in terms of the provisions of the Architectural Profession Act (Act 44 of 2000). Training experience after completion of the degree MArch(Professional) will be controlled by the conditions of the South African Council for the Architectural Profession. The registrar of this Council will provide information in this regard.
YEAR 1	**YEAR 1**
ARCH8900	DDIS7900 CONS7908 ATRE7904 BPKR7914 PARC7904

12.7.2 MASTER OF AGRICULTURE 5725, BC580152, BC580172, BC580190

LEARNING PROGRAMMES FOR MASTER OF AGRICULTURE

The aims of this degree study are:

(a) to present specialised postgraduate agricultural management training;

(b) to guide the student in such a way that he/she will be able to successfully integrate, communicate and apply the principles, concepts and knowledge of agricultural and management science; and

(c) to enhance applicable research skills in order to enable the student to qualify as a specialist in his/her field.

A student who registers for the MAgric degree and presents a dissertation (180 credits), must use one of the following codes:

RESEARCH			
BC580152	BC580111	BC580172	BC580190
AGRICULTURAL MANAGEMENT	**AGRICULTURAL ECON**	**IRRIGATION MANAGEMENT**	**WILDLIFE MANAGEMENT**
AGMA8900	AGEM8900	IRRI8900	WDMT8900

12.7.3 MASTER OF DISASTER MANAGEMENT BC470325

LEARNING PROGRAMMES FOR MASTER OF DISASTER MANAGEMENT

The main aim of the programme is to provide disaster management practitioners, or those who may have future disaster management responsibilities, training in a holistic approach towards disaster management to enable them to manage all kinds of disasters by implementing proactive disaster management strategies in terms of relevant legislation, policies and directives, and effectively co-ordinate relief and recovery programs.

The degree can be offered over a minimum period of one year (full time). Students will be allowed to take the degree over a two-year period (part time) by registering for fewer subjects per year. Prospective part-time candidates need to clarify their part-time studies with the Director of DiMTEC. Students need to obtain 180 credits.

Compulsory	Credits
DIMR7900 – Disaster Management Mini dissertation	120

Electives (choose at least 60 credits)

Code	Subject	Credits
DIMD7910	Ecosystem-Based Disaster Risk Reduction and Climate Change	60
DIME7910	Ethnic and Cultural Conduct	30
DIMG7900	Geographical Information Systems and Remote Sensing in Disaster Management	30
DIMH7910	Crisis Intervention and Trauma Management	30
DIMI7910	Disaster Risk and Impact Assessment	60
DIMM7910	Management of Media Relations	30
DIMP7900	Political Strategic Planning	30
DIMW7910	Water related disasters	60

12.7.4 MASTER OF SUSTAINABLE AGRICULTURE BC571347

LEARNING PROGRAMMES FOR MASTERS DEGREE IN SUSTAINABLE AGRICULTURE

The aim of this multi- and interdisciplinary postgraduate degree in Sustainable Agriculture is to address the global need for research and professional capacity to research, and provide solutions to sustainability in the field of agriculture. Sustainability in terms of food security, national resources and energy are key factors that inform the national and global development agenda. Sustainable agriculture seeks to sustain farms, resources and communities by promoting farming practices and methods that are profitable, environmentally sound and to the benefit of communities.

The Master's Degree in Sustainable Agriculture contains 180 credits and is presented in a minimum period of one year. This degree will develop agricultural specialists that could support sustainable agricultural practice, and in return support food security and socio-economic development.

The programme consists of five compulsory modules and submission of a research component in the form of a mini-dissertation. The programme requires assignments to be completed by students and submitted at predetermined dates. Assignments will be marked and graded by the lecturers, who will give students feedback in a written and oral format during contact sessions. Assignments will be part of a continual assessment process. Apart from the assignments, a continuous examination evaluation assessment (written) will take place at the end of each year, normally during November. The mini-dissertation, script or article is conducted and examined under the supervision of a supervisor or supervision committee. External assessment is done by a separate appointed panel of experts.

First Semester		Credits
SANR7906	Advanced Management of Natural Resources	24
SARS7906	Research Methodology and Methods for Sustainable Agriculture	24
SARP7900	Mini-dissertation	60
SALS7906	Advanced Livestock Production for Sustainable Agriculture	24
SAEX7906	Sustainable Agriculture and Extension: Theory and Practice	24
SAEC7906	Advanced Economics for Sustainable Agriculture	24

12.7.5 MASTER OF LAND AND PROPERTY DEVELOPMENT MANAGEMENT BC470374

LEARNING PROGRAMMES

Learning programmes: Each student **selects the field of interest, between Project Management or Valuation** and include all the compulsory modules (row C1/C2) from the prescribed discipline for the study years. Students must select sufficient modules and credits as indicated at each field of study from the electives (E) to obtain at least 180 credits for the degree programme.

YEAR	**FIRST**			**SECOND**	
	PROJECT MANAGEMENT	**VALUATION**		**PROJECT MANAGEMENT**	**VALUATION**
2018 CODE	BC470374	BC470374		BC470374	BC470374
CREDITS	**84**			**96**	
COMPULSORY C1	DPRP7902 TRBP7904 LSFP7902 AGEC7902 PPYC7901 BOEC7902 ENDC7902 ANDC7902 CCPC7901 CINC7901 INDR7902	WILD7902/NLE793 URRP7902 SOIL7904 AGEN7902 PPYC7901 BOEC7902 ENDC7902 ANDC7902 CCPC7901 CINC7901 INDR7902	C2	IPMP7904 ENDR7900 CINC7901	ENWV7904 ENDR7900 CINC7901
ELECTIVE				**SELECT ANY 16 CREDITS** BEH704 BGR704	**SELECT ANY 16 CREDITS** URHS7904 URLM7904

12.7.6 MASTER OF HUMAN SETTLEMENTS BC480271

These learning programmes aim to:

(a) Provide the student with the opportunity to present evidence of advanced study and research characterised by intellectual independence and advanced knowledge of a specialisation area in the subject, as well as accurate assessment of his/her own results and as well as that of others by production of a thesis, which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny.

(b) Develop the student, who will be able to demonstrate knowledge and understanding of supervised planning and execution of a research project in the discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature.

A student must do research on an approved topic in consultation with the Academic Departmental Head for at least two years, in preparation of a full dissertation.

YEAR 1+2	URHS8900

12.7.7 MASTER OF SCIENCE

These learning programmes aims at:

(a) Providing the student with the opportunity to present evidence of advanced study and research characterised by intellectual independence and advanced knowledge of a specialisation area in the subject, as well as accurate assessment of his/her own results and that of others by production of a thesis which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny.

(b) Developing the student in order to demonstrate knowledge and understanding of supervised planning and execution of a research project in the discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature.

- The minimum term of this study is 2 years and a total of 180 credits is allocated for this degree. The student may do a research Master's programme with a full dissertation or a structured Master's programme depending on the discipline for which they want to register.
- If the full dissertation option is followed the student must do research on an approved topic for at least two semesters, in consultation with the Academic Departmental Head, in preparation for a dissertation that shall be submitted as the only requirement for the degree. Students may be required to present at least one seminar/research report in each year in accordance with departmental rules.
- If the structured Master's Degree is all prescribed modules, a compulsory research essay must be completed. The topic for the research must be determined in consultation with the Academic Departmental Head. Students may be required to present at least one seminar/research report.

STRUCTURED MASTER'S DEGREES						
	ASTROPHYSICS	**COMPUTER SCIENCE AND INFORMATICS**		**MATHEMATICS OR APPLIED MATHEMATICS**		
2018 CODE	**BC470117**	**BC470122**		**BC470138 or BC470116**		
COMPULSORY	PHYA7970/PHYA7980	CSIS7910/CSIS7920		MATM7930/MATM7940		
ELECTIVES	Students in the National Astrophysics and Space Science Programme (NASSP) must do an Extended research essay (PHYA7900) (100 credits) on an approved subject, in consultation with the Academic Departmental Head, after having already completed a theoretical course component (PHYA7970/ PHYA7980 – Astrophysics and Space Science) (80 credits) presented by the University of Cape Town (UCT) consisting of a total of 5 UCT weight points from the NASSP Master's Degree (www.star.ac.za). An oral examination may be required which will be arranged with the student after the extended research essay has been submitted.	**At least 60 Credits of** CSIS7915/CSIS7925 CSIS7935/CSIS7945 CSIS7955/CSIS7965 CSIS7975/CSIS7985		**At least 96 credits of** MATA7914/MATA7924 MATB7914/MATB7924 MATC7914/MATC7924 MATD7914/MATD7924 MATE7914/MATE7924 MATF7914/MATF7924 MATG7914/MATG7924 MATH7914/MATH7924 MATI7914/MATI7924 MATJ7914/MATJ7924	MATK7914/MATK7924 MATL7914/MATL7924 MATM7914/MATM7924 MATN7914/MATN7924 MATO7914/MATO7924 MATP7914/MATP7924 MATQ7914/MATQ7924 MATR7914/MATR7924 MATS7914/MATS7924 MATT7914/MATT7924	MATU7914/MATU7924 MATV7914/MATV7924 MATW7914/MATW7924 MATX7914/MATX7924 MATY7914/MATY7924 MATZ7914/MATZ7924 MATZ7934/MATZ7944 MATZ7954/MATZ7964 One approved module from another discipline

	MATHEMATICAL STATISTICS RISK ANALYSIS	MATHEMATICAL STATISTICS	APPLIED STATISTICS	ACTUARIAL SCIENCES	ACTUARIAL SCIENCES
PROGRAMME CODE	**BC470187**	**BC470137**	**BC470146**	**BC470110** **If ACSG6800 is NOT completed**	**BC470110** **If ACSG6800 is completed**
COMPULSORY	STSR7900 OR STSD7900 STSE7910 STSS7910 STSF7920 STSF7940 (If STSF6815, STSF6825, STSF6845, STSE6825 were not part of the honours degree else any other NQF Exit Level 9 Mathematical Statistics Module)	STSR7900 OR STSD7900 STSB7910 STSE7910 STSP7910 STSM7920 (If STSB6810, STSE6815, STSP6815, STSM6825 were not part of the honours degree else any other NQF Exit Level 9 Mathematical Statistics Module)	STSR7900 OR STSD7900 STSS7920 (If STSS6825 was not part of the honours degree)	ACSR7900 OR ACSD7900 ACSG7900	ACSD7900
ELECTIVES	**Enough to obtain 180 NQF 9 credits**				
	STSB7910 STSP7910 STSM7920 STSR7920 STSS7920 STSA7910	STSF7940 STSA7910 STSR7920 STSS7920	STSB7910 STSA7910 STSE7910 STSP7910 STSM7920 STSR7920 STSS7910 STSF7920 STSF7940	STSB7910 STSA7910 STSE7910 STSP7910 STSS7920 STSR7920 STSM7920	STSB7910 STSA7910 STSE7910 STSP7910 STSS7920 STSR7920 STSM7920
	A written examination paper on four themes from the following and a compulsory short dissertation on an approved topic, themes should be chosen such that the module content does not overlap with a successfully completed honours-level module, e.g. STSB7910 may not be chosen if STSB6810 was successfully completed. Themes are selected in consultation with the Academic Departmental Head	A written examination paper on four themes from the following and a compulsory short dissertation on an approved topic, themes should be chosen such that the module content does not overlap with a successfully completed honours-level module, e.g. STSB7910 may not be chosen if STSB6810 was successfully completed. Themes are selected in consultation with the Academic Departmental Head.			

MASTERS OF SCIENCE MAJORING IN MINERAL RESOURCE MANAGEMENT BC470178

Effective mining and mineral beneficiation is dependent on functional integrated management practices that include aspects such as geology, mining, mineral processing, financial management and mining-related legislation, among others (including all MRM practices).

- Mining has traditionally consisted of various disciplines, which have been managed, in a fragmented fashion. The results of fragmented management led to task duplication and noncoordination of activities that span the whole spectrum of mining functions. These actions invariably resulted in the development of a high cost structure.
- The main objective of the Magister in Mineral Resource Management is to effectively integrate the relevant fields of expertise so as to manage mining activities in the most cost effective manner possible.
- The programme will consist of four separate parts taken over a period of at least two years. In phase one, students will be exposed to basic Geology, Mining, Metallurgy and Business Principles as an introduction before being exposed to more detail in the applied modules. Phase two and three modules will contain more detail and will also address other deficiencies of the students.
- Upon the successful completion of the compulsory modules in Phase 1 and GLGD7913/7923 from Phase 2, four modules from Phase 2 and two modules from Phase 3 (a total of 12 modules) and GLGD7910(mini dissertation) from Phase 4, the student will obtain a MSc majoring in Mineral Resource Management.

Some of the modules have compulsory contact time for lectures, case studies, practicals, tasks and tutorials, while others will be interactive and internet-based. The fourth phase comprises the completion of an extended research dissertation. Upon the successful completion of the compulsory modules in phase one, six modules from phase two, four modules from phase three and phase four, the student will obtain a Magister qualification.

PHASE1	PHASE2	PHASE3	PHASE4
GLGA7913/GLGA7923 GLGA7933/GLGA7943 GLGA7953/GLGA7963 GLGA7973/GLGA7983 GLGB7913/GLGB7923	GLGC7913/GLGC7923 GLGC7933/GLGC7943 GLGC7953/GLGC7963 GLGC7973/GLGC7983 GLGD7913/GLGD7923 GLGD7933/GLGD7943	GLGE7913/GLGE7923 GLGE7933/GLGE7943 GLGE7953/GLGE7963 GLGE7973/GLGE7983	GLGD7900

12.7.8 MASTER OF SCIENCE IN NANOSCIENCE

	MASTER OF SCIENCE IN NANOSCIENCE BC470179		
PROGRAMME CODE	BC470179		
COMPULSORY	Study code 4719: This qualification forms part of the National Nanoscience Postgraduate Teaching Platform (NNPTP) and is offered in collaboration with the University of the Western Cape, the Nelson Mandela Metropolitan University and the University of Johannesburg. Students are subjected to a selection process. The programme consists of a theoretical coursework component (80 Credits) and a mini-dissertation (100 Credits).	**a) Theoretical Coursework** The coursework component is presented at the University of the Western Cape (UWC). NSCC7911 and NSMN7911 are compulsory. Students register for a major field of specialization (NSFC7911, NSFP7911 or NSTC7914) and the applicable Experimental Techniques module. To complete the theoretical coursework component students have to enrol for the two foundation courses that are not part of the major field of specialization. For example: Students opting for Advanced Nanophysics (NSAP7900) accordingly select Foundations of Nano-biomedical Sciences for non-biologists (NSTC7914) and Foundations of Nanochemistry for Non-chemists (NSCC7911). The coursework component incorporates the following modules:	NSCC7911 – Central Concepts in Nanoscience NSMN7911 – Management for Nanoscientists NSFB7911 – Foundations of Nano-biomedical sciences for Non-biologists NSFC7911 – Foundations of Nanochemistry for Non-chemists NSFP7911 – Foundations of Nanophysics for Non-physicists NSTC7914 – Experimental Techniques in Nanochemistry NSTP7914 – Experimental Techniques in Nanophysics NSAP7900 – Advanced Nanophysics NSCH7900 – Advanced Nanochemistry NSRP7900 – Nanoscience Research Project **(b) Research Project** **Currently not available at the University of the Free State.* On successful completion of the coursework component, students must do an approved mini-dissertation (NSRP7900) (100 credits) in Nanoscience (in consultation with the Academic Departmental Head) at the University of the Free State.

RESEARCH MASTER'S DEGREES

Disciplines	PLAN CODE	MODULE CODE	Disciplines	PLAN CODE	MODULE CODE	Disciplines	PLAN CODE	MODULE CODE
Actuarial Sciences	BC480010	ACSG8900	Food Science	BC480029	FSCI8900	Microbiology	BC480239	MCBT8900
Agricultural Economics	BC480011	AGEC8900	Forensic Science	BC480030	FORS8900	Microbial Biotechnology	BC480077	MBBT8900
Applied Mathematics	BC480016	MATA8900	Forensic Chemistry	BC480065	FORC8900	Mineral Resource Management	BC480078	MRTM8900
Agrometeorology	BC480012	CLIM8900	Forensic Entomology	BC480066	FORE8900	Plant Health Ecology	BC480082	PHEC8900
Agrometeorology Interdisciplinary	BC480012	CLMI8900	Genetics Interdisciplinary	BC480030	GENI8900	Plant Breeding	BC480041	PLTB8900
Astrophysics	BC480017	PHYA8900	Forensic Genetics	BC480078	FORG8900	Plant Breeding Interdisciplinary	BC480081	PLTI8900
Behavioural Genetics	BC480018	GENB8900	Forensic Interdisciplinary	BC480068	FORI8900	Plant Pathology Interdisciplinary	BC480083	PPLI8900
Biochemistry	BC480019	BOCM8900	Genetics	BC480031	GENE8900	Plant Pathology	BC480042	PPLG8900
Botany	BC480020	BTNY8900	Geochemistry	BC480032	GECE8900	Physics	BC480040	PHYS8900
Chemistry	BC480021	CHEM8900	Geography	BC480033	GEOH8900	Property Science	BC480085	PROP8900
Computer Information Systems	BC480056	CSIS8900	Geo-informatics	BC480060	GISC8900	Quantity Surveying	BC480043	DQFR8900
Computer Science and Informatics	BC480022	CSIS8900	Geology	BC480035	GLGY8900	Soil Sciences	BC480044	SOIL8900
Consumer Science	BC480023	CNCS8900	Geohydrology	BC480034	GEHR8900	Soil Sciences Interdisciplinary	BC480088	SOII8900
Construction Management	BC480024	PQMR8900	Grassland Sciences	BC480036	GRAS8900	Statistics	BC480046	STSA8900
Entomology	BC480027	ENTO8900	Limnology	BC480076	LIMG8900	Wildlife	BC480082	WILD8900
Environmental Geology	BC480028	GLGE8900	Mathematical Statistics	BC480037	STST8900	Zoology	BC480049	ZLGY8900
Environmental Management	BC480060	ENMT8900	Mathematics	BC480038	MATM8900			

12.7.9 MASTER OF SCIENCE IN AGRICULTURE BC580012, BC580013, BC580015, BC580036, BC580041, BC580042, BC580044, BC580046, BC580048

These learning programmes aim at:

- providing the student with the opportunity to present evidence of advanced study and research characterised by intellectual independence and advanced knowledge of a specialisation area in the subject, as well as accurate assessment of his/her own results and that of others by production of a thesis which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny
- developing the student in order to demonstrate knowledge and understanding of supervised planning and execution of a research project in the discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature

The minimum term of this study is 1 year and a total of 180 credits are allocated for this degree. Rules: The student may do a research Master's programme with a full dissertation or a structured Master's programme depending on the discipline in which they want to register. For the full dissertation option the student must do research on an approved topic for at least two semesters, in consultation with the Academic Departmental Head, in preparation for a dissertation that shall be submitted as the only requirement for the degree.

DATA2614 and DATA2624 must have been successfully completed or must be done concurrently.

RESEARCH								
Agrometeorology	BC580012	CLIM8900	Animal Nutrition	BC580015	ANIN8900	Plant Breeding Interdisciplinary	BC580081	PLTI8900
Agrometeorology Interdisciplinary	BC580053	CLMI8900	Animal Physiology	BC580015	ANIP8900	Plant Pathology	BC580042	PPLG8900
Agronomy	BC580013	CROP8900	Food Science	BC580029	FSCI8900	Plant Pathology Interdisciplinary	BC580083	PPLI8900
Agronomy Interdisciplinary	BC580054	CROI8900	Grassland Science	BC580036	GRAS8900	Soil Science	BC580044	SOIL8900
Animal Breeding	BC580015	ANIB8900	Plant Breeding	BC580041	PLTB8900	Soil Science Interdisciplinary	BC580088	SOII8900
Animal Science	BC580015	ANIG8900						

12.7.10 MASTER OF URBAN AND REGIONAL PLANNING BC480348

LEARNING PROGRAMMES FOR MASTERS DEGREE OF URBAN AND REGIONAL PLANNING (Research) (4764)

These learning programmes aim to:

(a) Provide the student with the opportunity to present evidence of advanced study and research characterised by intellectual independence and advanced knowledge of a specialisation area in the subject, as well as accurate assessment of his/her own results and as well as that of others by production of a thesis which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny.

(b) Develop the student to be able to demonstrate knowledge and understanding of supervised planning and execution of a research project in the discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature.

A student must do research on an approved topic in consultation with the Academic Departmental Head for at least two years, in preparation of a full dissertation that shall be submitted as the only requirement for the degree.

This degree does not enable registration at the South African Council for Planners (SACPLAN).

Compulsory major modules
YEAR 1+2
URMD8900

12.7.11 MASTER OF URBAN AND REGIONAL PLANNING MURP BC470348

After completing the MURP Degree, the graduates will obtain a professional degree and will possess the following skills:

- The capacity to complete practical urban and regional planning projects including spatial frameworks, development plans and layouts
- The capacity to analyse issues from a theoretical and/or empirical perspective and to recommend suitable alternatives
- The capacity to communicate clearly and logically, write good planning and research reports, and debate these with stakeholders
- The ability to critically evaluate information and theories and to apply relevant concepts from different disciplines in innovative approaches to planning issues

The period of this study can be:

- Full Time 12 months,
- Part Time 24 months or
- Compact learning- block sessions 24 months presented as 4 - 5 workshop weeks per year

The Academic Departmental Head determines how the modules must be distributed over the years of study and in all degree programmes (Full time, Part time and Compact Learning). The modules may be spread over an additional year if a student does not have the necessary academic background. Compact learning students must attend compulsory workshop weeks at the department for the duration of the programme at times as determined by the Academic Departmental Head. During these workshop lectures, tutorials, practicals and discussions will take place. Assignments will be done and tests and examinations may also be written.

Students that register as full time or part time will also be expected to attend some classes, sessions, guest lectures, field trips, site visits, tours, tests and examinations during the block weeks.

A minimum of 204 credits must be presented for the MURP (Professional) Degree programme.

After sufficient practical training the graduate will be able to register as Urban and Regional Planner at the South African Council for Planners (SACPLAN).

Compulsory major modules		
Full time	**Compulsory semester modules:** URRM7914 / URRM7924 URPP7914 / URPP7924 URDP7912 / URDP7922 URPT7904	**Compulsory year modules:** URGI7904 URMD7900 URRP7906 URPT7904 URUP7906
Compact Learning and Part Time	**Year 1**	
	Compulsory semester modules: URPP7914 / URPP7924	**Compulsory year modules:** URRP7906 URUP7906 URPT7904
	Year 2	
	Compulsory semester modules: URRM7914 / URRM7924 URDP7912 / URDP7922	**Compulsory year modules:** URGI7904 URMD7900

12.8 DOCTORAL DEGREES (NQF EXIT LEVEL 10)

12.8.1 DOCTOR OF PHILOSOPHY (ARCHITECTURE) PhDArch BC490014

<table>
<tr><td colspan="6">The aim of the Doctor of Philosophy in Architecture is to provide an opportunity to students to present extensive research, innovative research in design processes, techniques and tacit knowledge, and publications with a specific focus within the field of architecture. Two PhD programmes are offered by the Department of Architecture.</td></tr>
<tr><td>Architecture</td><td>BC490014</td><td>ARCH9100</td><td>Architecture with Design</td><td>BC490114</td><td>ARCD9100</td></tr>
<tr><td colspan="3">The Doctor of Philosophy (PhD (Architecture)) may be undertaken in a thesis mode, or thesis by publication mode.</td><td colspan="3">The Doctor of Philosophy (PhD (Architecture with Design)) is undertaken in thesis by project mode with design focus. The thesis by project mode includes original creative work, a public exhibitions, and an exegesis as research requirements. The thesis by project mode is practice-based and/or design-led.</td></tr>
<tr><td colspan="3">After successfully completing the thesis, the PhD (Architecture) graduate would be able to:
• do independent research on the highest international level by applying and implementing original and highly specialised knowledge of the area of architecture
• Produce a dissertation that place research within the broader context of the field and which will be recognised internationally as a significant contribution.</td><td colspan="3">After successfully completing the thesis, the PhD (Architecture) graduate would be able to:
• Do independent research on the highest international level by applying and implementing original and highly specialised knowledge of the creative processes of architectural design, and the design nature of architecture
• Create
o a portfolio of innovative architectural design processes, techniques and tacit knowledge demonstrating expertise, and
o an exegesis on the creative processes, techniques and knowledge of architectural design.</td></tr>
</table>

12.8.2. DOCTOR OF PHILOSOPHY (PhD) FOR 2016 FOR ALL PROGRAMMES

This learning programme aims to:

(a) Provide the opportunity for students who have already obtain a NQF Exit Level 10 qualification and have contributed extensive publications of exceptional quality in the specific subject field or discipline over a considerable period of time.

(b) Enable the student to make an original contribution to the discipline.

The minimum term of this study is three years and a total of 360 credits is allocated for this degree. The student must do research for at least four semesters on an approved topic selected in consultation with the departmental chair in preparation to complete the thesis (360 credits). The degree study period therefore lasts three years. The student will present at least one seminar/research report in each year of study in accordance with departmental rules.
Students can register for a PhD with specialisation in one of the following areas:

Discipline	New Code	Mod Code	Discipline	New Code	Mod Code	Discipline	New Code	Mod Code
Actuarial Sciences	BC490010	ACSG9100	Entomology	BC490027	ENTO9100	Microbiology	BC490039	MCBT9100
Agricultural Economics	BC490011	AGEC9100	Environmental Geology	BC490028	GLGE9100	Microbial Biotechnology	BC490077	MBBT9100
Agricultural Management	BC490052	AGMA9100	Environmental Management	BC490060	ENMT9100	Mineral Resource Management	BC490078	MRTM9100
Agrometeorology	BC490012	CLIM9100	Food Science	BC490029	FSCI9100	Physics	BC490040	PHYS9100
Agrometeorology Interdisciplinary	BC490053	CLMI9100	Forensic Chemistry	BC490065	FORC9100	Plant Breeding	BC490041	PLTB9100
Agronomy	BC490013	CROP9100	Forensic Entomology	BC490066	FORE9100	Plant Breeding Interdisciplinary	BC490081	PLTI9100
Agronomy Interdisciplinary	BC490054	CROI9100	Forensic Genetics	BC490067	FORG9100	Plant Health Ecology	BC490082	PHEC9100
Animal Breeding	BC490015	ANIB9100	Forensic Interdisciplinary	BC490068	FORI9100	Plant Pathology	BC490042	PPLG9100
Animal Nutrition	BC490015	ANIN9100	Forensics Sciences	BC490030	FORS9100	Plant Pathology Interdisciplinary	BC490083	PPLI9100
Animal Physiology	BC490015	ANIP9100	Genetics	BC490031	GENE9100	Polymer Science	BC490084	PLYS9100
Animal Science	BC490015	ANIG9100	Genetics Interdisciplinary	BC490030	GENI9100	Property Science	BC490085	PROP9100
Applied Mathematics	BC490016	MATA9100	Geochemistry	BC490032	GECE9100	Quantity Surveying	BC490043	DQFR9100
Astrophysics	BC490017	PHYA9100	Geography	BC490033	GEOH9100	Sustainable Agriculture	BC490047	SADR9100
Behavioural Genetics	BC490018	GENB9100	Geohydrology	BC490034	GEHR9100	Soil Science	BC490044	SOIL9100
Biochemistry	BC490019	BOCD9100	Geographical Information Systems Geo-informatics	BC490069	GISC9100	Soil Science Interdisciplinary	BC490088	SOII9100
Botany	BC490020	BTNY9100	Geology	BC490035	GLGY9100	Statistics	BC490046	STSA9100
Chemistry	BC490021	CHEM9100	Grassland Science	BC490036	GRAS9100	Urban and Regional Planning	BC490048	URPD9100
Computer Information Systems	BC490056	CSIS9100	Irrigation Management	BC490072	IRRI9100	Wildlife	BC490089	WILD9100
Computer Science and Informatics	BC490022	CSIS9100	Human Settlements	BC490071	URHS9100	Wildlife Management	BC490090	WDMT9100
Consumer Sciences	BC490023	CNSC9100	Limnology	BC490076	LIMG9100	Wildlife Management	BC490090	WDMT9100
Construction Management	BC490024	PQMR9100	Mathematical statistics	BC490037	STSM9100	Zoology	BC490049	ZLGY9100
Disaster Management	BC490025	DSMT9100	Mathematics	BC490038	MATM9100			

12.8.3 DOCTOR OF SCIENCE (DSc)

These learning programmes aims to:

(a) Provide the opportunity for students who have already obtain a NQF Exit Level 10 qualification and have contributed extensive publications of exceptional quality in the specific subject field or discipline over a considerable period of time:

Students can register for a Doctoral degree with specialisation in one of the following areas:

Discipline	New Code 2017	Mod Code	Discipline	New Code 2017	Mod Code	Discipline	New Code 2017	Mod Code
Actuarial Sciences	BC490110	ACSG9100	Construction Management	BC490124	PQMR9100	Limnology	BC490176	LIMG9100
Agricultural Economics	BC490111	AGEC9100	Entomology	BC490127	ENTO9100	Mathematical statistics	BC490137	STSM9000
Agrometeorology	BC490112	CLIM9100	Environmental Geology	BC490128	GLGE9100	Mathematics	BC490138	MATM9100
Agrometeorology Interdisciplinary	BC490153	CLMI9100	Environmental Management	BC490160	ENMT9100	Microbiology	BC490139	MCBT9100
Agronomy	BC490113	CROP9100	Environmental Rehabilitation	BC490161	ENRH9100	Microbial Biotechnology	BC490177	MBBT9100
Agronomy Interdisciplinary	BC490154	CROI9100	Food Science	BC490129	FSCI9100	Physics	BC490140	PHYS9100
Animal Breeding	BC490115	ANIB9100	Forensic Chemistry	BC490165	FORC9100	Plant Breeding	BC490141	PLTB9100
Animal Nutrition	BC490115	ANIN9100	Forensic Entomology	BC490166	FORE9100	Plant Breeding Interdisciplinary	BC490181	PLTI9100
Animal Physiology	BC490115	ANIP9100	Forensic Genetics	BC490167	FORG9100	Plant Health Ecology	BC490182	PHEC9100
Animal Science	BC490115	ANIG9100	Forensic Interdisciplinary	BC490168	FORI9100	Plant Pathology	BC490142	PPLG9100
Applied Mathematics	BC490116	MATA9100	Forensics Sciences	BC490130	FORS9100	Polymer Sciences	BC490184	PLYS9100
Astrophysics	BC490117	PHYA9100	Genetics	BC490131	GENE9100	Property Science	BC490185	PROP9100
Behavioural Genetics	BC490118	GENB9100	Genetics Interdisciplinary	BC490130	GENI9100	Quantity Surveying	BC490143	DQFR9100
Biochemistry	BC490119	BOCD9100	Geochemistry	BC490132	GECE9100	Soil Science	BC490144	SOIL9100
Botany	BC490120	BTNY9100	Geography	BC490133	GEOH9100	Soil Science Interdisciplinary	BC490188	SOII9100
Chemistry	BC490121	CHEM9100	Geohydrology	BC490134	GEHR 9100	Statistics	BC490146	STSA9100
Computer Information Systems	BC490156	CSIS9100	Geographical Information Systems	BC490160	GISC9100	Wildlife	BC490189	WILD9100
Computer Science and Informatics	BC490122	CSIS9100	Geology	BC490135	GLGY9100	Zoology	BC490149	ZLGY9100
Consumer Sciences	BC490123	CNCS9100	Grassland Science	BC490136	GRAS9100			

13. MODULE CONTENT FOR UNDERGRADUATE AND POSTGRADUATE MODULES ALPHABETICALLY PER ACADEMIC DEPARTMENT (ACAD ORG)

ABBREVIATION AND NUMBERING SYSTEM

Important information of each module that form part of the qualification presented in the faculty are presented in the following two set of tables.

13.1 Table 1: **Prerequisite Table**

Year	Career	Session	Course ID	Module code	Course Title	Academic organisation	Campus	Location	Credits	Prerequisites
This indicate if the module can be registered for in 2018.	This indicate if the module is undergraduate or postgraduate.	This indicate if it is a first semester S1, second semester S2 or a year YR module.	This indicate a unique identification number for administrative purposes	First digit: the year of study in which the module is presented. Second digit: NQF level Third digit: the semester odd first even second Fourth digit multiply by 4 to indicate the credits	This indicate the name of the module	This indicate the Academic Department to which this module belongs.	This indicate if the course is link to qualification registered at Bloemfontein, QwaQwa or South campus.	Physical location of presentation	Number of credits	The requirement to register for this module

Term	Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
2181	UGRD	S1	023969	BLGY	1513	Introduction to Biology	098	MAIN	BFN	12	BLGY1513 Prerequisite: NSC Life Science Level 5
2181	UGRD	YR	025479	CLNS	3702	Natural Science Education Community Service Learning	098	MAIN	BFN	8	None
2181	UGRD	YR	025830	MATD	1400	Introduction to Mathematics	098	MAIN	BFN	48	MATD1400 Prerequisite: Students must have passed NSC Mathematics on performance level 2 or Mathematical Literacy level 5 in order to continue with this module.
2182	UGRD	S2	023978	MATD	1544	Introduction to University Mathematics	098	MAIN	BFN	16	MATD1544 Prerequisite: MATD1534
2181	UGRD	YR	022686	MTDA	1508	Mathematics Literacy in Agriculture	098	MAIN	BFN	32	None
2181	UGRD	YR	021245	MTDE	1508	Mathematical literacy for Business study	098	MAIN	BFN	32	None
2181	UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	MAIN	BFN	32	None
2181	UGRD	YR	021247	MTDL	1508	Mathematical Literacy for Law students	098	MAIN	BFN	32	None
2181	UGRD	S1	026031	QALC	1513	Academic Literacy, Language and Communication	098	MAIN	BFN	12	None
2182	UGRD	S2	023965	QCIV	3624	Civil Engineering	098	MAIN	BFN	16	QSUR3614 Prerequisite: Students must have passed MATM1614 and MATM1624 in order to register for this module.
2181	UGRD	S1	026186	QCLO	3714	Computer Logic	098	MAIN	BFN	16	QCLO3714; Student must have passed QELT2723 in order to continue with module.
2182	UGRD	S2	023946	QEDR	1524	Engineering Drawings	098	MAIN	BFN	16	None
2182	UGRD	S2	023947	QEFO	1520	Engineering Forum	098	MAIN	BFN	0	none
2182	UGRD	S2	026922	QELT	2723	Electrotechnique	098	MAIN	BFN	12	QELT2723: Student must have passed PHYS2624 and PHYS2642 in order to continue with module.
2182	UGRD	S2	023936	QENV	3724	Holistic Engineering Design	098	MAIN	BFN	16	QENV3724: Student mused have passed QMAD2623 and QSTR2614 in order to continue with module.
2182	UGRD	S2	023949	QFLO	3724	Fluid Mechanics	098	MAIN	BFN	16	QFLO3724: Student must have passed PHYS2614 in order to continue with module.
2181	UGRD	S1	016490	QFPE	3714	Food Processing Engineering	098	MAIN	BFN	16	FSCE3714 Prerequisite: Students must have passed VWS212 (FSCI2612) and FSK134 (PHYS1534) in order to register for this module.
2182	UGRD	S2	027033	QMAD	2623	Machine Design	098	MAIN	BFN	12	QMAD2623: Student must have passed MATA1614 and QSTR2614 in order to continue with module.
2181	UGRD	S1	023951	QMAT	2613	Engineering Materials	098	MAIN	BFN	12	
2182	UGRD	S2	023913	QMPR	3724	Microprocessors	098	MAIN	BFN	16	QMPR3724; Student must have passed CSIE3714 in order to continue with module.
2181	UGRD	S1	023952	QMSC	2613	Material Science	098	MAIN	BFN	12	
2182	UGRD	S2	023953	QPOW	3724	Electrical Power Systems	098	MAIN	BFN	16	QPOW3724 : Students must have passed QELT2723 and QSIG3714 in order to continue with module.
2181	UGRD	S1	023954	QSIG	3714	Signal Theory	098	MAIN	BFN	16	QSIG3714: Student must have passed QELT2732 in order to continue with module.
2181	UGRD	S1	027176	QSTR	2614	Strength of Materials I	098	MAIN	BFN	16	QSTR2614: Student must have passed PHYS1614 and MATM1614 and MATA1614 in order to continue with module.
2181	UGRD	S1	023963	QSTR	3714	Strength of Materials II	098	MAIN	BFN	16	QSTR3714: Student must have passed QSTR3614 in order to continue with module.
2182	UGRD	S2	023964	QSTR	3724	Strength of Materials III	098	MAIN	BFN	16	QSTR3724: Student must have passed QSTR2614 in order to continue with module.
2182	UGRD	S2	023966	QTHE	3724	Engineering Thermodynamics	098	MAIN	BFN	16	QTHE3724: Student must have passed PHYS2614 in order to continue with module.
2182	UGRD	S2	023967	QVAC	2520	Practical Experience 1	098	MAIN	BFN	0	None
2182	UGRD	S2	027312	QVAC	3520	Practical Engineering Experience	098	MAIN	BFN	0	None
2181	UGRD	YR	023222	SCNS	1508	Preparatory Learning for Natural Sciences	098	MAIN	BFN	32	None
2181	UGRD	YR	021245	MTDE	1508	Mathematical literacy for Business study	098	MAIN	OUDTSHOORN	32	None

Term	Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
2181	UGRD	S1	024678	BIOL	2674	Biostatistics	098	QWA	QWAQWA	16	None
2181	UGRD	S1	023977	MATD	1534	Introduction to University Mathematics 1	098	QWA	QWAQWA	16	MATD1534 Prerequisite: Students must have passed NSC Mathematics on performance level 4 in order to continue with this module.
2181	UGRD	S1	020151	MATD	1554	Basic Mathematics	098	QWA	QWAQWA	16	MATD1554 Prerequisite: Students must have passed NSC Mathematics on performance level 3 in order to continue with this module.
2182	UGRD	S2	025831	MATD	1564	Introduction to University Mathematics 1	098	QWA	QWAQWA	16	MATD1564 Prerequisite: Students must have passed NSC Mathematics on performance level 4 in order to continue with this module.
2182	UGRD	S2	025832	MATD	1584	Mathematics for EMS	098	QWA	QWAQWA	16	MATD1584 Prerequisite: Students must have passed MATD1554
2181	UGRD	YR	022686	MTDA	1508	Mathematics Literacy in Agriculture	098	QWA	QWAQWA	32	None
2181	UGRD	YR	021245	MTDE	1508	Mathematical literacy for Business study	098	QWA	QWAQWA	32	None
2181	UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	QWA	QWAQWA	32	None
2181	UGRD	YR	023222	SCNS	1508	Preparatory Learning for Natural Sciences	098	QWA	QWAQWA	32	None
2181	UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	SOUTH	BETHLEHEM	32	None
2181	UGRD	S1	020151	MATD	1554	Basic Mathematics	098	SOUTH	MOTHEO	16	MATD1554 Prerequisite: Students must have passed NSC Mathematics on performance level 3 in order to continue with this module.
2182	UGRD	S2	025832	MATD	1584	Mathematics for EMS	098	SOUTH	MOTHEO	16	MATD1584 Prerequisite: Students must have passed MATD1554
2181	UGRD	YR	021245	MTDE	1508	Mathematical literacy for Business study	098	SOUTH	MOTHEO	32	None
2181	UGRD	S1	020151	MATD	1554	Basic Mathematics	098	SOUTH	OUDTSHOORN	16	MATD1554 Prerequisite: Students must have passed NSC Mathematics on performance level 3 in order to continue with this module.
2182	UGRD	S2	025832	MATD	1584	Mathematics for EMS	098	SOUTH	OUDTSHOORN	16	MATD1584 Prerequisite: Students must have passed MATD1554
2181	UGRD	YR	021245	MTDE	1508	Mathematical literacy for Business study	098	SOUTH	OUDTSHOORN	32	None
2181	UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	SOUTH	PHUTHADITJ	32	None
2181	UGRD	S1	020151	MATD	1554	Basic Mathematics	098	SOUTH	SASOLBURG	16	MATD1554 Prerequisite: Students must have passed NSC Mathematics on performance level 3 in order to continue with this module.
2182	UGRD	S2	025831	MATD	1564	Introduction to University Mathematics 1	098	SOUTH	SASOLBURG	16	MATD1564 Prerequisite: Students must have passed NSC Mathematics on performance level 4 or MATD1554 in order to continue with this module.
2182	UGRD	S2	025832	MATD	1584	Mathematics for EMS	098	SOUTH	SASOLBURG	16	MATD1584 Prerequisite: Students must have passed MATD1554
2181	UGRD	YR	021245	MTDE	1508	Mathematical literacy for Business study	098	SOUTH	SASOLBURG	32	None
2181	UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	SOUTH	SASOLBURG	32	None
2181	UGRD	YR	023222	SCNS	1508	Preparatory Learning for Natural Sciences	098	SOUTH	SASOLBURG	32	None
2181	UGRD	S1	023969	BLGY	1513	Introduction to Biology	098	SOUTH	SOUTH	12	BLGY1513 Prerequisite: NSC Life Science Level 3 or Physical Science level 3
2181	UGRD	YR	025830	MATD	1400	Introduction to mathematics	098	SOUTH	SOUTH	48	MATD1400 Prerequisite: Students must have passed NSC Mathematics on performance level 2 or mathematical Literacy level 5 in order to continue with this module.
2181	UGRD	S1	023977	MATD	1534	Introduction to University Mathematics 1	098	SOUTH	SOUTH	16	MATD1564 Prerequisite: Students must have passed NSC Mathematics on performance level 4 or MATD1554 in order to continue with this module.
2182	UGRD	S2	023978	MATD	1544	Introduction to University Mathematics	098	SOUTH	SOUTH	16	MATD1544 Prerequisite: MATD1534
2181	UGRD	S1	020151	MATD	1554	Basic Mathematics	098	SOUTH	SOUTH	16	MATD1554 Prerequisite: Students must have passed NSC Mathematics on performance level 3 in order to continue with this module.
2182	UGRD	S2	025831	MATD	1564	Introduction to University Mathematics 1	098	SOUTH	SOUTH	16	MATD1564 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 4 (50%) or have passed MATD1554 in order to register for this module.
2182	UGRD	S2	025832	MATD	1584	Mathematics for EMS	098	SOUTH	SOUTH	16	MATD1584 Prerequisite: Students must have passed MATD1554
2181	UGRD	YR	022686	MTDA	1508	Mathematics Literacy in Agriculture	098	SOUTH	SOUTH	32	None
2181	UGRD	YR	021245	MTDE	1508	Mathematical literacy for Business study	098	SOUTH	SOUTH	32	None
2181	UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	SOUTH	SOUTH	32	None
2181	UGRD	YR	021247	MTDL	1508	Mathematical literacy for Law students	098	SOUTH	SOUTH	32	None

Term	Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
2181	UGRD	YR	023222	SCNS	1508	Preparatory Learning for Natural Sciences	098	SOUTH	SOUTH	32	None
2182	UGRD	S2	023978	MATD	1544	Introduction to University Mathematics	098	SOUTH	WELKOM	16	
2181	UGRD	S1	020151	MATD	1554	Basic Mathematics	098	SOUTH	WELKOM	16	MATD1554 Prerequisite: Students must have passed NSC Mathematics on performance level 3 in order to continue with this module.
2182	UGRD	S2	025831	MATD	1564	Introduction to University Mathematics 1	098	SOUTH	WELKOM	16	MATD1564 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 4 (50%) or have passed MATD1554 in order to register for this module.
2182	UGRD	S2	025832	MATD	1584	Mathematics for EMS	098	SOUTH	WELKOM	16	MATD1584 Prerequisite: Students must have passed MATD1554
2181	UGRD	YR	021245	MTDE	1508	Mathematical literacy for Business study	098	SOUTH	WELKOM	32	None
2181	UGRD	YR	021246	MTDH	1508	Mathematical Literacy	098	SOUTH	WELKOM	32	none
2181	UGRD	YR	023222	SCNS	1508	Preparatory Learning for Natural Sciences	098	SOUTH	WELKOM	32	None
2181	UGRD	S1	008113	AGEC	1514	Introduction to Agricultural Economics	099	MAIN	BFN	16	AGEC1514 Prerequisite: Students must have passed Mathematics on performance level 3 or Mathematical Literacy Level 6 or Maths Level 3 or Mathematical Literacy Level 6 and MTDA1508 in order to continue with this module.
2182	UGRD	S2	008117	AGEC	1624	Agricultural Finance	099	MAIN	BFN	16	AGEC1624 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2181	UGRD	S1	008118	AGEC	1634	Business functions for Agribusiness	099	MAIN	BFN	16	AGEC1634 Prerequisite: Students must have passed NSC Maths Level 3 or Mathematical Literacy Level 6 and MTDA1508.
2181	UGRD	S1	008124	AGEC	2614	Farm Planning and Management	099	MAIN	BFN	16	AGEC2614 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2182	UGRD	S2	008128	AGEC	2624	Introduction to Agricultural Marketing	099	MAIN	BFN	16	AGEC2624 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2181	UGRD	S1	008137	AGEC	3714	Managerial Economics	099	MAIN	BFN	16	AGEC3714 Prerequisite: Students must have passed AGEC2614 in order to continue with this module.
2182	UGRD	S2	025408	AGEC	3721	Agricultural Economics Seminar	099	MAIN	BFN	4	None
2182	UGRD	S2	008140	AGEC	3724	Resource Economics.	099	MAIN	BFN	16	AGEC3724 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2181	UGRD	S1	025062	AGEC	3734	Agribusiness Management.	099	MAIN	BFN	16	AGEC3734 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2182	UGRD	S2	008146	AGEC	3744	Agricultural Policy and Development	099	MAIN	BFN	16	AGEC3744 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2181	UGRD	S1	025671	AGEC	4814	Managerial economics	099	MAIN	BFN	16	AGEC4814 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2182	UGRD	S2	025672	AGEC	4824	Resource Economics	099	MAIN	BFN	16	AGEC4824 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2181	UGRD	S1	025673	AGEC	4834	Agribusiness Management	099	MAIN	BFN	16	AGEC4834 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2182	UGRD	S2	025674	AGEC	4844	Agricultural Policy and development	099	MAIN	BFN	16	AGEC4844 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2182	UGRD	S2	025519	AGEG	2624	Engineer principles in Agriculture Practices	099	MAIN	BFN	16	AGEG2624 Prerequisite: Students must have passed AGRI1554 with 60% or WTW134 in order to continue with this module.
2181	UGRD	S1	008407	AGEG	3714	Hydraulics	099	MAIN	BFN	16	AGEG3714 Prerequisite: Students must have passed AGEG2624 in order to continue with this module.
2182	UGRD	S2	008409	AGEG	3724	Irrigation Systems and Irrigation Surveying	099	MAIN	BFN	16	AGEG3724 Prerequisite: Students must have passed AGEG3714 in order to continue with this module.
2181	UGRD	S1	008415	AGEG	4814	Flood and Mechanised Irrigation	099	MAIN	BFN	16	AGEG4814 Prerequisite: Students must have passed AGEG3724 in order to continue with this module.
2182	UGRD	S2	008417	AGEG	4824	Specialised Micro, Drip and Underground Irrigation Systems.	099	MAIN	BFN	16	AGEG4824 Prerequisite: Students must have passed AGEG4814 in order to continue with this module.
2181	UGRD	S1	025078	AGMA	3714	Business Management and Entrepreneurship.	099	MAIN	BFN	16	AGMA3714: Students must have passed :AGEC1514 in order to continue with this module.

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2182	UGRD	S2	025763	AGMA	3724	Innovation Management.	099	MAIN	BFN	16	AGMA3724 : Student need to complete AGEC1514 in order to continue with this module.
2181	UGRD	S1	025061	AGMA	3734	Farm Tax	099	MAIN	BFN	16	AGEC3734 Prerequisite: Students must have passed AGEC1624 in order to continue with this module.
2182	UGRD	S2	008068	AGMA	3744	Strategic Agricultural Management.	099	MAIN	BFN	16	AGMA3744 : Student must have passed AGEC1514 in order to continue with this module.
2182	UGRD	S2	008069	AGMA	3762	Seminar: Integrated Agricultural Management.	099	MAIN	BFN	8	AGMA3762 Pre-requisite: Students must have passed AGEC1624 in order to continue with the module.
2181	UGRD	S1	008113	AGEC	1514	Introduction to Agricultural Economics	099	SOUTH	SOUTH	16	AGEC1514 Prerequisite: Students must have passed Mathematics on performance level 3 or Mathematical Literacy Level 6 or Maths Level 3 or Mathematical Literacy Level 6 and MTDA1508 in order to continue with this module
2182	UGRD	S2	008117	AGEC	1624	Agricultural Finance	099	SOUTH	SOUTH	16	AGEC1624 Prerequisite: Students must have passed AGEC1514 in order to continue with this module.
2181	PGRD	YR	026025	AGEC	6800	Research Report Econometrics	099	MAIN	BFN	40	Selection for BScHons majoring in Agricultural Economics
2181	PGRD	YR	025195	AGEC	6808	Research Project in Agricultural Economics.	099	MAIN	BFN	32	Selection for BScHons majoring in Agricultural Economics
2181	PGRD	S1	027234	AGEC	6815	Advanced Production and Natural resource economics	099	MAIN	BFN	20	Selection for BScHons majoring in Agricultural Economics
2182	PGRD	S2	027364	AGEC	6825	Agribusiness management and marketing	099	MAIN	BFN	20	Selection for BScHons majoring in Agricultural Economics
2181	PGRD	S1	027365	AGEC	6835	Macro economics and finance	099	MAIN	BFN	20	Selection for BScHons majoring in Agricultural Economics
2182	PGRD	S2	027235	AGEC	6845	Agricultural Policy and Development	099	MAIN	BFN	20	Selection for BScHons majoring in Agricultural Economics
2182	PGRD	S2	027236	AGEC	6865	Operational Research	099	MAIN	BFN	20	Selection for BScHons majoring in Agricultural Economics
2181	PGRD	YR	008215	AGEC	7902	Environmental Economics	099	MAIN	BFN	8	
2181	PGRD	YR	025064	AGEC	8900	Agricultural Economics extended dissertation	099	MAIN	BFN	180	BSc Honors in relevant discipline, Selection MSc.
2181	PGRD	YR	008218	AGEC	9100	Agricultural Economics Thesis	099	MAIN	BFN	360	M.Agric in relevant discipline. Selection for PhD.
2182	PGRD	S2	008183	AGEM	6824	Advanced Resources and Environmental Economics	099	MAIN	BFN	16	Selection for BScHons majoring in Agricultural Economics
2182	PGRD	S2	025676	AGEM	6844	Project Planning and Analysis	099	MAIN	BFN	16	Selection for BScHons majoring in Agricultural Economics
2181	PGRD	YR	026983	AGEM	8900	Dissertation Agricultural Economics	099	MAIN	BFN	180	BSc Honors in relevant discipline, Selection MSc.
2181	PGRD	YR	020682	AGEN	7902	Land Valiation and Business Plans	099	MAIN	BFN	8	
2181	PGRD	YR	027237	AGMA	6800	Research Report	099	MAIN	BFN	40	Selection for BScHons majoring in Agricultural Economics
2181	PGRD	S1	027366	AGMA	6815	Farm and Agribusiness Management	099	MAIN	BFN	20	Selection for BAgricHons majoring in Agricultural Management
2182	PGRD	S2	027298	AGMA	6825	Marketing and Human Resource Management.	099	MAIN	BFN	20	Selection for BAgricHons majoring in Agricultural Management
2181	PGRD	S1	027299	AGMA	6835	Macroeconomics and financial management	099	MAIN	BFN	20	Selection for BAgricHons majoring in Agricultural Management
2182	PGRD	S2	027367	AGMA	6845	Production and Project Management	099	MAIN	BFN	20	Selection for BAgricHons majoring in Agricultural Management
2181	PGRD	YR	008088	AGMA	8900	Agricultural Management extended dissertation	099	MAIN	BFN	180	BSc Honors in relevant discipline, Selection MSc.
2181	PGRD	YR	008094	AGMA	9100	Agricultural Management Thesis	099	MAIN	BFN	360	M.Agric in relevant discipline. Selection for PhD.
2181	UGRD	S1	008564	AGRI	1514	Biological principles in Agriculture	100	MAIN	BFN	16	None
2182	UGRD	S2	025169	AGRI	1624	Mathematical and Biometrical Principles in Agriculture	100	MAIN	BFN	16	AGRI1624 Prerequisite: Students must have passed NCS Maths Level 3 with AP of 30, or Mathslit Level 7 with AP 32, or BAgric ext/UPP Agric first year completed.
2182	UGRD	S2	024379	ANIB	2624	Introduction to animal and plant breeding	100	MAIN	BFN	16	ANIB Prerequisite: ANIG1624 must have been passed in order to continue with this module.
2181	UGRD	S1	025106	ANIB	3714	Theory of animal breeding	100	MAIN	BFN	16	
2182	UGRD	S2	003267	ANIB	3724	Molecular Animal Breeding	100	MAIN	BFN	16	
2181	UGRD	S1	025520	ANIB	4814	Animal Breeding: Mixed Model Theory	100	MAIN	BFN	16	ANIB4814 Prerequisite: Students must have passed ANIB3714 in order to continue with this module.
2182	UGRD	S2	025524	ANIB	4824	Animal Breeding: Practical Application	100	MAIN	BFN	16	

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2182	UGRD	S2	023750	ANIG	1624	Introducing to animal, wildlife and grassland sciences	100	MAIN	BFN	16	
2181	UGRD	S1	015936	ANIG	2614	Introductory Ruminant Production	100	MAIN	BFN	16	ANIG2614 Prerequisite: Students must have passed ANIG1624 in order to continue with this module.
2182	UGRD	S2	015941	ANIG	2624	Introductory Monogastric, Wildlife and Aquaculture Production	100	MAIN	BFN	16	
2181	UGRD	S1	022523	ANIG	3714	Cattle production systems	100	MAIN	BFN	16	
2182	UGRD	S2	025402	ANIG	3724	Sheep and goat production systems	100	MAIN	BFN	16	
2181	UGRD	S1	025403	ANIG	3734	Poultry production systems	100	MAIN	BFN	16	
2182	UGRD	S2	015956	ANIG	3744	Pig production systems	100	MAIN	BFN	16	
2181	UGRD	YR	025535	ANIG	4808	Research Project Animal Sciences	100	MAIN	BFN	32	
2181	UGRD	S1	023660	ANIN	3734	Fundamental and Experimental Animal Nutrition	100	MAIN	BFN	16	ANIN3734 Prerequisite: Students must have passed BOCH2614 (BCC214) with 60% in order to continue with this module.
2182	UGRD	S2	022524	ANIN	3744	Properties of feeds balancing rations and fodder flow planning	100	MAIN	BFN	16	
2181	UGRD	S1	025232	ANIN	4834	Applied monogastric nutrition	100	MAIN	BFN	16	
2182	UGRD	S2	025459	ANIN	4864	Applied runimant nutrition	100	MAIN	BFN	16	ANIN4864 Prerequisite: Students must have passed ANIN3734 (DVL334) in order to continue with this module.
2181	UGRD	S1	027244	ANIP	2614	Anatomy and Physiology of body compartments	100	MAIN	BFN	16	
2181	UGRD	S1	025066	ANIP	3714	Animal anatomy and physiology of growth in farm animals	100	MAIN	BFN	16	ANIP3714: Student must have passed ANIP2614 in order to continue with this module.
2182	UGRD	S2	025065	ANIP	3724	Animal Health	100	MAIN	BFN	16	
2181	UGRD	S1	025071	ANIP	4814	Applied reproduction physiology in farm animals	100	MAIN	BFN	16	
2182	UGRD	S2	025152	ANIP	4824	Meat, dairy and egg science	100	MAIN	BFN	16	
2181	UGRD	S1	002987	DATA	2614	Agricultural Datametry	100	MAIN	BFN	16	DATA2614 Prerequisite: Students must have passed Mathematics on performance level 3 in order to continue with this module.
2182	UGRD	S2	025687	DATA	2624	Agricultural Datametry	100	MAIN	BFN	16	
2181	UGRD	S1	022236	DATA	3712	Statistical Analysis	100	MAIN	BFN	8	DATA3712 Prerequisite: Students must have passed Mathematics on performance level 3 in order to continue with this module.
2181	UGRD	S1	024737	GRAS	2614	Grassland Ecology	100	MAIN	BFN	16	
2181	UGRD	S1	016569	GRAS	3714	Applied veld management and veld evaluation	100	MAIN	BFN	16	GRAS3714 Prerequisite: Students must have passed GRAS2614 in order to continue with this module.
2182	UGRD	S2	016570	GRAS	3724	Intensive Pasture Production	100	MAIN	BFN	16	GRAS3724 Prerequisite: Students must have passed GRAS3714 in order to continue with this module.
2181	UGRD	YR	026743	GRAS	4808	Research Project Grassland Sciences	100	MAIN	BFN	32	
2181	UGRD	S1	025725	GRAS	4814	Production and Utilisation Ecology	100	MAIN	BFN	16	GRAS4814 Prerequisite: Students must have passed GRAS3714 in order to continue with this module.
2182	UGRD	S2	016581	GRAS	4824	Advanced Veld Management	100	MAIN	BFN	16	GRAS4824 Prerequisite: Students must have passed GRAS3714 in order to continue with this module.
2181	UGRD	S1	025549	GRAS	4834	Defoliation Phenology and Physiology	100	MAIN	BFN	16	GRAS4834 Prerequisite: Students must have passed GRAS3714 in order to continue with this module.
2182	UGRD	S2	025334	GRAS	4844	Advanced Fodder Plant Evaluation	100	MAIN	BFN	16	GRAS4844 Prerequisite: Students must have passed GRAS3714 in order to continue with this module.
2181	UGRD	S1	027025	GRAS	4851	Professional Skills	100	MAIN	BFN	4	
2182	UGRD	S2	026495	WDMT	2624	Game and natural environment interaction	100	MAIN	BFN	16	WDMT2624 Prerequisite: Students must have passed ANIG1624 in order to continue with this module.
2181	UGRD	S1	026928	WDMT	3714	Applied wildfarm management	100	MAIN	BFN	16	

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2182	UGRD	S2	018040	WILD	3764	Applied Nutrition of Wild Herbivores and Carnivores	100	MAIN	BFN	16	
2182	UGRD	S2	027222	WILD	4826	Integrated planning and practical environmental management practices	100	MAIN	BFN	24	
2181	UGRD	S1	008564	AGRI	1514	Biological principles in Agriculture	100	SOUTH	SOUTH	16	
2182	UGRD	S2	023750	ANIG	1624	Introducing to animal, wildlife and grassland sciences	100	SOUTH	SOUTH	16	
2181	PGRD	YR	027238	AGRI	6808	Research Project Animal Production	100	MAIN	BFN	32	Selection BAgricHons majoring in AnimalPproduction
2181	PGRD	S1	027239	AGRI	6814	Advanced cattle production systems	100	MAIN	BFN	16	Selection BAgricHons majoring in AnimalPproduction
2182	PGRD	S2	027240	AGRI	6824	Advanced sheep and goat production systems	100	MAIN	BFN	16	Selection BAgricHons majoring in AnimalPproduction
2182	PGRD	S2	027300	AGRI	6844	Advanced Dairy Production systems	100	MAIN	BFN	16	Selection BAgricHons majoring in AnimalPproduction
2182	PGRD	S2	027241	AGRI	6864	Advanced pig production systems	100	MAIN	BFN	16	Selection BAgricHons majoring in AnimalPproduction
2182	PGRD	S2	027242	AGRI	6884	Advanced Poultry production systems	100	MAIN	BFN	16	Selection BAgricHons majoring in AnimalPproduction
2181	PGRD	YR	027243	AGRI	8900	Animal Production Dissertation	100	MAIN	BFN	180	AGRI8900 Prerequisite student must have passed BAgric Honors in order to continue with this course.
2181	PGRD	S1	026405	ANIB	6814	Animal Breeding: Mixed Model Theory	100	MAIN	BFN	16	Selection BScAgricHons
2182	PGRD	S2	026407	ANIB	6826	Applied Animal Breeding	100	MAIN	BFN	24	Selection BScAgricHons
2181	PGRD	YR	025310	ANIB	8900	Animal Breeding Dissertation	100	MAIN	BFN	180	Selection MScAgric
2182	PGRD	S2	025310	ANIB	8900	Animal Breeding Dissertation	100	MAIN	BFN	180	Selection MScAgric
2181	PGRD	YR	016016	ANIB	9100	Animal Breeding Thesis	100	MAIN	BFN	360	Selection for PhD
2181	PGRD	YR	025312	ANIG	8900	Animal Science Dissertation	100	MAIN	BFN	180	Selection MScAgric
2181	PGRD	YR	025203	ANIG	9100	Animal Sciences General Thesis	100	MAIN	BFN	360	Selection for PhD
2181	PGRD	S1	003377	ANIN	6815	Fundamental Animal Nutrition	100	MAIN	BFN	20	Selection BScAgricHons
2182	PGRD	S2	003378	ANIN	6835	Experimental Animal Nutrition	100	MAIN	BFN	20	Selection BScAgricHons
2182	PGRD	S2	026269	ANIN	6844	Applied monogastric nutrition	100	MAIN	BFN	16	Selection BScAgricHons
2181	PGRD	YR	025311	ANIN	8900	Animal Nutrition Dissertation	100	MAIN	BFN	180	Selection MScAgric
2182	PGRD	S2	025311	ANIN	8900	Animal Nutrition Dissertation	100	MAIN	BFN	180	Selection MScAgric
2181	PGRD	YR	025202	ANIN	9100	Animal Nutrition Thesis	100	MAIN	BFN	360	Selection for PhD
2181	PGRD	YR	026479	ANIP	8900	Animal PhysiologyDissertation	100	MAIN	BFN	180	Selection MScAgric
2181	PGRD	YR	026480	ANIP	9100	Animal Sciences Physiology Thesis	100	MAIN	BFN	360	Selection for PhD
2181	PGRD	YR	027068	GRAS	6805	Intensive Pasture Production	100	MAIN	BFN	20	
2181	PGRD	S1	025627	GRAS	6814	Production and utilisation ecology	100	MAIN	BFN	16	GRAS6814 Prerequisite: Students must have passed GRAS3714 (WDK314) in order to continue with this module
2182	PGRD	S2	025335	GRAS	6824	Advanced veld management	100	MAIN	BFN	16	GRAS6824 Prerequisite: Students must have passed GRAS3714 (WDK314) in order to continue with this module.
2181	PGRD	S1	025336	GRAS	6834	Defoliation phenology and physiology	100	MAIN	BFN	16	GRAS6834 Prerequisite: Students must have passed GRAS3714 (WDK314) in order to continue with this module.
2182	PGRD	S2	025337	GRAS	6844	Advanced fodder plant evaluation	100	MAIN	BFN	16	GRAS6844 Prerequisite: Students must have passed GRAS3714 (WDK314) in order to continue with this module.
2181	PGRD	YR	025548	GRAS	8900	Grassland Science Dissertation	100	MAIN	BFN	180	
2181	PGRD	YR	025412	GRAS	9100	Grassland Science thesis	100	MAIN	BFN	360	
2181	PGRD	YR	025948	WDMT	6808	Research Essay Wildlife Management	100	MAIN	BFN	32	Selection for BAgricHons majoring in Agricultural Management
2181	PGRD	S1	010673	WDMT	6816	Veld and Game Ecology	100	MAIN	BFN	24	Selection for BAgricHons majoring in Agricultural Management
2182	PGRD	S2	010681	WDMT	6826	Applied habitat evaluation	100	MAIN	BFN	24	Selection for BAgricHons majoring in Agricultural Management
2182	PGRD	S2	010675	WDMT	6846	Applied Wildlife Management	100	MAIN	BFN	24	Selection for BAgricHons majoring in Agricultural Management
2181	PGRD	YR	025942	WDMT	8900	Wildlife Management Dissertation	100	MAIN	BFN	180	Selection for Magric majoring in Agricultural Management

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2181	PGRD	YR	025943	WDMT	9100	Wildlife ManagementThesis	100	MAIN	BFN	360	Selection PhD majoring in Agricultural Management
2181	PGRD	YR	025900	WILD	4808	Research Report Wildlife	100	MAIN	BFN	32	
2181	PGRD	S1	025656	WILD	4814	Veld and Game Ecology.	100	MAIN	BFN	16	
2181	PGRD	YR	027047	WILD	4856	Veld and Game ecology	100	MAIN	BFN	24	
2181	PGRD	YR	025944	WILD	6806	Habitat evaluation and monitoring	100	MAIN	BFN	24	
2181	PGRD	YR	025744	WILD	6808	Research Report Wildlife	100	MAIN	BFN	32	
2181	PGRD	S1	025891	WILD	6814	Veld and Game Ecology	100	MAIN	BFN	16	
2181	PGRD	S1	025907	WILD	6816	Habitat Preferences and Diet Selection of Game	100	MAIN	BFN	24	
2182	PGRD	S2	026496	WILD	6826	Integrated planning and practical environmental management practices	100	MAIN	BFN	24	
2182	PGRD	S2	010682	WILD	6846	Applied wildlife management	100	MAIN	BFN	24	
2181	PGRD	S1	010680	WILD	6856	Veld and Game ecology	100	MAIN	BFN	24	
2181	PGRD	YR	025409	WILD	8900	Wildlife Dissertation	100	MAIN	BFN	180	
2181	PGRD	YR	025935	WILD	9100	Wldlife Thesis	100	MAIN	BFN	360	
2182	PGRD	S2	025935	WILD	9100	Wldlife Thesis	100	MAIN	BFN	360	
2181	UGRD	YR	021305	CDRA	2604	Computer Draughting	101	MAIN	BFN	16	CDRA2604 Prerequisite: Students must have passed CONS1506, DESN1500, PTEC1504 and TRIG1512 in order to continue with this module.
2181	UGRD	YR	001945	CONS	1506	Construction	101	MAIN	BFN	24	
2181	UGRD	YR	027538	CONS	2600	Construction	101	MAIN	BFN	40	CONS2600: Student must have passed CONS1506 and DESN1500 and HARC1504 in order to continue with module.
2181	UGRD	YR	027370	CONS	3700	Construction	101	MAIN	BFN	40	
2181	UGRD	YR	011130	DESN	1500	Design	101	MAIN	BFN	48	
2181	UGRD	YR	011132	DESN	2600	Design	101	MAIN	BFN	48	DESN2600 Prerequisite: Students must have passed CONS1506, DESN1500 and HARC1504 in order to continue with this module.
2181	UGRD	YR	011134	DESN	3700	Design	101	MAIN	BFN	48	DESN3700 Prerequisite: Students must have passed CONS2606, DESN2600, HARC2604 and TARC2604 in order to continue with this module.
2181	UGRD	YR	024732	HARC	1504	History of Architecture	101	MAIN	BFN	16	
2181	UGRD	YR	024733	HARC	2604	History of Architecture	101	MAIN	BFN	16	HARC2604 Prerequisite: Students must have passed CONS1506, DESN1500 and HARC1504 in order to continue with this module.
2181	UGRD	YR	011024	HARC	3704	History of Architecture	101	MAIN	BFN	16	HARC3704 Prerequisite: Students must have passed CONS2606, DESN2600, HARC2604 and TARC2604 in order to continue with this module.
2182	UGRD	S2	021204	PHOT	1522	Photography	101	MAIN	BFN	8	PHOT1522 Prerequisite: Students must have passed PHOT1512 in order to continue with this module.
2181	UGRD	YR	025958	PTEC	1504	Presentation Techniques	101	MAIN	BFN	16	
2181	UGRD	YR	024736	TARC	2604	Theory of Architecture	101	MAIN	BFN	16	TARC2604 Prerequisite: Students must have passed CONS1506 and DENS1500 and HARC1504 in order to continue with this module.
2181	UGRD	YR	014389	TARC	3704	Theory of Architecture	101	MAIN	BFN	16	TARC3704 Prerequisite: Students must have passed CONS2606, DENS2600, HARC2604 and TARC2604 in order to continue with this module.
2181	UGRD	S1	006089	TRIG	1512	Trigonometrical Drawing	101	MAIN	BFN	8	None
2181	PGRD	YR	027487	ARCD	9100	Architecture Thesis with Design	101	MAIN	BFN	360	Selection
2181	PGRD	YR	026270	ARCH	8900	Architecture Dissertation	101	MAIN	BFN	180	Selection
2181	PGRD	YR	026271	ARCH	9100	Architecture Thesis	101	MAIN	BFN	360	Selection
2181	PGRD	YR	024728	ATRE	7904	Architectural Treatise	101	MAIN	BFN	16	Selection
2181	PGRD	YR	017733	CONS	6808	Construction	101	MAIN	BFN	32	Selection
2181	PGRD	YR	021330	CONS	7908	Construction	101	MAIN	BFN	32	Selection
2181	PGRD	YR	020660	DDIS	7900	Design Mini-dissertation	101	MAIN	BFN	100	Selection

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2181	PGRD	YR	018785	DESN	6800	Design	101	MAIN	BFN	48	Selection
2181	PGRD	S1	023665	DMET	6812	Design Methods in Architecture	101	MAIN	BFN	8	Selection
2181	PGRD	YR	025742	HURB	6804	History of Urban Settlement	101	MAIN	BFN	16	Selection
2181	PGRD	YR	024735	PARC	7904	Professional Architect Practice	101	MAIN	BFN	16	Selection
2181	PGRD	YR	025947	RARC	6808	Research in Theory of Architecture	101	MAIN	BFN	32	Selection
2182	PGRD	S2	023664	RMET	6822	Research Methods for Architecture	101	MAIN	BFN	8	Selection
2181	UGRD	S1	026218	AGEX	2614	Extension with the Agricultural Innovation System	102	MAIN	BFN	16	Selection
2181	UGRD	S1	022586	SAAM	1716	Fundamentals of Agricultural Economics	102	MAIN	BFN	24	Selection
2182	UGRD	S2	025727	SAAM	1726	Fundamentals of Agricultural Economics	102	MAIN	BFN	24	Selection
2181	UGRD	S1	022587	SACP	1716	Foundational theories in plant production and practices	102	MAIN	BFN	24	Selection
2182	UGRD	S2	025925	SACP	1726	Introduction to Plant Production Practices	102	MAIN	BFN	24	Selection
2181	UGRD	S1	022589	SACT	1716	Basic Communication Skills	102	MAIN	BFN	24	Selection
2182	UGRD	S2	025728	SACT	1726	Basic Communication Skills	102	MAIN	BFN	24	Selection
2181	UGRD	S1	022588	SALP	1716	Foundation Theories in Animal Production practices	102	MAIN	BFN	24	Selection
2182	UGRD	S2	025997	SALP	1726	Foundation Theories in Animal Production practices	102	MAIN	BFN	24	Selection
2181	UGRD	S1	022585	SARD	1716	Fundamentals of Rural Development	102	MAIN	BFN	24	Selection
2182	UGRD	S2	025647	SARD	1726	Fundamentals of Rural Development	102	MAIN	BFN	24	Selection
2181	UGRD	S1	026218	AGEX	2614	Extension with the Agricultural Innovation System	102	QWA	QWAQWA	16	None
2182	UGRD	S2	026219	AGEX	2624	Communication for Innovation	102	QWA	QWAQWA	16	None
2181	UGRD	S1	026220	AGEX	3714	Facilitation for development	102	QWA	QWAQWA	16	None
2182	UGRD	S2	026221	AGEX	3724	Extension programme management	102	QWA	QWAQWA	16	None
2181	UGRD	S1	026222	AGEX	3734	Community mobilization and local organizational development	102	QWA	QWAQWA	16	None
2182	UGRD	S2	026984	AGEX	3744	Management of change and Adaptation	102	QWA	QWAQWA	16	None
2181	UGRD	S1	026223	AGEX	3754	Agricultural entrepreneurship and value chains	102	QWA	QWAQWA	16	None
2182	UGRD	S2	026224	AGEX	3764	Adult learning, Behavioural change & Gender	102	QWA	QWAQWA	16	None
2182	PGRD	S2	020273	SAAM	7926	National and International Agricultural Marketing	102	MAIN	BFN	24	Selection
2181	PGRD	S1	020256	SACP	7916	Sustainable Plant Production Systems	102	MAIN	BFN	24	Selection
2182	PGRD	S2	026010	SACT	7926	Communication and Technology Transfer for Sustainable Agriculture	102	MAIN	BFN	24	Selection
2181	PGRD	YR	025646	SADR	9100	Sustainable Agriculture Thesis	102	MAIN	BFN	360	Selection
2182	PGRD	S2	025646	SADR	9100	Sustainable Agriculture Thesis	102	MAIN	BFN	360	Selection
2181	PGRD	YR	027342	SAEC	5806	Economics for sustainable agriculture	102	MAIN	BFN	24	Selection
2181	PGRD	YR	027344	SAEC	7906	Economics for Sustainable Agriculture	102	MAIN	BFN	24	Selection
2181	PGRD	YR	027343	SAEX	5806	Extension for sustainability	102	MAIN	BFN	24	Selection
2181	PGRD	YR	027341	SAEX	7906	Sustainable Agriculture and Extension: Theory and Practice	102	MAIN	BFN	24	Selection
2181	PGRD	S1	026007	SAEX	7916	Rural agricultural extension; issues and concepts	102	MAIN	BFN	24	Selection
2182	PGRD	S2	026008	SAFM	7926	Farm Management for Sustainable Agriculture	102	MAIN	BFN	24	Selection

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2181	PGRD	S1	027340	SAIT	5814	Introduction to Sustainable Agriculture	102	MAIN	BFN	16	Selection
2181	PGRD	S1	020257	SALP	7916	Sustainable Live-stock Production Systems	102	MAIN	BFN	24	Selection
2181	PGRD	YR	027339	SALS	5806	Livestock production for Sustainable Agriculture	102	MAIN	BFN	24	Selection
2181	PGRD	YR	027338	SALS	7906	Advanced livestock production for sustainable agriculture	102	MAIN	BFN	24	Selection
2181	PGRD	YR	025926	SAMD	7900	Mini Dissertation Sustainable Agriculture	102	MAIN	BFN	72	Selection
2181	PGRD	YR	027337	SANR	5806	Assessment and management of natural resources	102	MAIN	BFN	24	Selection
2181	PGRD	YR	027336	SANR	7906	Assessment and Management of natural resources	102	MAIN	BFN	24	Selection
2181	PGRD	YR	025927	SAPA	7900	Publishable Article Sustainable Agriculture	102	MAIN	BFN	72	Selection
2182	PGRD	S2	020225	SAPM	7926	Project Management for Sustainable Agricultural Practices	102	MAIN	BFN	24	Selection
2182	PGRD	S2	026009	SARD	7926	Sociology of Sustainability	102	MAIN	BFN	24	Selection
2182	PGRD	S2	027335	SARP	5826	Research methods for sustainable agriculture	102	MAIN	BFN	24	Selection
2181	PGRD	YR	027334	SARP	7900	Mini-dissertation Sustainable Agriculture	102	MAIN	BFN	60	Selection
2181	PGRD	YR	025949	SASA	7900	Introduction to sustainable agriculture and rural devevelopment	102	MAIN	BFN	0	Selection
2181	PGRD	YR	010505	SASC	7900	Sustainable Agriculture: Minor Dissertation	102	MAIN	BFN	72	Selection
2182	PGRD	S2	010505	SASC	7900	Sustainable Agriculture: Minor Dissertation	102	MAIN	BFN	72	Selection
2182	PGRD	S2	020227	SASM	7926	Strategic Management and Planning in Agriculture	102	MAIN	BFN	24	Selection
2181	PGRD	S1	020275	SATN	7916	Agriculture Technology for Developing Countries	102	MAIN	BFN	24	Selection
2181	PGRD	S1	020223	SAUR	7916	Sustainable Utilisation of Natural Agricultural Resources and the environment	102	MAIN	BFN	24	Selection
2182	PGRD	S2	020274	SAVA	7926	Agricultural Product Processing and Preserving	102	MAIN	BFN	24	Selection
2181	PGRD	YR	015856	VHL	900	Sustainable Agriculture	102	MAIN	BFN	240	Selection
2181	UGRD	S1	002354	CHEM	1513	Inorganic and Analytical Chemistry (Mainstream)	103	MAIN	BFN	12	None
2181	UGRD	S1	022800	CHEM	1551	Inorganic and Analytical Chemistry (Practicle)	103	MAIN	BFN	4	CHEM1551 Prerequisite: Co-register with CHEM1513 or after CHEM1552+CHEM1642 is passed
2182	UGRD	S2	025182	CHEM	1623	Physical and Organic Chemistry (Mainstream)	103	MAIN	BFN	12	CHEM1623 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2182	UGRD	S2	025678	CHEM	1643	Physical and Organic Chemistry	103	MAIN	BFN	12	CHEM1643 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2182	UGRD	S2	026881	CHEM	1661	Physical and Organic Chemistry (Practical)	103	MAIN	BFN	4	CHEM1661: Student must have passed (CHEM1513 or CHEM1552+1642) +CHEM1551 in order to continue with module.
2181	UGRD	S1	026990	CHEM	2611	Physical Chemistry practicals	103	MAIN	BFN	4	CHEM2611 Prerequisite: Students must have passed ((CHEM1623 or CHEM1643 with 60%) + CHEM1661), MATM1614 or MATM1534 in order to continue with this module.
2181	UGRD	S1	026882	CHEM	2613	Physical Chemistry Theory	103	MAIN	BFN	12	CHEM2613 Prerequisite: Students must have passed ((CHEM1623 or CHEM1643 with 60%) + CHEM1661), MATM1614 or MATM1534 in order to continue with this module.
2182	UGRD	S2	026991	CHEM	2621	Organic Chemistry practicals	103	MAIN	BFN	4	CHEM2621 Prerequisite: Students must have passed ((CHEM1623 or CHEM1643 with 60%) + CHEM1661), MATM1614 or MATM1534 in order to continue with this module.

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2182	UGRD	S2	027034	CHEM	2623	Organic Chemistry Theroy	103	MAIN	BFN	12	CHEM2623 Prerequisite: Students must have passed ((CHEM1623 or CHEM1643 with 60%) + CHEM1661), MATM1614 or MATM1534 in order to continue with this module.
2181	UGRD	S1	026992	CHEM	2631	Analytical Chemistry practical	103	MAIN	BFN	4	CHEM2631 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2181	UGRD	S1	026883	CHEM	2633	Analytical Chemistry	103	MAIN	BFN	12	CHEM2633 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2182	UGRD	S2	027035	CHEM	2641	Inorganic Chemistry Practicals	103	MAIN	BFN	4	CHEM2641 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2182	UGRD	S2	026884	CHEM	2643	Inorganic Chemistry Theory	103	MAIN	BFN	12	CHEM2643 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2181	UGRD	S1	026885	CHEM	3711	Analytical Chemistry practicals	103	MAIN	BFN	4	CHEM3711 Prerequisite: Students must have passed CHEM2613 & CHEM2611, MATM1624 or MATM1544 in order to continue with this module.
2181	UGRD	S1	026886	CHEM	3713	Analytical Chemistry Theory	103	MAIN	BFN	12	CHEM3713 Prerequisite: Students must have passed CHEM2613 & CHEM2611, MATM1624 or MATM1544 in order to continue with this module.
2182	UGRD	S2	026993	CHEM	3721	Inorganic Chemistry practicals	103	MAIN	BFN	4	CHEM3721 Prerequisite: Students must have passed CHEM2641 & CHEM2643, MATM1624 or MATM1544 in order to continue with this module.
2182	UGRD	S2	026887	CHEM	3723	Inorganic Chemistry Theory	103	MAIN	BFN	12	CHEM3723 Prerequisite: Students must have passed CHEM2641 & CHEM2643, MATM1624 or MATM1544 in order to continue with this module.
2181	UGRD	S1	026888	CHEM	3731	Physical Chemistry Practical	103	MAIN	BFN	4	CHEM3731 Prerequisite: Student must have passed CHEM2613 and CHEM2611 and MATM1544 or MATM1624 in order to continue with module.
2181	UGRD	S1	026889	CHEM	3733	Physical Chemistry Theory	103	MAIN	BFN	12	CHEM3733 rerequisite:: Student must have passed CHEM2613 and CHEM2611 and MATM1544 or MATM1624 in order to continue with module.
2182	UGRD	S2	026890	CHEM	3741	Organic Chemistry practicals	103	MAIN	BFN	4	CHEM3741: Prerequisite Student must have passed CHEM2623 and CHEM2621 in order to continue with this module.
2182	UGRD	S2	026891	CHEM	3743	Organic Chemistry	103	MAIN	BFN	12	CHEM3743: Prerequisite Student must have passed CHEM2623 and CHEM2621 in order to continue with this module.
2181	UGRD	S1	002354	CHEM	1513	Inorganic and Analytical Chemistry (Mainstream)	103	QWA	QWAQWA	12	None
2181	UGRD	S1	022487	CHEM	1532	Organic Chemistry	103	QWA	QWAQWA	8	CHEM1532 Prerequisite: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
2181	UGRD	S1	022800	CHEM	1551	Inorganic and Analytical Chemistry (Practicle)	103	QWA	QWAQWA	4	CHEM1551 Prerequisite: Co-register with CHEM1513 or after CHEM1552+CHEM1642 is passed
2181	UGRD	S1	002429	CHEM	1552	Introduction to chemistry- development module	103	QWA	QWAQWA	8	CHEM1552 Prerequisite: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
2182	UGRD	S2	022486	CHEM	1622	Physical Chemistry	103	QWA	QWAQWA	8	CHEM1622 Prerequisite: Students must have passed CHEM1552 + CHEM1532.
2182	UGRD	S2	025182	CHEM	1623	Physical and Organic Chemistry (Mainstream)	103	QWA	QWAQWA	12	CHEM1623 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2182	UGRD	S2	022485	CHEM	1642	Inorganic and Analytical Chemistry	103	QWA	QWAQWA	8	CHEM1642 Prerequisite: Students must have passed CHEM1552 and MATD1554 or level 4 in NSS Mathematics.
2182	UGRD	S2	025678	CHEM	1643	Physical and Organic Chemistry	103	QWA	QWAQWA	12	CHEM1643 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2182	UGRD	S2	026881	CHEM	1661	Physical and Organic Chemistry (Practical)	103	QWA	QWAQWA	4	CHEM1661: Student must have passed (CHEM1513 or CHEM1552+1642) +CHEM1551 in order to continue with module.
2181	UGRD	S1	026990	CHEM	2611	Physical Chemistry practicals	103	QWA	QWAQWA	4	CHEM2611 Prerequisite: Students must have passed ((CHEM1623 or CHEM1643 with 60%) + CHEM1661), MATM1614 or MATM1534 in order to continue with this module.
2181	UGRD	S1	026882	CHEM	2613	Physical Chemistry Theory	103	QWA	QWAQWA	12	CHEM2613 Prerequisite: Students must have passed ((CHEM1623 or CHEM1643 with 60%) + CHEM1661), MATM1614 or MATM1534 in order to continue with this module.
2182	UGRD	S2	026991	CHEM	2621	Organic Chemistry practicals	103	QWA	QWAQWA	4	CHEM2621 Prerequisite: Students must have passed ((CHEM1623 or CHEM1643 with 60%) + CHEM1661), MATM1614 or MATM1534 in order to continue with this module.

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2182	UGRD	S2	027034	CHEM	2623	Organic Chemistry Theroy	103	QWA	QWAQWA	12	CHEM2623 Prerequisite: Students must have passed ((CHEM1623 or CHEM1643 with 60%) + CHEM1661), MATM1614 or MATM1534 in order to continue with this module.
2181	UGRD	S1	026992	CHEM	2631	Analytical Chemistry practical	103	QWA	QWAQWA	4	CHEM2631 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2181	UGRD	S1	026883	CHEM	2633	Analytical Chemistry	103	QWA	QWAQWA	12	CHEM2633 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2182	UGRD	S2	027035	CHEM	2641	Inorganic Chemistry Practicals	103	QWA	QWAQWA	4	CHEM2641 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2182	UGRD	S2	026884	CHEM	2643	Inorganic Chemistry Theory	103	QWA	QWAQWA	12	CHEM2643 Prerequisite: Students must have passed CHEM1513 + CHEM1551 in order to continue with this module.
2181	UGRD	S1	026885	CHEM	3711	Analytical Chemistry practicals	103	QWA	QWAQWA	4	CHEM3711 Prerequisite: Students must have passed CHEM2613 & CHEM2611, MATM1624 or MATM1544 in order to continue with this module.
2181	UGRD	S1	026886	CHEM	3713	Analytical Chemistry Theory	103	QWA	QWAQWA	12	CHEM3713 Prerequisite: Students must have passed CHEM2613 & CHEM2611, MATM1624 or MATM1544 in order to continue with this module.
2182	UGRD	S2	026993	CHEM	3721	Inorganic Chemistry practicals	103	QWA	QWAQWA	4	CHEM3721 Prerequisite: Students must have passed CHEM2641 & CHEM2643, MATM1624 or MATM1544 in order to continue with this module.
2182	UGRD	S2	026887	CHEM	3723	Inorganic Chemistry Theory	103	QWA	QWAQWA	12	CHEM3723 Prerequisite: Students must have passed CHEM2641 & CHEM2643, MATM1624 or MATM1544 in order to continue with this module.
2181	UGRD	S1	026888	CHEM	3731	Physical Chemistry Practical	103	QWA	QWAQWA	4	CHEM3731 rerequisite: Student must have passed CHEM2613 and CHEM2611 and MATM1544 or MATM1624 in order to continue with module.
2181	UGRD	S1	026889	CHEM	3733	Physical Chemistry Theory	103	QWA	QWAQWA	12	CHEM3733 Prerequisite Student must have passed CHEM2613 and CHEM2611 and MATM1544 or MATM1624 in order to continue with module.
2182	UGRD	S2	026890	CHEM	3741	Organic Chemistry practicals	103	QWA	QWAQWA	4	CHEM3741: Prerequisite Student must have passed CHEM2623 and CHEM2621 in order to continue with this module.
2182	UGRD	S2	026891	CHEM	3743	Organic Chemistry	103	QWA	QWAQWA	12	CHEM3743: Prerequisite Student must have passed CHEM2623 and CHEM2621 in order to continue with this module.
2181	UGRD	S1	022487	CHEM	1532	Organic Chemistry	103	SOUTH	BOITJHORIS	8	CHEM1532 Prerequisite: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
2181	UGRD	S1	002429	CHEM	1552	Introduction to chemistry- development module	103	SOUTH	BOITJHORIS	8	CHEM1552 Prerequisite: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
2182	UGRD	S2	022486	CHEM	1622	Physical Chemistry	103	SOUTH	BOITJHORIS	8	CHEM1622 Prerequisite: Students must have passed CHEM1552 + CHEM1532.
2182	UGRD	S2	022485	CHEM	1642	Inorganic and Analytical Chemistry	103	SOUTH	BOITJHORIS	8	CHEM1642 Prerequisite: Students must have passed CHEM1552 and MATD1554 or level 4 in NSS Mathematics.
2181	UGRD	S1	022487	CHEM	1532	Organic Chemistry	103	SOUTH	SASOLBURG	8	CHEM1532 Prerequisite: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
2181	UGRD	S1	022800	CHEM	1551	Inorganic and Analytical Chemistry (Practicle)	103	SOUTH	SASOLBURG	4	CHEM1551 Prerequisite: Co-register with CHEM1513 or after CHEM1552+CHEM1642 is passed
2181	UGRD	S1	002429	CHEM	1552	Introduction to chemistry- development module	103	SOUTH	SASOLBURG	8	CHEM1552 Prerequisite: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
2182	UGRD	S2	022486	CHEM	1622	Physical Chemistry	103	SOUTH	SASOLBURG	8	CHEM1622 Prerequisite: Students must have passed CHEM1552 + CHEM1532.
2182	UGRD	S2	022485	CHEM	1642	Inorganic and Analytical Chemistry	103	SOUTH	SASOLBURG	8	CHEM1642 Prerequisite: Students must have passed CHEM1552 and MATD1554 or level 4 in NSS Mathematics.
2181	UGRD	S1	022487	CHEM	1532	Organic Chemistry	103	SOUTH	SOUTH	8	CHEM1532 Prerequisite: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
2181	UGRD	S1	022800	CHEM	1551	Inorganic and Analytical Chemistry (Practicle)	103	SOUTH	SOUTH	4	CHEM1551 Prerequisite: Co-register with CHEM1513 or after CHEM1552+CHEM1642 is passed
2181	UGRD	S1	002429	CHEM	1552	Introduction to chemistry- development module	103	SOUTH	SOUTH	8	CHEM1552 Prerequisite: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
2182	UGRD	S2	022486	CHEM	1622	Physical Chemistry	103	SOUTH	SOUTH	8	CHEM1622 Prerequisite: Students must have passed CHEM1532.
2182	UGRD	S2	022485	CHEM	1642	Inorganic and Analytical Chemistry	103	SOUTH	SOUTH	8	CHEM1642 Prerequisite: Students must have passed CHEM1552 and MATD1554 or level 4 in NSS Mathematics.

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2182	UGRD	S2	026881	CHEM	1661	Physical and Organic Chemistry (Practical)	103	SOUTH	SOUTH	4	CHEM1661: Student must have passed (CHEM1513 or CHEM1552+1642) +CHEM1551 in order to continue with module.
2181	UGRD	S1	022487	CHEM	1532	Organic Chemistry	103	SOUTH	WELKOM	8	CHEM1532 Prerequisite: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
2181	UGRD	S1	022800	CHEM	1551	Inorganic and Analytical Chemistry (Practicle)	103	SOUTH	WELKOM	4	CHEM1551 Prerequisite: Co-register with CHEM1513 or after CHEM1552+CHEM1642 is passed
2181	UGRD	S1	002429	CHEM	1552	Introduction to chemistry- development module	103	SOUTH	WELKOM	8	CHEM1552 Prerequisite: NSC Math Level 3 (40%) or Maths HG F or SG E, or Physical or Biological Sciences L3 (40%)
2182	UGRD	S2	022486	CHEM	1622	Physical Chemistry	103	SOUTH	WELKOM	8	CHEM1622 Prerequisite: Students must have passed CHEM1532.
2182	UGRD	S2	022485	CHEM	1642	Inorganic and Analytical Chemistry	103	SOUTH	WELKOM	8	CHEM1642 Prerequisite: Students must have passed CHEM1552 and MATD1554 or level 4 in NSS Mathematics.
2181	PGRD	YR	026893	CHEM	6808	Research Report Chemistry	103	MAIN	BFN	32	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	026994	CHEM	6813	Inorganic Chemistry	103	MAIN	BFN	12	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	002398	CHEM	6814	Inorganic Chemistry	103	MAIN	BFN	16	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	026995	CHEM	6823	Inorganic Chemistry	103	MAIN	BFN	12	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	002399	CHEM	6824	Inorganic Chemistry	103	MAIN	BFN	16	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	026996	CHEM	6833	Physical Chemistry	103	MAIN	BFN	12	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	002400	CHEM	6834	Physical Chemistry	103	MAIN	BFN	16	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	026982	CHEM	6843	Physical Chemistry	103	MAIN	BFN	12	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	002401	CHEM	6844	Physical Chemistry	103	MAIN	BFN	16	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	026997	CHEM	6853	Organic Chemistry	103	MAIN	BFN	12	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	002402	CHEM	6854	Organic Chemistry	103	MAIN	BFN	16	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	026998	CHEM	6863	Organic Chemistry	103	MAIN	BFN	12	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	002403	CHEM	6864	Organic Chemistry	103	MAIN	BFN	16	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	026999	CHEM	6873	Analytical Chemistry	103	MAIN	BFN	12	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	002404	CHEM	6874	Analytical Chemistry	103	MAIN	BFN	16	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	027000	CHEM	6883	Analytical Chemistry	103	MAIN	BFN	12	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	002405	CHEM	6884	Analytical Chemistry	103	MAIN	BFN	16	Selection for BScHons majoring in Chemistry
2181	PGRD	YR	025316	CHEM	8900	Chemistry Dissertation	103	MAIN	BFN	180	Selection for MSc majoring in Chemistry
2182	PGRD	S2	025316	CHEM	8900	Chemistry Dissertation	103	MAIN	BFN	180	Selection for MSc majoring in Chemistry
2181	PGRD	YR	002411	CHEM	9100	Chemistry Thesis	103	MAIN	BFN	360	Selection for PhD majoring in Chemistry
2181	PGRD	S1	020162	CMPR	6814	Polymers and Polymer Reactions	103	MAIN	BFN	16	Selection for BScHons majoring in Polymer Science
2181	PGRD	YR	027186	NSCH	7900	Advanced Nanochemistry	103	MAIN	BFN	48	Selection for MSc majoring in Nano-Chemistry
2181	PGRD	S1	027206	NSCH	7914	Experimental Techniques in Nano-chemistry	103	MAIN	BFN	16	Selection for MSc majoring in Nano-Chemistry
2181	PGRD	YR	025410	PLYS	8900	Polymer Science Dissertation	103	MAIN	BFN	180	Selection for MSc majoring in Polymer Science
2181	PGRD	YR	025639	PLYS	9100	Polymer Science Thesis	103	MAIN	BFN	360	Selection for PhD majoring in Polymer Science
2181	PGRD	YR	026893	CHEM	6808	Research Report Chemistry	103	QWA	QWAQWA	32	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	026995	CHEM	6823	Inorganic Chemistry	103	QWA	QWAQWA	12	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	026996	CHEM	6833	Physical Chemistry	103	QWA	QWAQWA	12	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	026997	CHEM	6853	Organic Chemistry	103	QWA	QWAQWA	12	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	026998	CHEM	6863	Organic Chemistry	103	QWA	QWAQWA	12	Selection for BScHons majoring in Chemistry
2181	PGRD	S1	026999	CHEM	6873	Analytical Chemistry	103	QWA	QWAQWA	12	Selection for BScHons majoring in Chemistry
2182	PGRD	S2	027000	CHEM	6883	Analytical Chemistry	103	QWA	QWAQWA	12	Selection for BScHons majoring in Chemistry
2181	PGRD	YR	025316	CHEM	8900	Chemistry Dissertation	103	QWA	QWAQWA	180	Selection for MSc majoring in Chemistry
2181	PGRD	S1	020163	CMPA	6814	Polymer Testing and Characterisation I	103	QWA	QWAQWA	16	Selection for BScHons majoring in Polymer Science

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2182	PGRD	S2	020164	CMPA	6824	Applied Polymer Science	103	QWA	QWAQWA	16	Selection for BScHons majoring in Polymer Science
2182	PGRD	S2	020166	CMPB	6824	Polymer Blends, Composites and Nanocomposites	103	QWA	QWAQWA	16	Selection for BScHons majoring in Polymer Science
2182	PGRD	S2	020165	CMPC	6824	Polymer Testing and Characterization II	103	QWA	QWAQWA	16	Selection for BScHons majoring in Polymer Science
2181	PGRD	S1	020160	CMPO	6814	Polymers and Polymerization	103	QWA	QWAQWA	16	Selection for BScHons majoring in Polymer Science
2181	PGRD	S1	020161	CMPP	6814	Physical Polymer Science	103	QWA	QWAQWA	16	Selection for BScHons majoring in Polymer Science
2181	PGRD	YR	026583	CMPR	6808	Research project	103	QWA	QWAQWA	32	Selection for BScHons majoring in Polymer Science
2181	PGRD	S1	020162	CMPR	6814	Polymers and Polymer Reactions	103	QWA	QWAQWA	16	Selection for BScHons majoring in Polymer Science
2181	PGRD	YR	026018	PLSC	8900	Polymer Science	103	QWA	QWAQWA	180	Selection for MSc majoring in Polymer Science
2181	PGRD	YR	025639	PLYS	9100	Polymer Science Thesis	103	QWA	QWAQWA	360	Selection for PhD majoring in Polymer Science
2181	UGRD	S1	025160	BCIS	1513	Introduction to Information Systems	104	MAIN	BFN	12	BCIS1513 Co-requisite: Students must register BCIS1513 with CSIL1511.
2182	UGRD	S2	025049	BCIS	1623	Introduction to Software Design	104	MAIN	BFN	12	None
2181	UGRD	S1	025116	BCIS	2614	Systems Analysis & Design	104	MAIN	BFN	16	BCIS2614 Prerequisite: Students must have passed BCIS1513 in order to continue with this module.
2182	UGRD	S2	025115	BCIS	2624	Systems Infrastructure & Integration	104	MAIN	BFN	16	None
2181	UGRD	S1	025770	BCIS	3714	Information Systems in Organisations	104	MAIN	BFN	16	None
2181	UGRD	YR	023910	CSIE	1606	Object oriented programming for engineers	104	MAIN	BFN	24	CSIE1606 Co-requisite: Students must register this module simultaneously with MATM1614 and MATM1624.
2181	UGRD	S1	023911	CSIE	2613	Data structures & algorithms for engineers	104	MAIN	BFN	12	CISE2613 Prerequisite: Students must have passed CISE1606, MATM1614 and MATM1624 in order to continue with this module.
2181	UGRD	S1	002010	CSIL	1511	Computer Literacy: Part 1	104	MAIN	BFN	4	None
2182	UGRD	S2	002012	CSIL	1521	Computer Literacy: Part 2	104	MAIN	BFN	4	CSIL1521 Prerequisite: Students must have passed CSIL1511 in order to continue with this module.
2181	UGRD	S1	025158	CSIS	1553	Introduction to Computer Hardware	104	MAIN	BFN	12	CSIS1553 Co-requisite: Students must register this module with CSIL1511.
2181	UGRD	S1	012681	CSIS	1614	Programming and Problem Solving: Part 1	104	MAIN	BFN	16	CSIS1614 Co-requisite: Students must register this module with CSIL1511.
2182	UGRD	S2	012683	CSIS	1624	Programming and Problem Solving: Part 2	104	MAIN	BFN	16	CSIS1624 Prerequisite: Students must have passed CSIS1614 or CSIS1644 in order to continue with this module.
2182	UGRD	S2	021275	CSIS	1664	Introduction to the Internet and Web Page Development	104	MAIN	BFN	16	CSIS1664 Prerequisite: Students must have passed CSIS1614 or CSIS1644 OR 60% for NSC IT(Grade 12) in order to continue with this module.
2182	UGRD	S2	026272	CSIS	1683	Visual Basic for Applications (VBA) with the focus on Excel	104	MAIN	BFN	12	CSIL1683 Prerequisite: Students must have passed CSIL1511 in order to continue with this module.
2181	UGRD	S1	012688	CSIS	2614	Data Structures and Advanced Programming	104	MAIN	BFN	16	CSIS2614: Prerequisite: Students must have passed CSIS1624 or obtained at least 65% for CSIE1606 in order to continue with this module.
2182	UGRD	S2	025369	CSIS	2624	Human-Computer Interaction	104	MAIN	BFN	16	CSIS2624 Prerequisite: Students must have passed CSIS1614.
2181	UGRD	S1	025547	CSIS	2634	Introduction to Databases and Database Management Systems: Part 1	104	MAIN	BFN	16	CSIS2634 Prerequisite: Students must have passed CSIS1624 in order to register for this module.
2182	UGRD	S2	025711	CSIS	2642	Information Technology Service Learning	104	MAIN	BFN	8	CSIS2642 Prerequisite: Students must have passed CSIL1521 in order to register for this module.
2182	UGRD	S2	025685	CSIS	2664	Software Design	104	MAIN	BFN	16	CSIS2664 Prerequisite: Students must have passed CSIS2614 in order to register for this module.
2181	UGRD	S1	012697	CSIS	3714	Introduction to Databases and Database Management Systems: Part 2	104	MAIN	BFN	16	CSIS3714 Prerequisite: Students must have passed CSIS2634 in order to register for this module.
2182	UGRD	S2	012699	CSIS	3724	Software Engineering	104	MAIN	BFN	16	CSIS3724 Prerequisite: Students must have passed CSIS2634 in order to register for this module.
2181	UGRD	S1	025372	CSIS	3734	Internet Programming	104	MAIN	BFN	16	CSIS3734: Prerequisite: Students must have passed CSIS1664 and CSIS2664 in order to register for this module..
2182	UGRD	S2	012702	CSIS	3744	Computer Networks	104	MAIN	BFN	16	CSIS3744 Prerequisite: Students must have passed CSIS1624 or CSIE1606 in order to register this module.
2182	UGRD	S2	002012	CSIL	1521	Computer Literacy: Part 2	104	QWA	QWAQWA	4	CSIL1521 Prerequisite: Students must have passed CSIL1511 in order to continue with this module.

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2181	UGRD	S1	024706	CSIQ	1512	Computer Literacy For Computer Science	104	QWA	QWAQWA	8	None
2181	UGRD	S1	023305	CSIQ	1531	Computer Literacy: Part 1	104	QWA	QWAQWA	4	None
2181	UGRD	S1	025681	CSIQ	1533	Introduction to Software Development Concepts	104	QWA	QWAQWA	12	None
2182	UGRD	S2	023306	CSIQ	1541	Computer Literacy: Part 2	104	QWA	QWAQWA	4	BRS141 Prerequisite: Students must have passed BRS131 in order to continue with this module.
2181	UGRD	S1	025157	CSIQ	1553	Introduction to Computer Hardware	104	QWA	QWAQWA	12	None
2181	UGRD	S1	026896	CSIQ	1614	Programming and Problem Solving: Part 1	104	QWA	QWAQWA	16	CSIS1614 Co-requisite: Students must register this module with CSIQ1531.
2182	UGRD	S2	026897	CSIQ	1624	Programming and Problem Solving: Part 2	104	QWA	QWAQWA	16	CSIQ1624 Prerequisite: Students must have passed CSIQ1614 or CSIQ1644 in order to continue with this module.
2182	UGRD	S2	025159	CSIQ	1662	Introduction to Computer Networks	104	QWA	QWAQWA	8	
2182	UGRD	S2	027179	CSIQ	1681	Introduction to Software Development Part 2	104	QWA	QWAQWA	4	CSIQ1681: Student must have passed CSIQ1533 in order to continue with module.
2181	UGRD	S1	025123	CSIQ	2614	Data Structures and Advanced Programming	104	QWA	QWAQWA	16	CSIQ2614: Prerequisite: Students must have passed CSIS1624.
2182	UGRD	S2	012691	CSIQ	2624	Human-Computer Interaction	104	QWA	QWAQWA	16	CSIQ2624 Prerequisite: Students must have passed CSIS1614.
2181	UGRD	S1	024381	CSIQ	2634	Introduction to Databases and Database Management Systems: Part 1	104	QWA	QWAQWA	16	CSIQ2634 Prerequisite: Students must have passed CSIS1624 in order to register for this module.
2182	UGRD	S2	021284	CSIQ	2642	Information Technology Service Learning	104	QWA	QWAQWA	8	CSIQ2642 Prerequisite: Students must have passed CSIL1541 in order to register for this module.
2182	UGRD	S2	025122	CSIQ	2644	Mobile Development	104	QWA	QWAQWA	16	
2181	UGRD	S1	012696	CSIQ	2654	Introduction to Website Development	104	QWA	QWAQWA	16	CSIQ2654 Co-requisite: Students have passed CSIQ1531 in order to register for this module..
2182	UGRD	S2	023265	CSIQ	2664	Software Design	104	QWA	QWAQWA	16	CSIQ2664 Prerequisite: Students must have passed CSIQ2614 in order to register for this module.
2181	UGRD	S1	027163	CSIQ	3714	Introduction to Databases and Database Management Systems: Part 2	104	QWA	QWAQWA	16	CSIQ3714 Prerequisite: Students must have passed CSIQ2634 in order to register for this module.
2182	UGRD	S2	027180	CSIQ	3724	Software Engineering	104	QWA	QWAQWA	16	CSIQ3724 Prerequisite: Students must have passed CSIQ2634 in order to register for this module.
2181	UGRD	S1	012701	CSIQ	3734	Internet Programming	104	QWA	QWAQWA	16	CSIQ3734: Prerequisite: Students must have passed CSIQ1664 and CSQS2664 in order to register for this module..
2182	UGRD	S2	025684	CSIQ	3764	Databases and Database Management Systems 2	104	QWA	QWAQWA	16	
2182	UGRD	S2	027064	CSIQ	3784	Software Development Project	104	QWA	QWAQWA	16	
2182	UGRD	S2	022029	CSIL	1561	Computer Literacy: Part 1	104	SOUTH	BETHLEHEM	4	None
2182	UGRD	S2	022029	CSIL	1561	Computer Literacy: Part 1	104	SOUTH	OUDTSHOORN	4	None
2182	UGRD	S2	022029	CSIL	1561	Computer Literacy: Part 1	104	SOUTH	PHUTHADITJ	4	None
2182	UGRD	S2	022029	CSIL	1561	Computer Literacy: Part 1	104	SOUTH	SASOLBURG	4	None
2181	UGRD	S1	025395	CSIL	1551	Computer Literacy: Part 1	104	SOUTH	SOUTH	4	None
2182	UGRD	S2	022029	CSIL	1561	Computer Literacy: Part 1	104	SOUTH	SOUTH	4	None
2182	UGRD	S2	022029	CSIL	1561	Computer Literacy: Part 1	104	SOUTH	WELKOM	4	None
2181	PGRD	S1	025072	CSIC	6813	Artificial Intelligence	104	MAIN	BFN	12	CSIC6813 Prerequisite: Students must have passed MATM1614 (WTW114) and MATM1624 (WTW124) in order to register for this module.
2182	PGRD	S2	025073	CSIC	6823	Artificial Intelligence	104	MAIN	BFN	12	CISC6823 Prerequisite: Students must have passed MATM1614 (WTW114) and MATM1624 (WTW124) or MATM1534 (WTW134) with 60% and MATM1544 (WTW144) with 60% in order to register for this module.
2181	PGRD	S1	025244	CSIC	6833	Robotics	104	MAIN	BFN	12	CISC6823 Prerequisite: Students must have passed MATM1614 (WTW114) and MATM1624 (WTW124) or MATM1534 (WTW134) with 60% and MATM1544 (WTW144) with 60% in order to register for this module.
2182	PGRD	S2	025166	CSIC	6843	Management Information Systems	104	MAIN	BFN	12	
2181	PGRD	S1	025773	CSIC	6853	Capita Selecta	104	MAIN	BFN	12	None

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2182	PGRD	S2	025746	CSIC	6863	Capita Selecta	104	MAIN	BFN	12	None
2181	PGRD	S1	012714	CSID	6813	Business Intelligence	104	MAIN	BFN	12	None
2181	PGRD	S1	025490	CSID	6833	Advanced Databasis	104	MAIN	BFN	12	CSID6833 Prerequisite: Students must have passed CSIS2634 in order to register for this module.
2182	PGRD	S2	025344	CSID	6843	Advanced Databases	104	MAIN	BFN	12	CSID6843 Prerequisite: Students must have passed CSIS2634 in order to register for this module.
2181	PGRD	S1	025358	CSID	6853	Data Warehousing	104	MAIN	BFN	12	CSID6853 Prerequisite: Students must have passed CSIS3714 in order to register for this module.
2182	PGRD	S2	012728	CSID	6863	Data Warehousing	104	MAIN	BFN	12	
2181	PGRD	S1	012713	CSIE	6813	Knowledge-based Systems	104	MAIN	BFN	12	None
2181	PGRD	S1	012716	CSIE	6833	Management Information Systems	104	MAIN	BFN	12	None
2181	PGRD	S1	025079	CSIE	6853	IT Project Management	104	MAIN	BFN	12	None
2182	PGRD	S2	025155	CSIE	6863	IT Project Management	104	MAIN	BFN	12	None
2181	PGRD	S1	012718	CSIE	6873	Decision Support Systems	104	MAIN	BFN	12	None
2182	PGRD	S2	025352	CSIE	6883	Decision Support Systems	104	MAIN	BFN	12	None
2181	PGRD	S1	012708	CSII	6813	Information Security	104	MAIN	BFN	12	CSII6813 Prerequisite: Students must have passed CSI3744 in order to register for this module.
2182	PGRD	S2	025371	CSII	6823	Information Security	104	MAIN	BFN	12	CSII6823 Prerequisite: Students must have passed CSIS3744 in order to register for this module.
2181	PGRD	S1	012719	CSII	6833	Human-Computer Interaction	104	MAIN	BFN	12	None
2182	PGRD	S2	025365	CSII	6843	Human-Computer Interaction	104	MAIN	BFN	12	None
2181	PGRD	S1	025748	CSII	6853	Computer Ethics	104	MAIN	BFN	12	None
2182	PGRD	S2	025749	CSII	6863	Computer Ethics	104	MAIN	BFN	12	None
2182	PGRD	S2	027010	CSII	6883	Digital Forensic Science	104	MAIN	BFN	12	None
2181	PGRD	S1	012710	CSIM	6813	Theory of Algorithms	104	MAIN	BFN	12	CSIM6813 Prerequisite: Students must have passed MATM1614 (WTW114) and MATM1624 (WTW124) or MATM1534 (WTW134) with 60% and MATM1544 (WTW144) with 60% in order to register for this module.
2182	PGRD	S2	025386	CSIM	6823	Theory of Algorithms	104	MAIN	BFN	12	CSIM6813 Prerequisite: Students must have passed MATM1614 (WTW114) and MATM1624 (WTW124) or MATM1534 (WTW134) with 60% and MATM1544 (WTW144) with 60% in order to register for this module.
2181	PGRD	S1	025075	CSIM	6833	Automata Theory and Applications	104	MAIN	BFN	12	None
2182	PGRD	S2	025076	CSIM	6843	Automata Theory and Applications	104	MAIN	BFN	12	None
2182	PGRD	S2	027011	CSIN	6823	Network Management	104	MAIN	BFN	12	None
2181	PGRD	S1	025032	CSIN	6833	Advanced Computer Networks	104	MAIN	BFN	12	CSIN6833 Prerequisite: Students must have passed CSIS3744 in order to register for this module.
2182	PGRD	S2	025054	CSIN	6843	Advanced Computer Networks	104	MAIN	BFN	12	CSIN6843 Prerequisite: Students must have passed CSIS3744 in order to register for this module.
2181	PGRD	S1	025176	CSIP	6813	Object Design	104	MAIN	BFN	12	None
2182	PGRD	S2	025177	CSIP	6823	Object Design	104	MAIN	BFN	12	None
2181	PGRD	S1	025047	CSIP	6833	Advanced Internet Programming	104	MAIN	BFN	12	CSIP6833 Prerequisite: Students must have passed CSIS3734 in order to register for this module.
2182	PGRD	S2	025048	CSIP	6843	Advanced Internet Programming	104	MAIN	BFN	12	CSIP6843 Prerequisite: Students must have passed CSIS3734 in order to register for this module.
2181	PGRD	S1	025051	CSIP	6853	Advanced Proramming 1	104	MAIN	BFN	12	CSIP6853 Prerequisite: Students must have passed CSIS3724 in order to register for this module.
2182	PGRD	S2	025245	CSIP	6863	Advanced Proramming 1	104	MAIN	BFN	12	CSIP6863 Prerequisite: Students must have passed CSIS3724 in order to register for this module.
2181	PGRD	S1	025057	CSIP	6873	Advanced Programming 1	104	MAIN	BFN	12	CSIP6873 Prerequisite: Students must have passed CSIP6853 or CSIP6863 in order to continue with this module.

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2182	PGRD	S2	025050	CSIP	6883	Advanced Programming II	104	MAIN	BFN	12	CSIP6883 Prerequisite: Students must have passed CSIS2664 in order to continue with this module.
2181	PGRD	YR	023270	CSIS	6808	Computer Information Technology Project	104	MAIN	BFN	32	
2181	PGRD	YR	027082	CSIS	6809	Computer Information Technology Research Project	104	MAIN	BFN	36	Selection BScITHon
2181	PGRD	S1	012729	CSIS	6813	Introduction to Research	104	MAIN	BFN	12	None
2182	PGRD	S2	025246	CSIS	6823	Introduction to Research	104	MAIN	BFN	12	None
2181	PGRD	S1	022405	CSIS	6853	Capita Selecta	104	MAIN	BFN	12	None
2181	PGRD	S1	012757	CSIS	7910	Extended Research Essay	104	MAIN	BFN	120	Selection MSc majoring in Computer Science
2181	PGRD	S1	025248	CSIS	7915	Human-Computer Interaction	104	MAIN	BFN	20	Selection MSc majoring in Computer Science
2182	PGRD	S2	025360	CSIS	7920	Extended Research Essay	104	MAIN	BFN	120	Selection MSc majoring in Computer Science
2182	PGRD	S2	025154	CSIS	7925	Human-Computer Interaction	104	MAIN	BFN	20	Selection MSc majoring in Computer Science
2181	PGRD	S1	025094	CSIS	7935	Data Warehousing	104	MAIN	BFN	20	Selection MSc majoring in Computer Science
2182	PGRD	S2	025093	CSIS	7945	Data Warehousing	104	MAIN	BFN	20	Selection MSc majoring in Computer Science
2181	PGRD	S1	025100	CSIS	7955	Educational Technology	104	MAIN	BFN	20	Selection MSc majoring in Computer Science
2182	PGRD	S2	025101	CSIS	7965	Educational Technology	104	MAIN	BFN	20	Selection MSc majoring in Computer Science
2181	PGRD	S1	025137	CSIS	7975	Eye-tracking	104	MAIN	BFN	20	Selection MSc majoring in Computer Science
2182	PGRD	S2	025138	CSIS	7985	Eye-tracking	104	MAIN	BFN	20	Selection MSc majoring in Computer Science
2181	PGRD	YR	025686	CSIS	8900	Computer Informatics Systems Dissertation	104	MAIN	BFN	180	Selection MSc majoring in Computer Science
2181	PGRD	YR	025084	CSIS	9100	Computer Informatics Systems Thesis	104	MAIN	BFN	360	Selection PhD majoring in Computer Sciences
2181	PGRD	YR	026898	CSIQ	6809	Computer Information Technology Research Project	104	QWA	QWAQWA	36	Selection BScITHon
2182	PGRD	S2	026899	CSIQ	6824	Advanced Mobile Development	104	QWA	QWAQWA	16	Selection BScITHon
2181	PGRD	S1	027065	CSIQ	6833	Human-Computer Interaction	104	QWA	QWAQWA	12	Selection BScITHon
2182	PGRD	S2	026900	CSIQ	6844	Gamification	104	QWA	QWAQWA	16	Selection BScITHon
2181	PGRD	S1	027539	CSIQ	6853	Gamification	104	QWA	QWAQWA	12	Selection BScITHon
2182	PGRD	S2	027540	CSIQ	6863	IT Project Management	104	QWA	QWAQWA	12	Selection BScITHon
2181	PGRD	YR	027158	CSIQ	8900	Computer Informatics Systems Dissertation	104	QWA	QWAQWA	180	Selection MSc majoring in Computer Science
2181	PGRD	YR	027159	CSIQ	9100	Computer Informatics Systems Thesis	104	QWA	QWAQWA	360	Selection vir PhD
2181	PGRD	S1	025234	BDCM	7910	Biodiversity and Conservation Management	106	MAIN	BFN	48	Selection
2182	PGRD	S2	025314	CEMT	5820	Corporate Environmental Management and Sustainability	106	MAIN	BFN	48	Selection
2182	PGRD	S2	025713	EMTE	7920	Mini-thesis Environemntal Management	106	MAIN	BFN	96	Selection
2181	PGRD	S1	027579	IWRM	5810	Introduction to Integrated Water Resources, Resource Economics and Governance	106	MAIN	BFN	48	Selection
2182	PGRD	S2	027580	IWRM	5820	Integrated Water Resources Science	106	MAIN	BFN	48	Selection
2182	PGRD	S2	027581	IWRM	5846	Integrated Water Resources Management and Legislation	106	MAIN	BFN	24	Selection
2181	PGRD	YR	026476	LIMG	9100	Limnology Thesis (PhD)	106	MAIN	BFN	360	Selection
2181	PGRD	YR	026011	LIMH	6808	Research essay	106	MAIN	BFN	32	Selection
2181	PGRD	S1	025820	LIMH	6814	Scientific methodology	106	MAIN	BFN	16	Selection
2182	PGRD	S2	026013	LIMH	6824	Advanced specialised module	106	MAIN	BFN	16	Selection
2181	PGRD	S1	025946	LIMH	6834	Introduction to ecological monitoring of aquatic systems	106	MAIN	BFN	16	Selection
2182	PGRD	S2	009854	LIMH	6844	Water Resource Management	106	MAIN	BFN	16	Selection
2181	PGRD	S1	026012	LIMH	6856	Research: Literature study	106	MAIN	BFN	24	Selection

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2181	PGRD	S1	009861	MOB	707	Resources and Processes	106	MAIN	BFN	48	Selection
2182	PGRD	S2	009862	MOB	708	Corporate Environmental Management and Sustainability	106	MAIN	BFN	48	Selection
2181	PGRD	S1	009889	MOB	741	Water, Pollution and Rehabilitation Management	106	MAIN	BFN	48	Selection
2181	PGRD	S1	009891	MOB	743	Biodiversity & Conservation Management	106	MAIN	BFN	48	Selection
2181	PGRD	YR	009915	MOB	791	Mini-Dissertation	106	MAIN	BFN	96	Selection
2181	PGRD	YR	009916	MOB	900	Environmental Management	106	MAIN	BFN	360	Selection
2181	PGRD	S1	025762	WLMT	7910	Wetland Management	106	MAIN	BFN	48	Selection
2181	PGRD	S1	025649	WPRN	7910	Water, Pollution and Rehabilitation Management	106	MAIN	BFN	48	Selection
2182	UGRD	S2	005333	GEOH	1624	Introduction to Human Geography	107	MAIN	BFN	16	GEOH1624: Student must have passed GEOP1514 in order to continue with module.
2181	UGRD	S1	018365	GEOH	2614	Urban Geography	107	MAIN	BFN	16	GEOH2614: Students must have passed GEOH1624 in order to continue with module.
2181	UGRD	S1	005345	GEOH	3714	Applied Urban Development and Spatial Transformation	107	MAIN	BFN	16	GEOH3714: Student must have passed GEOH2614 in order to continue with module.
2182	UGRD	S2	023870	GEOH	3724	Rural Geography	107	MAIN	BFN	16	GEOH3724 Prerequisite: Students must have passed GEOH2614 in order to register for this module.
2181	UGRD	S1	005332	GEOP	1514	Introduction to Physical Geography	107	MAIN	BFN	16	GEOP1514 Prerequisite: Students must have passed Mathematics at performance level 4 in order to continue with this module.
2181	UGRD	S1	020083	GEOP	2614	Process Geomorphology	107	MAIN	BFN	16	GEOP2614: Student needs to have passed GEOP1514 or GLGY1614 in order to continue with module.
2182	UGRD	S2	020082	GEOP	2624	Environment and climate studies	107	MAIN	BFN	16	GEOP2624 Prerequisite: Students must have passed GEOP1514 (GEO114) in order to continue with this module.
2181	UGRD	S1	005353	GEOP	3714	Environmental Geomorphology	107	MAIN	BFN	16	GEOP3714: Student must have passed GEOP2614 in order to continue with module.
2182	UGRD	S2	018366	GEOP	3724	Environmental management and analysis	107	MAIN	BFN	16	GEOP3724: Student must have passed GEOP2624 in order to continue with module.
2182	UGRD	S2	020213	GISC	2624	Introduction to Geographical Information Science	107	MAIN	BFN	16	GISC2624: Student must have passed GEOP1514 and GEOH1624 in order to continue with module.
2181	UGRD	S1	024729	GISC	3704	Professional practice, Ethics and legal aspects of Geographical Information Science	107	MAIN	BFN	16	GISC3704: Student must have passed GISC2624 in order to continue with module.
2181	UGRD	YR	024729	GISC	3704	Professional practice, Ethics and legal aspects of Geographical Information Science	107	MAIN	BFN	16	GISC3704: Student must have passed GISC2624 in order to continue with module.
2182	UGRD	S2	020216	GISC	3724	Geographic Information Science	107	MAIN	BFN	16	GISC3724: Student must passed GISC2624 in order to continue with module.
2181	UGRD	S1	027067	GEOE	1514	Introduction to Physical Geography	107	QWA	QWAQWA	16	
2182	UGRD	S2	027162	GEOE	1624	Introduction to Human Geography	107	QWA	QWAQWA	16	
2181	UGRD	S1	026190	GEOG	1514	Introduction to Physical Geography	107	QWA	QWAQWA	16	
2182	UGRD	S2	026191	GEOG	1624	Introduction to Human Geography	107	QWA	QWAQWA	16	
2181	UGRD	S1	026273	GEOG	2614	Process Geomorpholgy	107	QWA	QWAQWA	16	
2182	UGRD	S2	026274	GEOG	2624	Environment and climate studies	107	QWA	QWAQWA	16	
2181	UGRD	S1	026431	GEOG	2634	Housing and Urban development	107	QWA	QWAQWA	16	GEOG2634 Prerequisite: Students must have passed GEOG1514 and GEOG1624 in order to continue with this module.
2182	UGRD	S2	026227	GEOG	2644	Biogeography and climate of Southern Africa	107	QWA	QWAQWA	16	
2181	UGRD	S1	026275	GEOG	3714	Environmental Geomorphology	107	QWA	QWAQWA	16	
2182	UGRD	S2	026432	GEOG	3724	Rural Geography	107	QWA	QWAQWA	16	GEOG3724 Prerequisite: Students must have passed GEOG3714 in order to continue with this module.
2181	UGRD	S1	026433	GEOG	3734	Applied Urban Development and Spatial Transformation	107	QWA	QWAQWA	16	GEOG3734 Prerequisite: Students must have passed GEOG2624 in order to continue with this module.

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2182	UGRD	S2	026554	GEOG	3744	Environmental management and analysis	107	QWA	QWAQWA	16	
2181	UGRD	S1	026228	GEOG	3754	Economic Geography	107	QWA	QWAQWA	16	
2182	UGRD	S2	026229	GEOG	3764	Ethical debates in Geography	107	QWA	QWAQWA	16	
2182	UGRD	S2	005333	GEOH	1624	Introduction to Human Geography	107	QWA	QWAQWA	16	GEOH1624: Student must have passed GEOP1514 in order to continue with module.
2181	UGRD	S1	005332	GEOP	1514	Introduction to Physical Geography	107	QWA	QWAQWA	16	GEOP1514 Prerequisite: Students must have passed Mathematics at performance level 4 in order to continue with this module.
2181	UGRD	S1	020083	GEOP	2614	Process Geomorphology	107	QWA	QWAQWA	16	GEOP2614: Student needs to have passed GEOP1514 or GLGY1614 in order to continue with module.
2182	UGRD	S2	020082	GEOP	2624	Environment and climate studies	107	QWA	QWAQWA	16	GEOP2624 Prerequisite: Students must have passed GEOP1514 (GEO114) in order to continue with this module.
2181	UGRD	S1	005353	GEOP	3714	Environmental Geomorphology	107	QWA	QWAQWA	16	GEOP3714: Student must have passed GEOP2614 in order to continue with module.
2181	UGRD	S1	026230	GEOR	1514	Introduction to Physical Geography	107	QWA	QWAQWA	16	
2182	UGRD	S2	026231	GEOT	1624	Tourism Geography	107	QWA	QWAQWA	16	
2181	UGRD	S1	026183	GEOT	2614	Global Tourism Studies	107	QWA	QWAQWA	16	
2182	UGRD	S2	026184	GEOT	2624	Primary and Secondary Aspects of Tourism Studies	107	QWA	QWAQWA	16	
2181	UGRD	S1	026276	GEOT	3714	Tourism Development and Policy	107	QWA	QWAQWA	16	
2182	UGRD	S2	026232	GEOT	3724	Nature Tourism Studies	107	QWA	QWAQWA	16	
2181	UGRD	S1	027023	GEOT	3734	Tourism Cultural Studies	107	QWA	QWAQWA	16	
2182	UGRD	S2	026185	GEOT	3744	Tourism and Local Development in South Africa	107	QWA	QWAQWA	16	
2182	UGRD	S2	020213	GISC	2624	Introduction to Geographical Information Science	107	QWA	QWAQWA	16	GISC2624: Student must have passed GEOP1514 and GEOH1624 in order to continue with module.
2182	UGRD	S2	020216	GISC	3724	Geographic Information Science	107	QWA	QWAQWA	16	GISC3724: Student must passed GISC2624 in order to continue with module.
2181	UGRD	S1	026236	GISS	2614	Introduction to Remote Sensing	107	QWA	QWAQWA	16	
2182	UGRD	S2	026442	GISS	2624	Introduction to Geographical Information Science	107	QWA	QWAQWA	16	GISS2624 Prerequisite: Students must have passed GEOG1514 and GEOG1624 in order to continue with this module.
2182	UGRD	S2	026443	GISS	3724	Geographic Information Science	107	QWA	QWAQWA	16	GISS3724 Prerequisite: Students must have passed GISS2624 in order to continue with this module.
2181	UGRD	S1	019375	TURM	3714	Tourism and Policy	107	QWA	QWAQWA	16	TRM314 Prerequisite: Students must have passed TRM214.
2182	UGRD	S2	019376	TURM	3724	Tourism and Local Economic Development	107	QWA	QWAQWA	16	TRM324 Prerequisite: Students must have passed TRM224.
2182	PGRD	S2	027250	BIOG	6826	Biogeography	107	MAIN	BFN	24	BIOG6826: Student must have passed GEOP3724 and (GEOP3714 or ZLGY3734) in order to continue with this module.
2181	PGRD	S1	027638	ENVG	6816	Environmental Policy and Practice	107	MAIN	BFN	24	ENVG6816: Student must have passed GEOP3724 in order to continue with module.
2182	PGRD	S2	005554	ENVG	6826	Environmental Policy and Practice	107	MAIN	BFN	24	ENVG6826 Prerequisite: Students must have passed GEOP3724 in order to register for this module.
2182	PGRD	S2	005566	ENVG	6846	Integrated Environmental Management	107	MAIN	BFN	24	ENVG6846 Prerequisite: Students must have passed GEOP3724 in order to register for this module.
2181	PGRD	YR	025715	ENVR	8900	Environmental Management Dissertation	107	MAIN	BFN	180	
2181	PGRD	YR	025471	ENVR	9100	Environmental Science Thesis	107	MAIN	BFN	360	
2181	PGRD	S1	005375	GEOF	6816	Theoretical Foundations of Geography	107	MAIN	BFN	24	
2181	PGRD	S1	005563	GEOH	6816	Urban Geography	107	MAIN	BFN	24	GEOH6816 Prerequisite: Students must have passed GEOH3714 (GEO314) in order to register for this module.
2181	PGRD	S1	025134	GEOH	6836	Rural Geography	107	MAIN	BFN	24	GEOH6836: Student must have passed GEOH3724 in order to continue with course.
2181	PGRD	YR	025167	GEOH	8900	Geography Dissertation	107	MAIN	BFN	180	Selection MSc

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2181	PGRD	YR	025181	GEOH	9100	Geography Thesis	107	MAIN	BFN	360	Selection PhD
2181	PGRD	S1	005555	GEOP	6816	Applied Geomorphology	107	MAIN	BFN	24	GEOP6816 Prerequisite: Students must have passed GEOP3714 in order to register for this module.
2181	PGRD	S1	027639	GEOP	6826	Applied Geomorphology	107	MAIN	BFN	24	Selection BSc Hons
2181	PGRD	YR	005388	GEOR	6808	Geography Research Report	107	MAIN	BFN	32	Selection BSc Hons
2181	PGRD	YR	025331	GEOR	8900	Geography Disseration	107	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025149	GEOR	9100	Geography Thesis	107	MAIN	BFN	360	Selection PhD
2181	PGRD	S1	025387	GISC	6816	Spatial analysis and modelling	107	MAIN	BFN	24	GISC6816 Prerequisite: Students must have passed GISC3724 (GIS324) in order to register this module.
2181	PGRD	YR	027024	GISC	8900	Geographical Informatic Sience Disseration	107	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025413	GISC	9100	Geography Thesis	107	MAIN	BFN	360	Selection PhD
2182	PGRD	S2	019938	GISR	6826	Remote Sensing and Image processing	107	MAIN	BFN	24	GISR6826 Prerequisite: Students must have passed GISC3724 in order to register for this module.
2182	PGRD	S2	005554	ENVG	6826	Environmental Policy and Practice	107	QWA	QWAQWA	24	ENVG6826 Prerequisite: Students must have passed GEOP3724 in order to register for this module.
2182	PGRD	S2	005566	ENVG	6846	Integrated Environmental Management	107	QWA	QWAQWA	24	ENVG6846 Prerequisite: Students must have passed GEOP3724 in order to register for this module.
2181	PGRD	S1	005375	GEOF	6816	Theoretical Foundations of Geography	107	QWA	QWAQWA	24	Selection BSc Hons
2181	PGRD	YR	026434	GEOG	6808	Research Report in Geography	107	QWA	QWAQWA	32	Selection BSc Hons
2181	PGRD	S1	026435	GEOG	6814	Intermediate geographic information systems	107	QWA	QWAQWA	16	Selection BSc Hons
2181	PGRD	S1	026436	GEOG	6816	Theoretical Foundations of Geography	107	QWA	QWAQWA	24	GEOH6816: Student must have passed GEOH3714 in order to continue with module.
2182	PGRD	S2	026437	GEOG	6826	Environmental policy and Practice	107	QWA	QWAQWA	24	Selection BSc Hons
2181	PGRD	S1	026438	GEOG	6836	Applied Geomorphology	107	QWA	QWAQWA	24	Selection BSc Hons
2182	PGRD	S2	026439	GEOG	6846	Integrated Environmental Management	107	QWA	QWAQWA	24	Selection BSc Hons
2181	PGRD	YR	026440	GEOG	8900	Geography : Disseration	107	QWA	QWAQWA	180	Selection MSc
2182	PGRD	S2	026440	GEOG	8900	Geography : Disseration	107	QWA	QWAQWA	180	Selection MSc
2181	PGRD	YR	026482	GEOG	9100	Geography Thesis	107	QWA	QWAQWA	360	Selection PhD
2182	PGRD	S2	026482	GEOG	9100	Geography Thesis	107	QWA	QWAQWA	360	Selection PhD
2181	PGRD	S1	005563	GEOH	6816	Urban Geography	107	QWA	QWAQWA	24	GEOH6816 Prerequisite: Students must have passed GEOH3714 (GEO314) in order to register for this module.
2181	PGRD	YR	025181	GEOH	9100	Geography Thesis	107	QWA	QWAQWA	360	Selection PhD
2181	PGRD	YR	025331	GEOR	8900	Geography Disseration	107	QWA	QWAQWA	180	Selection MSc
2181	PGRD	S1	025387	GISC	6816	Spatial analysis and modelling	107	QWA	QWAQWA	24	GISC6816 Prerequisite: Students must have passed GISC3724 (GIS324) in order to register this module.
2182	PGRD	S2	019938	GISR	6826	Remote Sensing and Image processing	107	QWA	QWAQWA	24	GISR6826 Prerequisite: Students must have passed GISC3724 in order to register for this module.
2181	PGRD	S1	026444	GISS	6816	Spatial analysis and modelling	107	QWA	QWAQWA	24	Selection BSc Hons
2181	UGRD	S1	005846	GLGY	1614	Introduction to Geology	108	MAIN	BFN	16	GLGY1614 Prerequisite: Students must have passed Mathematics on performance level 5 and physical sciences on performance level 5.
2182	UGRD	S2	005848	GLGY	1624	General Geology	108	MAIN	BFN	16	GLGY1624 Prerequisite: Students must have passed GLGY1614 (GLG114) in order to continue with this module.
2181	UGRD	S1	005852	GLGY	2612	Petrographical minerology	108	MAIN	BFN	8	GLGY2612: Student must have passed GLGY1614 and GLGY1624 with at least 55% in order to continue with module.
2181	UGRD	S1	005853	GLGY	2614	Advance mineralogy	108	MAIN	BFN	16	GLGY2614: Student must have passed GLGY1614 and GLGY1624 with at least 55% in order to continue with module.
2182	UGRD	S2	027561	GLGY	2626	Sedimentology principles and applications	108	MAIN	BFN	24	GLGY2626: Student must have passed GLGY1614 and GLGY1624 with at least 55% in both modules in order to register for this module.

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2181	UGRD	S1	005860	GLGY	2632	Geological techniques: uses and applications	108	MAIN	BFN	8	GLGY2632 Prerequisite: Students must have passed GLGY1614 and GLGY1624 with an average of at least 55% in order to continue with this module.
2182	UGRD	S2	025769	GLGY	2641	Geology for Engineering Practical	108	MAIN	BFN	4	
2182	UGRD	S2	025768	GLGY	2643	Geology for Engineering	108	MAIN	BFN	12	GLGY2643: Student must have passed GEOP1514 and GEOH1624 or BSc Majoring in Physics and Engineering Subjects.
2182	UGRD	S2	027437	GLGY	2646	Environmental Geology	108	MAIN	BFN	24	GLGY2646: Student must have passed GLGY1614 and GLGY1624. Students must have passed GLGY1614 (GLG114) and GLGY1624 (GLG124) with a 55% average in order to register for this module.
2181	UGRD	S1	005863	GLGY	2652	Geological structures and maps	108	MAIN	BFN	8	GLGY2652: Student must have passed GLGY1614 and GLGY1624. Students must have passed GLGY1614 (GLG114) and GLGY1624 (GLG124) with a 55% average in order to register for this module.
2182	UGRD	S2	026483	GLGY	2662	Geology of Southern Africa: genesis and age relationships	108	MAIN	BFN	8	GLGY2662: Student must have passed GLGY1614 & GLGY1624 with a 55% average in order to register for this module.
2181	UGRD	S1	005865	GLGY	3714	Igneous Petrology	108	MAIN	BFN	16	GLGY3714: Student must have passed GLGY2614 and GLGY2612 in order to continue with module.
2182	UGRD	S2	005867	GLGY	3724	Economic Geology	108	MAIN	BFN	16	GLGY3724: Student must have passed GLGY2614 and GLGY2612 and GLGY2624 and GLGY2622 in order to continue with module.
2181	UGRD	S1	005869	GLGY	3734	Advanced structural Geology	108	MAIN	BFN	16	GLGY3734: Student must have passed GLGY2652 and GLGY2624 and GLGY2622 and GLGY2662 and GLGY2632 in order to continue with module.
2182	UGRD	S2	005870	GLGY	3744	Metamorphic petrology	108	MAIN	BFN	16	GLGY3744 Prerequisite: Students must have passed GLGY2624 (GLG224) and GLGY3714 (GLG314) in order to register for this module.
2181	UGRD	S1	005872	GLGY	3754	Introduction to Geochemistry	108	MAIN	BFN	16	GLGY3754: Student must have passed GLGY2614 in orderto continue with module.
2182	UGRD	S2	005873	GLGY	3764	Exploration Geology	108	MAIN	BFN	16	GLGY3764 Prerequisite: Students must have passed GLGY2614 (GLG214) in order to register for this module.
2181	UGRD	S1	005874	GLGY	3774	Analytical geochemistry	108	MAIN	BFN	16	GLGY3774: Student must have passed GLGY2614 in order to continue with module.
2182	UGRD	S2	005875	GLGY	3784	Environmental Geochemistry	108	MAIN	BFN	16	GLGY3784: Student must have passed GLGY2614 and GLGY2644 in order to continue with module.
2181	PGRD	S1	025327	GECE	8900	Geochemistry Dissertation	108	MAIN	BFN	180	Selection
2181	PGRD	YR	025327	GECE	8900	Geochemistry Dissertation	108	MAIN	BFN	180	Selection
2181	PGRD	YR	025148	GECE	9100	Geochemistry Thesis	108	MAIN	BFN	360	GECE9100: Student must have passed relevant MSc, selection PHD or DSc, permission from ADH in order to continue with course.
2181	PGRD	S1	005913	GLGA	7913	Overview of Geology, Mining, Metallurgy and Business Processes	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025262	GLGA	7923	Overview of Geology, Mining, Metallurgy and Business Processes	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005914	GLGA	7933	Mineral Resource Management I (Methodology)	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025465	GLGA	7943	Mineral Resource Management I (Methodology)	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005915	GLGA	7953	Applied Geology	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025147	GLGA	7963	Applied Geology	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005916	GLGA	7973	Applied Mining	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025464	GLGA	7983	Applied Mining	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005917	GLGB	7913	Applied Metallurgy	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025724	GLGB	7923	Applied Metallurgy	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005918	GLGC	7913	MRM Implementation Practices	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025495	GLGC	7923	MRM Implementation Practices	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005919	GLGC	7933	MRM Information Practices	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025463	GLGC	7943	Mineral Resource Management Information Practices	108	MAIN	BFN	12	Selection MSc MRM

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2181	PGRD	S1	005920	GLGC	7953	MRM Organizational Change Practices	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025488	GLGC	7963	MRM Organizational Change Practices	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	025814	GLGC	7973	Virtual Mining: Simulation and Optimisation	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025478	GLGC	7983	Virtual Mining: Simulation and Optimisation	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	YR	005931	GLGD	7900	Mineral Resource Management Mini Dissertation	108	MAIN	BFN	60	Selection MSc MRM
2181	PGRD	S1	025263	GLGD	7913	Mineral Resource Management II (Advanced)	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025477	GLGD	7923	Mineral Resource Management II (Advanced)	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005923	GLGD	7933	Geological Modelling and Applied Geo-Statistics	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025489	GLGD	7943	Geological Modelling and Applied Geo-Statistics	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005924	GLGE	7913	Capita Selecta	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025462	GLGE	7923	Capita Selecta (course place holder)	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005925	GLGE	7933	Mining Throughput Accounting and Modelling	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025522	GLGE	7943	Mining Throughput Accounting and Modelling	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005926	GLGE	7953	MRTM Risk Practices	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025460	GLGE	7963	MRM Risk Practices	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	S1	005927	GLGE	7973	Modern Mining Supply Chain Principles	108	MAIN	BFN	12	Selection MSc MRM
2182	PGRD	S2	025756	GLGE	7983	Modern Mining Supply Chain Principles	108	MAIN	BFN	12	Selection MSc MRM
2181	PGRD	YR	025332	GLGE	8900	Environmental Geology Dissertation	108	MAIN	BFN	180	Selection MSc MRM
2181	PGRD	YR	025103	GLGE	9100	Environmental Geology Thesis	108	MAIN	BFN	360	Selection MSc MRM
2181	PGRD	YR	005903	GLGY	6806	Research Essay	108	MAIN	BFN	24	Selection for BScHons
2181	PGRD	YR	027266	GLGY	6808	Research Report Geology	108	MAIN	BFN	32	Selection for BScHons
2181	PGRD	S1	005886	GLGY	6816	Plate Tectonics	108	MAIN	BFN	24	Selection for BScHons
2181	PGRD	S1	027438	GLGY	6818	Geology Research Report	108	MAIN	BFN	32	Selection for BScHons
2182	PGRD	S2	005890	GLGY	6823	Sedimentology	108	MAIN	BFN	12	Selection for BScHons
2182	PGRD	S2	005893	GLGY	6826	Economic Geology	108	MAIN	BFN	24	Selection for BScHons
2182	PGRD	S2	027439	GLGY	6828	Geology Research Report	108	MAIN	BFN	32	Selection for BScHons
2181	PGRD	S1	005894	GLGY	6836	Mineralogy	108	MAIN	BFN	24	Selection for BScHons
2182	PGRD	S2	005895	GLGY	6843	Metamorphic Geology	108	MAIN	BFN	12	Selection for BScHons
2182	PGRD	S2	021328	GLGY	6846	Advanced Geochemistry	108	MAIN	BFN	24	GLGY6846 Prerequisite: Students must have passed GLGY3754 (GLG354), GLGY3774 (GLG374) and GLGY3784 (GLG384) in order to register for this module.
2181	PGRD	S1	005896	GLGY	6853	Igneous Geology	108	MAIN	BFN	12	Selection for BScHons
2182	PGRD	Q3	005896	GLGY	6853	Igneous Geology	108	MAIN	BFN	12	Selection for BScHons
2181	PGRD	S1	005897	GLGY	6856	Structural Geology	108	MAIN	BFN	24	GLGY6856 Prerequisite: Students must have passed GLGY3734 in order to register for this module.
2182	PGRD	S2	005898	GLGY	6863	Mineral Exploration	108	MAIN	BFN	12	Selection for BScHons
2181	PGRD	S1	005899	GLGY	6873	Environmental Geochemistry	108	MAIN	BFN	12	Selection for BScHons
2182	PGRD	S2	005900	GLGY	6883	Capita Selecta Geology	108	MAIN	BFN	12	Selection for BScHons
2181	PGRD	YR	025333	GLGY	8900	Geology Dissertation	108	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025053	GLGY	9100	Geology Thesis	108	MAIN	BFN	360	Selection PhD
2182	PGRD	S2	025053	GLGY	9100	Geology Thesis	108	MAIN	BFN	360	Selection PhD

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2181	PGRD	YR	025873	MRTM	8900	Mineral Resource Throughput Management Dissertation	108	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025296	MRTM	9100	Mineral Resource Throughput Management Thesis	108	MAIN	BFN	360	Selection PhD
2181	PGRD	S1	005915	GLGA	7953	Applied Geology	108	MAIN	PRETORIA	12	Selection MSc MRM
2181	PGRD	S1	005916	GLGA	7973	Applied Mining	108	MAIN	PRETORIA	12	Selection MSc MRM
2181	UGRD	YR	027378	GEHR	6808	Research Report Geohydrology	109	MAIN	BFN	32	
2181	PGRD	YR	026908	GEHI	8900	Geohydrology Interdisciplinary Dissertation	109	MAIN	BFN	180	
2181	PGRD	YR	027022	GEHI	9100	Thesis Geohydrology Interdisciplinary	109	MAIN	BFN	360	
2181	PGRD	YR	025328	GEHR	8900	Geohydrology Dissertation	109	MAIN	BFN	180	
2181	PGRD	YR	026475	GEHR	9100	Geohydrology Thesis	109	MAIN	BFN	360	
2182	PGRD	S2	026475	GEHR	9100	Geohydrology Thesis	109	MAIN	BFN	360	
2181	PGRD	S1	005657	GEOH	6815	Groundwater Hydraulics	109	MAIN	BFN	20	verander volgende jaar
2182	PGRD	S2	025151	GEOH	6825	Groundwater Modelling	109	MAIN	BFN	20	verander volgende jaar
2181	PGRD	S1	005658	GEOH	6835	Hydrochemistry and Pollution	109	MAIN	BFN	20	verander volgende jaar
2182	PGRD	S2	025174	GEOH	6845	Mining Geohydrology and Hydrology	109	MAIN	BFN	20	verander volgende jaar
2181	PGRD	S1	025150	GEOH	6855	Groundwater Geophysics	109	MAIN	BFN	20	verander volgende jaar
2182	PGRD	S2	005664	GEOH	6865	Groundwater Management	109	MAIN	BFN	20	verander volgende jaar
2181	UGRD	S1	014534	MATA	1614	Engineering Statics	111	MAIN	BFN	16	MATA1614 Prerequisite: Students must have passed Grade 12 Mathematics with Level 5 in order to register this module.
2182	UGRD	S2	014536	MATA	1624	Engineering Dynamics	111	MAIN	BFN	16	MATA1624 Prerequisite: Students must have passed MATA1614 + Min MATM1614 or pass in MATM1534 in order to register for this module.
2181	UGRD	S1	014541	MATA	2614	Dynamics of rigid bodies	111	MAIN	BFN	16	MATA2614 Prerequisite: Students must have passed MATA1624 in order to register for this module.
2181	UGRD	S1	022207	MATA	2634	Introduction to Mathematical Modelling	111	MAIN	BFN	16	MATA2634 Prerequisite: Students must have passed MATM1624 or 65% pass in MATM1544 in order to register for this module.
2182	UGRD	S2	016895	MATA	2644	Ordinary Differential Equations	111	MAIN	BFN	16	MATA2644 Prerequisite: Students must have passed MATM1614 or 65% pass in MATM1544 in order to register for this module.
2182	UGRD	S2	016904	MATA	3764	Industrial Mathematics	111	MAIN	BFN	16	MATA3764 Prerequisite: Students must have passed MATA2634 + MATA3774 in order to register for this module.
2181	UGRD	S1	016905	MATA	3774	Numerical Analysis	111	MAIN	BFN	16	MATA3774 Prerequisite: Students must have passed MATM2614 + MATM2654 in order to continue with this module.
2182	UGRD	S2	016906	MATA	3784	Dynamical Systems	111	MAIN	BFN	16	MATA3784 Prerequisite: Students must have passed MATM2614 + MATA2644 in order to register for this module.
2181	UGRD	S1	016887	MATM	1534	Calculus	111	MAIN	BFN	16	MATM1534 Prerequisite: Students must have passed Grade 12 Maths HG E, or SG C or Performance Level 5 or WTW/WTV164 (MATD1564) or WTW184 (MATD1584) in order to register for this module.
2182	UGRD	S2	025834	MATM	1542	Introductory Calculus and Statics	111	MAIN	BFN	8	NSC Mathemtics level 5 or 70% IN MATD1534 OR MATD1564
2182	UGRD	S2	019761	MATM	1544	Calculus and Algebra	111	MAIN	BFN	16	MATM1544 Prerequisite: Students must have passed MATM1534 or obtained at least a minimum of 40% in WTW114 (MATM1614) in order to continue with this module.
2181	UGRD	S1	023271	MATM	1574	Precalculus I	111	MAIN	BFN	16	MATM1574 Prerequisite: Students must have passed Grade 12 Mathematics on performance Level 4 in order to register for this module.
2182	UGRD	S2	023272	MATM	1584	Precalculus II	111	MAIN	BFN	16	MATM1584 Prerequisite: Students must have passed MATM1574 in order to register for this module.
2181	UGRD	S1	016885	MATM	1614	Calculus	111	MAIN	BFN	16	MATM1614 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 6 or at least a mark of 75% in MATM1584 or MATD1534 or MATD1564 or pass in MATM1534 and least 60% in a Departmental admission test.
2182	UGRD	S2	025833	MATM	1624	Algebra and logic	111	MAIN	BFN	16	MATM1624 Prerequisite: Students must have passed MATM1614 in order to continue with this module.

Term	Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
2181	UGRD	S1	025835	MATM	2614	Vector Analysis	111	MAIN	BFN	16	MATM2614 Prerequisite: Students must have passed MATM1624 in order to register for this module.
2182	UGRD	S2	025836	MATM	2624	Linear Algebra	111	MAIN	BFN	16	MATM2624 Prerequisite: Students must have passed MATM1624 in order to continue with this module.
2181	UGRD	S1	025760	MATM	2654	Scientific Computing	111	MAIN	BFN	16	MATM2654 Prerequisite: Students must have passed MATM1624 or 65% pass in MATM1544 in order to register this module.
2182	UGRD	S2	025837	MATM	2664	Sequences and Series	111	MAIN	BFN	16	MATM2664 Prerequisite: Students must have passed MATM1624 in order to register for this module.
2181	UGRD	S1	016899	MATM	3714	Complex Analysis	111	MAIN	BFN	16	MATM3714 Prerequisite: Students must have passed MATM2614 + MATM2664 in order to register for this module.
2182	UGRD	S2	016900	MATM	3724	Real Analysis	111	MAIN	BFN	16	MATM3724 Prerequisite: Students must have passed MATM2614 + MATM2664 in order to register for this module.
2181	UGRD	S1	016901	MATM	3734	Discrete Mathematics	111	MAIN	BFN	16	MATM3734 Prerequisite: Students must have passed MATM2624 + MATM2664 in order to register for this module.
2182	UGRD	S2	016902	MATM	3744	Algebra	111	MAIN	BFN	16	MATM3744 Prerequisite: Students must have passed MATM2624 in order to register for this module.
2181	UGRD	S1	025080	MATR	1534	Calculus	111	MAIN	BFN	16	MATR1534 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 5 (60%) or WTV/WTW164 (MATD1564) or WTW184 (MATM1584) in order to register for this module.
2181	UGRD	YR	026477	MATM	1502	Introductory Calculus and Statics	111	MAIN	BUILDSC	8	NSC Mathematics level 5 or 70% IN MATD1534 OR MATD1564
2182	UGRD	S2	016895	MATA	2644	Ordinary Differential Equations	111	QWA	QWAQWA	16	MATA2644 Prerequisite: Students must have passed MATM1614 or 65% pass in MATM1544 in order to register for this module.
2181	UGRD	S1	016887	MATM	1534	Calculus	111	QWA	QWAQWA	16	MATM1534 Prerequisite: Students must have passed Grade 12 Maths HG E, or SG C or Performance Level 5 or WTW/WTV164 (MATD1564) or WTW184 (MATD1584) in order to register for this module.
2182	UGRD	S2	019761	MATM	1544	Calculus and Algebra	111	QWA	QWAQWA	16	MATM1544 Prerequisite: Students must have passed MATM1534 or obtained at least a minimum of 40% in WTW114 (MATM1614) in order to continue with this module.
2181	UGRD	S1	016885	MATM	1614	Calculus	111	QWA	QWAQWA	16	MATM1614 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 6 or at least a mark of 75% in MATM1584 or MATD1534 or MATD1564 or pass in MATM1534 and least 60% in a Departmental admission test.
2182	UGRD	S2	025833	MATM	1624	Algebra and logic	111	QWA	QWAQWA	16	MATM1624 Prerequisite: Students must have passed MATM1614 in order to continue with this module.
2181	UGRD	S1	025835	MATM	2614	Vector Analysis	111	QWA	QWAQWA	16	MATM2614 Prerequisite: Students must have passed MATM1614 in order to register for this module.
2182	UGRD	S2	025836	MATM	2624	Linear Algebra	111	QWA	QWAQWA	16	MATM2624 Prerequisite: Students must have passed MATM1624 in order to continue with this module.
2182	UGRD	S2	025837	MATM	2664	Sequences and Series	111	QWA	QWAQWA	16	MATM2664 Prerequisite: Students must have passed MATM1624 in order to register for this module.
2181	UGRD	S1	016899	MATM	3714	Complex Analysis	111	QWA	QWAQWA	16	MATM3714 Prerequisite: Students must have passed MATM2614 + MATM2664 in order to register for this module.
2182	UGRD	S2	016900	MATM	3724	Real Analysis	111	QWA	QWAQWA	16	MATM3724 Prerequisite: Students must have passed MATM2614 + MATM2664 in order to register for this module.
2181	UGRD	S1	016901	MATM	3734	Discrete Mathematics	111	QWA	QWAQWA	16	MATM3734 Prerequisite: Students must have passed MATM2624 + MATM2664 in order to register for this module.
2182	UGRD	S2	016902	MATM	3744	Algebra	111	QWA	QWAQWA	16	MATM3744 Prerequisite: Students must have passed MATM2624 in order to register for this module.
2181	PGRD	S1	021332	MATA	6814	Algebra	111	MAIN	BFN	16	Selection for BScHons majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025343	MATA	6824	Algebra	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	021931	MATA	7914	Algebra	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025346	MATA	7924	Algebra	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	YR	025339	MATA	8900	Mathematics Dissertation	111	MAIN	BFN	180	Selection for MSc majoring in Mathematics and Applied Mathematics

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2181	PGRD	YR	025201	MATA	9100	Applied Mathematics Thesis	111	MAIN	BFN	360	Selection for PhD majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025629	MATB	6814	Galois Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	021125	MATB	6824	Galois Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	021932	MATB	7914	Galois Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025363	MATB	7924	Galois Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025366	MATC	6814	Introduction to Topology	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	021357	MATC	6824	Introduction to Topology	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	021933	MATC	7914	Introduction to Topology	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025370	MATC	7924	Introduction to Topology	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	016907	MATD	6814	Modern Topology	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025380	MATD	6824	Modern Topology	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	016937	MATD	7914	Modern Topology	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025381	MATD	7924	Modern Topology	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025259	MATE	6814	Analysis	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025260	MATE	6824	Analysis	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	021934	MATE	7914	Analysis	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025347	MATE	7924	Analysis	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	016908	MATF	6814	Measure and Integration Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025376	MATF	6824	Measure and Integration Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	016938	MATF	7914	Measure and Integration Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025377	MATF	7924	Measure and Integration Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	021365	MATG	6814	CodingTheory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025351	MATG	6824	CodingTheory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	021937	MATG	7914	Coding Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025350	MATG	7924	Coding Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025261	MATH	6814	Discrete Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	026021	MATH	6824	Discrete Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	016939	MATH	7914	Discrete Mathematics	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025356	MATH	7924	Discrete Mathematics	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	021366	MATI	6814	Set Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025345	MATI	6824	Set Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	021768	MATI	7914	Set Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025385	MATI	7924	Set Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025368	MATJ	6814	Group Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	022392	MATJ	6824	Group Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	021938	MATJ	7914	Group Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025364	MATJ	7924	Group Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	021402	MATK	6814	Ring Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025383	MATK	6824	Ring Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	021939	MATK	7914	Ring Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025384	MATK	7924	Ring Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	021403	MATL	6814	Category Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025362	MATL	6824	Category Theory	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	021940	MATL	7914	Category Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics

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2182	PGRD	S2	025428	MATL	7924	Category Theory	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	021404	MATM	6814	Methods of Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025523	MATM	6818	Research Report	111	MAIN	BFN	32	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025838	MATM	6819	Research Report Mathematics	111	MAIN	BFN	36	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025378	MATM	6824	Methods of Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025264	MATM	6828	Mini Dissertation	111	MAIN	BFN	32	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025839	MATM	6829	Research Report Mathematics	111	MAIN	BFN	36	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025503	MATM	7910	Mini Dissertation	111	MAIN	BFN	60	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	021941	MATM	7914	Methods of Mathematics	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	021378	MATM	7920	Mini Dissertation	111	MAIN	BFN	48	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025379	MATM	7924	Methods of Mathematics	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	026911	MATM	7930	Mini Dissertation Mathematics	111	MAIN	BFN	84	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	026912	MATM	7940	Mini Dissertation Mathematics	111	MAIN	BFN	84	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	YR	025355	MATM	8900	Mathematics Dissertation	111	MAIN	BFN	180	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	YR	025068	MATM	9100	Mathematics Thesis	111	MAIN	BFN	360	Selection for PhD majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	016910	MATN	6814	Digital Image Processing	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025353	MATN	6824	Digital Image Processing	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	016940	MATN	7914	Digital Image Processing	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025354	MATN	7924	Digital Image Processing	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025388	MATO	6814	Numerical Linear Algebra	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	021405	MATO	6824	Numerical Linear Algebra	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	021956	MATO	7914	Numerical Linear Algebra	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025392	MATO	7924	Numerical Linear Algebra	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	016911	MATP	6814	Numerical Solution of Differential Equations	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025382	MATP	6824	Numerical Solution of Differential Equations	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	016941	MATP	7914	Numerical Solution of Differential Equations	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025265	MATP	7924	Numerical solution of differential equations	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025266	MATQ	6814	Optimisation	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025267	MATQ	6824	Optimisation	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025268	MATQ	7914	Optimisation	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025269	MATQ	7924	Optimisation	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025270	MATR	6814	Cryptography	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025271	MATR	6824	Cryptography	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025272	MATR	7914	Cryptography	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025273	MATR	7924	Cryptography	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025274	MATS	6814	Partial differential equations	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025275	MATS	6824	Partial differential equations	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025276	MATS	7914	Partial differential equations	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025277	MATS	7924	Partial differential equations	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025278	MATT	6814	Fluid mechanics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025279	MATT	6824	Fluid mechanics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025280	MATT	7914	Fluid mechanics	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	021959	MATT	7924	Fluid Mechanics	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025281	MATU	6814	Biological Modelling	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics

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2182	PGRD	S2	025282	MATU	6824	Biological Modelling	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025285	MATU	7914	Biological Modelling	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025283	MATU	7924	Biological Modelling	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	021407	MATV	6814	Fractional Calculus	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025284	MATV	6824	Fractional Calculus	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025286	MATV	7914	Fractional Calculus	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025340	MATV	7924	Fractional Calculus	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	021255	MATW	6814	Financial Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025287	MATW	6824	Financial Mathematics	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025288	MATW	7914	Financial Mathematics	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025289	MATW	7924	Financial Mathematics	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	016913	MATX	6814	Graph Theory	111	MAIN	BFN	16	MATX6814 Prerequisite: Students must have passed MATM3734 and obtained at least 40% in MATM3744 in order to register for this module.
2182	PGRD	S2	025393	MATX	6824	Graph Theory	111	MAIN	BFN	16	MATX6824 Prerequisite: Students must have passed MATM3734 and obtained at least 40% in MATM3744 in order to register for this module.
2181	PGRD	S1	016943	MATX	7914	Graph Theory	111	MAIN	BFN	16	MATX7914 Prerequisite: Students must have passed MATM3734 and obtained at least 40% in MATM3744 in order to register for this module.
2182	PGRD	S2	025840	MATX	7924	Graph Theory	111	MAIN	BFN	16	MATX7924 Prerequisite: Students must have passed MATM3734 and obtained at least 40% in MATM3744 in order to register for this module.
2181	PGRD	S1	022393	MATY	6814	Asymptotic methods	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025841	MATY	6824	Asymptotic methods	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	026022	MATY	7914	Asymptotic Methods	111	MAIN	BFN	16	MATY7914 Prerequisite: Students must have passed MATY6814 or MATY6824 in order to register for this module.
2182	PGRD	S2	026023	MATY	7924	Asymptotic Methods	111	MAIN	BFN	16	MATX7924 Prerequisite: Students must have passed MATY6814 or MATY6824 in order to continue with this module.
2181	PGRD	S1	025842	MATZ	6814	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025843	MATZ	6824	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025844	MATZ	6834	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025290	MATZ	6844	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	016920	MATZ	6854	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2182	PGRD	S2	025411	MATZ	6864	Capita Selecta	111	MAIN	BFN	16	Selection for BScHons in Mathematics and Applied Mathematics
2181	PGRD	S1	025291	MATZ	7914	Capita Selecta	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025292	MATZ	7924	Capita Selecta	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	021962	MATZ	7934	Capita Selecta	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	PGRD	S2	025293	MATZ	7944	Capita Selecta	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	025294	MATZ	7954	Capita Selecta	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2181	PGRD	S1	016950	MATZ	7964	Capita Selecta	111	MAIN	BFN	16	Selection for MSc majoring in Mathematics and Applied Mathematics
2182	UGRD	S2	025172	AGRI	1664	Microbiological principles in Agriculture	112	MAIN	BFN	16	None
2182	UGRD	S2	023974	BLGY	1683	Introductory Biochemistry and Microbiology	112	MAIN	BFN	12	BLGY1683 Prerequisite: Students must have passed BLGY1513 in order to register for this module.
2181	UGRD	S1	001789	BOCB	2616	Biochemistry of biological compounds	112	MAIN	BFN	24	BOCB2616 Prerequiste: Students must have passed BLGY1683 AND CHEM1623 OR CHEM1643 OR [CHEM 1622 AND CHEM1642] AND CHEM1661
2182	UGRD	S2	001794	BOCE	2626	Enzymology and introductory metabolism	112	MAIN	BFN	24	BOCE2626 Prerequisite: Students must have passed BOCB2616 in order to continue with this module.
2181	UGRD	S1	025994	BOCE	3714	Advanced enzyme kinetics and metabolism	112	MAIN	BFN	16	BOCE3714 Prerequisite: Students must have passed BOCE2626 in order to continue with this module.

Term	Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
2181	UGRD	S1	020204	BOCH	2614	Biochemistry for agriculture and health sciences	112	MAIN	BFN	16	None
2181	UGRD	S1	020058	BOCM	3714	Molecular Biology	112	MAIN	BFN	16	BOCM3714 Prerequisite: Students must have passed BOCE2626 in order to continue with this module.
2182	UGRD	S2	025190	BOCP	3724	Protein Biochemistry	112	MAIN	BFN	16	BOCP3724 Prerequisite: Students must have passed BOCE2626 in order to continue with this module.
2182	UGRD	S2	025081	BOCS	3724	Cell membranes, signal transduction and immunology	112	MAIN	BFN	16	BOCS3724 Prerequisite: Students must have passed BOCE2626 in order to continue with this module.
2181	UGRD	S1	016483	FSCA	3714	Food products from animals	112	MAIN	BFN	16	FSCA3714 Prerequisite: Students must have passed FSCS2624 in order to register for this module.
2182	UGRD	S2	016492	FSCB	3724	Food Microbiology	112	MAIN	BFN	16	FSCB3724 Prerequisite: Students must have passed BLGY1683 + FSCI2613 in order to continue with this module.
2181	UGRD	S1	026906	FSCC	2613	Food Chemistry	112	MAIN	BFN	12	FSCC2613 Prerequisite: CHEM1623 or CHEM1643 or [CHEM 1622 ans CHEM1642] and CHEM1661
2182	UGRD	S2	016471	FSCC	2622	Chemical analysis of food	112	MAIN	BFN	8	FSCC2622 Prerequisite: Students must have passed FSCC2613 order to register for this module.
2181	UGRD	S1	025092	FSCD	4814	Dairy Science	112	MAIN	BFN	16	FSCD4814 Prerequisite: Students must have passed FSCA3714 in order to register for this module.
2182	UGRD	S2	026562	FSCG	4826	Product Development and Sensory Analysis	112	MAIN	BFN	24	FSCG4826 Prerequisite: Students must have passed FSCA3714, FSCP3724 and FSCB3724 in order to continue with this module.
2181	UGRD	S1	026907	FSCI	2613	Introductory Food Science	112	MAIN	BFN	12	None
2181	UGRD	S1	026511	FSCL	4806	Food Science Literature Study	112	MAIN	BFN	24	FSCL4806 Prerequisite: Students must have passed FSCA3714, FSCE3714, FSCP3724 and FSCB3724 in order to continue with this module.
2181	UGRD	S1	016506	FSCM	4814	Meat Science	112	MAIN	BFN	16	FSCM4814 Prerequisite: Students must have passed FSCA3714 in order to register for this module.
2182	UGRD	S2	016486	FSCP	3724	Food products from plants	112	MAIN	BFN	16	FSCP3724 Prerequisite: Students must have passed FSCS2624 in order to register for this module.
2181	UGRD	S1	025145	FSCP	4814	Food products from plants	112	MAIN	BFN	16	FSCP4814 Prerequisite: Students must have passed FSCA3714 in order to register this module.
2181	UGRD	YR	026512	FSCR	4808	Food Science Research Project	112	MAIN	BFN	32	FSCA3714 AND FSCE3714 AND FSCP3724 AND FSCB3724
2182	UGRD	S2	016472	FSCS	2624	Food Systems	112	MAIN	BFN	16	FSCS2624 Prerequisites: Students must have passed FSCI2613 and FSCC2613 in order to continue with this module.
2182	UGRD	S2	009550	MCBC	3724	Commercial microbial products and biotechnology	112	MAIN	BFN	16	MCBC3724: Student must have passed MCBP2626 in order to continue with this module.
2182	UGRD	S2	027265	MCBE	3724	Microbial ecology and environmental microbiology	112	MAIN	BFN	16	MCBE3724: Student must have passed MCBP2626 in order to continue with this module.
2181	UGRD	S1	020060	MCBG	3714	Growth, nutrition and death of microoganisms	112	MAIN	BFN	16	MCBG3714: Student must have passed MCBP2626 in order to continue with module.
2181	UGRD	S1	019676	MCBH	2614	Introduction to Microbiology for health and consumer sciences	112	MAIN	BFN	16	None
2182	UGRD	S2	019677	MCBH	2624	Introduction to Microbial Pathogenicity for health and consumer sciences	112	MAIN	BFN	16	MCBH2624 Prerequisite: Students must have passed MCBH2614 in order to register for this module.
2181	UGRD	S1	009514	MCBP	2616	The basic principles of Microbiology	112	MAIN	BFN	24	MCBP2616: Students must have passed BLGY1683 in order to continue with module.
2182	UGRD	S2	009520	MCBP	2626	Microbial evolution and diversity	112	MAIN	BFN	24	MCBP2626 Prerequisite: Students must have passed MCBP2616 in order to continue with this module.
2181	UGRD	S1	009547	MCBP	3714	Pathogens and immunity	112	MAIN	BFN	16	MCBP3714: Student must have passed MCBP2626 in order to continue with module.
2181	PGRD	S1	027210	BOCB	6834	Bioinformatics and omics sciences	112	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025077	BOCD	9100	Biochemistry Thesis	112	MAIN	BFN	360	Selection PhD
2182	PGRD	S2	027211	BOCE	6844	Enzymology and catalysis	112	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	020686	BOCL	6826	Research: Literature study	112	MAIN	BFN	24	Selection BScHons

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2181	PGRD	S1	001842	BOCM	6814	Advanced Molecular Biology	112	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	001848	BOCM	8900	Biochemistry	112	MAIN	BFN	180	Selection MSc
2182	PGRD	S2	025069	BOCO	6822	Biochemistry oral examination of theory and Practical	112	MAIN	BFN	8	Selection BScHons
2182	PGRD	S2	025235	BOCR	6828	Research Essay	112	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	025113	BOCT	6814	Techniques in Biochemistry	112	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025720	FSCD	6814	Dairy Science	112	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	026561	FSCG	6826	Product Development and Sensory Analysis	112	MAIN	BFN	24	Selection BScHons
2181	PGRD	YR	025326	FSCI	8900	Food Science Dissertation	112	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025142	FSCI	9100	Food Science Thesis	112	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	026569	FSCL	6806	Food Science Literature Study	112	MAIN	BFN	24	Selection BScHons
2181	PGRD	S1	026455	FSCM	6814	Meat Science	112	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	026474	FSCP	6814	Food products from plants	112	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	026525	FSCR	6808	Research Project Food Science	112	MAIN	BFN	32	Selection BScHons
2181	PGRD	YR	025630	MBBT	8900	Microbial Biotechnology Dissertation	112	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025171	MBBT	9100	Microbial Biotechnology Thesis	112	MAIN	BFN	360	Selection PhD
2181	PGRD	S1	002154	MCBC	6814	Continuous and Batch Cultivation of Microorganisms	112	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025847	MCBD	6834	Microbial Diversity	112	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	020685	MCBL	6826	Research : Literature Study	112	MAIN	BFN	24	Selection BScHons
2181	PGRD	S1	009567	MCBM	6814	Microbial Molecular Biology	112	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	009562	MCBO	6822	Oral examination in Microbiology	112	MAIN	BFN	8	Selection BScHons
2181	PGRD	S1	009566	MCBP	6814	Applied Microbial Physiology	112	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025848	MCBP	6844	Applied Microbial Physiology	112	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	009569	MCBR	6828	Research Report	112	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	009561	MCBT	6814	Techniques in Microbiology	112	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025341	MCBT	8900	Microbiology Dissertation	112	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025173	MCBT	9100	Microbiology Thesis	112	MAIN	BFN	360	Selection PhD
2181	UGRD	S1	004921	PHYA	1554	Introductory astronomy	113	MAIN	BFN	16	None
2182	UGRD	S2	004922	PHYA	1664	Principles and Practice of Observational Astronomy	113	MAIN	BFN	16	PHYA1664: Student must have passed PHYA1554 in order to continue with module.
2181	UGRD	S1	027564	PHYA	2614	Astrophysics	113	MAIN	BFN	16	PHYA2614: Student must have passed PHYA1554 or PHYA1664 and MATM1614 or MATM1624 or MATM1534 or MATM1544 in order to continue with module.
2181	UGRD	YR	025074	PHYA	3708	Astronomy Practicle	113	MAIN	BFN	32	PHYA3708 Prerequisite: Students must have passed PHYA2613 and PHYA2623 in order to register for this module.
2181	UGRD	YR	027565	PHYA	3709	Astronomy Practicle	113	MAIN	BFN	36	PHYA3709 :Student must have passed PHYA2613 and PHYA2623 in orderto continue with module.
2181	UGRD	S1	025198	PHYA	3772	Radiative Processes I	113	MAIN	BFN	8	PHYA3772: Student must have passed PHYS2614 and PHYS1642 in order to continue with module.
2182	UGRD	S2	022235	PHYA	3782	Radiative Processes II	113	MAIN	BFN	8	PHYA3782: Student must have passed PHYS3714 and PHYS3732 and PHYS3772 in order to continue with course.
2182	UGRD	S2	027566	PHYC	2623	Introduction to Numerical Analysis and Quantitative Methods	113	MAIN	BFN	12	PHYS1624: Student must have passed PHYS1514 or PHYS1534 and MATM1614 or MATM1534 in order to continue with module.
2181	UGRD	S1	027603	PHYM	2613	Analytical mechanics for physicists and engineers	113	MAIN	BFN	12	PHYM2613: Student must have passed PHYS1614 or 1624 and MATM1614 or MATM1624 or MATM1534 or MATM1544 in order to continue with module.
2181	UGRD	S1	004913	PHYS	1512	Physics for Building Science students	113	MAIN	BFN	8	None
2181	UGRD	S1	004914	PHYS	1514	Mechanics, Optics and Electricity	113	MAIN	BFN	16	None

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2181	UGRD	S1	004919	PHYS	1534	Mechanics, Optics, Electricity and Biological and Medical Relevant Topics	113	MAIN	BFN	16	None
2182	UGRD	S2	023869	PHYS	1543	Physics for physiotherapists	113	MAIN	BFN	12	none
2182	UGRD	S2	004917	PHYS	1624	Mechanics, Thermodynamics, Electricity and Magnetism	113	MAIN	BFN	16	PHYS1624: Student must have passed PHYS1514 or PHYS1534 and MATM1614 or MATM1534 in order to continue with module.
2182	UGRD	S2	004920	PHYS	1644	Electricity, Magnetism, Biologically and Medically Relevant Topics	113	MAIN	BFN	16	None
2181	UGRD	S1	004924	PHYS	2614	Mechanics, Waves and Optics	113	MAIN	BFN	16	PHYS2614: Student must have passed PHYS1514 or PHYS1534 and PHYS1624 or PHYS1644 and MATM1614 or MATM1534 and MATM1624 or MATM1544 in orderto continue with module.
2182	UGRD	S2	004927	PHYS	2624	Electronics	113	MAIN	BFN	16	PHYS2624: Student must have passed PHYS1514 or 60% PHYS1534 and (PHYS1624 or 60% PHYS1644) and (MATM1614 or MATM1534) and (MATM1624 or MATM1544).
2181	UGRD	S1	004930	PHYS	2632	Practical Work: Physics	113	MAIN	BFN	8	PHYS2632 Co-requisite: PHYS2614 and PHYS2632 must be registered simultaneously.
2182	UGRD	S2	004933	PHYS	2642	Electromagnetism	113	MAIN	BFN	8	PHYS2632 Co-requisite: PHYS2614 and PHYS2632 must be registered simultaneously.
2181	UGRD	S1	004935	PHYS	2654	Ophthalmic Optics/Visual Optics	113	MAIN	BFN	16	PHYS2654 : Students must have passed PHYS1514 or PHYS1534 and PHYS1624 or PHYS1644 in order to register for this module.
2182	UGRD	S2	022361	PHYS	2664	Special Ophthalmic Optics	113	MAIN	BFN	16	PHYS2664: Student must have passed PHYS1514 or PHYS1534 and PHYS2654 or PHYS1624 or 1644 in order to continue with module.
2181	UGRD	S1	004938	PHYS	3714	Modern Physics	113	MAIN	BFN	16	PHYS3714:Student must have passed PHYS2614 in order to continuewith module.
2182	UGRD	S2	004940	PHYS	3724	Solid state physics	113	MAIN	BFN	16	PHYS3732: Student must have passed PHYS2614 in order to continue with module.
2181	UGRD	S1	004942	PHYS	3732	Statistical Physics I	113	MAIN	BFN	8	PHYS3732 Prerequisite: Students must have passed PHYS2614 in order to continue with this module.
2182	UGRD	S2	004944	PHYS	3742	Statistical Physics II	113	MAIN	BFN	8	PHYS3742: Student must have passed PHYS3732 in order to continue with module.
2181	UGRD	S1	004947	PHYS	3752	Practical Work: Physics	113	MAIN	BFN	8	PHYS3752 Prerequisite: Students must have passed PHYS2632 and co-requisite: register simultaneously with PHYS3714 and PHYS3732 in order to register for this module.
2182	UGRD	S2	004948	PHYS	3762	Practical Work: Physics	113	MAIN	BFN	8	PHYS3762 Prerequisite: Students must have passed PHYS2632 and register simultaneously for PHYS3724 and PHYS3742 in order to register for this module.
2182	UGRD	S2	025197	PSYA	3782	Radiative Processes II	113	MAIN	BFN	8	None
2181	UGRD	YR	026489	PHYS	1502	Physics for Building Science students	113	MAIN	BUILDSC	8	None
2181	UGRD	S1	004913	PHYS	1512	Physics for Building Science students	113	MAIN	BUILDSC	8	None
2181	UGRD	S1	004914	PHYS	1514	Mechanics, Optics and Electricity	113	QWA	QWAQWA	16	None
2181	UGRD	S1	004919	PHYS	1534	Mechanics, Optics, Electricity and Biological and Medical Relevant Topics	113	QWA	QWAQWA	16	None
2182	UGRD	S2	004917	PHYS	1624	Mechanics, Thermodynamics, Electricity and Magnetism	113	QWA	QWAQWA	16	PHYS1624: Student must have passed PHYS1514 or PHYS1534 and MATM1614 or MATM1534 in order to continue with module.
2182	UGRD	S2	004920	PHYS	1644	Electricity, Magnetism, Biologically and Medically Relevant Topics	113	QWA	QWAQWA	16	None
2181	UGRD	S1	004924	PHYS	2614	Mechanics, Waves and Optics	113	QWA	QWAQWA	16	PHYS2614: Student must have passed PHYS1514 or PHYS1534 and PHYS1624 or PHYS1644 and MATM1614 or MATM1534 and MATM1624 or MATM1544 in orderto continue with module.
2182	UGRD	S2	004927	PHYS	2624	Electronics	113	QWA	QWAQWA	16	PHYS2624: Student must have passed PHYS1514 or 60% PHYS1534 and (PHYS1624 or 60% PHYS1644) and (MATM1614 or MATM1534) and (MATM1624 or MATM1544).
2181	UGRD	S1	004930	PHYS	2632	Practical Work: Physics	113	QWA	QWAQWA	8	PHYS2632 Co-requisite: PHYS2614 and PHYS2632 must be registered simultaneously.
2182	UGRD	S2	004933	PHYS	2642	Electromagnetism	113	QWA	QWAQWA	8	PHYS2642: Student must have passed PHYS2614 in order to continue with module.

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2181	UGRD	S1	004935	PHYS	2654	Ophthalmic Optics/Visual Optics	113	QWA	QWAQWA	16	PHYS2654 : Students must have passed PHYS1514 or PHYS1534 and PHYS1624 or PHYS1644 in order to register for this module.
2182	UGRD	S2	022361	PHYS	2664	Special Ophthalmic Optics	113	QWA	QWAQWA	16	PHYS2664: Student must have passed PHYS1514 or PHYS1534 and PHYS2654 or PHYS1624 or 1644 in order to continue with module.
2181	UGRD	S1	004938	PHYS	3714	Modern Physics	113	QWA	QWAQWA	16	PHYS3714:Student must have passed PHYS2614 in order to continuewith module.
2182	UGRD	S2	004940	PHYS	3724	Solid state physics	113	QWA	QWAQWA	16	PHYS3732: Student must have passed PHYS2614 in order to continue with module.
2181	UGRD	S1	004942	PHYS	3732	Statistical Physics I	113	QWA	QWAQWA	8	PHYS3732 Prerequisite: Students must have passed PHYS2614 in order to continue with this module.
2182	UGRD	S2	004944	PHYS	3742	Statistical Physics II	113	QWA	QWAQWA	8	PHYS3742: Student must have passed PHYS3732 in order to continue with module.
2181	UGRD	S1	004947	PHYS	3752	Practical Work: Physics	113	QWA	QWAQWA	8	PHYS3752 Prerequisite: Students must have passed PHYS2632 and co-requisite: register simultaneously with PHYS3714 and PHYS3732 in order to register for this module.
2182	UGRD	S2	004948	PHYS	3762	Practical Work: Physics	113	QWA	QWAQWA	8	PHYS3762 Prerequisite: Students must have passed PHYS2632 and register simultaneously for PHYS3724 and PHYS3742 in order to register for this module.
2181	PGRD	YR	023891	NSAP	7900	Advanced nanophysics	113	MAIN	BFN	48	Selection MSc Nano Science
2181	PGRD	YR	023888	NSCC	7911	Central Concepts in Nanoscience	113	MAIN	BFN	4	Selection MSc Nano Science
2181	PGRD	YR	023887	NSFB	7911	Foundations of Nano-biomedical Sciences for Non-biologists	113	MAIN	BFN	4	Selection MSc Nano Science
2181	PGRD	YR	023885	NSFC	7911	Foundations of Nanochemistry for Non-chemists	113	MAIN	BFN	4	Selection MSc Nano Science
2181	PGRD	S1	027185	NSFP	7911	Foundations of nanophysics for non-physicists	113	MAIN	BFN	4	Selection MSc Nano Science
2181	PGRD	YR	023886	NSMN	7911	Management for nanoscientists	113	MAIN	BFN	4	Selection MSc Nano Science
2181	PGRD	YR	023889	NSRP	7900	Nanoscience Research Project	113	MAIN	BFN	100	Selection MSc Nano Science
2181	PGRD	YR	023890	NSTP	7914	Experimental Techniques in Nanophysics	113	MAIN	BFN	16	Selection MSc Nano Science
2181	PGRD	YR	025779	PHYA	6808	Atrophysics Research Essay	113	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	004964	PHYA	6814	Astrophysics	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025636	PHYA	6824	Astrophysics	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004966	PHYA	6834	General Relativity and Cosmology	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025761	PHYA	6844	General Relativity and Cosmology	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004965	PHYA	6854	Astrophysical Fluid Dynamics	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025774	PHYA	6864	Astrophysical Fluid Dynamics	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025766	PHYA	6874	High Energy Astrophysics	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025758	PHYA	6884	High Energy Astrophysics	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	004979	PHYA	7900	Astrophysics Mini-dissertation	113	MAIN	BFN	100	Selection BScHons
2181	PGRD	S1	020736	PHYA	7970	Astrophysics and Space Science	113	MAIN	BFN	80	Selection BScHons
2181	PGRD	YR	025313	PHYA	8900	Astrophysics Dissertation	113	MAIN	BFN	180	Selection BScHons
2181	PGRD	YR	025633	PHYA	9100	Physics Thesis	113	MAIN	BFN	360	Selection BScHons
2181	PGRD	S1	025765	PHYC	6814	Capita Selecta I	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025937	PHYC	6834	Capita Selecta II	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025922	PHYC	6844	Capita Selecta IV	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025936	PHYE	6814	Electrodynamics	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	004960	PHYE	6824	Electrodynamics	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025394	PHYE	6834	Electronics	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	004963	PHYE	6844	Electronics	113	MAIN	BFN	16	Selection BScHons

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2181	PGRD	S1	004959	PHYI	6814	Statistical Physics	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025662	PHYI	6824	Statistical Physics	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004961	PHYI	6834	Material Science I	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025889	PHYI	6844	Material Science I	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004962	PHYI	6854	Material Science II	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025890	PHYI	6864	Material Science II	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004958	PHYI	6874	Semi-Conductors	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025663	PHYI	6884	Semi-Conductors	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004955	PHYR	6814	Research Techniques	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025664	PHYR	6824	Research Techniques	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025893	PHYS	6808	Practicals	113	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	004953	PHYS	6814	Quantum Mechanics	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025389	PHYS	6824	Quantum Mechanics	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004954	PHYS	6834	Solid State Physics I	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025660	PHYS	6844	Solid State Physics I	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004956	PHYS	6854	Computational methods of Physics	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025659	PHYS	6864	Computational methods of Physics	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004957	PHYS	6874	Solid State Physics II	113	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025658	PHYS	6884	Solid State Physics II	113	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025637	PHYS	8900	Physics Dissertation	113	MAIN	BFN	180	Selection BScHons
2182	PGRD	S2	025637	PHYS	8900	Physics Dissertation	113	MAIN	BFN	180	Selection BScHons
2181	PGRD	YR	025184	PHYS	9100	Physics Thesis	113	MAIN	BFN	360	Selection BScHons
2181	PGRD	S1	025765	PHYC	6814	Capita Selecta I	113	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	025922	PHYC	6844	Capita Selecta IV	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	S1	025936	PHYE	6814	Electrodynamics	113	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	004960	PHYE	6824	Electrodynamics	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	S1	025394	PHYE	6834	Electronics	113	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	004963	PHYE	6844	Electronics	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	S1	004959	PHYI	6814	Statistical Physics	113	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	025662	PHYI	6824	Statistical Physics	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	S1	004961	PHYI	6834	Material Science I	113	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	025889	PHYI	6844	Material Science I	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	S1	004958	PHYI	6874	Semi-Conductors	113	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	025663	PHYI	6884	Semi-Conductors	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	S1	004955	PHYR	6814	Research Techniques	113	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	025664	PHYR	6824	Research Techniques	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	YR	025893	PHYS	6808	Practicals	113	QWA	QWAQWA	32	Selection BScHons
2181	PGRD	S1	004953	PHYS	6814	Quantum Mechanics	113	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	025389	PHYS	6824	Quantum Mechanics	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	S1	004954	PHYS	6834	Solid State Physics I	113	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	025660	PHYS	6844	Solid State Physics I	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	S1	004956	PHYS	6854	Computational methods of Physics	113	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	025659	PHYS	6864	Computational methods of Physics	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	S1	004957	PHYS	6874	Solid State Physics II	113	QWA	QWAQWA	16	Selection BScHons

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2182	PGRD	S2	025658	PHYS	6884	Solid State Physics II	113	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	YR	025637	PHYS	8900	Physics Dissertation	113	QWA	QWAQWA	180	Selection MSc
2182	PGRD	S2	025637	PHYS	8900	Physics Dissertation	113	QWA	QWAQWA	180	Selection MSc
2181	PGRD	YR	025184	PHYS	9100	Physics Thesis	113	QWA	QWAQWA	360	Selection MSc
2182	PGRD	S2	025184	PHYS	9100	Physics Thesis	113	QWA	QWAQWA	360	Selection MSc
2182	UGRD	S2	023973	BLGY	1643	The interdependence of plants and life on earth	114	MAIN	BFN	12	BLGY1643 Prerequisite: Students must have passed BLGY1513 in order to continue with this module.
2181	UGRD	S1	025052	BTNY	2616	Plant adaptations for survival on land	114	MAIN	BFN	24	BTNY2616 Prerequisite: Students must have passed BLGY1513 and BLGY1643 in order to continue with this module.
2182	UGRD	S2	026182	BTNY	2622	Field excursion 1	114	MAIN	BFN	8	BTNY2622 Prerequisite: Student must have passed Min. BTNY2616 (45%) in order to continue with this module. Only compulsory for BSc and BSc Agric students.
2182	UGRD	S2	025163	BTNY	2626	Introductory plant development and biotechnology	114	MAIN	BFN	24	BTNY2626 Prerequisite: Student must have passed Min. BTNY2616 (45%) in order to continue with this module.
2181	UGRD	S1	025236	BTNY	3712	Field excursion 2	114	MAIN	BFN	8	BTNY3712 Prerequisite: Student must have passed Min. BTNY2616 (45%) in order to continue with this module.
2181	UGRD	YR	025236	BTNY	3712	Field excursion 2	114	MAIN	BFN	8	BTNY3712 Prerequisite: Student must have passed Min. BTNY2616 (45%) in order to continue with this module.
2181	UGRD	S1	020065	BTNY	3714	Diversity and systematics of higher plants	114	MAIN	BFN	16	BTNY3714 Prerequisite: Student must have passed Min. BTNY2616 (45%) in order to continue with this module. BTNY3712 must be taken in the same year of study.
2182	UGRD	S2	011803	BTNY	3724	Carbon metabolism in plants	114	MAIN	BFN	16	BTNY3724 Prerequisite: Student must have passed Min. BTNY2626 (45%) in order to continue with this module.
2181	UGRD	S1	011806	BTNY	3734	Vegetation science and environmental management	114	MAIN	BFN	16	BTNY3734 Prerequisite: Student must have passed Min. BTNY2616 (45%) in order to continue with this module. BTNY3712 must be taken in the same year of study.
2182	UGRD	S2	020044	BTNY	3744	Plant defence and biotechnology	114	MAIN	BFN	16	BTNY3744 Prerequisite: Student must have passed Min. BTNY2626 (45%) in order to continue with this module.
2181	UGRD	S1	021239	BTNY	3754	Plant molecular biotechnology	114	MAIN	BFN	16	BTNY3754 Prerequisite: Students must have passed Min BTNY2616 (45%) in order to continue with this module.
2182	UGRD	S2	027253	BTNY	3764	Ecophysiology: soil-plant-water interactions	114	MAIN	BFN	16	BTNY3764 Prerequisite: Student must have passed Min. BTNY2626 (45%) in order to continue with this module.
2181	UGRD	S1	025107	PLTB	2613	Theoretical principles of Plant Breeding	114	MAIN	BFN	12	None
2182	UGRD	S2	025070	PLTB	2623	Applied principles of Plant Breeding	114	MAIN	BFN	12	PLTB2623 Prerequisite: Student must have passed BTNY2613 in order to continue with this module.
2181	UGRD	S1	011881	PLTB	3714	Principles of quantitative genetics in Plant Breeding	114	MAIN	BFN	16	PLTB3714 Prerequisite: Student must have passed PLTB2613 and PLTB2623 in order to continue with this module.
2182	UGRD	S2	025300	PLTB	3724	Breeding for abiotic stress tolerance	114	MAIN	BFN	16	PLTB3724 Prerequisite: Student must have passed PLTB2613 and PLTB2623 in order to continue with this module.
2182	UGRD	S2	025996	PLTB	3744	Advanced Breeding Techniques	114	MAIN	BFN	16	PLTB3744 Prerequisite: Student must have passed PLTB2613 and PLTB2623 in order to continue with this module.
2181	UGRD	YR	025921	PLTB	4806	Literature review	114	MAIN	BFN	24	PLTB4806 Prerequisite: Student must have passed all PLTB modules up to 3rd year in order to continue with this module.
2181	UGRD	YR	025899	PLTB	4808	Research Project Plant Breeding	114	MAIN	BFN	32	PLTB4808 Prerequisite: Student must have passed all PLTB modules up to 3rd year in order to continue with this module.
2181	UGRD	S1	019703	PLTB	4814	Advanced quantitative genetics in Plant Breeding	114	MAIN	BFN	16	PLTB4814 Prerequisite: Student must have passed PLTB3714 in order to continue with this module.
2182	UGRD	S2	025301	PLTB	4824	Quality and stress tolerance breeding	114	MAIN	BFN	16	PLTB4824 Prerequisite: Student must have passed PLTB3724 in order to continue with this module.
2181	UGRD	S1	019704	PLTB	4834	Marker-assisted Plant Breeding	114	MAIN	BFN	16	None
2181	UGRD	S1	011894	PLTB	4854	Statistics in Plant Sciences	114	MAIN	BFN	16	PLTB4854 Prerequisite: Student must have passed PLTB3714 in order to continue with this module.
2182	UGRD	S2	024836	PPLG	2624	Principles of plant pathology	114	MAIN	BFN	16	PPLG2624 Prerequisite: Students must have passed Min. BLGY1513 and one of Min. BLGY1643 or Min. BLGY1683 in order to continue with this module.

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2181	UGRD	S1	012101	PPLG	3714	Mycological plant pathology	114	MAIN	BFN	16	PPLG3714 Prerequisite: Student must have passed Min. PPLG2624 in order to continue with this module.
2182	UGRD	S2	012091	PPLG	3724	Plant disease management	114	MAIN	BFN	16	PPLG3724 Prerequisite: Student must have passed Min. PPLG2624 in order to continue with this module.
2181	UGRD	S1	025885	PPLG	3734	Bacterial and viral diseases of plants	114	MAIN	BFN	16	PPLG3734 Prerequisite: Student must have passed Min. PPLG2624 in order to continue with this module.
2182	UGRD	S2	025305	PPLG	3744	Ecology of plant pathogens	114	MAIN	BFN	16	PPLG3744 Prerequisite: Student must have passed Min. PPLG2624 in order to continue with this module.
2181	UGRD	YR	025884	PPLG	4806	Literature review Plant Pathology	114	MAIN	BFN	24	None
2181	UGRD	YR	024837	PPLG	4808	Plant Pathology Research Repor	114	MAIN	BFN	32	None
2182	UGRD	S2	025183	PPLG	4824	Plant-pathogen interactions	114	MAIN	BFN	16	None
2181	UGRD	S1	025886	PPLG	4834	Epidemiology and control of plant diseases	114	MAIN	BFN	16	None
2182	UGRD	S2	025887	PPLG	4844	Molecular plant pathology	114	MAIN	BFN	16	None
2182	UGRD	S2	024594	BIOL	1624	Plant biology	114	QWA	QWAQWA	16	BIOL1624 Prerequisite: Students must have passed BIOL1514 in order to continue with this module.
2182	UGRD	S2	024704	BIOL	2644	The physical environment: natural resources, ecology and sustainability	114	QWA	QWAQWA	16	BIOL2644 Prerequisite: Students must have passed BIOL2614 in order to continue with this module.
2181	UGRD	S1	024597	BOTA	2654	Introduction to plant anatomy and morphology	114	QWA	QWAQWA	16	BIOL2654 Prerequisite: Students must have passed two of BIOL1514 or BIOL1644 or BIOL1624 in order to continue with this module.
2182	UGRD	S2	024679	BOTA	2684	Plant physiology and biotechnology	114	QWA	QWAQWA	16	BIOL2684 Prerequisite: Students must have passed BIOL1514 in order to continue with this module.
2182	UGRD	S2	024685	BOTA	3724	Plant metabolism and the environment	114	QWA	QWAQWA	16	BOTA3724 Prerequisite: Students must have passed BIOL2684 in order to continue with this module.
2181	UGRD	S1	024686	BOTA	3734	Introduction to plant systematics	114	QWA	QWAQWA	16	BOTA3734 Prerequisite: Students must have passed BIOL2644 in order to continue with this module.
2182	UGRD	S2	024687	BOTA	3744	Ethnobotany and Plant Defence	114	QWA	QWAQWA	16	BOTA3744 Prerequisite: Students must have passed BIOL2684 in order to continue with this module.
2181	UGRD	S1	024688	BOTA	3754	Vegetation ecology	114	QWA	QWAQWA	16	BOTA3754 Prerequisite: Students must have passed BIOL2684 in order to continue with this module.
2182	UGRD	S2	023973	BLGY	1643	The interdependence of plants and life on earth	114	SOUTH	SOUTH	12	BLGY1643 Prerequisite: Students must have passed BLGY1513 in order to continue with this module.
2181	PGRD	YR	025805	BOTA	8900	Botany Dissertation	114	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	011853	BTNY	6806	Literature review	114	MAIN	BFN	24	Selection BScHons
2181	PGRD	YR	011855	BTNY	6808	Research Project Botany	114	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	011830	BTNY	6814	Advanced Plant Ecology	114	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	027358	BTNY	6816	Literature review Botany	114	MAIN	BFN	24	Selection BScHons
2181	PGRD	S1	027368	BTNY	6818	Botany Research Project	114	MAIN	BFN	32	Selection BScHons
2182	PGRD	S2	025237	BTNY	6824	Plant Physiology (Metabolism and Growth)	114	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	027369	BTNY	6826	Literature review Botany	114	MAIN	BFN	24	Selection BScHons
2182	PGRD	S2	026879	BTNY	6828	Research Report Botany	114	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	011841	BTNY	6834	Plant Molecular Systematics	114	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	011843	BTNY	6844	Plant Physiology II (Plant Defence and Applications)	114	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	011845	BTNY	6854	Advanced plant taxonomy	114	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	011846	BTNY	6864	Ecosystem management and restoration	114	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	011848	BTNY	6874	Advanced plant molecular biotechnology	114	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	011850	BTNY	6884	Plant analytical biochemistry	114	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	027254	BTNY	6894	Methods in Palaeo-ecology	114	MAIN	BFN	16	BTNY6894: Student must have passed BSc Degree with Botany as major in order to continue with this course.

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2181	PGRD	YR	025238	BTNY	8900	Botany Dissertation	114	MAIN	BFN	180	Selection MSc
2182	PGRD	S2	025238	BTNY	8900	Botany Dissertation	114	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	011857	BTNY	9100	Botany Thesis	114	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	025255	ENRH	6806	Literature review Environmental Rehabilitation	114	MAIN	BFN	24	Selection BScHons
2181	PGRD	YR	025256	ENRH	6808	Research project	114	MAIN	BFN	32	Selection BScHons
2181	PGRD	YR	025554	ENRH	8900	Environmental Rehabilitation, Dissertation	114	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	024957	ENRH	9100	Environmental Rehabilitation Thesis	114	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	026462	ENVR	6806	Literature review	114	MAIN	BFN	24	Selection BScHons
2181	PGRD	YR	025473	ENVR	6808	Research Project	114	MAIN	BFN	32	Selection BScHons
2181	PGRD	YR	025778	LIMG	8900	Limnology Dissertation	114	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025726	PHEC	8900	Plant health ecology dissertation	114	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	024958	PHEC	9100	Plant Health Ecology Thesis	114	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	025923	PLTB	6806	Literature review	114	MAIN	BFN	24	Selection BScHons
2181	PGRD	S1	025924	PLTB	6814	Advanced quantitative genetics in Plant Breeding	114	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	027567	PLTB	6816	Literature review Plant breeding	114	MAIN	BFN	24	Selection BScHons
2181	PGRD	S1	025895	PLTB	6818	Plant Breeding Research Report	114	MAIN	BFN	32	Selection BScHons
2181	PGRD	YR	025895	PLTB	6818	Plant Breeding Research Report	114	MAIN	BFN	32	Selection BScHons
2182	PGRD	S2	025302	PLTB	6824	Quality and stress tolerance breeding	114	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	027568	PLTB	6828	Plant Breeding Research Report	114	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	025780	PLTB	6834	Marker-assisted Plant Breeding	114	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	024840	PLTB	6854	Statistics in Plant Sciences	114	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025060	PLTB	6874	Advanced statistics in Plant Sciences	114	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025349	PLTB	8900	Dissertation Plant Breeding	114	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025638	PLTB	9100	Plant Breeding Thesis	114	MAIN	BFN	360	Selection PhD
2182	PGRD	S2	025638	PLTB	9100	Plant Breeding Thesis	114	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	025303	PLTI	8900	Interdisciplinary Plant Breeding Dissertation	114	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025304	PLTI	9100	Interdisciplinary Thesis Plant Breeding	114	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	019712	PPLG	6806	Literature review	114	MAIN	BFN	24	Selection BScHons
2181	PGRD	YR	019713	PPLG	6808	Plant Pathology Research Report	114	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	027516	PPLG	6816	Literature review Plant Pathology	114	MAIN	BFN	24	Selection BScHons
2181	PGRD	S1	025888	PPLG	6824	Plant-pathogen interactions	114	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025888	PPLG	6824	Plant-pathogen interactions	114	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	027515	PPLG	6826	Literature review Plant Pathology	114	MAIN	BFN	24	Selection BScHons
2181	PGRD	S1	025892	PPLG	6834	Epidemiology and control of plant diseases	114	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025894	PPLG	6844	Molecular Plant Pathology	114	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025640	PPLG	8900	Dissertation Plant Pathology	114	MAIN	BFN	180	Selection MSc
2182	PGRD	S2	025640	PPLG	8900	Dissertation Plant Pathology	114	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025641	PPLG	9100	Thesis Plant Pathology	114	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	027026	PPLI	8900	Interdisciplinary Plant Pathology Dissertation	114	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	027260	PPLI	9100	Interdisciplinary Plant Pathology Thesis	114	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	026411	BOTA	6808	Botany Research Project	114	QWA	QWAQWA	32	Selection BScHons
2181	PGRD	S1	024690	BOTA	6814	Restoration ecology	114	QWA	QWAQWA	16	Selection BScHons

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2182	PGRD	S2	024691	BOTA	6824	Plant ecophysiology	114	QWA	QWAQWA	16	BOTA6824 Prerequisite: Students must have passed BOTA3764 in order to continue with this module.
2182	PGRD	S2	026412	BOTA	6844	Plant biotechnology	114	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	024692	BOTA	6864	Phytomedicine	114	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	YR	025805	BOTA	8900	Botany Dissertation	114	QWA	QWAQWA	180	Selection BScHons
2182	PGRD	S2	025805	BOTA	8900	Botany Dissertation	114	QWA	QWAQWA	180	Selection MSc
2181	PGRD	YR	025806	BOTA	9100	Botany Thesis (PhD)	114	QWA	QWAQWA	360	Selection PhD
2181	UGRD	YR	025401	ABSR	2604	Applied Building Science	115	MAIN	BFN	16	None
2181	UGRD	YR	025496	ABSR	3704	Applied Building Science	115	MAIN	BFN	16	None
2182	UGRD	S2	026985	BARR	1522	Architecture	115	MAIN	BFN	8	None
2182	UGRD	S2	001850	BBER	1524	Building Economics 1	115	MAIN	BFN	16	COER1504 Prerequisite: Students must have passed Grade 12 Mathematics on performance Level 5 in order to register for this module.
2181	UGRD	S1	027245	BBER	2612	Building Economics	115	MAIN	BFN	8	None
2182	UGRD	S2	027268	BBER	2622	Building Economics	115	MAIN	BFN	8	None
2181	UGRD	S1	027488	BBSD	2614	Building Sciences II	115	MAIN	BFN	16	None
2181	UGRD	S1	027489	BBSD	3712	Building Science 3	115	MAIN	BFN	8	None
2181	UGRD	S1	026877	BBSR	1514	Building Science I	115	MAIN	BFN	16	None
2181	UGRD	S1	027270	BBSR	2614	Building Sciences II	115	MAIN	BFN	16	None
2181	UGRD	S1	027271	BCSR	2612	Construction Science	115	MAIN	BFN	8	None
2182	UGRD	S2	027302	BCSR	2622	Construction Science 2	115	MAIN	BFN	8	None
2181	UGRD	YR	001529	BDQR	1504	Descriptive Quantification 1	115	MAIN	BFN	16	DQFR1504 Prerequisite: Students must have passed Grade 12 Mathematics on performance Level 5 in order to register for this module.
2181	UGRD	YR	001531	BDQR	2604	Descriptive Quantification	115	MAIN	BFN	16	None
2181	UGRD	YR	001609	BKR	306	Building Contracts Law	115	MAIN	BFN	24	None
2181	UGRD	YR	001620	BKS	302	Descriptive Quantification (Project)	115	MAIN	BFN	8	None
2182	UGRD	S2	026878	BPDR	1522	Property Development 1	115	MAIN	BFN	8	None
2181	UGRD	S1	025298	BPDR	2614	Property Development Economics	115	MAIN	BFN	16	None
2182	UGRD	S2	027519	BPDR	2624	Property Development	115	MAIN	BFN	16	None
2181	UGRD	YR	025469	BSCR	2604	Building Science	115	MAIN	BFN	16	None
2181	UGRD	YR	025476	BSCR	3704	Building Sciences III	115	MAIN	BFN	16	None
2181	UGRD	YR	025239	CCMR	3704	Construction Contracts and Management	115	MAIN	BFN	16	None
2181	UGRD	YR	025315	CFNR	3704	Construction Finance	115	MAIN	BFN	16	None
2181	UGRD	YR	001854	COER	3704	Building Economics	115	MAIN	BFN	16	None
2181	UGRD	YR	025545	CSCR	2604	Construction Science 2	115	MAIN	BFN	16	None
2181	UGRD	YR	007980	CSCR	3704	Construction Science	115	MAIN	BFN	16	None
2181	UGRD	YR	025320	DCPR	3704	Descriptive Construction Project	115	MAIN	BFN	16	None
2181	UGRD	YR	025251	DQFR	3704	Descriptive Quantification	115	MAIN	BFN	16	None
2181	UGRD	YR	023848	EGSR	1504	Engineering Science	115	MAIN	BFN	16	EGSR1504 Prerequisite: Students must have passed Grade 12 Mathematics on performance Level 5 in order to register for this module.
2181	UGRD	YR	003859	PDER	1504	Property Development Economics	115	MAIN	BFN	16	PDER1504 Prerequisite: Students must have passed Grade 12 Mathematics on performance Level 5 in order to register for this module.
2181	UGRD	YR	003867	PDER	3704	Property Development Economics	115	MAIN	BFN	16	None
2181	UGRD	YR	011951	PQMR	1504	Production and Operational Management	115	MAIN	BFN	16	PQMR1504 Prerequisite: Students must have passed Grade 12 Mathematics on performance Level 5 in order to register for this module.
2181	UGRD	YR	025306	PQMR	2604	Production and Operational Management	115	MAIN	BFN	16	None
2181	UGRD	YR	011955	PQMR	3704	Production and Operational Management	115	MAIN	BFN	16	None

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2182	UGRD	S2	025759	SURV	2622	Land Surveying	115	MAIN	BFN	8	None
2181	UGRD	YR	025400	ABSD	2604	Applied Building Science	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	025217	ABSD	3704	Applied Building Science	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	023847	ARGD	2604	Architecture	115	MAIN	BUILDSC	16	None
2182	UGRD	S2	027200	BARD	1522	Architecture	115	MAIN	BUILDSC	8	None
2182	UGRD	S2	027049	BBED	1524	Building Economics 1	115	MAIN	BUILDSC	16	None
2181	UGRD	S1	026986	BBSD	1514	Building Science I	115	MAIN	BUILDSC	16	None
2181	UGRD	S1	027517	BCCD	3712	Construction Law	115	MAIN	BUILDSC	8	None
2182	UGRD	S2	027518	BCCD	3722	Construction Law	115	MAIN	BUILDSC	8	None
2181	UGRD	YR	026987	BDQD	1504	Descriptive Quantification I	115	MAIN	BUILDSC	16	None
2182	UGRD	S2	026989	BPDD	1522	Property Development I	115	MAIN	BUILDSC	8	None
2181	UGRD	YR	019523	BSCD	2604	Building Science	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	002026	BSCD	3704	Building Science	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	002318	CCM	306	Building Contracts Law	115	MAIN	BUILDSC	24	None
2181	UGRD	YR	025359	CCMD	3704	Building Contracts Law	115	MAIN	BUILDSC	16	CCMD3704 Prerequisite: Students must have passed Grade 12 Mathematics with performance Level 5 in order to register for this module.
2181	UGRD	YR	025240	CFND	3704	Construction Finance	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	002570	COED	1504	Building Economics	115	MAIN	BUILDSC	16	COED1504 Prerequisite: Students must have passed Grade 12 Mathematics with performance Level 5 in order to register this module.
2181	UGRD	YR	025470	COED	2604	Building Economics	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	002572	COED	3704	Building Economics	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	002629	CSCD	2604	Construction Science	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	002636	CSCD	3704	Construction Science	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	025319	DCPD	3704	Descriptive Construction Project	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	003108	DQFD	1504	Descriptive Quantification	115	MAIN	BUILDSC	16	DQFD1504 Prerequisite: Students must have passed Grade 12 Mathematics on performance Level 5 in order to register for this module.
2181	UGRD	YR	025249	DQFD	2604	Descriptive Quantification	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	025250	DQFD	3704	Descriptive Quantification	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	003113	DQS	302	Descriptive Quantification (Project)	115	MAIN	BUILDSC	8	None
2181	UGRD	YR	025252	DQSD	3704	Descriptive Quantification Project	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	003572	EGSD	1504	Engineering Science	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	011551	PDED	1504	Property development economics	115	MAIN	BUILDSC	16	PDED1504 Prerequisite: Students must have passed Grade 12 Mathematics on performance Level 5 in order to register for this module.
2181	UGRD	YR	025297	PDED	2604	Property Development Economics	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	011553	PDED	3704	Property Development Economics	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	020319	PQMD	1504	Production and Operational Management	115	MAIN	BUILDSC	16	PQMD1504 Prerequisite: Students must have passed Grade 12 Mathematics on performance Level 5 in order to register for this module.
2181	UGRD	YR	020687	PQMD	2604	Production and Operational Management	115	MAIN	BUILDSC	16	None
2181	UGRD	YR	012144	PQMD	3704	Production and Operational Management	115	MAIN	BUILDSC	16	None
2182	UGRD	S2	025759	SURV	2622	Land Surveying	115	MAIN	BUILDSC	8	None
2181	PGRD	YR	026038	AINC	7901	Advanced Construction- and Agricultural Engineering	115	MAIN	BFN	4	AINC7901 Prerequisite: Students must have passed CINC7901 in order to register for this module.
2181	PGRD	YR	026033	ANDC	7902	Advanced Property Development	115	MAIN	BFN	8	None
2181	PGRD	YR	025539	APMR	6803	Advanced Project Management	115	MAIN	BFN	12	None
2182	PGRD	S2	026981	BCFR	6822	Construction Finance	115	MAIN	BFN	8	None

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2181	PGRD	YR	026988	BIPR	6804	Integrated Project Quantity Surveying and Construction Management	115	MAIN	BFN	16	None
2181	PGRD	YR	001549	BKI	402	Management of Information and Communication Systems	115	MAIN	BFN	8	None
2181	PGRD	YR	001857	BOE	704	Building Economics	115	MAIN	BFN	16	None
2181	PGRD	YR	026034	BOEC	7902	Building Economics for MProp	115	MAIN	BFN	8	None
2181	PGRD	YR	001910	BOR	700	Quantity Surveying	115	MAIN	BFN	120	None
2181	PGRD	YR	001911	BOR	900	Quantity Surveying	115	MAIN	BFN	240	None
2182	PGRD	S2	027196	BPCR	6822	Professional Practice	115	MAIN	BFN	8	None
2181	PGRD	S1	025635	BPDR	6812	Property Development IV	115	MAIN	BFN	8	None
2181	PGRD	YR	001980	BPK	404	Professional Practice	115	MAIN	BFN	16	None
2181	PGRD	S1	025807	BPKR	7914	Professional Practice	115	MAIN	BFN	16	None
2181	PGRD	YR	027060	BPMR	6804	Project Management	115	MAIN	BFN	16	None
2181	PGRD	S1	026745	BPPR	6812	Professional Practice	115	MAIN	BFN	8	None
2182	PGRD	S2	027115	BPQR	6822	Professional Practice	115	MAIN	BFN	8	None
2181	PGRD	YR	002322	CCP	702	Construction Contracts, Procedure and Procurement	115	MAIN	BFN	8	None
2181	PGRD	YR	026036	CCPC	7901	Property Law	115	MAIN	BFN	4	None
2181	PGRD	YR	007632	CFNR	6804	Construction Finance	115	MAIN	BFN	16	None
2181	PGRD	YR	002498	CIN	702	Construction and Agricultural Engineering	115	MAIN	BFN	8	None
2181	PGRD	YR	020681	CIN	793	Construction and Agricultural Engineering	115	MAIN	BFN	8	None
2181	PGRD	YR	026035	CINC	7901	Construction and Agricultural Engineering	115	MAIN	BFN	4	None
2181	PGRD	YR	001856	COER	6804	Building Economics	115	MAIN	BFN	16	None
2181	PGRD	YR	027007	COMR	6804	Construction Management	115	MAIN	BFN	16	None
2181	PGRD	YR	025782	CPOR	6804	Production and Operational Management	115	MAIN	BFN	16	None
2181	PGRD	YR	025632	CRPR	6808	Construction Management Research Report	115	MAIN	BFN	32	None
2181	PGRD	YR	025546	CSCR	6803	Construction Science	115	MAIN	BFN	12	None
2182	PGRD	S2	027012	CTIR	6822	Construction Technology and Innovation	115	MAIN	BFN	8	None
2181	PGRD	YR	003106	DPRP	7902	Dispute Resolution	115	MAIN	BFN	8	None
2181	PGRD	YR	025645	DQFR	8900	Quantity Surveying Dissertation	115	MAIN	BFN	180	None
2181	PGRD	YR	026428	DQFR	9100	Quantity Surveying Thesis	115	MAIN	BFN	360	None
2181	PGRD	YR	003873	END	404	Property Development Economics	115	MAIN	BFN	16	None
2181	PGRD	YR	003877	END	704	Property Development	115	MAIN	BFN	16	None
2181	PGRD	YR	020710	END	792	Research Essay : Property Development	115	MAIN	BFN	32	None
2181	PGRD	YR	020679	END	793	Property Development	115	MAIN	BFN	16	None
2181	PGRD	YR	026032	ENDC	7902	Property Development	115	MAIN	BFN	8	None
2181	PGRD	YR	025323	ENDR	7900	Research Essay : Property Development	115	MAIN	BFN	60	ENDR7900 Prerequisite: Students must have passed INDR7902 in order to register for this module.
2181	PGRD	YR	020677	ENWV	7904	Property Valuation and Management	115	MAIN	BFN	16	None
2181	PGRD	YR	020259	GIP	402	Integrated Project	115	MAIN	BFN	8	None
2181	PGRD	YR	006012	GPB	404	Advanced Project Management	115	MAIN	BFN	16	None
2181	PGRD	YR	025161	INDR	7902	Introduction to Research	115	MAIN	BFN	8	None
2181	PGRD	YR	025743	INPR	6803	Integrated Project	115	MAIN	BFN	12	None
2181	PGRD	YR	026505	IPMP	7904	Integrated Project	115	MAIN	BFN	16	None
2181	PGRD	YR	007627	KOB	700	Construction Management	115	MAIN	BFN	120	None

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2181	PGRD	YR	020728	KOB	900	Construction Management	115	MAIN	BFN	240	None
2181	PGRD	YR	007981	KWE	404	Construction Science	115	MAIN	BFN	16	None
2181	PGRD	YR	020719	LSFP	7902	Life Cycle Cost , Facility Evaluation and Management	115	MAIN	BFN	8	None
2181	PGRD	YR	020670	NLE	793	Applied Game Farm Planning	115	MAIN	BFN	16	None
2181	PGRD	YR	020276	PFMR	6804	Property Facilities Management	115	MAIN	BFN	16	None
2181	PGRD	YR	025643	PPRR	6802	Professional Practice	115	MAIN	BFN	8	None
2181	PGRD	YR	012143	PPY	702	Professional Practice	115	MAIN	BFN	8	None
2181	PGRD	YR	026037	PPYC	7901	Professional Practice	115	MAIN	BFN	4	None
2181	PGRD	YR	025318	PQMR	8900	Construction Management Dissertation	115	MAIN	BFN	180	None
2181	PGRD	YR	025680	PQMR	9100	Construction Management Thesis	115	MAIN	BFN	360	None
2181	PGRD	YR	025764	PROP	8900	Property Sciences Dissetation	115	MAIN	BFN	180	None
2181	PGRD	YR	025644	PROP	9100	Property development Thesis	115	MAIN	BFN	360	None
2181	PGRD	YR	020251	PVPR	6804	Property Valuation Practice	115	MAIN	BFN	16	None
2181	PGRD	S1	027031	QBER	6812	Building Economics	115	MAIN	BFN	8	None
2182	PGRD	S2	027032	QBER	6822	Building Economics	115	MAIN	BFN	8	None
2181	PGRD	YR	001536	QDQR	6804	Descriptive Quantification IV	115	MAIN	BFN	16	None
2181	PGRD	YR	027114	QRPR	6808	Quantity Surveying Research Report	115	MAIN	BFN	32	None
2181	PGRD	YR	020297	TRBP	7904	Applied Project Management	115	MAIN	BFN	16	None
2181	PGRD	YR	026493	URDT	6804	Human Settlement Development Management	115	MAIN	BFN	16	None
2181	PGRD	YR	017577	APM	404	Advanced Project Management	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	025538	APMD	6803	Advanced Project Management	115	MAIN	BUILDSC	12	None
2182	PGRD	S2	027074	BCFD	6822	Construction Finance	115	MAIN	BUILDSC	8	None
2181	PGRD	YR	027075	BIPD	6804	Integrated Project Quantity Surveying and Construction Management	115	MAIN	BUILDSC	16	None
2182	PGRD	S2	027195	BPCD	6822	Professional Practice	115	MAIN	BUILDSC	8	None
2181	PGRD	S1	027050	BPDD	6812	Property Development IV	115	MAIN	BUILDSC	8	None
2181	PGRD	YR	027076	BPMD	6804	Project Management	115	MAIN	BUILDSC	16	None
2181	PGRD	S1	027059	BPPD	6812	Professional Practice IV	115	MAIN	BUILDSC	8	None
2182	PGRD	S2	027197	BPQD	6822	Professional Practice	115	MAIN	BUILDSC	8	None
2181	PGRD	YR	017802	CFND	6804	Construction Finance	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	002574	COED	6804	Building Economics	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	027198	COMD	6804	Construction Management	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	027077	CPOD	6804	Production and Operational Management IV	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	027063	CRPD	6808	Construction Management Research Report	115	MAIN	BUILDSC	32	None
2181	PGRD	YR	002641	CSC	404	Construction Science	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	025544	CSCD	6803	Construction Science	115	MAIN	BUILDSC	12	None
2182	PGRD	S2	027079	CTID	6822	Construction Technology and Innovation	115	MAIN	BUILDSC	8	None
2181	PGRD	YR	019538	DQFD	6804	Descriptive Quantification	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	006937	INP	402	Integrated Project	115	MAIN	BUILDSC	8	None
2181	PGRD	YR	025661	INPD	6803	Integrated Project	115	MAIN	BUILDSC	12	None
2181	PGRD	YR	018667	MCI	402	Management Information and Communication Systems	115	MAIN	BUILDSC	8	None

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2181	PGRD	YR	025631	MCID 6808	Management of Information and Communication Systems	115	MAIN	BUILDSC	32	None
2181	PGRD	YR	011554	PDE 404	Property Development Economics	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	025634	PDED 6802	Property Development Economics	115	MAIN	BUILDSC	8	None
2181	PGRD	YR	020248	PFMD 6804	Property Facilities Management	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	012135	PPR 404	Professional Practice	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	025642	PPRD 6802	Professional Practice	115	MAIN	BUILDSC	8	None
2181	PGRD	YR	025781	PQMD 6804	Production and Operational Management	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	020246	PVPD 6804	Property Valuation Practice	115	MAIN	BUILDSC	16	None
2181	PGRD	S1	027111	QBED 6812	Building Economics	115	MAIN	BUILDSC	8	None
2182	PGRD	S2	027199	QBED 6822	Building Economics	115	MAIN	BUILDSC	8	None
2181	PGRD	YR	027112	QDQD 6804	Descriptive Quantification IV	115	MAIN	BUILDSC	16	None
2181	PGRD	YR	027113	QRPD 6808	Quantity Surveying Research Report	115	MAIN	BUILDSC	32	None
2181	UGRD	S1	008572	AGRI 1534	Chemical Principles in Agricultural	116	MAIN	BFN	16	LWL134 Prerequisite: Students must have passed Mathematics on level 3 in order to continue with this module.
2181	UGRD	S1	008578	AGRI 1554	Physical and mechanised principles in agriculture	116	MAIN	BFN	16	LWL154 Prerequisite: Students must have passed Mathematics on level 3 in order to continue with this module.
2181	UGRD	S1	008606	CLIM 2614	Fundamentals of Agrometeorology	116	MAIN	BFN	16	CLIM2614 Prerequisite: Students must have passed SCCS1624 (GKG124) or PHYS1534 (FSK134) or AGRI1554 (LWL154) or register these modules concurrently.
2182	UGRD	S2	008610	CLIM 2624	Agrometeorology for farming systems	116	MAIN	BFN	16	CLIM2624 Prerequisite: Students must have passed SCCS1624 (GKG124) or obtained a minimum mark for CLIM2614 (LWR214) in order to continue with this module.
2181	UGRD	S1	008622	CLIM 3714	Climate data analysis for agrometeorological services	116	MAIN	BFN	16	CLIM3714 Prerequisite: Students must have passed CLIM2614 (LWR214) or CLIM2624 (LWR224) in order to continue with this module.
2182	UGRD	S2	008625	CLIM 3724	Climate Change and Variability	116	MAIN	BFN	16	LWR324 Prerequisite: Students must have passed LWR214.
2181	UGRD	S1	008635	CLIM 4814	Micrometeorology and Specialised Instrumentation	116	MAIN	BFN	16	LWR414 Prerequisite: Students must have passed LWR214.
2182	UGRD	S2	008637	CLIM 4824	Simulating biophysical interactions	116	MAIN	BFN	16	LWR424 Prerequisite: Students must have passed LWR214 in order to continue with this module.
2181	UGRD	S1	008639	CLIM 4834	Physical and dynamical meteorology	116	MAIN	BFN	16	LWR434 Prerequisite: Students must have passed LWR214 in order to continue with this module.
2182	UGRD	S2	008641	CLIM 4844	Weather analysis and forecasting	116	MAIN	BFN	16	LWR444 Prerequisite: Students must have passed LWR214 in order to continue with this module.
2181	UGRD	S1	024384	CROP 2614	Concepts in crop production	116	MAIN	BFN	16	CROP2614 Prerequisite: Students must have passed SCCS1624 (GKG124) in order to continue with this module.
2182	UGRD	S2	000451	CROP 2624	Winter grain, industrial and diverse crops	116	MAIN	BFN	16	CROP2624: Student must have passed CROP2614 or concurrently in order to continue with module.
2181	UGRD	S1	025117	CROP 3714	Summer grain, oil and protein-rich crops	116	MAIN	BFN	16	CROP3714 Prerequisite: Students must have passed CROP2614 (AGR214) or register it concurrently in order to register for this module.
2182	UGRD	S2	025118	CROP 3724	Vegetable crops	116	MAIN	BFN	16	CROP3724: Student must have passed CROP 2614 or concurrently in order to continue with module.
2181	UGRD	S1	025091	CROP 4814	Crop physiology	116	MAIN	BFN	16	
2182	UGRD	S2	025089	CROP 4824	Role of nutrition in crop development	116	MAIN	BFN	16	
2181	UGRD	S1	025090	CROP 4834	Water dynamics in crop production	116	MAIN	BFN	16	
2182	UGRD	S2	025031	CROP 4844	Weed control	116	MAIN	BFN	16	
2182	UGRD	S2	025165	SCCS 1624	Introduction to soil, crop and climate sciences	116	MAIN	BFN	16	
2181	UGRD	S1	025194	SCCS 4814	Research methodology	116	MAIN	BFN	16	
2182	UGRD	S2	025307	SCCS 4824	Literature review	116	MAIN	BFN	16	

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2181	UGRD	S1	025133	SOIL	2614	Soil classification, evaluation, and land use planning	116	MAIN	BFN	16	SOIL2614 Prerequisite: Students must have passed SCC1624 in order to register for this module.
2181	UGRD	S1	025132	SOIL	2624	Sustainable soil and water management	116	MAIN	BFN	16	SOIL2624: Student must have passed SCCS1624 Iin order to register for this module.
2182	UGRD	S2	025132	SOIL	2624	Sustainable soil and water management	116	MAIN	BFN	16	SOIL2624: Student must have passed SCCS1624 Iin order to continue with this module.
2181	UGRD	S1	025130	SOIL	3714	Soil fertility and fertilization	116	MAIN	BFN	16	SOIL3714 Prerequisite: Students must have passed SCC1624 in order to register for this module.
2182	UGRD	S2	025129	SOIL	3724	Soil contaminants and management	116	MAIN	BFN	16	SOIL3724 Prerequisite: Students must have passed SCCS1624 in order to register for this module.
2181	UGRD	S1	025128	SOIL	4814	Soil chemical principles and applications	116	MAIN	BFN	16	SOIL4814 Prerequisite: Students must have passed SOIL3614 or SOIL3624; and CHEM1514 or CHEM1644 or AGRI1534 in order to register for this module.
2182	UGRD	S2	025121	SOIL	4824	Soil physical principles and applications	116	MAIN	BFN	16	SOIL4824 Prerequisites: Students must have passed SOIL2624 in order to register for this module.
2181	UGRD	S1	025131	SOIL	4834	Soil classification principles and applications	116	MAIN	BFN	16	SOIL4834 Prerequisite: Students must have passed SOIL2614 in order to register for this module.
2182	UGRD	S2	025308	SOIL	4844	Soil biological principles and applications	116	MAIN	BFN	16	SOIL4844 Prerequisite: Students must have passed SOIL3714 or SOIL2724 in order to register for this module.
2181	PGRD	S1	025241	CLIM	6814	Micrometeorology and Specialised Instrumentation	116	MAIN	BFN	16	
2182	PGRD	S2	025317	CLIM	6824	Simulating biophysical interactions	116	MAIN	BFN	16	
2181	PGRD	S1	026414	CLIM	6834	Physics and dynamics of the atmosphere	116	MAIN	BFN	16	
2182	PGRD	S2	025242	CLIM	6844	Weather analysis and forecasting	116	MAIN	BFN	16	
2181	PGRD	S1	027061	CLIM	6854	Agrometeorological Services for Extension	116	MAIN	BFN	16	
2182	PGRD	S2	027062	CLIM	6864	Tropical meteorology	116	MAIN	BFN	16	
2181	PGRD	YR	025679	CLIM	8900	Agrometeorology Dissertation	116	MAIN	BFN	180	
2181	PGRD	YR	026415	CLMI	8900	Agrometeorology Dissertation	116	MAIN	BFN	180	
2181	PGRD	YR	026416	CLMI	9100	Agrometeorology Interdisciplinary Thesis	116	MAIN	BFN	360	
2181	PGRD	YR	022369	CROI	8900	Agronomy Dissertation	116	MAIN	BFN	180	
2181	PGRD	YR	022373	CROI	9100	Agronomy Thesis (Interdisciplinary)	116	MAIN	BFN	360	
2181	PGRD	S1	025475	CROP	6814	Crop Physiology	116	MAIN	BFN	16	
2182	PGRD	S2	025321	CROP	6824	Role of nutrition in crop development	116	MAIN	BFN	16	
2181	PGRD	S1	025474	CROP	6834	Water dynamics in crop production	116	MAIN	BFN	16	
2182	PGRD	S2	026427	CROP	6844	Weed control	116	MAIN	BFN	16	
2181	PGRD	YR	025543	CROP	8900	Agronomy Dissertation	116	MAIN	BFN	180	
2181	PGRD	YR	025405	CROP	9100	Agronomy Thesis	116	MAIN	BFN	360	
2181	PGRD	YR	025338	IRRI	6808	Research project in irrigation management	116	MAIN	BFN	32	
2181	PGRD	S1	002022	IRRI	6816	Evaluation of soil and water for irrigation suitability	116	MAIN	BFN	24	
2182	PGRD	S2	002023	IRRI	6826	Evaluation of soil fertility and pest control	116	MAIN	BFN	24	
2182	PGRD	S2	002024	IRRI	6846	Irrigation design	116	MAIN	BFN	24	
2181	PGRD	YR	026277	IRRI	8900	Irrigation Science Dissertation	116	MAIN	BFN	180	
2181	PGRD	YR	026278	IRRI	9100	Irrigation Science Thesis	116	MAIN	BFN	360	
2181	PGRD	YR	025751	SCCS	6808	Research project in soil, crop and climate sciences	116	MAIN	BFN	32	
2181	PGRD	S1	025901	SCCS	6814	Research Methodology	116	MAIN	BFN	16	
2182	PGRD	S2	025648	SCCS	6824	Research Project	116	MAIN	BFN	16	
2181	PGRD	YR	026491	SOII	8900	Soil Science Interdisciplinary Dissertation	116	MAIN	BFN	180	

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2181	PGRD	YR	027036	SOII	9100	Soil Science Interdisciplinary Thesis	116	MAIN	BFN	360	
2181	PGRD	S1	025902	SOIL	6814	Soil chemical principles and applications	116	MAIN	BFN	16	
2182	PGRD	S2	025903	SOIL	6824	Soil physical principles and applications	116	MAIN	BFN	16	
2181	PGRD	S1	026449	SOIL	6834	Soil classification principles and applications	116	MAIN	BFN	16	
2182	PGRD	S2	026450	SOIL	6844	Soil biological principles and applications	116	MAIN	BFN	16	
2181	PGRD	YR	025650	SOIL	7904	Land Evaluation	116	MAIN	BFN	16	
2181	PGRD	YR	025651	SOIL	8900	Soil Science Dissertation	116	MAIN	BFN	180	
2181	PGRD	YR	025652	SOIL	9100	Soil Science Thesis	116	MAIN	BFN	360	
2182	PGRD	S2	025652	SOIL	9100	Soil Science Thesis	116	MAIN	BFN	360	
2181	UGRD	S1	027232	ACSF	1613	Actuarial Financial Management	117	MAIN	BFN	12	ACSF1613 Prerequisite:National Senior Certificate (NCS) Mathematics on performance level 5 (60%) or MATD1564 OR MATD1534 OR MATM1584
2182	UGRD	S2	027233	ACSF	1623	Actuarial Financial Reporting	117	MAIN	BFN	12	ACSF 1623 Prerequisite:National Senior Certificate (NCS) Mathematics on performance level 5 (60%) or MATD1564 OR MATD1534 OR MATM1584
2181	UGRD	S1	025223	ACSF	2716	Introductory Financial Mathematics	117	MAIN	BFN	24	ACSF2716 Prerequisite: Students must have passedSTSM1614+STSM1624 and (MATM1614 +MATM1624) in order to continue with this module.
2182	UGRD	S2	025224	ACSF	2726	Financial Mathematics	117	MAIN	BFN	24	ACSF2726 Prerequisite: Students must have passed ACSF2716 in order to continue with this module.
2182	UGRD	S2	025225	ACSF	2746	Advanced Financial Mathematics	117	MAIN	BFN	24	ACSF2746 Prerequisite: Students must have passed ACSF2716 with 60% in order to register for this module.
2181	UGRD	YR	023662	ACSF	3706	Actuarial Financial Economics	117	MAIN	BFN	24	ACSF3706 Prerequisite: Students must have passed MATM2614 + MATA2644 + ACSF2746 in order to register this module.
2181	UGRD	S1	026003	ACSG	1614	Introduction to Actuarial Science	117	MAIN	BFN	16	ACSG1614 Prerequisite: National Senior Certificate (NCS) Mathematics on performance level 5 (60%) MATD1564 OR MATD1534 OR MATM1584
2181	UGRD	YR	021261	ACSL	3706	Actuarial Models	117	MAIN	BFN	24	ACSL3706 Prerequisites: Students must have passed ACSF2746 in order to continue with this module.
2181	UGRD	S1	025227	ACSS	3716	Actuarial Statistical Methods	117	MAIN	BFN	24	ACSS3716 Prerequisite: Students must have passed ACSF2746 and STSMS2626 in order to register for this module.
2181	UGRD	S1	023583	EBCS	1514	Business Calculations	117	MAIN	BFN	16	EBCS1514 Prerequisite: Students must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
2182	UGRD	S2	023596	EBCS	1524	Business Calculations	117	MAIN	BFN	16	EBCS1524 Prerequisite: Students must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
2181	UGRD	S1	023592	ECPM	1514	Calculations for Public Managers	117	MAIN	BFN	16	ECPM51405 Prerequisite: Students must have passed Grade 12 Maths level 3 for the 4 year curriculum and on level 4 for the 3 year curriculum in order to register for this module.
2181	UGRD	S1	025712	EFBC	1514	Business Calculations	117	MAIN	BFN	16	EFBC1514 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 3 (40%) in order to register for this module.
2182	UGRD	S2	025757	ISCI	1624	Introduction to Investment Science	117	MAIN	BFN	16	ISCI1624 Prerequisite: Students must have passed NCS Mathematics on performance level 5 (60%) or MATD1564 OR MATM1534 or MATM1584 in order to continue with this module.
2181	UGRD	S1	025628	ISCI	3714	Investment Science	117	MAIN	BFN	16	ISCI3714 Prerequisite: Students must have passed ISCI1624+ ICSI1624+ACSF2746 + ACSF2726 in order to continue with this module.
2182	UGRD	S2	025999	STSA	1624	Introduction to Statistics	117	MAIN	BFN	16	National Senior Certificate (NCS) Mathematics on performance level 5 (60%) or MATD1564 OR MATD1534 OR MATM1584
2181	UGRD	S1	014057	STSA	2616	Multiple Regression Analysis and Time Series Analysis	117	MAIN	BFN	24	STSA2616 Prerequisite: Students must have passed STSA1624 or EBCS1524 or EFBC2524 in order to continue with this module.
2182	UGRD	S2	014061	STSA	2626	Multiple Regression: Variance and time series analysis	117	MAIN	BFN	24	STSA2626 Prerequisite: Students must have passed STSA2616 in order to register for this module.
2181	UGRD	S1	014068	STSA	3716	Statistical Inference (Applied)	117	MAIN	BFN	24	STSA3716 Prerequisite: Students must have passedSTSA1624 and (MATM1614 or MATM1534) in order to continue with this module.
2182	UGRD	S2	014071	STSA	3726	Applied Regression and Time Series Analysis	117	MAIN	BFN	24	STSA3726 Prerequisite: Students must have passed STSA3716 in order to continue with this module.

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2181	UGRD	S1	023851	STSA	3732	Applied Statistics I	117	MAIN	BFN	8	STSA3732 Prerequisite: Students must have passed STSA2626 in order to continue with this module.
2182	UGRD	S2	023852	STSA	3742	Applied Statistics II	117	MAIN	BFN	8	STSA3742 Prerequisite: Students must have passed STSA3732 in order to continue with this module.
2181	UGRD	S1	016783	STSM	1614	Introductory Statistics	117	MAIN	BFN	16	STSM1614 Prerequisite: NCS Mathematics level 6 (70%) or at least 60% in MATD1564/MATD1534 or a pass in MATM1584 or MATM1534
2182	UGRD	S2	016787	STSM	1624	Introductory Probability Theory	117	MAIN	BFN	16	STSM1624 Prerequisite: Students must have passed STSM1614 + MATM1614 or 75% in MATM1534 in order to continue with this module.
2181	UGRD	S1	016790	STSM	2616	Sample distribution theory and inference	117	MAIN	BFN	24	STSM2616 Prerequisite: Students must have been passed STSM1624 in order to continue with this module.
2182	UGRD	S2	016792	STSM	2626	Inference I	117	MAIN	BFN	24	STSM2626 Prerequisite: Students must have passed STSM2616 in order to register for this module.
2181	UGRD	S1	016795	STSM	3714	Inference	117	MAIN	BFN	16	STSM3714: Student must have passed MATM1624 or MATM1544 and STSM2626 in order to continue with module.
2182	UGRD	S2	016797	STSM	3724	Multivariate Analysis	117	MAIN	BFN	16	STSM3724 Prerequisite: Students must have passed MATM1624 or MATM1544 and STSM3714 in order to continue with this module.
2181	UGRD	S1	026004	STSM	3734	Causal inference: ANOVA, regression, and the potential outcomes approach	117	MAIN	BFN	16	STSM3734 Prerequisite: Students must have passed STSM2626 in order to continue with module.
2182	UGRD	S2	025653	STSM	3744	Time Series Analysis and GLMs	117	MAIN	BFN	16	STSM3744 Prerequisite: Students must have passed STSM3714 + STSM3734 in order to register for this module.
2181	UGRD	S1	023583	EBCS	1514	Business Calculations	117	MAIN	EOFF	16	EBCS1514 Prerequisite: Students must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
2182	UGRD	S2	023596	EBCS	1524	Business Calculations	117	MAIN	EOFF	16	EBCS1524 Prerequisite: Students must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
2181	UGRD	S1	022243	SKL	114	Introduction to Statistics I	117	MAIN	EOFF	16	NONENONE
2182	UGRD	S2	022244	SKL	124	Introduction to Statistics II	117	MAIN	EOFF	16	
2181	UGRD	S1	026281	STSL	1514	Introductory Statistics I	117	MAIN	EOFF	16	None
2182	UGRD	S2	026282	STSL	1524	Introductory Statistics II	117	MAIN	EOFF	16	None
2181	UGRD	S1	023583	EBCS	1514	Business Calculations	117	QWA	QWAQWA	16	EBCS1514 Prerequisite: Students must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
2182	UGRD	S2	023596	EBCS	1524	Business Calculations	117	QWA	QWAQWA	16	EBCS1524 Prerequisite: Students must have passed Grade 12 Maths on performance level 3 (40%) in order to register for this module.
2181	UGRD	S1	023592	ECPM	1514	Calculations for Public Managers	117	QWA	QWAQWA	16	ECPM51405 Prerequisite: Students must have passed Grade 12 Maths level 3 for the 4 year curriculum and on level 4 for the 3 year curriculum in order to register for this module.
2181	UGRD	S1	025712	EFBC	1514	Business Calculations	117	QWA	QWAQWA	16	EFBC1514 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 3 (40%) in order to register for this module.
2181	UGRD	S1	023597	EFBC	2514	Business Calculations	117	QWA	QWAQWA	16	EFBC2514 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 3 for the 4 year curriculum and on level 4 for the 3 year curriculum in order to register for this module.
2182	UGRD	S2	023598	EFBC	2524	Business Calculations	117	QWA	QWAQWA	16	EFBC2524 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 3 for the 4 year curriculum and on level 4 for the 4 year curriculum.
2182	UGRD	S2	025999	STSA	1624	Introduction to Statistics	117	QWA	QWAQWA	16	National Senior Certificate (NCS) Mathematics on performance level 5 (60%) or MATD1564 OR MATD1534 OR MATM1584
2181	UGRD	S1	023597	EFBC	2514	Business Calculations	117	SOUTH	SOUTH	16	EFBC52514 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 3 for the 4 year curriculum and on level 4 for the 3 year curriculum in order to register for this module.
2182	UGRD	S2	023598	EFBC	2524	Business Calculations	117	SOUTH	SOUTH	16	EFBC2524 Prerequisite: Students must have passed Grade 12 Mathematics on performance level 3 for the 4 year curriculum and on level 4 for the 4 year curriculum.
2181	PGRD	YR	025420	ACSD	7900	Dissertation	117	MAIN	BFN	120	Selection for MSc Majoring in Actuarial Science

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2181	PGRD	YR	023669	ACSG	6800	Actuarial Asset and Liability Management	117	MAIN	BFN	60	ACSG6800 Prerequisite: 5 exemptions from Actuarial Society of South Africa subjects
2181	PGRD	YR	027157	ACSG	6890	Introduction to Actuarial Asset and Liability Management	117	MAIN	BFN	30	ACSG6890 Prerequisite: 5 exemptions from Actuarial Society of South Africa subjects
2181	PGRD	YR	023670	ACSG	7900	Actuarial Asset and Liability Management	117	MAIN	BFN	60	ACSG7900 Prerequisite: 5 exemptions from Actuarial Society of South Africa subjects
2181	PGRD	YR	025309	ACSG	8900	Actuarial Science	117	MAIN	BFN	180	ACSG8900 Prerequisite: Selection for MSc majoring in Actuarial Science
2181	PGRD	S1	026212	ACSH	7910	Specialist Health Insurance	117	MAIN	BFN	30	ACSH7910 Prerequisite: 5 exemptions from Actuarial Society of South Africa subjects
2182	PGRD	S2	026213	ACSH	7920	Specialist Health Insurance	117	MAIN	BFN	30	ACSH7920 Prerequisite: 5 exemptions from Actuarial Society of South Africa subjects
2181	PGRD	S1	026214	ACSI	7910	Specialist Investments	117	MAIN	BFN	30	ACSI7910 Prerequisite: 5 exemptions from Actuarial Society of South Africa subjects
2182	PGRD	S2	026215	ACSI	7920	Specialist Investments	117	MAIN	BFN	30	ACSI7920 Prerequisite: 5 exemptions from Actuarial Society of South Africa subjects
2181	PGRD	S1	001075	ACSL	6815	Actuarial Contingencies	117	MAIN	BFN	20	ACSL6815 Prerequisite: 4 exemptions from Actuarial Society of South Africa subjects
2181	PGRD	S1	026216	ACSL	7910	Specialist Life Insurance	117	MAIN	BFN	30	ACSL7910 Prerequisite: 5 exemptions from Actuarial Society of South Africa subjects
2182	PGRD	S2	026217	ACSL	7920	Specialist Life Insurance	117	MAIN	BFN	30	ACSL7920 Prerequisite: 5 exemptions from Actuarial Society of South Africa subjects
2181	PGRD	YR	025226	ACSR	6808	Actuarial Modelling and Literature Study	117	MAIN	BFN	32	ACSR6808 Prerequisite:Selection for BScHons majoring in Actuarial Science
2181	PGRD	YR	024877	ACSR	7900	Short Dissertation	117	MAIN	BFN	60	ACSR7900 Prerequisite:BScHons majoring in Actuarial Science, 65% for ACSR6808
2181	PGRD	YR	025396	ACST	8900	Actuarial Science	117	MAIN	BFN	180	ACST8900 Prerequisite: 5 Selection for MSc majoring in Actuarial Science
2181	PGRD	YR	024878	ACST	9100	Actuarial Sciences Thesis	117	MAIN	BFN	360	ACST9100 Prerequisite: 5 Selection for PhD majoring in Actuarial Science
2181	PGRD	S1	022927	STSA	6815	Multivariate Methods	117	MAIN	BFN	20	STSA6815 Prerequisite:STSA6815 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744)in order to register for this module.
2182	PGRD	S2	022949	STSA	6825	Data Mining	117	MAIN	BFN	20	STSA6825 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744)in order to register for this module.
2181	PGRD	S1	022928	STSA	7910	Multivariate Methods	117	MAIN	BFN	30	STSA7910 PrerequisiteThis module may not be registered if STSA6815 has already been completed.
2181	PGRD	YR	026445	STSA	8900	Statistics Dissertation	117	MAIN	BFN	180	STSA8900 Prerequisite: Selection for MSc majoring in Statistics
2181	PGRD	YR	026454	STSA	9100	Statistics Thesis	117	MAIN	BFN	360	STSA9100 Prerequisite: Selection for PhD majoring in Statistics
2181	PGRD	S1	027160	STSB	6810	Bayes Analysis	117	MAIN	BFN	30	STSB6810 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module.
2181	PGRD	S1	022822	STSB	7910	Bayes Analysis	117	MAIN	BFN	30	STSB7910 Prerequisite:This module may not be registered if STSB6815 has already been completed.
2182	PGRD	S2	022929	STSC	6825	Categorical Data Analysis	117	MAIN	BFN	20	STSC6825 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module.
2181	PGRD	YR	024881	STSD	7900	Mini Dissertation	117	MAIN	BFN	120	Selection MSc majoring in Statistic or Mathematical Statistics
2181	PGRD	S1	025896	STSE	6815	Modelling Extremal Events	117	MAIN	BFN	20	STSE6815 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module.
2182	PGRD	S2	022945	STSE	6825	Modelling Extremal Events	117	MAIN	BFN	20	STSE6815 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module.

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2181	PGRD	S1	025897	STSE	7910	Modelling Extreme Events	117	MAIN	BFN	30	STSF7910 Prerequisite:This module may not be registered if STSE6825 has already been completed.
2182	PGRD	S2	022946	STSE	7920	Modelling Extreme Events	117	MAIN	BFN	30	STSF7920 Prerequisite:This module may not be registered if STSE6825 has already been completed.
2181	PGRD	S1	022828	STSF	6815	Financial Times Series	117	MAIN	BFN	20	STSF6815 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module. in order to register for this module.
2182	PGRD	S2	022935	STSF	6825	Risk Analysis	117	MAIN	BFN	20	STSF6825 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module. in order to register for this module.
2182	PGRD	S2	025904	STSF	6845	Econometrics	117	MAIN	BFN	20	STSF6845 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module.
2181	PGRD	S1	022899	STSF	7910	Financial Time Series	117	MAIN	BFN	30	STSF7910 Prerequisite: This module may not be registered if STSF6815 has already been completed.
2182	PGRD	S2	022936	STSF	7920	Risk Analysis	117	MAIN	BFN	30	STSF7920 Prerequisite: This module may not be registered if STSF6825 has already been completed.
2182	PGRD	S2	022940	STSF	7940	Econometrics	117	MAIN	BFN	30	STSF7940 Prerequisite: This module may not be registered if STSF6845 has already been completed.
2181	PGRD	S1	022823	STSM	6815	Regression Analysis	117	MAIN	BFN	20	STSM6815 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module. in order to register for this module.
2182	PGRD	S2	022941	STSM	6825	Generalised Linear Models	117	MAIN	BFN	20	STSM6825 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module. in order to register for this module.
2182	PGRD	S2	022947	STSM	6845	Mixed Linear Models	117	MAIN	BFN	20	STSM6845 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module. in order to register for this module.
2182	PGRD	S2	022942	STSM	7920	Generalised Linear Models	117	MAIN	BFN	30	STSM7920 Prerequisite: Students must have passed STSM6825 in order to register for this module.
2182	PGRD	S2	022948	STSM	7940	Mixed Linear Models	117	MAIN	BFN	30	STSM7940 Prerequisite: Students must have passed STSM6845 in order to register for this module.
2181	PGRD	YR	022951	STSM	8900	Mathematical Statistics Dissertation	117	MAIN	BFN	180	STSX7920 Prerequisite: Selection for MSc majoring in Statistics or Mathematical Statistics.
2181	PGRD	YR	025168	STSM	9100	Mathematical Statistics Thesis	117	MAIN	BFN	360	STSM9100 Prerequisite: Selection for PhD Statistics or Mathematical Statistics
2181	PGRD	S1	025905	STSP	6815	Stochastic Processes	117	MAIN	BFN	20	STSP6815 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module. in order to register for this module.
2182	PGRD	S2	022943	STSP	6825	Statistical Programming	117	MAIN	BFN	20	STSP6815 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module. in order to register for this module.
2181	PGRD	S1	022825	STSP	7910	Stochastic Processes	117	MAIN	BFN	30	STSP7910 Prerequisite: Students may not have passed STSP6815 in order to register for this module.
2182	PGRD	S2	022944	STSP	7920	Statistical Programming	117	MAIN	BFN	30	STSP7920 Prerequisite: MATM2654 or STSS6815 or STSS7190. This module may not be registered if STSP6825 has already been completed.
2181	PGRD	YR	022950	STSR	6808	Statistical Modelling en Literature Study	117	MAIN	BFN	32	STSR6808 Prerequisite:Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module. in order to register for this module.

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2182	PGRD	S2	022937	STSR	6825	Reliability and Survival Analysis	117	MAIN	BFN	20	STSR6825 Prerequisite: Students must have passed STSP6815 in order to register this module.
2181	PGRD	YR	022952	STSR	7900	Mini-dissertation	117	MAIN	BFN	60	STSR7900 Prerequisite:BScHons (Statistics or Mathematical Statistics); 65% for STSR6808
2182	PGRD	S2	022938	STSR	7920	Reliability and Survival Analysis	117	MAIN	BFN	30	STSR7920 Prerequisite: Students must have passed STSP6815 or STSP7910 in order to continue with this module.
2181	PGRD	S1	027161	STSS	6810	Stochastic Simulation	117	MAIN	BFN	30	STSR6810 Prerequisite: MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module.
2181	PGRD	S1	022826	STSS	6815	Stochastic Simulation	117	MAIN	BFN	20	STSS6815 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module.
2182	PGRD	S2	024879	STSS	6825	Sampling Techniques	117	MAIN	BFN	20	STSS6825 Prerequisite: Students must have passed MATM1614 & MATM1624, as well as a minimum average mark of 65% in (STSA2616+2626+3716+3726) or 60% in (STSM3714+3724+3734+3744) in order to register for this module. in order to register for this module.
2181	PGRD	S1	022827	STSS	7910	Stochastic Simulation	117	MAIN	BFN	30	STSS7910 Prerequisite:This module may not be registered if STSS6815 has already been completed.
2182	PGRD	S2	024880	STSS	7920	Sampling Techniques	117	MAIN	BFN	30	STSS7920 Prerequisite: This module may not be registered if STSS6815 has already been completed.
2181	PGRD	YR	025120	STST	9100	Statistics Thesis	117	MAIN	BFN	360	STST9100 Prerequisite: Selection for PhD Statistics or Mathematical Statistics
2182	PGRD	S2	025898	STSX	6825	Capita Selecta	117	MAIN	BFN	20	STSX6825 Prerequisite: Selection for BScHons majoring in Statistics or Mathematical Statistics.
2181	PGRD	S1	022933	STSX	7910	Capita Selecta	117	MAIN	BFN	30	STSX7910 Prerequisite: Selection for MSc majoring in Statistics or Mathematical Statistics.
2182	PGRD	S2	022934	STSX	7920	Capita Selecta	117	MAIN	BFN	30	STSX7920 Prerequisite: Selection for MSc majoring in Statistics or Mathematical Statistics.
2181	PGRD	YR	025906	UMRD	8900	Urban and Regional Planning Dissertation	118	MAIN	BFN	180	Selection for Hons
2181	PGRD	YR	027389	URBP	6805	Basic Practice in Urban and Regional Planning	118	MAIN	BFN	20	Selection for Hons
2181	PGRD	YR	024738	URBP	6806	Basic Practice in Urban and Regional Planning	118	MAIN	BFN	24	Selection for Hons
2181	PGRD	S1	024739	URCS	6812	Capita Selecta in Planning	118	MAIN	BFN	8	Selection for Hons
2181	PGRD	S1	024762	URCS	6814	Capita Selecta in Planning	118	MAIN	BFN	16	Selection for Hons
2181	PGRD	S1	024757	URCS	7912	Capita Selecta in Planning	118	MAIN	BFN	8	Selection for Masters
2181	PGRD	S1	024764	URCS	7913	Capita Selecta in Planning	118	MAIN	BFN	12	Selection for Masters
2181	PGRD	S1	024741	URCS	7914	Capita Selecta in Planning	118	MAIN	BFN	16	Selection for Masters
2181	PGRD	S1	024766	URCS	7916	Capita Selecta in Planning	118	MAIN	BFN	24	Selection for Masters
2182	PGRD	S2	024758	URCS	7922	Capita Selecta in Planning	118	MAIN	BFN	8	Selection for Masters
2182	PGRD	S2	024742	URCS	7924	Capita Selecta in Planning	118	MAIN	BFN	16	Selection for Masters
2181	PGRD	S1	023867	URDP	7912	Research proposal	118	MAIN	BFN	8	Selection for Masters
2182	PGRD	S2	024759	URDP	7922	Dissertation Proposal in Urban and Regional Planning	118	MAIN	BFN	8	Selection for Masters
2181	PGRD	S1	027388	UREP	6813	Research in Environmental Planning	118	MAIN	BFN	12	Selection for Hons
2181	PGRD	S1	024743	UREP	6814	Research in Environmental Planning	118	MAIN	BFN	16	Selection for Hons
2182	PGRD	S2	027387	UREP	6823	Research in Environmental Planning	118	MAIN	BFN	12	Selection for Hons
2181	PGRD	S1	023221	URFP	7912	Futurology for Planning	118	MAIN	BFN	8	Selection for Masters
2182	PGRD	S2	025654	URFP	7922	Futurology for Planning	118	MAIN	BFN	8	Selection for Masters
2181	PGRD	YR	024760	URGI	7904	Geographic Information Systems for Planners	118	MAIN	BFN	16	Selection for Masters

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2181	PGRD	YR	026283	URHA	6804	Human Settlement Management and Administration	118	MAIN	BFN	16	Selection for Hons
2181	PGRD	S1	027402	URHS	6813	Housing for Planners	118	MAIN	BFN	12	Selection for Hons
2181	PGRD	S1	027297	URHS	6814	Human Settlements Planning	118	MAIN	BFN	16	Selection for Hons
2181	PGRD	S1	024768	URHS	7913	Housing for Planners	118	MAIN	BFN	12	Selection for Masters
2182	PGRD	S2	024769	URHS	7923	Housing for Planners	118	MAIN	BFN	12	Selection for Masters
2181	PGRD	YR	023443	URHS	8900	Dissertation in Housing	118	MAIN	BFN	180	
2182	PGRD	S2	023443	URHS	8900	Dissertation in Housing	118	MAIN	BFN	180	
2181	PGRD	YR	025750	URHS	9100	Urban and Regional Planning Thesis	118	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	026284	URHT	6804	Human Settlements Theory	118	MAIN	BFN	16	Selection for Hons
2181	PGRD	S1	020406	URID	7912	Integrated Development Planning	118	MAIN	BFN	8	Selection for Masters
2182	PGRD	S2	025667	URID	7922	Integrated Development Planning	118	MAIN	BFN	8	Selection for Masters
2181	PGRD	S1	027386	URLM	6813	Land Use Management	118	MAIN	BFN	12	Selection for Hons
2181	PGRD	S1	024745	URLM	6814	Land Use Management	118	MAIN	BFN	16	Selection for Hons
2182	PGRD	S2	024746	URLM	6824	Land Use Management	118	MAIN	BFN	16	Selection for Hons
2181	PGRD	S1	020402	URLM	7912	Planning Management	118	MAIN	BFN	8	Selection for Masters
2182	PGRD	S2	025655	URLM	7922	Planning Management	118	MAIN	BFN	8	Selection for Masters
2181	PGRD	YR	027385	URMD	6808	Urban and Regional Planning Research Report	118	MAIN	BFN	32	Selection for Hons
2181	PGRD	YR	024770	URMD	7900	Extended Research Essay	118	MAIN	BFN	88	Selection for Masters
2181	PGRD	YR	025666	URMD	8900	Dissertation	118	MAIN	BFN	180	
2181	PGRD	YR	025665	URPD	9100	Urban and Regional Planning Thesis	118	MAIN	BFN	360	Selection PhD
2182	PGRD	S2	025665	URPD	9100	Urban and Regional Planning Thesis	118	MAIN	BFN	360	Selection PhD
2181	PGRD	S1	024771	URPP	7914	Professional Practice in Urban and Regional Planning	118	MAIN	BFN	16	Selection for Masters
2182	PGRD	S2	024772	URPP	7924	Professional Practice in Urban and Regional Planning	118	MAIN	BFN	16	Selection for Masters
2181	PGRD	YR	024747	URPT	6804	Research in Theory of Planning	118	MAIN	BFN	16	Selection for Hons
2181	PGRD	YR	027384	URPT	7904	Research in Theory of Planning	118	MAIN	BFN	16	Selection for Masters
2181	PGRD	S1	021088	URRA	7912	Planning for Rural Areas	118	MAIN	BFN	8	Selection for Masters
2182	PGRD	S2	025668	URRA	7922	Planning for Rural Areas	118	MAIN	BFN	8	Selection for Masters
2181	PGRD	S1	027383	URRE	6813	Research in Economics for Planners	118	MAIN	BFN	12	Selection for Hons
2181	PGRD	S1	024748	URRE	6814	Research in Economics for Planners	118	MAIN	BFN	16	Selection for Hons
2182	PGRD	S2	027401	URRE	6823	Research in Economics for Planners	118	MAIN	BFN	12	Selection for Hons
2182	PGRD	S2	024749	URRE	6824	Research in Economics for Planners	118	MAIN	BFN	16	Selection for Hons
2181	PGRD	S1	024773	URRM	7914	Research Methodologies for Planners	118	MAIN	BFN	16	Selection for Masters
2182	PGRD	S2	024774	URRM	7924	Research Methodologies for Planners	118	MAIN	BFN	16	Selection for Masters
2181	PGRD	YR	007014	URRP	7902	Introductory Studies in Regional Planning	118	MAIN	BFN	8	Selection for Masters
2181	PGRD	YR	024756	URRP	7906	Applied Regional Planning Project	118	MAIN	BFN	24	Selection for Masters
2181	PGRD	YR	026494	URRR	6805	Research Essay in Human Settlements	118	MAIN	BFN	20	Selection for Hons
2181	PGRD	YR	027382	URRT	6803	Research in Regional Planning Theory	118	MAIN	BFN	12	Selection for Hons
2181	PGRD	YR	024750	URRT	6805	Research in Regional Planning Theory	118	MAIN	BFN	20	Selection for Hons
2181	PGRD	S1	027381	URSC	6813	Research in Socio-Cultural Aspects in Planning	118	MAIN	BFN	12	Selection for Hons
2181	PGRD	S1	024751	URSC	6814	Research in Socio-Cultural Aspects in Planning	118	MAIN	BFN	16	Selection for Hons

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2182	PGRD	S2	027400	URSC	6823	Research in Socio-Cultural Aspects in Planning	118	MAIN	BFN	12	Selection for Hons
2182	PGRD	S2	024752	URSC	6824	Research in Socio-Cultural Aspects in Planning	118	MAIN	BFN	16	Selection for Hons
2181	PGRD	S1	020415	URTD	7912	Planning for Tourism	118	MAIN	BFN	8	Selection for Masters
2182	PGRD	S2	025669	URTD	7922	Planning for Tourism	118	MAIN	BFN	8	Selection for Masters
2181	PGRD	S1	020419	URTP	7912	Transportation planning for planners	118	MAIN	BFN	8	Selection for Masters
2182	PGRD	S2	025723	URTP	7922	Transportation planning for planners	118	MAIN	BFN	8	Selection for Masters
2181	PGRD	YR	024753	URUP	7906	Urban Research Project	118	MAIN	BFN	24	Selection for Masters
2181	PGRD	YR	027380	URUT	6803	Research in Urban Development Theory	118	MAIN	BFN	12	Selection for Hons
2181	PGRD	YR	024754	URUT	6804	Research in Urban Development Theory	118	MAIN	BFN	16	Selection for Hons
2181	PGRD	S1	025504	URUT	7912	Geography for Planners	118	MAIN	BFN	8	Selection for Masters
2182	PGRD	S2	020405	URUT	7922	Geography for Planners	118	MAIN	BFN	8	Selection for Masters
2182	PGRD	S2	023241	VMB	614	Urbanisation	118	MAIN	BFN	16	
2182	UGRD	S2	023972	BLGY	1663	Introduction to Zoology and Entomology	119	MAIN	BFN	12	BLGY1663 Prerequisite: Students must have passed BLGY1513 in order to continue with this module.
2181	UGRD	S1	024755	ENTO	2614	Introduction to Morphology, Anatomy and Bio-ecology of Insects	119	MAIN	BFN	16	ENTO 2614: Student must have completed the first year of BAgric or BSc Agric to continue with module.
2181	UGRD	S1	004168	ENTO	2616	Functional Morphology and Evolutionary Biology of Insects	119	MAIN	BFN	24	ENTO2616 Prerequisite: Students must have passed BLGY1513 and BLGY1663 (only relevant to BSc students) in order to register for this module.
2182	UGRD	S2	004171	ENTO	2626	Ecophysiology of Insects	119	MAIN	BFN	24	ENTO2626: Student must have passed BLGY1513 and BLGY1663 and ENTO2616 on order to continue with module.
2181	UGRD	S1	020061	ENTO	3714	Advanced Insect Ecology	119	MAIN	BFN	16	ENTO3714: Student must have passed ENTO2626 in order to continue with module.
2182	UGRD	S2	020052	ENTO	3724	Applied Insect Pest Management	119	MAIN	BFN	16	ENTO3724 Prerequisite: Students must have passed ENTO2626 and ENTO3714 in order to register for this module.
2181	UGRD	S1	004185	ENTO	3734	Advanced Medical, Veterinary and Forensic Entomology	119	MAIN	BFN	16	ENTO3734: Student must have passed ENTO2616 and ENTO2626 in order to continue with module.
2182	UGRD	S2	004187	ENTO	3744	Applied Insect Biochemistry and Pharmacology	119	MAIN	BFN	16	ENTO3744: Student must have passed ENTO2626 and ENTO3714 in order to continue with module.
2181	UGRD	S1	021237	ENTO	3754	Agricultural Entomology	119	MAIN	BFN	16	ENTO3754: Student must have passed ENTO2616 and ENTO2626 in order to continue with module.
2181	UGRD	S1	003133	ZLGY	2616	Animals of medical and veterinary importance	119	MAIN	BFN	24	ZLGY2616 Prerequisite: Students must have passed BLGY1513 and BLGY1663 in order to register for this module.
2182	UGRD	S2	003136	ZLGY	2626	Vertebrate Life and Evolution	119	MAIN	BFN	24	ZLGY2626: Student must have passed ZLGY2616 in order to continue with module.
2181	UGRD	S1	020054	ZLGY	3714	Marine and Freshwater Ecology	119	MAIN	BFN	16	ZLGY3714: Student must have passed ZLGY2626 in order to continue with module.
2182	UGRD	S2	020063	ZLGY	3724	Life Strategies in Arid Environment	119	MAIN	BFN	16	ZLGY3724 Prerequisite: Students must have passed ZLGY2626 in order to register for this module.
2181	UGRD	S1	003151	ZLGY	3734	Conservation Ecology	119	MAIN	BFN	16	ZLGY3734 : Students must have passed ZLGY2626 in order to register for this module.
2182	UGRD	S2	003154	ZLGY	3744	Animal Behaviour	119	MAIN	BFN	16	ZLGY3744: Student must have passed ZLGY2626 in order to continue with module.
2181	UGRD	YR	027156	BIOL	1504	Lower life and molecular biology	119	QWA	QWAQWA	16	
2181	UGRD	S1	024562	BIOL	1514	Lower life and molecular biology	119	QWA	QWAQWA	16	
2182	UGRD	S2	024563	BIOL	1644	Animal Biology	119	QWA	QWAQWA	16	BIOL1644 Prerequisite: Students must have passed BIOL1514 in order to continue with this module.
2181	UGRD	S1	024595	BIOL	2614	Evolution, genetics and diversity	119	QWA	QWAQWA	16	BIOL2614 Prerequisite: Students must have passed BIOL1624 and BIOL1644 in order to continue with this module.
2181	UGRD	S1	024680	BIOL	3714	Human ecological footprint	119	QWA	QWAQWA	16	
2182	UGRD	S2	024681	BIOL	3724	Macroevolution and speciation	119	QWA	QWAQWA	16	BIOL3724 Prerequisite: Students must have passed BIOL2614 in order to continue with this module.

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2182	UGRD	S2	024599	UNIR	2624	Insect ecophysiology	119	QWA	QWAQWA	16	
2182	UGRD	S2	024601	UNIR	3724	Applied entomology	119	QWA	QWAQWA	16	
2181	UGRD	S1	024701	UNIR	3734	Medical, veterinary and forensic entomology	119	QWA	QWAQWA	16	UNIR3734 Prerequisite: Students must have passed UNIR2624 in order to continue with this module.
2182	UGRD	S2	024702	UNIR	3744	Insect biochemistry and pharmacology	119	QWA	QWAQWA	16	
2181	UGRD	S1	024700	ZOOL	2614	Basic entomology	119	QWA	QWAQWA	16	
2181	UGRD	S1	024596	ZOOL	2634	Invertebate biodiversity	119	QWA	QWAQWA	16	
2182	UGRD	S2	024598	ZOOL	2664	African vertebrates	119	QWA	QWAQWA	16	BIOL2664 Prerequisite: Students must have passed BIOL1514 in order to continue with this module.
2182	UGRD	S2	024761	ZOOL	2684	Introduction to Parasitology	119	QWA	QWAQWA	16	ZOOL2684 Prerequisite: Students must have passed BIOL2614 in order to continue with this module.
2181	UGRD	S1	024695	ZOOL	3714	Introduction to Animal Behaviour	119	QWA	QWAQWA	16	ZOOL3764 Prerequisite: Students must have passed BIOL2644 in order to continue with this module.
2182	UGRD	S2	024695	ZOOL	3714	Introduction to Animal Behaviour	119	QWA	QWAQWA	16	ZOOL3764 Prerequisite: Students must have passed BIOL2644 in order to continue with this module.
2182	UGRD	S2	026555	ZOOL	3724	Ecotoxicology	119	QWA	QWAQWA	16	ZOOL3724 Prerequisite: Students must hav epassed BIOL2634 in order to continue with this module.
2181	UGRD	S1	024600	ZOOL	3734	Insect ecophysiology	119	QWA	QWAQWA	16	UNIR3714 Prerequisite: Students must have passed UNIR2624 in order to continue with this module.
2182	UGRD	S2	024693	ZOOL	3744	Molecular parasitology	119	QWA	QWAQWA	16	ZOOL3744 Prerequisite: Students must have passed ZOOL2684 in order to continue with this module.
2181	UGRD	S1	024694	ZOOL	3754	Freshwater and marine ecology	119	QWA	QWAQWA	16	ZOOL3754 Prerequisite: Students must have passed BIOL2644 in order to continue with this module.
2181	PGRD	YR	020717	ENTO	6808	Research Project Entomology	119	MAIN	BFN	32	Selection BScHons
2181	PGRD	Q1	025714	ENTO	6814	Research techniques, scientific methodology and scientific communication	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025714	ENTO	6814	Research techniques, scientific methodology and scientific communication	119	MAIN	BFN	16	Selection BScHons
2182	PGRD	Q3	004202	ENTO	6822	Quantitative Ecology	119	MAIN	BFN	8	Selection BScHons
2181	PGRD	Q2	004203	ENTO	6832	Biodiversity, Evolution & Biogeography	119	MAIN	BFN	8	Selection BScHons
2182	PGRD	Q4	004204	ENTO	6842	The Environment	119	MAIN	BFN	8	Selection BScHons
2181	PGRD	Q1	004205	ENTO	6854	Insect-Plant Interactions	119	MAIN	BFN	16	Selection BScHons
2182	PGRD	Q3	004206	ENTO	6864	Medical and Veterinary Entomology	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	Q2	004207	ENTO	6874	Forensic Entomology	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004207	ENTO	6874	Forensic Entomology	119	MAIN	BFN	16	Selection BScHons
2182	PGRD	Q4	004208	ENTO	6884	Advanced Pest Management	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	004210	ENTO	6894	Capita selecta in Entomology	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025324	ENTO	8900	Entomology Dissertation	119	MAIN	BFN	180	ENTO8900: Student must have passed an Honours degree in Entomology to continue with course.
2181	PGRD	YR	025415	ENTO	9100	Entomology Thesis	119	MAIN	BFN	360	ENTO9100: Student must have passed a MSc in Entomology in order to continue with course.
2181	PGRD	YR	020641	ZLGY	6808	Zoology Research Project	119	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	003168	ZLGY	6814	Research Techniques, Scientific Methodology and Scientific Communication	119	MAIN	BFN	16	Selection BScHons
2182	PGRD	Q3	003169	ZLGY	6822	Quantitative Ecology	119	MAIN	BFN	8	Selection BScHons
2182	PGRD	S2	003169	ZLGY	6822	Quantitative Ecology	119	MAIN	BFN	8	Selection BScHons
2181	PGRD	Q2	003171	ZLGY	6832	Biodiversity, Evolution & Biogeography	119	MAIN	BFN	8	Selection BScHons
2181	PGRD	Q1	023318	ZLGY	6834	Wetland Ecology	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	023318	ZLGY	6834	Wetland Ecology	119	MAIN	BFN	16	Selection BScHons

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2182	PGRD	Q4	003172	ZLGY	6842	The Environment	119	MAIN	BFN	8	Selection BScHons
2181	PGRD	Q1	003173	ZLGY	6854	Veterinary Ectoparasitology	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	003173	ZLGY	6854	Veterinary Ectoparasitology	119	MAIN	BFN	16	Selection BScHons
2182	PGRD	Q3	003174	ZLGY	6864	Animal Behaviour	119	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	003174	ZLGY	6864	Animal Behaviour	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	Q2	003175	ZLGY	6874	Aquatic Parasitology	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	003175	ZLGY	6874	Aquatic Parasitology	119	MAIN	BFN	16	Selection BScHons
2182	PGRD	Q4	003176	ZLGY	6884	African Ornithology	119	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	003176	ZLGY	6884	African Ornithology	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	003178	ZLGY	6894	Capita selecta in Zoology	119	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	026453	ZLGY	8900	Zoology Dissertation	119	MAIN	BFN	180	Selection MSc
2182	PGRD	S2	026453	ZLGY	8900	Zoology Dissertation	119	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	026027	ZLGY	9100	Zoology Thesis	119	MAIN	BFN	360	Selection PhD
2181	PGRD	YR/S2	025424	ZOOL	8900	Zoology Dissertation	119	MAIN/ QWA	BFN	180	Selection MSc
2181	PGRD	YR	024682	BIOL	6808	Research essay	119	QWA	QWAQWA	32	Selection BScHons
2181	PGRD	Q1	026029	BIOL	6814	Scientific methodology and communication	119	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	024683	BIOL	6824	Current events in science	119	QWA	QWAQWA	16	BIOL6824 Prerequisite: Students must have passed BIOL3714 in order to continue with this module.
2181	PGRD	S1	024684	BIOL	6834	Advanced biostatistics	119	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	025430	BIOL	6844	Advanced biostatistics	119	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	YR	025439	LFSC	8900	Life Science Dissertation	119	QWA	QWAQWA	180	Selection MSc
2181	PGRD	YR	025767	LFSC	9100	Life Sciences Thesis	119	QWA	QWAQWA	360	Selection PhD
2181	PGRD	YR	026446	UNIR	6808	Entomology Research Project	119	QWA	QWAQWA	32	Selection BScHons
2181	PGRD	S1	024703	UNIR	6814	Science reading course	119	QWA	QWAQWA	16	UNIR6814 Prerequisite: Students must have passed UNIR3714 in order to continue with this module.
2181	PGRD	YR	026447	UNIR	8900	Entomology Dissertation	119	QWA	QWAQWA	180	Selection MSc
2181	PGRD	YR	026448	UNIR	9100	Entomology Thesis	119	QWA	QWAQWA	360	Selection PhD
2181	PGRD	YR	026451	ZOOL	6808	Zoology Research Report	119	QWA	QWAQWA	32	Selection BScHons
2181	PGRD	S1	024696	ZOOL	6814	Applied behavioural ecology	119	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	024697	ZOOL	6824	Veterinary parasitology	119	QWA	QWAQWA	16	Selection BScHons
2182	PGRD	S2	024698	ZOOL	6844	Biosystematics	119	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	S1	024699	ZOOL	6854	Immunology	119	QWA	QWAQWA	16	Selection BScHons
2181	PGRD	YR	025424	ZOOL	8900	Zoology Dissertation	119	QWA	QWAQWA	180	Selection MSc
2181	PGRD	YR	026452	ZOOL	9100	Zoology Thesis	119	QWA	QWAQWA	360	Selection PhD
2181	PGRD	S1	025322	DIME	7910	Management of Media Relations	123	MAIN	BFN	30	
2181	PGRD	YR	025550	DIMG	7900	Information Management Disaster Management	123	MAIN	BFN	30	
2181	PGRD	S1	027071	DIMH	7910	Crisis Intervention and Trauma Management	123	MAIN	BFN	30	
2181	PGRD	S1	027139	DIMI	5810	Introduction to Disaster Management	123	MAIN	BFN	15	
2181	PGRD	S1	025258	DIMI	7910	Disaster Risk and Impact Assessment	123	MAIN	BFN	60	
2181	PGRD	S1	027080	DIML	5810	Legal and institutional arrangements for disaster managers	123	MAIN	BFN	15	
2181	PGRD	S1	002839	DIMM	5810	Theoretical Models for disaster risk reduction	123	MAIN	BFN	15	
2181	PGRD	S1	025688	DIMM	7910	Management of Media Relations	123	MAIN	BFN	30	

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2182	PGRD	S2	002844	DIMN	5820	Management of Natural and Human-Made Disasters	123	MAIN	BFN	15	
2182	PGRD	S2	002843	DIMP	5820	Public Health in Disaster Managament	123	MAIN	BFN	15	
2181	PGRD	YR	027083	DIMP	7900	Political Strategic Planning	123	MAIN	BFN	30	
2181	PGRD	S1	027084	DIMR	5810	Research design and methodology	123	MAIN	BFN	15	
2181	PGRD	YR	027066	DIMR	7900	Disaster Management Mini-Dissertation	123	MAIN	BFN	120	
2182	PGRD	S2	027085	DIMS	5820	Strategic Disaster Management	123	MAIN	BFN	15	
2182	PGRD	S2	027086	DIMT	5820	Information Technology in Disaster Management	123	MAIN	BFN	15	
2182	PGRD	S2	023902	DISM	9100	Disaster Management	123	MAIN	BFN	360	
2181	PGRD	YR	025097	DSMT	9100	Disaster Management Thesis	123	MAIN	BFN	360	
2182	PGRD	S2	025097	DSMT	9100	Disaster Management Thesis	123	MAIN	BFN	360	
2182	UGRD	S2	023971	BLGY	1623	Introduction to Genetics	124	MAIN	BFN	12	BLGY1623 Prerequisite: Students must have passed BLGY1513
2181	UGRD	S1	023975	FORS	2616	Introductory Forensic Science	124	MAIN	BFN	24	FORS2616 Prerequisite: Students must have passed BLGY1513, BLGY1623, CHEM1513 and CHEM1623 with 60% in order to register this module.
2182	UGRD	S2	023976	FORS	2626	Crime Scene Management	124	MAIN	BFN	24	FORS2626 Prerequisite: Students must have passed BLGY1513, BLGY1623, CHEM1513 and CHEM1623 with 60% in order to register for this module.
2181	UGRD	S1	024992	FORS	3714	Trace and impression evidence	124	MAIN	BFN	16	FORS3714 Prerequisite: Students must have passed FORS2616 and FORS2626 in order to register this module.
2182	UGRD	S2	024993	FORS	3724	Forensic Chemistry	124	MAIN	BFN	16	FORS3724 Prerequisite: Students must have passed FORS2626 in order to register this module.
2181	UGRD	S1	024994	FORS	3734	Forensic Entomology	124	MAIN	BFN	16	FORS3734 Prerequisite: Students must have passed BLGY1663 and FORS2616 in order to register this module.
2182	UGRD	S2	024995	FORS	3744	Forensic Genetics	124	MAIN	BFN	16	FORS3744: Student must have passed FORS2616 and GENE2626 in order to continue with module.
2181	UGRD	S1	027178	FORS	3774	Forensic Chemistry	124	MAIN	BFN	16	FORS3724 Prerequisite: Students must have passed FORS2626 in order to register this module.
2182	UGRD	S2	027177	FORS	3784	Trace and impression evidence	124	MAIN	BFN	16	FORS3714 Prerequisite: Students must have passed FORS2616 and FORS2626 in order to register this module.
2181	UGRD	S1	024996	GENE	2616	Principles of Genetics: Human Genetics	124	MAIN	BFN	24	GENE2616: Student must have passed BLGY1513 and BLGY1623 and one of (MATM1513 or STSA1624) in order to continue with module.
2182	UGRD	S2	022469	GENE	2626	Molecular Genetics	124	MAIN	BFN	24	GENE2626: Student must have passed GENE2616 in order to continue with module.
2181	UGRD	S1	024959	GENE	3714	Genomics	124	MAIN	BFN	16	GENE3714: Student must have passed GENE2616 and GENE2626 in order to continue with module.
2181	UGRD	S1	021238	GENE	3734	Behavioural Genetics	124	MAIN	BFN	16	GENE3734: Students must have passed GENE2616 and GENE2626 in order to continue with module.
2182	UGRD	S2	005292	GENE	3744	Population and Conservation Genetics	124	MAIN	BFN	16	GENE3744: Student must have passed GENE2616 and GENE2626 in order to continue with module.
2182	UGRD	S2	026441	GENE	3764	Advances in Genetics	124	MAIN	BFN	16	GENE3764 Prerequisite: Students must have passed GENE2616 and GENE2626 in order to continue with this module.
2181	UGRD	S1	020443	HMBG	2614	Human Molecular Biology of Dietetics	124	MAIN	BFN	16	HMBG2614: Student must have passed BLGY1513 in order to continue with module.
2182	UGRD	S2	022509	HMBG	3744	Human Molecular Biology of Immunology and Haemostasis	124	MAIN	BFN	16	HMBG3744: Student must have passed GENE2616 and GENE2626 in order to continue with module.
2181	PGRD	YR	026461	FORC	6808	Research Essay: Forensic Chemistry	124	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	025772	FORC	6814	Advanced forensic techniques	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025423	FORC	8900	Forensic Chemistry Dissertation	124	MAIN	BFN	180	Selection MSc
2182	PGRD	S2	025423	FORC	8900	Forensic Chemistry Dissertation	124	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	024954	FORC	9100	Forensic Chemistry Thesis	124	MAIN	BFN	360	Selection PhD

Term	Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
2181	PGRD	YR	025425	FORE	8900	Forensic Entomology Dissertation	124	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	024955	FORE	9100	Forensic Entomology Thesis	124	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	022956	FORG	6808	Research Essay	124	MAIN	BFN	32	FORG6808 Prerequisite: Students must have passed FORG6816 in order to continue with this module.
2181	PGRD	S1	025716	FORG	6814	Research: Literature Study	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025716	FORG	6814	Research: Literature Study	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	022955	FORG	6816	Research Techniques	124	MAIN	BFN	24	Selection BScHons
2182	PGRD	S2	025717	FORG	6824	Research: Literature Study	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	022958	FORG	6834	Forensic DNA typing and quality assurance	124	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025450	FORG	6844	Forensic DNA typing and quality assurance	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025499	FORG	6854	Crime Scene Investigation and the Juctice system	124	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	022959	FORG	6864	Crime scene management and the justice system	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	022961	FORG	6874	Capita Selecta in Forensic Genetics	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025562	FORG	8900	Forensic Genetics Dissertation	124	MAIN	BFN	180	Selection MSc
2181	PGRD	S1	026005	FORG	9100	Forensic Genetics Thesis	124	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	026005	FORG	9100	Forensic Genetics Thesis	124	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	025426	FORI	8900	Forensic Sciences Interdisciplinary Dissertation	124	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025325	FORI	9100	Forensic Sciences Interdisciplinary	124	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	025461	FORS	6808	Research Report	124	MAIN	BFN	32	FORS6808 Prerequisite: Students must have passed FORS6886 in order to continue with this module.
2181	PGRD	S1	024960	FORS	6814	Research: Literature Review	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025718	FORS	6816	Research Techniques Forensic Science	124	MAIN	BFN	24	Selection BScHons
2182	PGRD	S2	025771	FORS	6824	Research: Literature Review	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	026503	FORS	6834	Evaluating & Interpreting Forensic Evidence: Forensic Sciences	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	024962	FORS	6854	Crime to Court	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	024966	FORS	6874	Capita Selecta in Forensic Sciences	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	024965	FORS	6893	Research: Literature Review	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025427	FORS	8900	Forensic Sciences Dissertation	124	MAIN	BFN	180	Selection MSc
2182	PGRD	S2	025427	FORS	8900	Forensic Sciences Dissertation	124	MAIN	BFN	180	Selection PhD
2181	PGRD	S1	025429	FORS	9100	Forensic Science Thesis	124	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	025429	FORS	9100	Forensic Science Thesis	124	MAIN	BFN	360	Selection MSc
2181	PGRD	S1	025468	GENB	6814	Advanced Behavioural Genetics	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	022520	GENB	8900	Behavioural Genetics Dissertation	124	MAIN	BFN	180	Selection BScHons
2181	PGRD	YR	022521	GENB	9100	Behavioural Genetics Thesis	124	MAIN	BFN	360	Selection BScHons
2181	PGRD	S1	005315	GENC	6814	Advanced Cytotaxonomy	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	020664	GENE	6808	Research Report Genetics	124	MAIN	BFN	32	Selection BScHons
2181	PGRD	S1	025625	GENE	6814	Research: Literature Review	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025776	GENE	6816	Research Techniques	124	MAIN	BFN	24	Selection BScHons
2182	PGRD	S2	025721	GENE	6824	Research : Literature Study	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	026502	GENE	6834	Capita Selecta: Genetics	124	MAIN	BFN	16	Selection BScHons

Term	Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
2182	PGRD	S2	022396	GENE	6844	Capita Selecta: Genetics	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025777	GENE	8900	Genetics Dissertation	124	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025552	GENE	9100	Genetics Thesis	124	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	025722	GENF	8900	Forensic Genetics Dissertation	124	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025467	GENF	9100	Forensics Genetics Thesis	124	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	025626	GENG	6808	Research Essay	124	MAIN	BFN	32	Selection BScHons
2181	PGRD	YR	005630	GENH	6804	Research: Literature Review	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	022962	GENH	6806	Research Techniques	124	MAIN	BFN	24	Selection BScHons
2181	PGRD	S1	005627	GENH	6814	Advanced Human Genetics	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	YR	025329	GENH	8900	Human Molecular Genetics Disseration	124	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	024956	GENH	9100	Human Molecular Genetics Thesis	124	MAIN	BFN	360	Selection PhD
2181	PGRD	YR	025330	GENI	8900	Genetics Interdisciplinary Dissertation	124	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025416	GENI	9100	Genetics Interdisciplinary Thesis	124	MAIN	BFN	360	Selection PhD
2181	PGRD	S1	025466	GENM	6814	Recombinant DNA technology	124	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	025501	GENP	6824	Applied Conservation Genetics	124	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	025502	GENS	6814	Advanced Molecular Systematics	124	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	018361	GENS	6824	Advanced Molecular Systematics	124	MAIN	BFN	16	Selection BScHons
2181	UGRD	S1	027325	CNCC	1612	Clothing construction I	125	MAIN	BFN	8	None
2182	UGRD	S2	027326	CNCC	1622	Clothing construction II	125	MAIN	BFN	8	None
2181	UGRD	S1	027327	CNCC	2612	Clothing construction III	125	MAIN	BFN	8	CNCC2612: Student must have passed CNCC1612 and CSCC2622 in order to continue with module.
2182	UGRD	S2	027521	CNCC	2622	Clothing construction IV	125	MAIN	BFN	8	CNCC2622: Student must have passed CNCC1612 and CSCC1622 in order to continue with module.
2181	UGRD	S1	027522	CNCC	3712	Clothing construction V	125	MAIN	BFN	8	CNCC3712: Student must have passed CNCC2612 and CSCC2622 in order to continue with module.
2182	UGRD	S2	027523	CNCC	3722	Clothing construction VI	125	MAIN	BFN	8	CNCC3722: Student must have passed CNCC2612 and CSCC2622 in order to continue with module.
2181	UGRD	S1	027524	CNCD	3732	Community development	125	MAIN	BFN	8	CNCD3732: Student must have passed CNFD2624 or CNST2614 in order to continue with module.
2182	UGRD	S2	019441	CNCR	3764	Research Methodology Consumer Science	125	MAIN	BFN	16	CNCR3764: Student must have passed CNSF3714 in order to continue with module.
2182	UGRD	S2	023979	CNCS	1622	Ergonomics and Apparatus studies	125	MAIN	BFN	8	None
2182	UGRD	S2	023980	CNCS	1624	Home planning	125	MAIN	BFN	16	None
2181	UGRD	S1	024835	CNCS	1634	Interior design	125	MAIN	BFN	16	None
2181	UGRD	S1	025192	CNCS	2612	Resource Management	125	MAIN	BFN	8	None
2182	UGRD	S2	025000	CNCS	3744	The interior, food or clothing business	125	MAIN	BFN	16	None
2181	UGRD	YR	025196	CNCS	4809	Research Project	125	MAIN	BFN	36	None
2181	UGRD	S1	025109	CNCS	4814	The early history of textiles, clothing, interiors or foods	125	MAIN	BFN	16	None
2182	UGRD	S2	025108	CNCS	4824	The recent history of textiles, clothing, interiors or foods	125	MAIN	BFN	16	None
2181	UGRD	S1	027328	CNFD	1614	Introductory food I	125	MAIN	BFN	16	None
2182	UGRD	S2	027329	CNFD	1624	Introductory food II	125	MAIN	BFN	16	CONS3700: Student must have passed CONS2600 (New code) or CONS2606 (Old Code) and HARC2604 and TARC2604 and DESN2600 in order to continue.
2182	UGRD	S2	023985	CNFD	2624	Food preparation I	125	MAIN	BFN	16	None

Term	Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
2181	UGRD	S1	025143	CNFD	3713	Food preservation	125	MAIN	BFN	12	None
2181	UGRD	S1	025144	CNFD	3732	Food product development	125	MAIN	BFN	8	None
2182	UGRD	S2	025144	CNFD	3732	Food product development	125	MAIN	BFN	8	None
2182	UGRD	S2	025170	CNFD	3744	Meal planning	125	MAIN	BFN	16	None
2181	UGRD	YR	025085	CNFD	4808	Consumer Analysis of Foods	125	MAIN	BFN	32	None
2181	UGRD	S1	027330	CNFS	2613	Food security I	125	MAIN	BFN	12	None
2182	UGRD	S2	027525	CNFS	2623	Food security II	125	MAIN	BFN	12	CNFS2623: Student must have passed AGEC1514 in order to continue with module.
2181	UGRD	S1	027526	CNFS	3714	Food security III	125	MAIN	BFN	16	CNFS3714: Student must have passed CNFS2613 and CNFS2623 in order to continue with module.
2182	UGRD	S2	027527	CNFS	3724	Food security IV	125	MAIN	BFN	16	CNFS3724: Student must have passed CNFS2613 and CNFS2623 in order to continue with module.
2181	UGRD	S1	025808	CNOT	2614	Skills	125	MAIN	BFN	16	None
2181	UGRD	S1	027528	CNSB	1614	Consumer behaviour I	125	MAIN	BFN	16	None
2182	UGRD	S2	027529	CNSB	1624	Consumer behaviour II	125	MAIN	BFN	16	None
2181	UGRD	S1	027530	CNSB	2614	Cosumer behaviour III	125	MAIN	BFN	16	CNSB2614: Student must have passed CNSB1614 and CNSB1624 in order to continue with module.
2182	UGRD	S2	023981	CNSB	2624	Consumer behaviour IV	125	MAIN	BFN	16	
2181	UGRD	S1	027531	CNSB	3714	Consumer behaviour V	125	MAIN	BFN	16	CNSB3714: Student must have passed CNSB2614 in order to continue with module.
2182	UGRD	S2	025087	CNSB	3724	Consumer behaviour VI	125	MAIN	BFN	16	CNSB3724: Student must have passed CNSB3714 in order to continue with this module.
2181	UGRD	S1	023983	CNSF	2614	Food III	125	MAIN	BFN	16	CNSF2614: Student must have passed CNSF1614 and CNSF1624 in order to continue with module.
2181	UGRD	S1	027532	CNSF	3714	Food V	125	MAIN	BFN	16	CNSF3714: Student must have passed CNSF2614 and CNSF2624 in order to continue with module.
2182	UGRD	S2	027533	CNSF	3724	Food VI	125	MAIN	BFN	16	None
2181	UGRD	S1	027534	CNSI	1612	Interior I	125	MAIN	BFN	8	None
2182	UGRD	S2	027535	CNSI	1622	Interior II	125	MAIN	BFN	16	CNSI1622: Student must have passed CNSI1612 in order tocontinue with module.
2181	UGRD	S1	027536	CNSI	2612	Interior III	125	MAIN	BFN	8	
2182	UGRD	S2	027537	CNSI	2622	Interior IV	125	MAIN	BFN	8	CNSI2622: Student must have passed CNSI1622 in order to continue with module.
2181	UGRD	S1	025110	CNSI	3712	Interior V	125	MAIN	BFN	8	CNSI3712: Student must have passed CNSI2622 in order to continue with module.
2182	UGRD	S2	025111	CNSI	3722	Interior VI	125	MAIN	BFN	8	CNSI3722: Student must have passed CNSI3712 in order to continue with module.
2181	UGRD	S1	025067	CNST	3734	Apparel industry	125	MAIN	BFN	16	None
2182	UGRD	S2	025067	CNST	3734	Apparel industry	125	MAIN	BFN	16	None
2182	UGRD	S2	025179	CNST	3744	Pattern design	125	MAIN	BFN	16	None
2181	UGRD	S1	025112	CNST	3754	Textile design and construction	125	MAIN	BFN	16	None
2181	UGRD	S1	025083	CNST	4814	Clothing industry	125	MAIN	BFN	16	None
2182	UGRD	S2	025199	CNST	4824	Quality management in the clothing industry	125	MAIN	BFN	16	None
2181	UGRD	S1	025125	CNST	4834	Social aspects of clothing	125	MAIN	BFN	16	None
2182	UGRD	S2	025200	CNST	4844	Psychological aspects of clothing	125	MAIN	BFN	16	None
2182	UGRD	S2	025175	CNST	4854	Natural textile fibres	125	MAIN	BFN	16	None
2182	UGRD	S2	025141	CNST	4864	Finishes for natural textile fibres	125	MAIN	BFN	16	None
2181	PGRD	S1	026418	CNCS	6814	The early history of textiles, clothing, interior or foods	125	MAIN	BFN	16	Selection BScHons

Term	Career	Session	Course ID	Module code		Course Long Title	Acad Org	Campus	Location	Credits	Prerequisites
2182	PGRD	S2	025525	CNCS	8900	Consumer Science Dissertation	125	MAIN	BFN	180	Selection MSc
2181	PGRD	YR	025086	CNCS	9100	Consumer Sciences Thesis	125	MAIN	BFN	360	Selection PhD
2181	PGRD	S1	026423	CNST	6834	Social aspects of clothing	125	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	026424	CNST	6844	Psychological aspects of clothing	125	MAIN	BFN	16	Selection BScHons
2181	PGRD	S1	026425	CNST	6854	Natural textile fibres	125	MAIN	BFN	16	Selection BScHons
2182	PGRD	S2	026426	CNST	6864	Finishes for natural textile fibres	125	MAIN	BFN	16	Selection BScHons
2181	UGRD	YR	025972	AGAN	1508	Academic Literacy in Afrikaans (for students in the Natural Sciences)	405	MAIN	BFN	32	None
2181	UGRD	YR	022693	EALN	1508	English Academic Literacy for Natural Sciences	405	MAIN	BFN	32	None
2181	UGRD	YR	025809	EALN	2504	English Academic Literacy for the Natural Sciences	405	MAIN	BFN	16	None
2181	UGRD	YR	022693	EALN	1508	English Academic Literacy for Natural Sciences	405	QWA	QWAQWA	32	None
2181	UGRD	YR	022693	EALN	1508	English Academic Literacy for Natural Sciences	405	SOUTH	BOITJHORIS	32	None
2181	UGRD	YR	025972	AGAN	1508	Academic Literacy in Afrikaans (for students in the Natural Sciences)	405	SOUTH	SOUTH	32	None
2181	UGRD	YR	022693	EALN	1508	English Academic Literacy for Natural Sciences	405	SOUTH	SOUTH	32	None

13.2 Table 2: **Learning outcomes and Learning Content Table**

The table below provides information related to the course content of each module included in the learning programmes. The module code as well as a content description and learning outcomes are displayed in the table. This is organised according to departments, alphabetically first all undergraduate modules and then post graduate modules.

Office of the Dean: Natural and Agricultural Science(98)

Undergraduate

Module Code	Course Title	Course Description	Campus	Learning Outcomes

Agricultural Economics(99)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEC	1514	Introduction to Agricultural Economics	The role of resources in the agricultural economy, supply and demand of agricultural products, marketing and the determination of price, farm management- and financial principles: the current agricultural-, trade- and development policies in South Africa. - Practical assignments will be given which to complement the theory done in class.	MAIN	Student will be able to: - Outline the role of resources in the agricultural economy. - Explain supply and demand of agricultural products, marketing and the determination of price. - Discuss farm management- and financial principles.
AGEC	1624	Agricultural Finance	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completion of this module the student will have knowledge: - About the purpose and components of a farm record keeping system. - The handling of depreciation, also in terms of the income tax act as well as the procedure for taking the impact of inflation into consideration. A basic overview of income tax as well as the handling of Value Added Tax (VAT) is also covered. - The purpose, components, completion and analysis of each of the financial statements. An economic and financial analysis of a farming business with interpretation and advice on the results. - Budgets for different enterprises (both livestock and crops). - Practical work: Upkeep and analysis of farming records and application of different techniques, also by means of a personal computer.	MAIN	Student will be able to: - discuss and explain the purpose and components of a farm record keeping system. - explain the handling of depreciation, income tax act and inflation and handling of Value Added Tax (VAT). -compile and analyse and interpret financial statements apply economic analysis of a farming business with interpretation and provide advice on the results. - develop budgets for different enterprises (both livestock and crops).
AGEC	1634	Business functions for Agribusiness	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completion of this module the student will have knowledge: - This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics. Introduction to management as well as the environments in which a business operates. - Special focus will be given to eight management functions: Marketing, Financial Management, Human Resource Management, Operational Management, Logistics Management, Administration, Public Relations and General Management - Practical work: Introduction to the fundamental knowledge, theories, principles and practices of Agricultural Economics. Emphasis on the eight management functions.	MAIN	Student will be able to: -Discuss the theories, principles and practices of Agricultural Economics. Introduction to management and the business environment. -List and discuss the eight management functions: Marketing, Financial Management, Human Resource Management, Operational Management, Logistics Management, Administration, Public Relations and General Management.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEC	2614	Farm Planning and Management	- The main purpose of this module is to enable the student to analyse and plan changes (risks and opportunities) within a farming business. The module is divided into two sections: Section I: Consists of the planning of livestock and crop production enterprises Section II: Consists of the composition of livestock and crop production enterprises in a whole farm production plan, given the marketing and financial plans, which include mechanisation and human resource planning as well as the planning of the business agreement. - The focus is further placed on all aspects of human resource management. - Practical work: The development of enterprise budgets, mechanisation planning, human resource planning and practical exercises to apply risk management instruments in practice.	MAIN	Student will be able to: -Discuss the difference in long term (strategic) and short term (tactical) decision making in agriculture. -Discuss and apply basic production economic concepts and decision rules that are followed with regard to profit maximising levels of inputs used and output produced. -Apply basic agricultural economic concepts in the case of animal production and be able to calculate break-even production levels and prices for animal production. -Apply basic agricultural economic concepts in the case of crop production and will be able to identify the factors that affect profitability of the current crop and how to select the most profitable crop in a crop-production system. -Explain the use of partial and whole-farm budgeting in agricultural decision making. -Calculate machinery cost that is necessary for machinery management and will also be able to motivate how he/she will go about improving the level of efficiency of an agricultural machine. -Understand the risk and uncertainty in agricultural decision making, the factors that affect the willingness and ability of a decision maker to take a risk, and be able to use decision support tools and decision rules to motivate a choice between risky alternatives
AGEC	2624	Introduction to Agricultural Marketing	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: (a) to provide the student with knowledge on the nature and dynamics of the food marketing system, from the production of agricultural commodities to the final consumption of food products and services; (b) to enable the student to plan and employ programmes to manage the price risks of agricultural commodities through the use of forward contracts, futures, and option strategies; (c) to introduce the students to the forecasting of agricultural product prices. The student will understand how to do analysis and interpretations of demand and supply, price and income elasticity. Knowledge of the quantification of agricultural marketing questions, the fitting of supply and demand curves, identification of variables that influence agricultural prices, the interdependence of the agriculture sector with the rest of the economy, the international environment and strategic planning will be obtained. - Practical work: Forecasting the prices of grains and oilseeds and trading on SAFEX. Analysing of supply, demand and price by means of basic econometric techniques. Compiling a marketing plan for an agricultural product taking cognisance of the financial implications.	MAIN	Student will be able to: - Explain and discuss the nature and dynamics of the food marketing system. - Plan and employ programmes to manage the price risks of agricultural commodities through the use of forward contracts, futures, and option strategies. - Introduce the students to the forecasting of agricultural product prices.
AGEC	3714	Managerial Economics	The aim of AGEC 3714 is to broaden the student's knowledge base with respect to the theoretical treatment of traditional production economics employing both detailed graphics, differential calculus and spreadsheets. Specifically factor-product, factor-factor and product-product relationships are considered. AGEC 3714 also aims at providing an introductory treatment of the development of linear programming models, solving the models using the simplex method and interpretation of results.	MAIN	Student will be able to: - Apply principles pertaining to the optimal allocation of one and two variable inputs necessary to evaluate the allocative and technical efficiency of production with the aim of maximizing profit; - Use alternative production functions to determine optimal resource allocation. -Apply principles pertaining short-run and long-run cost relationships. These relationships will enable the student to plan for the most profitable level of output (short-run) and the optimal scale of production (long-run). - Use mathematical skills to apply optimisation theory to determine: - Optimal input use (one variable and two variable inputs) - Optimal supply decision (one variable output). - The students will gain a better understanding of different types of activities that are used to construct linear programming models of complex decision-making problems. Students will also develop the skills to apply these activities to construct linear programming models, solve the models and to interpret the results.
AGEC	3721	Agricultural Economics Seminar	This module prepares students how to do a written assignment on specific agricultural economic and related topics.	MAIN	Student will be able to: -Do a written assignment on specific agricultural economic and related topics.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEC	3724	Resource Economics.	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: -Aspects that will be addressed include: property rights, externalities and environmental problems, market and government failures, optimal use/ management of natural resources and the environment with special reference to water, soil, natural vegetation, fisheries and other species, and pollution. - Practical work: Application of measuring techniques to determine the economic effects of natural resource and environmental problems. Evaluation of alternative solutions to problems.	MAIN	Student will be able to: -Utilize the theory of natural resource and environmental economics; and -Optimal use/management of natural resources and the environment with special reference to water, soil, natural vegetation, fisheries and other species, and pollution.
AGEC	3734	Agribusiness Management.	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completion of this module the student will have knowledge: - Analyse and confidently handle challenges pertaining to the agribusiness system such as entrepreneurship, strategic management in agriculture, quality management, role and importance of value chains, competitiveness of SA agriculture, choice of legal business forms (sole proprietorship, partnership, close Corporation, private company, business trust, cooperative, new generation cooperative) and handling collaboration structures in the value chain, as well as human resource management within a modern transformed society. - Practical work: Develop a detailed and coherent business plan for an agribusiness deploying a wide range of agricultural economics techniques.	MAIN	Student is will be able to: -Analyse and confidently handle challenges pertaining to the agribusiness system such as entrepreneurship, strategic management in agriculture, quality management, role and importance of value chains, competitiveness of SA agriculture; -Choose legal business forms (sole proprietorship, partnership, close corporation, private company, business trust, cooperative, new generation cooperative); and -Handle collaboration structures in the value chain, as well as human resource management within a modern transformed society.
AGEC	3744	Agricultural Policy and Development	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: -Involvement of the government in agriculture, reasons for government interference, how agricultural policy causes distortions and the spill over effect of it, The effect of policy on the welfare of populations and on the competitiveness of agriculture, factors that prevent small scale farmers from becoming surplus producers, transaction costs and the utilisation of new technologies, The role of research in developing countries, the development of human capital and poverty. Practical work: Discussion of reading material and analyses of agricultural policy on computers.	MAIN	Student will be able to: -discuss and explain the involvement of the government in agriculture; -explore the effect of policy on the welfare of populations and on the competitiveness of agriculture; and -analyse the role of research in developing countries, the development of human capital and poverty.
AGEC	4814	Managerial economics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completion of this module the student will have knowledge: - How micro economics provides the framework for ‘economic’ ways of thinking and how this basic knowledge was developed in techniques such as Linear Programming (LP) that solve agricultural economic problems to make efficient decisions. -Knowledge of the principles underlying decision-making under uncertainty. -Practical work: Spread sheet models of production and cost functions. Fitting of production functions by means of regressions. Application of LP models. Measurement of risk with subjective probabilities. Forecasting.	MAIN	Student will be able to: -Use techniques such as Linear Programming (LP); -Examine and discuss spread sheet models of production and cost functions; -Apply and fit production functions by means of regressions; and -Measure of risk with subjective probabilities.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEC	4824	Resource Economics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completion of this module the student will have knowledge: -On the theory of natural resource and environmental economics. Aspects that will be addressed include: property rights, externalities and environmental problems, market and government failures, optimal use/management of natural resources and the environment with special reference to water, soil, natural vegetation, fisheries and other species, and pollution. -Practical work: Application of measuring techniques to determine the economic effects of natural resource and environmental problems. Evaluation of alternative solutions to problems.	MAIN	Student will be able to: -Utilize the theory of natural resource and environmental economics; -Use and manage natural resources and the environment with special reference to water, soil, natural vegetation, fisheries and other species, and pollution; and -apply relevant mathematical and graphical techniques in the field of natural resource and environmental economics to determine optimal resource use and pollution levels.
AGEC	4834	Agribusiness Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: -Analyse and confidently handle challenges pertaining to the agribusiness system such as entrepreneurship, strategic management in agriculture, quality management, role and importance of value chains, competitiveness of SA agriculture, choice of legal business forms (sole proprietorship, partnership, close Corporation, private company, business trust, cooperative, new generation cooperative) and handling collaboration structures in the value chain, as well as human resource management within a modern transformed society. -Practical work: Develop a detailed and coherent business plan for an agribusiness deploying a wide range of agricultural economics techniques.	MAIN	Student will be able to: -Analyse and confidently handle challenges pertaining to the agribusiness system such as entrepreneurship, strategic management in agriculture, quality management, role and importance of value chains, competitiveness of SA agriculture; -Examine and choose legal business forms (sole proprietorship, partnership, close corporation, private company, business trust, cooperative, new generation cooperative); and -Handle collaboration structures in the value chain, as well as human resource management within a modern transformed society.
AGEC	4844	Agricultural Policy and development	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: Knowledge will be gained in this module about the involvement of the government in agriculture, reasons for government interference, how agricultural policy causes distortions and the spill over effect of it, The effect of policy on the welfare of populations and on the competitiveness of agriculture, factors that prevent small scale farmers from becoming surplus producers, transaction costs and the utilisation of new technologies, The role of research in developing countries, the development of human capital and poverty. Practical work: Discussion of reading material and analyses of agricultural policy on computers.	MAIN	Student will be able to: -Examine and discuss the involvement of the government in agriculture; -Discuss the effect of policy on the welfare of populations and on the competitiveness of agriculture; and -Discuss the role of research in developing countries, the development of human capital and poverty.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEG	2624	Engineer principles in Agriculture Practices	This module contains fundamental knowledge, theories, principles and practices of Agricultural Engineering including: Engineering skills in aspects of soil and water conservation. The design of waterways, terraces, contours in conservation farming practices. The learning of how to determine flow and the protection of soil conservation works, weirs and farm dams. Recovery of erosion trenches with the help of mechanical control measures. Basic hydraulics and the practical design of stock-watering systems and pipelines.Practical work: The development of designer skills and the application of calculations. Measurements and standardisation with specific application in the agriculture.	MAIN	Student will be able to: -Discuss and explain concepts, principles and theories, and an understanding of Soil conservation and the prosses of soil erosion. -Recognise the reasons soil erosion occur.Assess the available methods of reclaiming eroded lands and differentiate between their engineering applications to select the most appropriate method. -Depict the mechanism in the designing of soil dams and stock watering systems and waterways to rehabilitate land. -Solve problems in unfamiliar context, through the evaluation, selection and application of appropriate methods and procedures in processes of investigation, and to find solutions based on gathered evidence: -Apply suitable criteria and perform basic design hydraulic designs of pipelines. -Calculate and correlate pipe diameters and internal pressure with allowable limits to determine suitable correct sizes. -Select and design the right electrical and diesel motors for different applications. _ Evaluate and select different sources of appropriate information, to apply well-developed processes of analysis and evaluation to make decisions, act appropriately, and understand relationships and impacts between pump and gravitational systems. in familiar and new contexts: -Collect and analyse data to find the best economical decision for your design problem.- Identify the factors affecting the lifespan of engineering components and choose the appropriate type of maintenance program required. - Predict the lifespan of different pipeline solutions compile, communicate and present complex pipelines information reliably and coherently using conventions appropriate to the context, to be aware and understand the ethical implications of decisions and actions.
AGEG	3714	Hydraulics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Engineering including: • Knowledge of basic hydraulics and the solving of problems. Applications of hydraulics in the instalment of agricultural networks, pumps and electrical motors. • The student must be familiar with the practical implementation and application of Eskom networks and tariffs. • Practical work: Introduction with irrigation systems, solving of hydraulic problems, determining of HQ curves of pumps, deciding on pumps and the power requirements of pumps. • Practical calculations of electricity tariffs.	MAIN	Student will be able to: - Apply the key concepts, principles and theories, and an understanding of pump design and HQ curves: Understand and select appropriate design approaches taking relevant industry norms and standards into account. -Recognise the reasons for safety factors and fatigue failure of brittle and ductile materials. -Assess the available pumps and electrical motors and differentiate between their engineering applications to select the most appropriate pump or motor. -Understand and depict the mechanism and operation of centrifugal and positive displacement pumps. -Identify, evaluate and solve problems in unfamiliar context, through the evaluation, selection and application of appropriate methods and procedures in pump design, and to find solutions based on gathered evidence: -Apply suitable criteria and perform basic design of pump components. -Calculate and correlate internal impellors sizes. -Select and design different pumps under various loading and operating conditions. -Evaluate and select different ESCOM tariffs structures of appropriate information, to apply well-developed processes of analysis and evaluation to make decisions, act appropriately, and understand relationships and impacts between Ruraflex and Landrate systems in familiar and new contexts: -Collect and analyse data to select the appropriate ESCOM tariff and determine the suitable electrical power costs for an application. -Identify the factors affecting the lifespan of pump components and choose the appropriate type of maintenance program required. -Compile, communicate and present complex information reliably and coherently using existing irrigation systems: -Illustrate proficient communication of complex pump and transformer information, presented through written, verbal or practical demonstration, reflecting awareness and understanding of the implications resulting from decisions and actions. -Promote and support learning, work effectively in a team, identify and address task-specific learning, evaluate team performance against criteria provided, take responsibility for all decisions and team actions, and responsible use of resources: -Analyse and subdivide assignments into manageable identified learning tasks for each team member to ensure effective teamwork. -Use available resources correctly and responsibly to execute assignments. -Appraise the team performance for compliance with the criteria provided, and take responsibility for own designs.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEG	3724	Irrigation Systems and Irrigation Surveying	This module contains fundamental knowledge, theories, principles and practices of Agricultural Engineering including: • Ability to determine the use of the relevant irrigation systems in specific circumstances and conditions. Practical experience in the basic planning and design of irrigation systems. • Practical work: The learning of methods in the selection of the correct irrigation systems and the determining of the cost effectiveness of the different systems. • Practical surveying and design.	MAIN	Student should be able to: -Apply the key concepts, principles and theories, and an understanding of irrigation design: -Select appropriate design approaches taking relevant SABI norms and standards into account. -Recognise the reasons for specific design methods. -Assess the available information to determine which irrigation system is best suited for the application. -Understand and depict the SABI irrigation design method. -Assess the different irrigation methods and their application in engineering situations. -Identify, evaluate and solve problems in unfamiliar context- -Apply suitable criteria and perform basic irrigation designs of main pipelines and manifolds. -Calculate and correlate internal friction and pressures within allowable limits to determine suitable pipe sizes. -Select and design different electrical motors under various loading and operating conditions. -Evaluate and select different irrigation systems and and to make decisions, act appropriately, and understand relationships and impacts between the different irrigation systems in familiar and new contexts: -Compile, communicate and present complex irrigation information and to be aware and understand the decisions and actions.
AGEG	4814	Flood and Mechanised Irrigation	This module contains fundamental knowledge, theories, principles and practices of Agricultural Engineering including: • Knowledge on the subject, management and evaluation of specific flood and mechanised irrigation systems. • The study and application of SAIB norms and principles. • Practical work: Design and evaluation of flood and sprinkler systems. Determining the effectiveness of above-mentioned systems.	MAIN	Student should be able to: The student completing this module will be have: -Apply the key concepts, principles and theories, and an understanding of mechanized and flood irrigation: -Select appropriate design approaches taking relevant SABI norms and standards into account. -Recognise the reasons for mechanized irrigation. -Assess the available irrigation design principles and differentiate between their engineering applications to select the most appropriate mechanised irrigation system. -Depict the management and the evaluation and operation of flood and Mechanized irrigation systems. _Assess the different centre pivots and their application in field situations -Identify, evaluate and solve problems in unfamiliar context -Apply suitable criteria and perform basic design of flood and centre pivot components. -Calculate and correlate internal frictions with allowable limits to determine suitable section sizes for centre pivots. -Select and design different centre pivot movement and transmission under loading and operating conditions. -Evaluate and select different design layouts, to apply well-designed layouts and evaluation to make decisions, act appropriately, collect and analyse data to select the appropriate irrigation method and determine the suitable pumps and motors required for irrigation application in various contexts. -Identify the factors affecting the lifespan of engineering components and choose the appropriate type of maintenance program required.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEG	4824	Specialised Micro, Drip and Underground Irrigation Systems.	This module contains fundamental knowledge, theories, principles and practices of Agricultural Engineering including: • Ability to design, manage and evaluation of drip and micro-irrigation systems. Application of practice directed norms and principles. • Practical work: Design and evaluation of drip and micro-irrigation systems. Determining of the effectiveness and cost effectiveness of the above-mentioned systems.	MAIN	Student should be able to: The student completing this module will be have: -Ability to apply the design methods, key concepts, principles and theories, and an understanding of micro and drip irrigation. Select appropriate design approaches taking relevant industry norms and standards into account. -Recognise the reasons for drip or micro irrigation. -Assess the available fastening methods for micro and drip and differentiate between their engineering applications to select the most appropriate method. -Depict the mechanism and operation of micro and drip irrigation and the efficiency thereof. -Assess the different spray patterns and fastening systems and their application in irrigation situations. -Identify, evaluate and solve problems in unfamiliar context, through the evaluation, selection and application of appropriate methods and procedures in processes of investigation, and to find solutions based on gathered evidence. Apply suitable criteria and perform basic design of hydraulic components. Calculate and correlate internal friction and pressure within allowable limits to determine suitable pipe diameters. Select and design different pressure compensated and non-compensated drippers and micros under various pressure and operating conditions. Evaluate and select different sources of appropriate information, to apply well-developed processes of analysis and evaluation to make design decisions, act appropriately, and understand relationships and impacts between micro and drip irrigation systems in familiar and new contexts: -Collect and analyse data to select the appropriate design method and determine the suitable micro or drip required for irrigation design application in various contexts. -Identify the factors affecting the lifespan of filter components and choose the appropriate filter for the maintenance program required. -Predict the lifespan of the different micro and drip systems under various conditions using water quality as basis. -Compile, communicate and present irrigation design information reliably and coherently using conventions appropriate to the context, to be aware and understand the implications of decisions and actions: -Promote and support learning, work effectively in a team, identify and address task-specific learning, evaluate team performance against criteria provided, take responsibility for all decisions and team actions, and responsible use of resources:
Postgraduate					
AGBS	6824	Agribusiness Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will understand: - The overall learning outcome of this module is to obtain comprehensive knowledge of strategic management principles and methods for production, processing, wholesaling, retailing and service forms in the context of the markets of these firms, thus across specialised areas in agriculture.	MAIN	Student will be able to: - obtain comprehensive knowledge of strategic management principles and methods for production, processing, wholesaling, retailing and service forms in the context of the markets of these firms, thus across specialised areas in agriculture.
AGEC	6800	Research Report Econometrics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: -Basic regression analysis and other econometric techniques and models. The module contains lessons that you can apply to a wide range of empirical economic problems. The course consists of both theoretical and practical application, where the student will be able to use various computer programmes to solve economic problems. Econometrics gives empirical content to most economic theory. -Completing a research project under the guidance of a supervisor and will become skilled in problem identification, development of research objectives and hypotheses, identification and reviewing of relevant literature, specification of a conceptual and analytical framework, locating sources of data, sampling concepts and design, methods of data collection including questionnaire design and testing, analysis of data, presentation and interpretation of research results, and report writing.	MAIN	Student will be able to: -Formulate research problem, objectives and hypotheses, identification and reviewing of relevant literature; -Specify conceptual and analytical framework, locate sources of data, sampling concepts and design, methods of data collection including questionnaire design and testing, analysis of data; -Apply regression analysis and other econometric techniques and models; -Give empirical content to most economic theory using econometric techniques; -Interpret and present research results, and report writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEC	6806	Agricultural Policy	After completion of this course the student should understand the agricultural policy process and have a good theoretical knowledge about agricultural policy; know the South African agricultural policy and have a thorough understanding of it; be able to evaluate agricultural policy by using different methods; and be able to evaluate the effect of agricultural policy on agricultural develop	MAIN	The student should be able to: - Discuss the South African agricultural policy with a thorough understanding of it. - Evaluate agricultural policy by using different methods. - Evaluate the effect of agricultural policy on agricultural development.
AGEC	6808	Research Project in Agricultural Economics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: Students will complete a research project under the guidance of a supervisor and will become skilled in problem identification, development of research objectives and hypotheses, identification and reviewing of relevant literature, specification of a conceptual and analytical framework, locating sources of data, sampling concepts and design, methods of data collection including questionnaire design and testing, analysis of data, presentation and interpretation of research results, and report writing.	MAIN	The student will be able to: -identify problems and develop research objectives and hypotheses, identification and reviewing of relevant literature; -develop specifications of a conceptual and analytical framework, locating sources of data, sampling concepts and design, methods of data collection including questionnaire design and testing, analysis of data; and -Present and interpret research results, and write reports.
AGEC	6814	Quantitative Techniques	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will understand: - The learner will be competent in demonstrating knowledge about micro economic concepts and - Market structures and concentration in the South African economy.	MAIN	The student should be able to: - Demonstrating knowledge about micro economic concepts; and - Discuss market structures and concentration in the South African economy.
AGEC	6815	Advanced Production and Natural resource economics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: - Theory and practical application of production economics to inform agricultural producers in terms of optimal input use. - Theory and practical application of environmental and natural resource economics and the important role of economic values in guiding resource allocation and management.	MAIN	Student will be able to: -Econometrically estimate production, cost and profit functions and to apply those functions to identify optimal input and output levels. -Motivate a choice of a specific functional form and to derive product supply and factor demand functions using both the primal and dual approaches. -Mathematically derive factor demand and product supply functions to inform optimal resource use. -Apply appropriate techniques to benchmark input use to inform efficient use of scarce resources. -Analyse and Evaluate the concept of value as it applies to resources and the important role of economic values in guiding resource allocation and management. -Apply valuation techniques such as the travel cost method, hedonic price methods and contingent valuation. - Use these techniques to determine the benefits to society from different natural resource management and environmental improvement policies and programmes.
AGEC	6824	Operational Research	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will understand: - The primary learning outcome of this course is to build the capacity of the student to synthesise information regarding complex agricultural problems, to represent these problems mathematically within a linear, mixed integer, dynamic linear or a risk programming framework as appropriate, to solve these problems using the General Algebraic Modelling System (GAMS) and to interpret the results. - To build the capacity of the student to represent a specific problem using mathematical notation specific to the GAMS modelling language, solve the model and interpret the results for various problem sets.	MAIN	The student should be able to: - Synthesise information regarding complex agricultural problems, to represent these problems mathematically within a linear, mixed integer, dynamic linear or a risk programming framework as appropriate. - Solve these problems using the General Algebraic Modelling System (GAMS) and to interpret the results.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEC	6825	Agribusiness management and marketing	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: The overall learning outcome of this module is to obtain comprehensive knowledge of strategic management principles and methods for production, processing, wholesaling, retailing and service forms in the context of the markets of these firms, thus across specialised areas in agriculture.The necessary knowledge base, a deep understanding of the complexities of marketing agricultural products and Have the skills to compile an all-encompassing management and marketing plan.	MAIN	Student will be able to: -Examine and apply strategic management principles and methods for production, processing, wholesaling, retailing and service forms in the context of the markets of these firms, thus across specialised areas in agriculture; -Discuss the complexities of marketing agricultural products; and -Compile an all-encompassing management and marketing plan.
AGEC	6834	Production and Consumer Economics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will understand: - This module aims to build the capacity of the student to econometrically estimate production, cost and profit functions and to apply those functions to identify optimal input and output levies. - The student will be able to motivate a choice of a specific functional form and to derive product supply and factor demand functions using both the primal and dual approaches.	MAIN	The student should be able to: - Econometrically estimate production, cost and profit functions and to apply those functions to identify optimal input and output levies. - Motivate a choice of a specific functional form and to derive product supply and factor demand functions using both the primal and dual approaches.
AGEC	6835	Macro economics and finance	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including, knowledge about macro and agricultural economic concepts and Market structures and concentration in the South African economy. Critically analyse and independently evaluate an agribusiness's financial position and Propose recommendations on the growth and protection of equity capital in a risky macro-economic environment.	MAIN	Student will be able to: -Analyse and discuss basic macro-economic structures and concepts-effect and implications for agriculture; -Discuss and interpret key economic indicators and cycles implications for agriculture and strategic management decisions. -Discuss and analyse monetary Policy and the effect on the agricultural sector and markets. -Explain the Government and Fiscal policy and effect on the agricultural economy and markets -Analyse and provide a discussion of financial statements and information; -Analyse and make recommendation on the feasibility of new projects using capital budgeting techniques; and -Devise a credit evaluation and scoring procedure to evaluate credit applications.
AGEC	6844	International Agricultural Trade	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will have: - The necessary knowledge base, a deep understanding of the complexities of international trade and - Have the skills to analyse international trade independently.	MAIN	The student should be able to: - Discuss and apply of the complexities of international trade; and - Analyse international trade independently.
AGEC	6845	Agricultural Policy and Development	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will understand: - The agricultural policy process and have a good theoretical knowledge about agricultural policy; know the South African agricultural policy and have a thorough understanding of it; - Evaluate agricultural policy by using different methods. - Evaluate the effect of agricultural policy on agricultural development. - The theoretical and empirical knowledge to analyse agricultural households, rural markets and institutions. - Evaluate the alternative policies of agricultural and economic development, based on how agricultural households and rural organisations and institutions function. - International development of Agriculture and related industries	MAIN	Student will be able to: -Analyse and discuss the South African agricultural policy; -Evaluate agricultural policy by using different method; -Evaluate the effect of agricultural policy on agricultural development; -Analyse agricultural households, rural markets and institutions; -Evaluate the alternative policies of agricultural and economic development; and -Evaluate International development of Agriculture and related industries

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEC	6854	Agricultural Policy	After completion of this course the student should understand the agricultural policy process and have a good theoretical knowledge about agricultural policy; know the South African agricultural policy and have a thorough understanding of it; be able to evaluate agricultural policy by using different methods; and be able to evaluate the effect of agricultural policy on agricultural develop	MAIN	The student should be able to: - Discuss the South African agricultural policy with a thorough understanding of it. - Evaluate agricultural policy by using different methods. - Evaluate the effect of agricultural policy on agricultural development.
AGEC	6865	Operational Research	This module aims at developing students` capacity to synthesize information regarding complex problems confronting agricultural, environmental and resource economists, to represent these problems mathematically using mathematical notation within a linear, mixed integer or a risk programming framework as appropriate, to solve these problems using appropriate software and to interpret the results. The course will also cover risk simulation and stochastic efficiency analyses.	MAIN	Student will be able to: - Use Linear Programming (LP), to set up simple decision problems as LP problems, to demonstrate how to solve maximisation and minimisation LP problems using graphical analyses and to discuss the notion of sensitivity analyses; -Represent a specific problem using mathematical notation specific to the GAMS modeling language, solve the model and interpret the results for various problem sets; - Examine the assumption of certainty of the input parameters of a mathematical programming model given due recognition of the underlying assumptions of alternative methods to include objective function risk (Mean Variance, MOTAD, Target-MOTAD), risks involving resource availability (Chance constraints) and technical coefficient risk (quadratic and MOTAD programming approaches) for various agricultural related problems; and - Analyse risk, quantify risk and apply risk efficiency criteria to choose amongst risky alternatives
AGEC	6874	Agricultural Econometrics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will understand: - This is an applied course in basic regression analysis and other econometric techniques and models. The module contains lessons that you can apply to a wide range of empirical economic problems. The course consists of both theoretical and practical application, where the student will be able to use various computer programmes to solve economic problems. Econometrics gives empirical content to most economic theory. - The students must be able to familiarise themselves with the nature and structure of the data in question and be able to apply various techniques in data transformation and modelling.	MAIN	The student should be able to: - Applied course in basic regression analysis and other econometric techniques and models; - Use various computer programmes to solve economic problems; and - Econometrics gives empirical content to most economic theory.
AGEC	6884	Agricultural Marketing and Price Analysis	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will have: -The necessary knowledge base, a deep understanding of the complexities of marketing agricultural products and -Have the skills to compile an all-encompassing marketing plan.	MAIN	Student will be able to: -Examine and discuss the complexities of marketing agricultural products. -Compile an all-encompassing marketing plan.
AGEC	6894	Agricultural Financing	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will understand: - After completion of this module, the student will be able to critically analyse and independently evaluate an agribusiness's financial position and - Propose recommendations on the growth and protection of equity capital in a risky macro-economic environment.	MAIN	The student should be able to: - Critically analyse and independently evaluate an agribusiness's financial position. - Propose recommendations on the growth and protection of equity capital in a risky macro-economic environment.
AGEC	7902	Environmental Economics	Environmental Economics includes the study of property rights and environmental challenges, as well as the management natural resources and the environment.	MAIN	At the end of the module, the student is expected to have attained : 1. Specialist knowledge in property rights and environmental challenges. 2. Specialist skills to manage natural resources and the environment.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGEC	8900	Agricultural Economics extended dissertation	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: Research project in specialized field of Agricultural Economics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
AGEC	9100	Agricultural Economics Thesis	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: Research project in specialized field of Agricultural Economics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	The student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format);and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
AGEM	6824	Advanced Resources and Environmental Economics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will have: - With an understanding of the theory of environmental and natural resource economics, learners will be able to understand the concept of value as it applies to these resource and the important role of economic values in guiding resource allocation and management. - Students will gain an understanding of valuation techniques such as the travel cost method, hedonic price methods and contingent valuation, and the capacity to - Use these techniques to determine the benefits to society from different natural resource management and environmental improvement policies and programmes.	MAIN	The student should be able to: - Describe the concept of value as it applies to resources and the important role of economic values in guiding resource allocation and management. - Discuss and apply valuation techniques such as the travel cost method, hedonic price methods and contingent valuation. - Use these techniques to determine the benefits to society from different natural resource management and environmental improvement policies and programmes.
AGEM	6844	Project Planning and Analysis	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: After completing this course the student will have: -The objectives of this unit are to introduce learners to the principles of project design, planning and management, project design concepts and methods that effectively link projects to rural and economic development strategies.	MAIN	Student will be able to: -Apply the principles of project design, planning and management, project design concepts and methods that effectively link projects to rural and economic development strategies.
AGEM	8900	Dissertation Agricultural Economics	This module contains fundamental knowledge, theories, principles and practices of Agricultural Economics, including: Research project in specialized field of Agricultural Economics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
AGEN	7902	Land Valiation and Business Plans	Land Valiation and Business Plans	MAIN	Student will be able to: -Examine land value and the factors influencing land prices. -Use skills to compile Business Plans for development projects.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGMA	6800	Research Report	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: -Completing a research project under the guidance of a supervisor and will become skilled in problem identification, development of research objectives and hypotheses, identification and reviewing of relevant information sources, specification of a conceptual and analytical framework, locating sources of data, sampling concepts and design, methods of data collection including questionnaire design and testing, analysis of data, presentation and interpretation of research results, and report writing.	MAIN	Student will be able to: -Formulate research problem, objectives and hypotheses, identification and reviewing of relevant literature; -Specify conceptual and analytical framework, locate sources of data, sampling concepts and design, methods of data collection including questionnaire design and testing, analysis of data; and -Interpret and present research results, and report writing
AGMA	6808	Research Project	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will: - Complete an integrated business plan under the guidance of a supervisor. - The students will become skilled in problem identification, development of research objectives and hypotheses, identification and reviewing of relevant information sources, the design of a business plan, methods of data collection, the analysis of data and the presentation and interpretation of results in a business plan.	MAIN	The student is expected to be able to: - Complete an integrated business plan. - The students will become skilled in the development of research projects.
AGMA	6814	Financial Management.	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will understand: - A critical analysis and interpretation of the financial statements of an agribusiness by using key financial ratios. - The evaluation of the impact and financial feasibility of new projects, growth strategies on the key financial ratios and the long term well-being of the business by taking into account the changing macro-economic environment. - Practical/Project: At the end of the course the student must submit an assignment and do a presentation illustrating the application of these principles on an agribusiness of his/her choice.	MAIN	Student will be able to: -Critical analysis and interpretation of the financial statements; and -Evaluation of the impact and financial feasibility of new projects, growth strategies on the key financial ratios.
AGMA	6815	Farm and Agribusiness Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management including comprehensive knowledge of strategic management principles and directives, strategy formulation and implementation and contemporary strategic applications. The second learning outcome of this model relates to the development and application of strategic management principles within the broader business plan concepts	MAIN	Student will be able to: -Explain and apply the basis principles of strategic management; -Explain and apply the principles of corporate governance within a strategic management framework; -Explain and apply the principles of both internal and external environment analysis; -Explain and apply the principles of grand and functional strategies within the broader framework of strategic management; -Align strategy with industry life cycle; -Explain and apply chain management principles within the framework of strategic management; -Explain and apply structural drivers and instruments the context of strategy implementation; -Explain and apply strategic control and evaluation mechanisms; -Explain and apply the basic concept of business plan development; and -Apply general strategic management principles within a specific case studies/ business plan.
AGMA	6824	Advanced Agricultural Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will understand: -Effective management styles. -Leadership and information systems.	MAIN	Student will be able to: -Discuss explore and apply effective management styles -Develop and use leadership and information systems.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGMA	6825	Marketing and Human Resource Management.	This module contains fundamental knowledge, theories, principles and practices of Agricultural Marketing and Human Resource Management. After completing this course the student will understand: -The students will be equipped with the decision-making skills and knowledge needed to perform a complete marketing plan for an agri-business. -More specifically, the module encompasses the analysis of the macro and internal environment in which marketing takes place, strategic marketing process and the development of marketing plan. -A comprehensive knowledge of human resource management in South Africa. -Students will be able to analyse and confidently manage challenges pertaining to the management of their staff in terms of employment relationships, workforce planning, establishing employee relationships (recruiting, appointing and orientating), utilising and developing employees (motivating, leading and training) and the influence of Labour Laws and policies.	MAIN	Student will be able to: - Perform a complete marketing plan for an agri-business; - Develop a marketing plan; - Examine human resource management in South Africa; and - Analyse and confidently manage challenges pertaining to the management of their staff.
AGMA	6834	Production Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will understand: - The theoretical concepts of production economics, which include, amongst others, input/output, input/input, and output/output relationships; economic optimal input and output levels; and economies of scale. - The student will be able to compile comprehensive enterprise budgets for cash and perennial crops, pastures and livestock enterprises with special reference to the consideration of the availability, and the quality of available natural resources. - With the aid of actual case studies, the student will understand how theoretical concepts are applied in practice when making management decisions to choose between different production alternatives, production processes, and the adoption of new production technology. - Practical: The student will be able to assess the financial impact of management decisions within a case study of his/her choice.	MAIN	The student will be able to: - explain and discuss the theoretical concepts of production economics; - compile comprehensive enterprise budgets; and - apply theoretical concepts in practice when making management decisions.
AGMA	6835	Macroeconomics and financial management	This module contains fundamental knowledge, theories, principles and practices of Agricultural management, including: - Market structures and concentration in the South African economy. - the student will be able to critically analyse and independently evaluate an agribusiness's financial position and - The evaluation of the impact and financial feasibility of new projects, growth strategies on the key financial ratios and the long term well-being of the business by taking into account the changing macro-economic environment	MAIN	Student will be able to: - Analyse the basic macro-economic structures and concepts-effect and implications for agriculture; - Discuss and interpret key economic indicators and cycles implications for agriculture and strategic management decisions. - Analysis and interpretation of the financial statements; - Evaluate the impact and financial feasibility of new projects, growth strategies on the key financial ratios; and - Interpret and present research results, and report writing
AGMA	6844	Project Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will understand: - Project management is the process by which projects are defined, planned, implemented, monitored and controlled to realise project objectives. - After completing this module the student will be able to develop a project plan, define the scope of the project, set objectives, develop a time-schedule and a budget, manage resources, measure progress and - Manage the project to complete the project successfully.	MAIN	The student will be able to: - apply Project management principles and defined, planned, implemented, monitored and controlled to realise project objectives; - develop a project plan, define the scope of the project, set objectives, develop a time-schedule and a budget, manage resources, measure progress; and - Manage the project to complete the project successfully.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGMA	6845	Production and Project Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will understand: -Project management is the process by which projects are defined, planned, implemented, monitored and controlled to realise project objectives. -After completing this module the student will be able to develop a project plan, define the scope of the project, set objectives, develop a time-schedule and a budget, manage resources, measure progress and -Manage the project to complete the project successfully.	MAIN	Student will be able to: -Examine the concept of project management cycle; -Contextualise and interpret project management concepts within the context of strategic goal achievement; -Explain and apply the principles of project scope management; -Explain and apply the principles of project intergration management; -Examine, explain and apply the principles of project communication management; -Explain and apply the principles of project time management; -Explain and apply the principles of project human resource management; -Explain and apply the principles of project quality management; -Explain and apply the principles of project cost management; -Explain and apply the principles of project procurement management; -Explain and apply the principles of project risk management; and -Apply general project management concepts and principles within different case studies
AGMA	6854	Marketing Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will understand: - The students will be equipped with the decision-making skills and knowledge needed to perform a complete marketing plan for an agri-business. - More specifically, the module encompasses the analysis of the macro and internal environment in which marketing takes place, strategic marketing process and the development of marketing plan. - Practical: Supplementation will take place by giving real life case studies.	MAIN	The student should be able to: - Decision-making skills and knowledge needed to perform a complete marketing plan for an agri-business. - Development of marketing plan.
AGMA	6864	Human Resource Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will have: - A comprehensive knowledge of human resource management in South Africa. - Students will be able to analyse and confidently manage challenges pertaining to the management of their staff in terms of employment relationships, workforce planning, establishing employee relationships (recruiting, appointing and orientating), utilising and developing employees (motivating, leading and training) and the influence of Labour Laws and policies.	MAIN	The student should be able to: - discuss and explain human resource management in South Africa. - Analyse and confidently manage challenges pertaining to the management of their staff.
AGMA	6874	Financial Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will be able to do: - A critical analysis and interpretation of the financial statements of an agribusiness by using the key financial ratios. - The evaluation of the impact and financial feasibility of new projects, growth strategies on the key financial ratios. - The evaluation of the long term well-being of the business by taking into account the changing macro-economic environment. - PRACTICAL: At the end of the course the student must submit an assignment and do a presentation illustrating the application of these principles on an agribusiness of his/her choice.	MAIN	The student will be able to: - Analysis and interpretation of the financial statements; - Evaluate the impact and financial feasibility of new projects; and - Evaluate the long term well-being of the business by taking into account the changing macro-economic environment.
AGMA	6884	Business Management	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management/Economics, including: After completing this course the student will have: - A comprehensive knowledge of strategic management theories and methods. - The student will be able to practically apply strategic management concepts in terms of production, processing, retail and service sectors of businesses in various industries.	MAIN	The student should be able to: - discuss and explain strategic management theories and methods. - apply strategic management concepts in terms of production, processing, retail and service sectors of businesses in various industries.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGMA	8900	Agricultural Management extended dissertation	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management, including: Research project in specialized field of Agricultural Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Learning outcomes: -Having successfully completed this programme, the student will be able to demonstrate knowledge and understanding of supervised planning and execution of a research project in a natural or agricultural science discipline. - formulate hypothesis, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results, and writing of a dissertation according to a structured format and related literature.
AGMA	9100	Agricultural Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Agricultural Management, including: Research project in specialized field of Agricultural Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	The student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format);and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
DIMD	7910	Ecosystem-Based Disaster Risk Reduction And Climate Change Adaptation (Eco-DRR)	This highly interactive and problem-based course provides students with theoretical concepts and Practical tools in understanding environment and disaster linkages and applications of ecosystem-based disaster risk management. This module contains fundamental knowledge, theories, principles and practices relevant to Eco-DRR/CCA including the approaches and tools of mainstreaming the environment into disaster risk reduction and climate change adaptation	MAIN	Students must be able to: -Describe and explain the main components and drivers of risk and disasters, -Analyse most commonly used models -Explain different terminology used by DRR and CCA communities -obtain data and information on global trends related to DRR - Obtain some hands on experience with participatory risk mapping and Vulnerability and Capacity Analysis (VCA) -Explain the link between global environmental problems, disasters, and sustainable development - Explain the multiple benefits ecosystems offer for disaster risk reduction -Explain how disasters are linked to the natural conditions in specific biomes / ecoregions Describe how ecosystem services can help to decrease disaster risk Understand the limits and opportunities of ecological and physical infrastructure for DRR -Explore methods to assess costs and benefits of DRR measures and value ecosystem services Session and content -Explore about the importance of spatial planning as an overarching concept for reducing disaster risk using ecosystem management tools, various ecosystem management tools and approaches, disaster risk for different ecosystem and hazard types,the role of ecosystems for reducing urban risks, the importance of community based disaster riskreduction through ecosystem management - Summarise the main concepts and issues learned in Blocks 1-3
DIMW	7910	Water related disasters	Management of Disasters (Natural and Human Made)	MAIN	No outcomes provided

Animal and Wildlife and Grassland Sciences (100)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGRI	1514	Biological principles in Agriculture	After completion students will be able to apply the principles of the physiology of farm animals and agricultural and horticultural crops within disciplines. The different body systems of the animal are addressed.. The inherent physiological differences in plants are demonstrated, the establishment and vegetative and reproductive growth are discussed, while the surveying, transport and working of fertilisers, water and pesticides are addressed. Practical work: Demonstrations of the principles involved in the body. The most important theoretical aspects of crops are practically conducted	MAIN	Student should be able: Di-scuss, describe and explain concepts related to the anatomy and physiology of the different animal and plant systems and gain insight into the practical applied manipulation of certain aspects in the field of animal and plant production.
AGRI	1624	Mathematical and Biometrical Principles in Agriculture	Skills will be developed in mathematical and statistical calculations. The use of algebraic and graphical solutions of problems as applied to linear and quadratic equations. The use of descriptive statistics, with attention to central and dispersion parameters (mean and variance). Use and application of ANOVA, regression and correlation to solve agriculturally related problems. Practical work: Calculations will be done applying the theoretical knowledge in solving agriculturally orientated mathematical and statistical problems.	MAIN	Student will be able to: -describe and explain key terms, concepts, facts and principles of elementary statistics, with regard to mean, variance and linear regression; -select and apply standard statistical methods, procedures, and/or techniques within the discipline to analyse typical data sets found in agricultural; -Accessing, processing and managing information, in respect of which a learner is able to demonstrate an ability to gather information from various sources then apply appropriate analyses and evaluation of the data; and -Producing and communicating the information, accurately and coherently, using conventions appropriate to statistics and scientific reporting
ANIB	2624	Introduction to animal and plant breeding	This module contains fundamental knowledge, theories, principles and practices of animal and plant breeding including modes of inheritance: evolution and genetic diversity; mitosis and meiosis; chromosomes, locus and genes; Mendelian inheritance; sex chromosomes and determination of sex; linkage and crossing over; sex related inheritance; randomness of inheritance; dominance and epistasis. Population genetics: gene and genotypic frequencies, effect of selection and mating systems on gene and genotypic frequencies; Hardy-Weinberg law; deleterious genes and detecting carriers of deleterious genes; simply inherited and polygenic traits; natural and artificial selection; conservation genetics.	MAIN	Student will be able to: -Outline modes of inheritance and population genetics and how that knowledge relates to animal and plant breeding.
ANIB	3714	Theory of animal breeding	Genetic model for quantitative traits; genotype x environment interaction; statistical methods applied to animal breeding; probabilities and goodness of fit; the resemblance between relatives; heritability and repeatability; prediction of selection response; short and long term results of selection; introduction to quantitative traits; inbreeding and crossbreeding; threshold values and scale effects; phenotypic, genetic and environmental correlations; hybrid vigour; correlated responses; natural selection. Practical work: The student estimates heritability; genetic and phenotypic correlation and other parameters.	MAIN	Student will be able to: - An integrated knowledge of the resemblance between relatives; genetic parameters; prediction of selection response; short and long term results of selection; inbreeding and crossbreeding; threshold values and scale effects; genetic and environmental correlations; correlated responses; natural selection; hybrid vigour; epigenetics; - Detailed knowledge of the theory of animal breeding how this knowledge relates to other fields, disciplines or practices; -Evaluate types of knowledge and explanations typical within the animal breeding context; - Identify, evaluate and solve problems in unfamiliar contexts; - Calculate heritability; genetic and phenotypic correlations and other parameters; and - Communicate effectively through visual and numeric proficiency during oral and written presentations
ANIB	3724	Molecular Animal Breeding	Reproductive technologies, cloning, molecular genetic technologies, genetic markers, major genes and the ethical aspects of new technologies in livestock improvement. Practical work The student gain new knowledge of the practical aspects of this new technology through demonstrations.	MAIN	Students will be able to: -Discuss the impact of modern reproductive technologies, cloning, molecular genetic technologies, genetic markers, major genes and the ethical aspects of new technologies in livestock improvement.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ANIB	4814	Animal Breeding: Mixed Model Theory	This module includes the study of genetic model for quantitative traits, matrix algebra; statistics in animal breeding; importance of heritability and repeatability; methodologies for genetic prediction; optimisation of selection; different models for the prediction of breeding values; Sire model, animal model, Bayes theory, QTLs, genomic models; relationships and inbreeding; simple rules for computing A and A-1 matrices; joint estimation of several vectors of random effects; accounting for genomic information in genetic analyses. Practical work: The student estimates variance components and resulting breeding values using matrix algebra and is familiarised with the application of breeding values. The use of different computer programmes for genetic analyses of large datasets is mastered.	MAIN	Student will be able to: - Apply and engage with concepts of quantitative genetics in Animal breeding - Apply and engage with a range of terms, concepts and issues concerning the genetic analyses of Animal breeding data and the interpretation of the results as well as the components of the extended genetic model for quantitative traits; -Use relevant statistical techniques and the application in quantitative traits; -Discuss the importance of heritability and repeatability in animal breeding; -Use appropriate methodologies for genetic predictions: selection index and BLUP; - Optimize genetic change by manipulation of elements of the key equation -Apply appropriate statistical techniques for the calculation of correction factors; -Use matrix algebra in the prediction of breeding values using mixed model methodology: Sire model, Animal model, multiple trait models; and -Estimate variance components from field data.
ANIB	4824	Animal Breeding: Practical Application	After completion the student is familiar with the basics of practical animal breeding; selection objectives; selection trials; mating systems; selection techniques; national livestock improvement schemes; selection for growth and efficiency; genotype x environment interactions; unique breeding problems in different breeds and species; linear type traits. Practical work The student interprets performance test data and herd profiles; conduct practical selection of breeding stock; evaluate breeding programmes. Demonstration of commercial herd/flock manage-ment software as used in different livestock industries.	MAIN	Student will be able to: -Apply, integrate and engage with concepts of quantitative genetics in the animal breeding problems; -Explain the meaning of BLUP of breeding values and know how to apply it in practice; -Apply the criteria to determine the traits to be included in a breeding objective -Formulate breeding plans for several livestock species; -Discuss international developments in the animal breeding field; -Calculate individual inbreeding coefficients for a large dataset and be able to interpret it in a practical situation; and -Utilise the objectives and application of all National Improvement Schemes of different species and be able to critically evaluate their design that influence the rate of genetic improvement for economic important traits.
ANIG	1624	Introducing to animal, wildlife and grassland sciences	This module includes an introduction to the study of animal, wildlife and grassland science. It includes the following: domestication and migration routes of livestock species, livestock industry, livestock breeds; handling of farm animals; concepts in livestock production; livestock and the environment; safety in livestock production; wildlife species and production systems; vegetation of South Africa and the rangeland ecosystem; career opportunities in the animal, wildlife and grassland science industries. Practical work Visits to different production systems. Demonstrations of animal handling in different species. Rangeland evaluation techniques. Identification of wildlife and vegetation species.	MAIN	Student will be able to: -Describe domestication and migration routes of livestock species; -Defend the importance of livestock industry; -Identify livestock breeds; -Explain handling of farm animals and concepts in livestock production, livestock and the environment and safety in livestock production based on an awareness of the complexity of ethical dilemmas; -Identify wildlife and vegetation species; -Evaluate production systems; and -Describe vegetation of South Africa and the rangeland ecosystem;
ANIG	2614	Introductory Ruminant Production	After completion the student will be familiar with the general principles of beef, dairy, sheep and goat production, the role of the four industries in South Africa, different breeds, the effect of nutrition, breeding, physiology and health on the efficient production of beef, mutton (lamb meat), milk and wool. Practical work Visits to beef, dairy, sheep and goat production and processing units will be arranged to expose students to the different aspects of the production systems commonly used in South Africa. Basic animal husbandry skills (dipping, dosing, vaccination, castration, dehorning etc.) will be demonstrated and performed. The basic principles of meat, milk and wool evaluation will be demonstrated.	MAIN	Student will be able to: -Discuss the general principles of beef, dairy, sheep and goat production, and the role of the four industries in Southern Africa; -Identify different breeds, and the effect of breeding, nutrition, physiology and animal health on the efficient production of beef, mutton (lamb meat), milk and wool; -Apply animal husbandry skills (dipping, dosing, vaccination, castration, dehorning etc.); and -Apply principles of meat, milk and wool evaluation.
ANIG	2624	Introductory Monogastric, Wildlife and Aquaculture Production	After completion the student will be familiar with the general principles of horse husbandry, pig, poultry, wildlife, ostrich and aquaculture production, the role of the industries in South Africa, different breeds, the effect of nutrition, breeding, physiology and health on the efficient production of meat and eggs. Practical work Visits to various production and processing units will be arranged to expose students to the different production systems commonly used in South Africa. Basic animal husbandry skills (dipping, dosing, vaccination, castration, docking etc.) will be demonstrated and performed. The basic principles of meat and egg evaluation will be demonstrated.	MAIN	Student will be able to: -Identify and discuss the general principles of horse husbandry, pig, poultry, wildlife, ostrich and aquaculture production, and the role of these industries in Southern Africa; -Identify and discuss different breeds, and the effect of breeding, nutrition, physiology and health have on the efficient production of meat and eggs; -Apply animal husbandry skills (dipping, dosing, vaccination, castration, docking etc.); -Apply principles of meat and egg evaluation.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ANIG	3714	Cattle production systems	Having successfully completed this module the student will understand the integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises. Practical work Students must compile and evaluate a management system for sheep, dairy and beef enterprises.	MAIN	Student will be able to: -Discuss management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; -Discuss how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises; and -Compile and evaluate a management system for sheep, dairy and beef enterprises.
ANIG	3724	Sheep and goat production systems	Having successfully completed this module the student will understand the integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises. Practical work Students must compile and evaluate a management system for sheep, dairy and beef enterprises.	MAIN	Student will be able to: -Apply integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; -Discuss how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises; and -Compile and evaluate a management system for sheep, dairy and beef enterprises.
ANIG	3734	Poultry production systems	Having successfully completed this module the student will understand the integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises. Practical work Students must compile and evaluate a management system for sheep, dairy and beef enterprises.	MAIN	Student will be able to: -Discuss integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; -Discuss how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises; -Compile and evaluate a management system for sheep, dairy and beef enterprises.
ANIG	3744	Pig production systems	This module includes the study of fertility and selection, vaccination and venereal diseases and crop residues and planted pastures in relation to pig management.	MAIN	The students will be able to: - Integrated knowledge and understand the concepts, principles and theories of elements of pig production systems and the practical application thereof in different situations; - Critically evaluate different production systems; - Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for pigs; - Develop a complete management program for this species; and - Communicate effectively through visual, numeric and language proficiency during oral and / written presentations.
ANIG	4808	Research Project Animal Sciences	A subject specific project will be completed under the guidance of a supervisor and it is expected of students to submit a research report in the format of a scientific publication and to prepare and orally present the results in the format required by scientific conferences.	MAIN	Student will be able to: - perform problem solving, hypothesis formulating, planning, execution and analysis of animal science experiments/research, - use a range of specialised skills to identify, analyse and address complex problems drawing systematically on the body of knowledge and methods appropriate to the field of animal science. - interpret results and prepare scientific report - communicate effectively through visual, numeric and/or language proficiency during oral and written presentations. -work effectively in a team or group, and to take full responsibility for own decisions and actions, and full accountability for the decisions and actions of others where appropriate. -demonstrate insight developed in this module provides a background for further post graduate studies.
ANIN	3734	Fundamental and Experimental Animal Nutrition	The student is familiar with the concepts of feeds and nutrients (water, carbohydrates, lipids, proteins, minerals and vitamins); digestive systems (monogastric, ruminant and lower digestive tract fermenters), digestion, absorption and metabolism; nutrient deficiencies, toxicity and metabolic disturbances; digestibility of feeds and feed components; techniques for the evaluation of feeds and pastures; nutrient requirements for monogastric animals, ruminants and lower digestive tract fermenters. Practical work:Students perform feeding and digestion trials, and laboratory analyses.	MAIN	Student will be able to: - Apply and discuss the basic concepts of nutrients; digestive systems of monogastric, ruminant and lower digestive tract fermenters, digestion, absorption and metabolism; nutrient deficiencies, toxicity and metabolic disturbances; digestibility of feeds and feed components; techniques for the evaluation of feeds and pastures; nutrient requirements for monogastric animals, ruminants and lower digestive tract fermenters; and - Communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding digestibility studies and/or any relevant topic.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ANIN	3744	Properties of feeds balancing rations and fodder flow planning	On completion the student is familiar with the identification, classification, nutritional characteristics, processing and toxicity of feeds; feed additives and by-products. Practical work: The student performs identification of feeds using basic principles.	MAIN	Students will be able to: -Discuss the classification, nutritional characteristics, processing and toxicity of feeds; feed additives and by-products; -Use feeds in diets for several ruminant and/or monogastric species; -Communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding feeds and/or any relevant topic.
ANIN	4834	Applied monogastric nutrition	On the successful completion of this module, the student is familiar with the principles of nutrient requirements, nutritional management and the interaction between nutrition and physiological development of poultry and pigs during different biological developmental phases and within intensive production systems. The comprehensive integration of biochemical and nutritional knowledge during the physical and chemical evaluation of diets for monogastric animals will be demonstrated. Practical work: The student performs balancing of diets using detailed computer assisted formulation software and production simulation models with specific reference to poultry and pig species. Participating in research activities with regard to applied nutritional management of the mentioned species.	MAIN	Student will be able to: -apply and demonstrate principles and in-depth insight regarding basic concepts and nutritional requirements of broilers, layers, breeder parent stock, sows, piglets and boars in different physiological developmental stadiums and housing systems to produce economical high quality animal protein products; -apply the necessary principles needed to formulate diets for several monogastric species using computer assisted models with integrated knowledge and understanding of feed ingredient limitations as well as ingredient cost; -discuss and apply principles of international developments in the animal nutrition field; with specific reference to changes within the poultry and pig sectors; and -communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding diet formulation and/or any relevant topic within applied monogastric nutrition.
ANIN	4864	Applied runimant nutrition	On completion, the student is familiar with the nutrient requirements and nutritional management of dairy cattle, dairy calves, beef cattle, sheep and goats during different physiological stages; intensive, extensive and semi-intensive feeding systems for livestock, including drought feeding, over-wintering, stall feeding, supplementation on veld and irrigated pastures. Practical work: The student performs balancing of rations using computer assisted linear programming, formulation- and simulation models. Participation in any management and/or research activities with regard to applied nutritional management of the mentioned species.	MAIN	Student will be able to: -evaluate and engage with concepts and feeding management of dairy cattle, dairy calves, beef cattle, sheep and goats in different physiological stadiums and systems to produce economical high quality animal products within specific environmental conditions. -formulate diets for several ruminant species using computer assisted models; -evaluate and engage with international developments in the animal nutrition field; and -Communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding ration formulation and/or any relevant topic within applied ruminant nutrition.
ANIP	2614	Anatomy and Physiology of body compartments	On a basic systems approach the animal body is divided into body and fluid compartments. Body compartments are studied with emphasis on embryological development of the pleural and peritoneal cavities. Blood and its components will be studied followed by the lymphatic system (anatomy, histology and physiology). Bacterial and viral diseases as well as vector borne diseases will be covered. The anatomy and physiology of the different systems within each body compartment will be covered such as the cardiovascular, respiratory, endocrine and digestive system.	MAIN	Student will be able to: -Describe and explain embryological development of the body and fluid compartments; -Identify anatomical compartments of the body and systems within each compartment (cardiovascular, respiratory, endocrine and digestive systems); -Describe the physiology of the body compartments and systems within each compartment (cardiovascular, respiratory, endocrine and digestive systems); -Comprehend the physiology of the fluid compartments (hematopoiesis and immunology); -Identify anatomical structures of the lymphatic system; and -Identify and apply the control of bacterial, viral and vector borne diseases.
ANIP	3714	Animal anatomy and physiology of growth in farm animals	Anatomy and Physiology of muscles and nerves. Animal growth and development, and the underlying physiological principles. Applied aspects of animal growth and development. Fundamental aspects of growth, development and size at different growth phases. The use and application of growth promotants in South Africa. Energy metabolism in live and post mortem muscle.	MAIN	Students will be able to: - Identify anatomical structures of locomotion; - Associate with animal growth and development and apply its underlying physiological principles; - Classify embryological development and factors that affect growth and development; - Debate the use and application of growth promotants in South Africa; and - Define and apply the knowledge on energy metabolism in live and post mortem muscle.
ANIP	3724	Animal Health	The student is familiar with the vaccination and dosing of farm animals, the immune reaction, diagnosis, symptoms, lesions, treatment and control of certain common diseases in livestock, external and internal parasite control and the occurrence of dystocia. Practical work: Elementary diagnostic and post mortem procedures. The principals involved with RIA determinants and immunological techniques are demonstrated.	MAIN	Student will be able to: - Discuss and explain causes, symptoms, lesions, diagnosis, treatment and control measures of certain common diseases of farm animals; -Examining, vaccinating and dosing techniques regarding farm animals; - Discuss the characteristics of the immune reaction and resistance against parasites and pathogens; and - Identify and address ethical issues on animal health problems

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ANIP	4814	Applied reproduction physiology in farm animals	Functional anatomy of the reproductive organs, endocrine and mammary glands, reproductive characteristics of various animal species, followed by the underlying physiological principles of endocrinology, endocrine control of reproductive cycles, gametogenesis, fertilisation, conception, gestation, parturition and lactation. Principles and application of synchronisation, semen collection, artificial insemination, super-ovulation and embryo transfer in sheep goats, cattle and pigs. Practical work: Macroscopic examination of the reproductive tract; semen evaluation; demonstration of synchronisation, laparoscopy and pregnancy diagnosis in sheep and cattle are performed and demonstrated. Visits to AI stations, pig and poultry production units and dairies.	MAIN	Student will be able to: -Identify functional anatomical reproductive organs in male and female animals; -Implement concepts such of reproduction efficiency and means of increasing reproduction in farm animals and poultry; gametogenesis and the endocrine control of reproduction; puberty; -Explain super-ovulation and embryo transfer in sheep, goats, cattle and pigs; -Explain and apply synchronisation and artificial insemination in sheep, goats, cattle and pigs; and -Identify and address ethical issues based on the suitability of different ethical value systems on the application of animal reproductive techniques.
ANIP	4824	Meat, dairy and egg science	To provide an overview of meat, dairy and egg industry in South Africa, on the continent and worldwide. Post mortem energy metabolism in muscle, the composition and quality aspects of meat and milk, the process of meat and milk production, and factors that affect the quality attributes of meat and milk. Embryological development of eggs. Composition of carcass and meat, slaughtering process, meat quality, and the consumer. Dairy industry. Composition and nutritional value of milk and factors that influence it. Milk production, milk quality and distribution. Egg production and distribution.	MAIN	Student will be able to: -Explain the physiological processes of conversion of muscle to meat; -Discuss the marketing and factors affecting meat consumption; -Summarise the slaughtering processes and carcass processing and classification systems of different species; -Explain carcass health inspection; -Explain the physiological processes of lactation; -Discuss marketing and factors affecting dairy consumption; -Describe milk composition and dairy quality; and -Discuss egg production and marketing.
DATA	2614	Agricultural Datametry	The student will learn how to calculate and interpret statistics (mean, variance, analysis of variance (ANOVA) and multiple comparison of means) from various experimental designs. Data sets will be analysed during tutorials to illustrate the techniques learned.	MAIN	Student will be able to: -apply appropriate methods, procedures and/or techniques in statistical analyses within a defined context; and -interpret results from statistical analyses using real data sets.
DATA	2624	Agricultural Datametry	The student will do regression analyses (linear, non linear, multi linear), frequency tables and Chi square analysis of categorical and frequency data, graphical presentations, univariate and mixed model analyses of data applicable to Agricultural related industries and co-variance analysis combining regression and ANOVA. Practical work; The student will learn about regression (simple linear regression and multiple regression), correlation and co- variance	MAIN	Student will be able to: - apply appropriate methods, procedures and/or techniques in regression and co-variance analyses within a defined context. - interpret results from regression and co-variance analyses using real data sets.
DATA	3712	Statistical Analysis	The student will learn to use statistical software packages, SAS and EXCEL, to analyse data typically found in agricultural research. Using SAS and Excel, data will be processed to generate descriptive, analyses of variance (ANOVA) and regression statistics for further interpretation, inference and reporting regarding the analysed data. Practical work: The student will use the software statistical packages, SAS and Excel to analyse data using appropriate statistical methodology. The results will be tabulated, saved and exported as HTML, RTF, DOC and PDF files. These results will then be summarised and reported.	MAIN	Student will be able to: - apply appropriate statistical methods, procedures and/or techniques in analyses of data within a defined context using commercially available statistical software packages; and - interpret and report results from these data analyses
GRAS	2614	Grassland Ecology	Students are introduced to Grassland Science and Wildlife Management and equipped with the basic principles of the ecology of veld vegetation and herbivore game species. Must be able to describe and evaluate the causes and results of vegetation changes. Knowledgeble of ecological aspects of rangeland and rangeland ecosytems (domesticated and game animals). Identification and description of South African fodder plants including grasses, karoo shrubs and trees, as well as indicator and problem plants. Identification of herbivore game species and knowledge off their habitat requirements and diet selection.	MAIN	Student will be able to: -Discuss , explain and explore: The vegetation of South Africa, including the biomes and veld types of South Africa,Growth and development of pasture plants, Physiological aspects of pasture utilization, including photosynthesis, Indicator and problem plants, Ecological status and grazing values of grasses, karoo shrubs and woody plants, including their identification. -Link these fundamental principles to practical, real-world situations

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GRAS	3714	Applied veld management and veld evaluation	The aim and principles of veld management with livestock and wildlife will be studied in this module. Knowledge of grazing habits of livestock and wildlife and selective grazing will be attained. Identification and analysing of veld management methods and strategies will be discussed. The student will be equipped to determine grazing capacity and stock rate. The student will be able to do scientific planning of farm unit and study the methods for evaluating grassland in terms of botanical composition and veld condition.	MAIN	Student will be able to: - differentiate between all applicable pasture terminology and correctly use it. - interpret the conduct of the animal on veld and make calculations on the grazing capacity to determine the number and type of animals on natural veld. - discuss the development of camp systems over the last half century and describe the increasing developments in multi-camp systems and the group camp approach in a theoretical and practical example considering the principles of veld management. - analyse of the pasture data, and prescribe special applicable treatment for it, of which veld fires are an important factor. - analyse the economic implications of stock numbers and veld management, on the basis of the appraisal of the carrying capacity of veld. - determine the different measures of veld evaluation and study different methods of veld condition determination to eventually determine the carrying capacity of veld and - apply above knowledge to do pasture scientific planning of a farm unit with consideration of the number of camps, carrying ability of veld, use of suitable number and type of animals, so that efficient veld management is applied and sustainable high production from veld is ensured, eventually measured in terms of animal products, while aiming at conservation farming.
GRAS	3724	Intensive Pasture Production	After completion of the module the student will knowf the importance, extent and purpose of intensive pasture production in the RSA. The student will gather information about seed germination of fodder plants. Evaluation of factors important in veld reclamation and veld reinforcement will be discussed. Identification and evaluation of suitable crops for planting/cultivating: cultivation aspects, choice of crops, nutritive value, quality, utilisation and forage conservation will be studied. The student must integrate all the information to do fodder flow planning.	MAIN	Students will be able to: -Manage seed germination principles of fodder plants in pasture cultivation and veld restoration; -Evaluate factors important in veld reclamation, reinforcement and restoration; and -Identify and evaluate suitable fodder crops for planting/cultivating, which include cultivation aspects, choice of crops, quality, quantity, utilization and conservation
GRAS	4808	Research Project Grassland Sciences	A subject specific project will be completed under the guidance of a supervisor and it is expected of students to submit a research report in the format of a scientific publication and to prepare and orally present the results in the format required by scientific conferences.	MAIN	Student will be able to: - perform problem solving, hypothesis formulating, planning, execution and analysis of Grassland science experiments/research, - use a range of specialised skills to identify, analyse and address complex problems drawing systematically on the body of knowledge and methods appropriate to the field of Grassland Science - interpret results and prepare scientific report - communicate effectively through visual, numeric and/or language proficiency during oral and written presentations. -work effectively in a team or group, and to take full responsibility for own decisions and actions, and full accountability for the decisions and actions of others where appropriate. -demonstrate insight developed in this module provides a background for further post graduate studies.
GRAS	4814	Production and Utilisation Ecology	Students are introduced to the fundamental principles of ecology. The student must be able to evaluate the sustainability of the grassland ecosystem and the factors influencing it in order to find long-term, practical solutions to ecological problems. The hydrological and other biological cycles in the grassland ecosystem will be covered. Mathematical models for the estimation of the biomass of woody plants for purposes of calculating the browsing capacity for domestic stock and game species will be studied	MAIN	Students will be able to: Evaluate the sustainability of the rangeland ecosystem and the factors that may influence it in order to find long-term, practical solutions to ecological problems. -Discuss the principles of ecology and also be able to link this knowledge to practical, real-world situations with reference to the specific aspects of study include the following: -The ecological approach and its meaning, -Principles concerned with the regulation and stabilisation of rangeland ecosystems, -Biogeochemical cycles in rangeland ecosystems, -Elasticity and condition of rangeland ecosystems, -Knowledge of the problem of bush encroachment and how to use principles of ecosystem functioning in finding long-term solutions, -The quantification of woody plants and the calculation of the browsing capacity for domestic stock and game species.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GRAS	4824	Advanced Veld Management	Knowledge of the extent and history of the conservation idea will be studied in this module. Identification of the causes and results of veld deterioration (erosion) and measures to combat it will be done. The student should be able to identify the importance of veld management in different veld types and the critical evaluation of system/practices. Identification and analysing the grazing habits of livestock and game and selective grazing. Determination of grazing capacity and stocking rate and application of special treatments for veld will be discussed. Students will carry out veld management planning and bringing applied wildlife management in proper relation to marketing, legal aspects, economics and sosio-economical aspects of game. Students will be familiar with the management of communal areas.	MAIN	Student will be able to: -study the behaviour conduct of domestic animals and game on veld and make calculations on the grazing capacity to determine the influence of number and type of animals on natural veld; -recommend an exact or applied veld management system as well as special treatments for veld; -analyse the economic implications of stock and game numbers and veld management, based on estimating the carrying capacity of veld; and -use the above information to recommend a sound veld management strategy under different situations, with different kinds of animals and to take the management skills of the farmer into consideration.
GRAS	4834	Defoliation Phenology and Physiology	The student will have a higher level of knowledge on physiological and phenological aspects of fodder plants. The student have to gain information about water absorption, translocation and food storage in fodder plants as applicable to grassland management. Identification of critical periods (phenological and physiological) in the seasonal growth cycle of grasses, legumes, fodder shrubs and bushes. Be adjusted to the influence of intensity, frequency and season of defoliation on net assimilation rate, root growth, growth reserves and plant growth changes of grasses, bushes and Karoo shrubs. Bringing the influence of water shortages in proper relation to the growth and development of fodder plants. Students will gain knowledge of seasonal variation in nutritional value and quality of fodder plants.	MAIN	Students will be able to: -Identify critical phenological and physiological periods in the growth cycle of fodder plants (grasses, shrubs and trees); -Apply defoliation physiological principles of fodder plant to ensure sustainable management of the grazing ecosystem; and -Evaluate the influence of intensity, frequency and season of defoliation on leaf and root growth, growth reserves and nutritive value of fodder plants.
GRAS	4844	Advanced Fodder Plant Evaluation	After completion the student will have a higher level of knowledge on the classification of vegetation and identification of the variables that influence the grassland ecosystem. Planning and conducting of grassland science research will be carried out. Sampling, arrangement, statistical tests and simulation models applicable to the grassland ecosystem will be done. Student should be able to identify methods to measure variables and the productivity of the grassland ecosystem and knowledge of the practical application of the techniques. Evaluation of applied livestock and wildlife management systems will be studied. Student should be familiar with the principles, application and limitations of the most important wildlife management . Research methodology	MAIN	Student will be able to: -Examine advanced principles of the objectivity and application of methods and techniques to measure the composition and productivity of the ecosystem and any changes that may occur; and -Link these fundamental principles to practical, real-world situations and include knowledge of the following: Changes within the ecosystem, Planning and conducting research, Sampling vegetation, Cover as measure to evaluate veld, Presence and absence of species as measure of veld assessment, Density as measure of evaluating veld, Production as basis of veld assessment, Utilisation, forage intake and nutritive value of veld, Determination of veld condition
GRAS	4851	Professional Skills	Knowledge attain concerning the principles for writing seminars and scientific publications, acquiring literature and consultation thereof, gathering of information, writing and presenting a seminar on a grassland scientific subject, project presentations and reports; communication skills development.	MAIN	Student will be able to -Gather information on a specific topic in Grassland Science; and -Write a report and present the report to an audience.
WDMT	2624	Game and natural environment interaction	A study is made of the interaction between game and their environment, with emphasis on their habitat and food selection in the natural veld, competition for it, as well as seasonal changes in the environment. The role that the wild animals environment plays in its reproduction, herd size, migration, conflict with humans, etc. are also covered. General principles on ecology, availability and utilization of food by game in natural veld (extensive system), as well as basic methods of veld surveys and carrying capacity are discussed on an introductory level.	MAIN	Student will be able to: -describe the link between the game animal and its environment, since the environment determines for example the habitat, space, shelter and food available to the animals, their reproduction success, migration patterns, herd sizes and interaction with other game species ‘ each of which will be discussed in detail; -discuss the factors that influence availability of food in the natural veld, the preferences, selection and utilisation of food by the game animal during different seasons and how that impacts on their habitat selection and ultimately on their survival; -Classify wild animals into different categories based on their feeding habits and characteristics; -explain some basic principles of the ecology and management of game animals; -explore knowledge on the `human-wildlife-conflict’ concept mostly driven by the decrease in habitat size and in available food sources to game animals, and obtain valuable practical examples of cases where this conflict had been reduced; -Obtain introductory skills in the execution of methods to do veld surveys and calculate the carrying capacity of an area -develop concepts on the game animal and its interaction with the environment in order to expand on it in their future studies and to be equipped to deal with certain practical scenarios they could be faced with in the game ranching industry. Examples include small areas that need a more hands-on approach in management of veld and game species (limited food and habitat available and the resulting competition for it), or to determine when food will become limited and what action to take, e.g. give supplementary feed or reduce animal numbers.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
WDMT	3714	Applied wildfarm management	Knowledge of the physical management of game species, including feeding requirements, genetic control and diseases. Familiar with legislation, feeding and breeding programs, diseases and parasitology. Familiar with ecological principles, monitoring, wildlife production and marketing. The evaluation and analysing of game-utilization, including aspects of nutrition, breeding and genetic principles will be very valuable for the future of the current game industry in South Africa.	MAIN	Student will be able to : - use the different methods of the sustainable utilization of the ecosystem (ecological and economical), as well as the practical management and planning of wildlife on a game farm or nature reserve. identify the daily challenges on a physical game farm and handling of game. - explain and apply practical game management, veld (habitat) management and marketing, utilization systems, economic, socio-- economic aspects and legislation - make informed decisions regarding wildlife management.
WILD	3764	Applied Nutrition of Wild Herbivores and Carnivores	After completion the student is familiar with the principles of nutrition, nutrients and the digestive systems of important groups of wild herbivores and carnivores in Africa. Diet selection, as well as the utilization of grasses, shrubs and trees by different wild herbivore species, is related to habitat preferences. Activities such as prey selection, hunting techniques, scavenging and the utilization of prey animals by wild carnivore species are related to their social behaviour and habitat. The nutrition and dietary requirements of wild animals are studied for both in situ and ex situ situations. Practical work Assignments form an integral part of the module, both for the theory and the practical work. Developing skills in identifying wild animal species, including their spoor and faecal excretion. Prey animals are identified anatomically by means of the remains of carcasses and the faeces of predators. Techniques are studied and applied to determine and study qualitative and quantitative aspects of the nutrition of wild animals.	MAIN	Student will be able to: Exa-mine and discuss the principles of nutrition, nutrients and the digestive systems of important groups of wild herbivores and carnivores in Africa; -Perform diet selection and discuss, as well as the utilization of grasses, shrubs and trees by different wild herbivore species, is related to habitat preferences. -Examine prey selection, hunting techniques, scavenging and the utilization of prey animals by wild carnivore species are related to their social behaviour and habitat. -Examine the nutrition and dietary requirements of wild animals are studied for both in situ and ex situ situations.
WILD	4826	Integrated planning and practical environmental management practices	The student will be familiar the physical planning of a game farm, including sustainability, stocking densities, fencing requirements, handling facilities, minimum farm sizes and legal aspects. The student will be familiar with different techniques on game capture and game counting, immobilisation, transport and handling of stress, game diseases and parasitology and the legal aspects thereof. The student will also be familiar with the evaluation and analysing of game-utilization, including all aspects of hunting and live sales, as well as processing of game-products.	MAIN	Student will be able to: -Examine and apply the sustainable utilization of the ecosystem (ecological and economical), as well as the practical management and planning of the game farm or nature reserve based on scientific monitoring techniques. -Discuss and evaluate physical game farm planning (legislation and legal aspects) and handling of game (disease control and legal aspects). Practical veld (habitat) management and marketing, utilization systems, economic, socio-economic aspects and legislation.
Postgraduate					
AGRI	6808	Research Project Animal Production	A subject specific project will be completed under the guidance of a supervisor and it is expected of students to submit a research report in the format of a scientific report and to prepare and orally present the results in the format required by scientific conferences.	MAIN	Student will be able to: - perform problem solving, hypothesis formulating, planning, execution and analysis of animal production experiments/research, - use a range of specialised skills to identify, analyse and address complex problems drawing systematically on the body of knowledge and methods appropriate to the field of animal production. - interpret results and prepare scientific report - communicate effectively through visual, numeric and/or language proficiency during oral and written presentations. -work effectively in a team or group, and to take full responsibility for own decisions and actions, and full accountability for the decisions and actions of others where appropriate. -demonstrate insight developed in this module provides a background for further post graduate studies.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGRI	6814	Advanced cattle production systems	Integrated nutrition, breeding and reproduction management of the following will be studied in depth and compiled in an Excell worksheet: -a weaner vs steer vs ox systems -intensive (feedlot management) vs extensive production systems	MAIN	Student will be able to: - Conduct an in-depth discussion regarding advanced principles of cattle production systems and should be able to: - Apply and integrate the knowledge and in-depth insight regarding the basic concepts and principles of cattle production systems and the practical application thereof in different situations; -Critically evaluate different production systems; -Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for cattle; -Develop a complete management program for this species; -Communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding any relevant topic within this module; -Work efficiently in a group and to take responsibility for own decisions and actions. The student will be able to: 1. Identify, understand and discuss management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; 2. Discuss how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises; and 3. Compile and evaluate a management system for sheep, dairy and beef enterprises.
AGRI	6824	Advanced sheep and goat production systems	Integrated nutrition, breeding and reproduction management of the following will be studied in depth and summarized in an Excell worksheet: -Intensive vs extensive production systems of wool and meat sheep as well as Angora and meat producing goats	MAIN	Student will be able to: - integrate knowledge and discuss and analyse the concepts, principles and theories of elements of sheep and goat production systems and the practical application thereof under different scenarios; - critically evaluate different sheep and goat production systems; - collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for sheep and goats on an advanced level; -Discuss management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; -Discuss how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises; and -Compile and evaluate a management system for sheep, dairy and beef enterprises.
AGRI	6844	Advanced Dairy Production systems	Integrated nutrition, breeding and reproduction management of dairy cattle will be studied in depth and compiled in an Excell worksheet: -TMR vs milk from pastures	MAIN	Student will be able to: -Explain and discuss the concepts, principles and theories of elements of dairy production systems and the practical application thereof in different situations; - Critically evaluate different dairy production systems; - Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for dairy cattle; - Develop a complete management program for this species; - Communicate effectively through visual and numeric proficiency during oral and written presentations; -Work effectively in a group, and to take responsibility for own decisions and actions
AGRI	6864	Advanced pig production systems	Integrated nutrition, breeding and reproduction management of different pig producing systems will be studied in depth and compiled in an Excell worksheet: -Environmental controlled vs. semi-environmental controlled production systems of sows and grower/slaughtering pigs. (intensive vs semi-intensive)	MAIN	Student will be able to: -Integrate the concepts, principles and theories of elements of pig production systems and the practical application thereof in different situations; -Critically evaluate different pig production systems; -Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for pigs; -Equipped with the necessary knowledge and skills needed to develop a complete management program for this species; -Communicate effectively through visual, numeric and language proficiency during oral and/or written presentations; and -Work effectively in a team or group, and to take responsibility for own decisions and actions

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGRI	6884	Advanced Poultry production systems	Integrated nutrition, breeding and reproduction management of different poultry production systems will be studied in depth and compiled in an Excell worksheet: - Production systems: layers, broilers and breeder parentstock.	MAIN	Student will be able to: -Integrate the concepts, principles and theories of various poultry production systems and the practical application thereof in different situations to develop production plans ; -Critically evaluate different poultry production systems; -Collect, filter and integrate the necessary evidence and apply it to an argument and decision making in problems regarding production systems for poultry; -Develop a complete management program for this species; -Communicate effectively through visual and numeric proficiency during oral and written presentations; and -Work effectively in a group, and to take responsibility for own decisions and actions
AGRI	8900	Animal Production Dissertation	This module contains fundamental knowledge, theories, principles and practices of Animal Production, including: Research project in specialized field of Animal Production as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. -offer the candidate the opportunity of increasing his/her knowledge of a specific field within Animal Production; -to guide the candidate in the planning and execution of a research programme; -to train the candidate in the collection, and interpretation of research results and writing of scientific papers; -to guide the candidate towards conducting independent research and communicating research results; and -to develop the candidate's management skills concerning integrated application of acquired knowledge and skills in actual situations, namely the running of farming enterprises and processing of agricultural products.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIB	6814	Animal Breeding: Mixed Model Theory	This module includes the study of genetic model for quantitative traits, matrix algebra; statistics in animal breeding; importance of heritability and repeatability; methodologies for genetic prediction; optimisation of selection; different models for the prediction of breeding values; Sire model, animal model, Bayes theory, QTLs, genomic models; relationships and inbreeding; simple rules for computing A and A-1 matrices; joint estimation of several vectors of random effects; accounting for genomic information in genetic analyses. Practical work: The student estimates variance components and resulting breeding values using matrix algebra and is familiarised with the application of breeding values. The use of different computer programmes for genetic analyses of large datasets is mastered.	MAIN	Studen - Apply and engage with concepts of quantitative genetics in Animal breeding - Apply and engage with a range of terms, concepts and issues concerning the genetic analyses of Animal breeding data and the interpretation of the results as well as the components of the extended genetic model for quantitative traits; -Use relevant statistical techniques and the application in quantitative traits; -Discuss the importance of heritability and repeatability in animal breeding; -Use appropriate methodologies for genetic predictions: selection index and BLUP; - Optimize genetic change by manipulation of elements of the key equation -Apply appropriate statistical techniques for the calculation of correction factors; -Use matrix algebra in the prediction of breeding values using mixed model methodology: Sire model, Animal model, multiple trait models; and -Estimate variance components from field data.
ANIB	6826	Applied Animal Breeding	After successful completion of this module the student will have a fundamental knowledge and insight of selection objectives, selection criteria, genetic parameters thereof and how to construct a com¬prehensive breeding plan that will result in genetic improved populations of different livestock species under South African environmental conditions.	MAIN	Student will be able to: -Apply and discuss selection objectives, selection criteria, genetic parameters thereof; -construct a breeding plan from start to finish that will result in a genetic improved population and ultimately profit for the breeder under South African environmental conditions, for a breed of their choice; - collect, filter and integrate the necessary evidence and apply it to an argument and decision making in different Animal breeding situations; - use and application of selection indexes on an international basis; - use and application of Genomics in modern animal breeding; - use the scientific literature effectively; - integrate and evaluate information from a variety of sources (books, scientific journals, electronic - internet) -Communicate effectively through visual, numeric and/or language proficiency during oral / written presentations.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ANIB	8900	Animal Breeding Dissertation	This module contains fundamental knowledge, theories, principles and practices of Animal Breeding, including: Research project in specialized field of Animal Breeding as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIB	9100	Animal Breeding Thesis	This module contains fundamental knowledge, theories, principles and practices of Animal Breeding, including: Research project in specialized field of Animal Breeding as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	the student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format);and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIG	8900	Animal Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Animal Science, including: Research project in specialized field of Animal Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. (a) offer the candidate the opportunity of increasing his/her knowledge of a specific field within Animal Science; (b) to guide the candidate in the planning and execution of a research programme; (c) to train the candidate in the collection, and interpretation of research results and writing of scientific papers; (d)to guide the candidate towards conducting independent research and communicating research results; and (e) to develop the candidate's management skills concerning integrated application of acquired knowledge and skills in actual situations, namely the running of farming enterprises and processing of agricultural products.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIG	9100	Animal Sciences General Thesis	This module contains fundamental knowledge, theories, principles and practices of Animal Sciences, General including: Research project in specialized field of Animal Sciences, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
ANIN	6815	Fundamental Animal Nutrition	Through self study (studying literature and written seminars) the student is familiarized with the concepts of feeds and nutrients (water, carbohydrates, lipids, proteins, minerals and vitamins); digestive systems (monogastric, ruminant and lower digestive tract fermenters), digestion, absorption and metabolism; nutrient deficiencies, toxicity and metabolic disturbances; digestibility of feeds and feed components; techniques for the evaluation of feeds and pastures; protein and energy requirements for monogastric animals, ruminants and lower digestive tract fermenters. The student is provided opportunity to master through self study specific topics and write seminars in scientific style and format.	MAIN	The student will be able to: * Classify and discuss the different types of feeds and nutrients (water, carbohydrates, lipids, proteins, minerals and vitamins); * Differentiate between digestive systems (monogastric, ruminant and lower digestive tract fermenters); * understand and describe digestion, absorption, metabolism of nutrients and nutrient deficiencies; * Identify and treat nutrient toxicity and metabolic disturbances; * Determine the digestibility of feeds, feed components and pastures; * Differentiate between protein and energy requirements for monogastric animals, ruminants and lower digestive tract fermenters; and * Write seminars in scientific style and format.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ANIN	6835	Experimental Animal Nutrition	On completion of this module the student will be well acquainted and have an in-depth knowledge regarding the quantitative aspect of nutrition e.g. the quantity of nutrients provided by the feed and secondly the nutrient requirements of various farm animals. Experi-mental techniques used for the quantification of nutrient utilization and requirements are addressed.	MAIN	Student will be able to: - examine the quantitative aspect of nutrition (quantity of nutrients provided by the feed); - examine the nutrient requirements of various farm animals; - apply and discuss experimental techniques used for the quantification of nutrient utilization and requirements of farm animals.
ANIN	6844	Applied monogastric nutrition	On the successful completion of this module, the student is familiar with the principles of nutrient requirements, nutritional management and the interaction between nutrition and physiological development of poultry and pigs during different biological developmental phases and within intensive production systems. The comprehensive integration of biochemical and nutritional knowledge during the physical and chemical evaluation of diets for monogastric animals will be demonstrated. Practical work: The student performs balancing of diets using detailed computer assisted formulation software and production simulation models with specific reference to poultry and pig species. Participating in research activities with regard to applied nutritional management of the mentioned species.	MAIN	Student will be able to: -apply and demonstrate principles and in-depth insight regarding basic concepts and nutritional requirements of broilers, layers, breeder parent stock, sows, piglets and boars in different physiological developmental stadiums and housing systems to produce economical high quality animal protein products; -apply the necessary principles needed to formulate diets for several monogastric species using computer assisted models with integrated knowledge and understanding of feed ingredient limitations as well as ingredient cost; -discuss and apply principles of international developments in the animal nutrition field; with specific reference to changes within the poultry and pig sectors; and -communicate effectively through visual, numeric and/or language proficiency during oral/written feedback regarding diet formulation and/or any relevant topic within applied monogastric nutrition.
ANIN	8900	Animal Nutrition Dissertation	This module contains fundamental knowledge, theories, principles and practices of Animal Nutrition, including: Research project in specialized field of Animal Nutrition as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIN	9100	Animal Nutrition Thesis	This module contains fundamental knowledge, theories, principles and practices of Animal Nutrition, including: Research project in specialized field of Animal Nutrition as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student must be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIP	8900	Animal Physiology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Animal Physiology , including: Research project in specialized field of Animal Physiology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ANIP	9100	Animal Sciences Physiology Thesis	This module contains fundamental knowledge, theories, principles and practices of Animal Sciences, General including: Research project in specialized field of Animal Sciences, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GRAS	6805	Intensive Pasture Production	The application of veld intensification and the use of planted pastures to improve and supplement the natural veld in order to maintain sustainable productivity.	MAIN	Student will be able to: -Examine and discuss veld-intensification; and -Use planted pastures to improve and supplement the natural veld in order to maintain sustainable productivity.
GRAS	6814	Production and utilisation ecology	Students are introduced to the fundamental principles of ecology. The student must be able to evaluate the sustainability of the grassland ecosystem and the factors influencing it in order to find long-term, practical solutions to ecological problems. The hydrological and other biological cycles in the grassland ecosystem will be covered. Mathematical models for the estimation of the biomass of woody plants for purposes of calculating the browsing capacity for domestic stock and game species will be studied	MAIN	Students will be able to: -Evaluate the sustainability of the rangeland ecosystem and the factors that may influence it in order to find long-term, practical solutions to ecological problems. They must have a fundamental knowledge of the principles of ecology and also be able to link this knowledge to practical, real-world situations. Specific aspects of study include the following: -The ecological approach and its meaning, -Principles concerned with the regulation and stabilisation of rangeland ecosystems, -Biogeochemical cycles in rangeland ecosystems, -Elasticity and condition of rangeland ecosystems, -Knowledge of the problem of bush encroachment and how to use principles of ecosystem functioning in finding long-term solutions, -The quantification of woody plants and the calculation of the browsing capacity for domestic stock and game species.
GRAS	6824	Advanced veld management	The student should be able to identify the importance of veld management in different veld types and the critical evaluation of system/practices. Identification and analysing the grazing habits of livestock and game and selective grazing. Determination of grazing capacity and stocking rate and application of special treatments for veld will be discussed. Students will carry out veld management planning and bringing applied wildlife management in proper relation to marketing, legal aspects, economics and socio-economic aspects of game.	MAIN	Student will be able to: -study the behaviour conduct of domestic animals and game on veld and make calculations on the grazing capacity to determine the influence of number and type of animals on natural veld; -recommend an exact or applied veld management system as well as special treatments for veld; -analyse the economic implications of stock and game numbers and veld management, based on estimating the carrying capacity of veld; and -use the above principles to recommend a sound veld management strategy under different situations, with different kinds of animals and to take the management skills of the farmer into consideration
GRAS	6834	Defoliation phenology and physiology	The student is on a higher level familiar with the physiological and phenological management principles for sustainable utilization of the grazing ecosystem. The student will be familiar with the influence of intensity and frequency of defoliation on the production and root growth of fodder plants. Different techniques for grassland productivity quantification will be demonstrated and evaluated. The student must present practical work in the form of scientific reports. Visits to veld in different conditions will be arranged.	MAIN	Students will be able to: -Identify critical phenological and physiological periods in the growth cycle of fodder plants (grasses, shrubs and trees); -Apply defoliation physiological principles of fodder plant to ensure sustainable management of the grazing ecosystem; and -Evaluate the influence of intensity, frequency and season of defoliation on leaf and root growth, growth reserves and nutritive value of fodder plants.
GRAS	6844	Advanced fodder plant evaluation	In this course students are trained in the classification of vegetation and the identification of the variables that influence the grassland ecosystem. The appropriate approach to the planning and execution of grassland science research is covered, including sampling, statistical tests and simulation models. Applied livestock and wildlife management systems will be studied. Students should be able to identify appropriate methods to measure environmental variables and the productivity of the grassland ecosystem, including practical knowledge of the application of the techniques	MAIN	Student will be able to: -Examine advanced principles of the objectivity and application of methods and techniques to measure the composition and productivity of the ecosystem and any changes that may occur; and -Link these fundamental principles to practical, real-world situations and include knowledge of the following: Changes within the ecosystem, Planning and conducting research, Sampling vegetation, Cover as measure to evaluate veld, Presence and absence of species as measure of veld assessment, Density as measure of evaluating veld, Production as basis of veld assessment, Utilisation, forage intake and nutritive value of veld, Determination of veld condition
GRAS	8900	Grassland Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Grassland Science, including: Research project in specialized field of Grassland Scienceas discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GRAS	9100	Grassland Science thesis	This graduate study aims at: -providing the candidate with the opportunity to prove her/his ability to plan and do research independently and to report the results; -enabling the candidate to make an original contribution to the respective discipline.	MAIN	Student will be able to: Manage independent planning and conducting of in-depth research in a natural or agricultural science discipline.
WDMT	6808	Research Essay Wildlife Management	Short research essay - Integrated planning of a game farm/reserve where various aspects of wildlife management will be applied practically. Its objective is to solve management problems and to ensure the sustainable utilisation of the natural resources.	MAIN	Student will be able to: -execute an integrated planning of a game ranch/reserve where various aspects of wildlife management will be applied practically. - solve management problems and to ensure the sustainable utilization of the natural resources.
WDMT	6816	Veld and Game Ecology	Veld and Game Ecology - the identification and analysis of ecological game farming areas and familiarity with ecosystem characteristics. The student must be adjusted to physiological, phenological and ecological principles of the management of the grassland ecosystem. Population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing habits.	MAIN	Identification and analysis of ecological game ranching areas and be familiar with ecosystem characteristics. Must be aware of physiological, phenological and ecological principles of the management of the grassland ecosystem. Informed about population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing preferences.
WDMT	6826	Applied habitat evaluation	Knowledge of the principles, applications and limitations with regard to important wildlife management and research techniques. Practical skills of techniques to determine primary production, veld condition and grazing capacity of the grass and tree layer. Familiar with techniques to determine fodder intake and feeding preferences of game species.	MAIN	Student will be able to: -apply practical techniques that can be used to evaluate the resource (habitat). This includes the calculation of the grazing capacity of both the herbaceous and tree layer, feed intake, food preferences of game species and game feeding in order to ensure the calculation of optimal game numbers and species combinations. -manage determination of primary production, grazing capacity and veld condition assessment. Feed intake and food preferences of game species and the morphological and physiological aspects of game feeding.
WDMT	6846	Applied Wildlife Management	Applied Wildlife Management - the student must have knowledge of the physical planning of a game farm, including fencing requirements, handling facilities, minimum farm sizes and legal aspects. The student must also be familiar with game capture, immobilisation, transport and handling of stress, game diseases and parasitology. The evaluation and analysing of game-utilisation, including all aspects of hunting and life sales, as well as processing of game-products.	MAIN	Student will be able to: -Explain the physical planning of a game farm, including fencing requirements, handling facilities, minimum farm sizes and legal aspects. Familiar with game capture, immobilisation, transport and handling of stress, game diseases and parasitology. The evaluation and analysing of game-utilization, including all aspects of hunting and live sales, as well as processing of game-products.
WDMT	8900	Wildlife Management Dissertation	Wildlife Management Dissertation	MAIN	Student will be able to: Manage supervised planning and execution of a research project in a natural or agricultural science discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results.
WDMT	9100	Wildlife Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Animal Sciences, General including: Research project in specialized field of Wildlife, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
WILD	4808	Research Report Wildlife	Execution of an integrated research project where a specific aspects of wildlife management will be investigated. Its objective is to solve management problems and to ensure the sustainable utilization of the natural resources.	MAIN	Student will be able to: -apply the different aspects of game management practically and to successfully solve a clearly defined problem or deficiency in the management of a game ranch or nature reserve, whether ecological and/ or economical. -apply the theory of game management in a practical game ranching or nature reserve situation. Emphasis is placed on the planning and methodology being used, the application of suitable techniques, as well as the utilization of the computer in the processing of data or the compiling of a management model where applicable. The planning of the project will commence during the first semester with execution throughout the year.
WILD	4814	Veld and Game Ecology.	Identification and analysis of ecological game ranching areas and be familiar with ecosystem characteristics. Must be aware of physiological, phenological and ecological principles of the management of the grassland ecosystem. Informed about population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing preferences.	MAIN	Student will be able to: -discuss, explore and explain basic ecology, physiology en phenology, of game species such as their social behaviour en feeding preferences; -manage the ecosystem in such a way that optimal production in a sustainable manner can be maintained; -confident in handling matters such as to identify ecological game ranching areas and ecosystem characteristics; and - advise on game species and behaviour patterns and on habitat preferences, diet selection and plant-animal-habitat interactions.
WILD	4856	Veld and Game ecology	Identification and analysis of ecological game ranching areas and be familiar with ecosystem characteristics. Must be aware of physiological, phenological and ecological principles of the management of the grassland ecosystem. Informed about population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing preferences.	MAIN	Student will be able to: -Manage basic ecology, physiology en phenology, as well as knowledge of game species such as their social behaviour en feeding preferences, to manage the ecosystem in such a way that optimal production in a sustainable manner can be maintained. -Identify ecological game ranching areas and ecosystem characteristics, advise on game species and behaviour patterns and on habitat preferences, diet selection and plant-animal-habitat interactions.
WILD	6806	Habitat evaluation and monitoring	The student will be familiar with the principles, applications and limitations with regard to important wildlife management and research techniques. Students will be exposed to practical skills and techniques to determine primary production, veld condition and grazing capacity of the grass and tree layer involving an ecological game farm planning. The student will become familiar with techniques to determine fodder intake and feeding preferences of game species and will use the experience and literature to develop a detailed game management plan.	MAIN	Student will be able to: --discuss and apply practical techniques that can be used to evaluate the resource (habitat). -do a detailed game farm planning which include the calculation of the grazing capacity of both the herbaceous and tree layer, feed intake, food preferences of game species and game feeding in order to ensure the calculation of optimal game numbers and species combinations. -examine primary production, grazing capacity and veld condition assessment and to perform these techniques physically. Feed intake and food preferences of game species and the morphological and physiological aspects of game feeding will also be addressed via literature based on game ranch management.
WILD	6808	Research Report Wildlife	Execution of an integrated research project where a specific aspects of wildlife management will be investigated. Its objective is to solve management problems and to ensure the sustainable utilization of the natural resources.	MAIN	Student will be able to: - apply the different aspects of game management practically and to successfully solve a clearly defined problem or deficiency in the management of a game ranch or nature reserve, whether ecological and/ or economical. -apply the theory of game management in a practical game ranching or nature reserve situation. Emphasis is placed on the planning and methodology being used, the application of suitable techniques, as well as the utilization of the computer in the processing of data or the compiling of a management model where applicable. The planning of the project will commence during the first semester with execution throughout the year.
WILD	6814	Veld and Game Ecology	Veld and Game Ecology - the identification and analysis of ecological game farming areas and familiarity with ecosystem characteristics. The student must be adjusted to physiological, phenological and ecological principles of the management of the grassland ecosystem. Population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing habits.	MAIN	Student will be able to: -Identify and analyse ecological game ranching areas and be familiar with ecosystem characteristics; -Discuss and physiological, phenological and ecological principles of the management of the grassland ecosystem; and -Outline population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing preferences.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
WILD	6816	Habitat Preferences and Diet Selection of Game	The identification and analysis of ecological game farming areas and familiarity with ecosystem characteristics. The student must be adjusted to physiological, phenological and ecological principles of the management of the grassland ecosystem. Population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing habits.	MAIN	Student will be able to: -examine basic ecology, physiology en phenology, as well as knowledge of game species such as their social behaviour en feeding preferences, -manage the ecosystem in such a way that optimal production in a sustainable manner can be maintained. - identify ecological game ranching areas and ecosystem characteristics, advise on game species and behaviour patterns and on habitat preferences, diet selection and plant-animal-habitat interactions.
WILD	6826	Integrated planning and practical environmental management practices	The student will be familiar the physical planning of a game farm, including sustainability, stocking densities, fencing requirements, handling facilities, minimum farm sizes and legal aspects. The student will be familiar with different techniques on game capture and game counting, immobilisation, transport and handling of stress, game diseases and parasitology and the legal aspects thereof. The student will also be familiar with the evaluation and analysing of game-utilization, including all aspects of hunting and live sales, as well as processing of game-products.	MAIN	Student will be able to: -Examine and apply the sustainable utilization of the ecosystem (ecological and economical), as well as the practical management and planning of the game farm or nature reserve based on scientific monitoring techniques. -Discuss and evaluate physical game farm planning (legislation and legal aspects) and handling of game (disease control and legal aspects). Practical veld (habitat) management and marketing, utilization systems, economic, socio-economic aspects and legislation.
WILD	6846	Applied wildlife management	Knowledge of the physical planning of a game farm, including fencing requirements, handling facilities, minimum farm sizes and legal aspects. Familiar with game capture, immobilisation, transport and handling of stress, game diseases and parasitology. The evaluation and analysing of game-utilization, including all aspects of hunting and live sales, as well as processing of game-products.	MAIN	Student will be able to: -Apply different methods of the sustainable utilization of the ecosystem (ecological and economical), as well as the practical management and planning of the game farm or nature reserve. -Examine and apply principles of physical game farm planning and handling of game. Practical veld (habitat) management and Marketing, utilization systems, economic, socio-economic aspects and legislation.
WILD	6856	Veld and Game ecology	Identification and analysis of ecological game ranching areas and be familiar with ecosystem characteristics. Must be aware of physiological, phenological and ecological principles of the management of the grassland ecosystem. Informed about population dynamics of game, including aspects such as knowledge of game species, social behaviour, reproduction, habitat preferences, diet selection and grazing preferences.	MAIN	Student will be able to: -Manage basic ecology, physiology en phenology, as well as knowledge of game species such as their social behaviour en feeding preferences, to manage the ecosystem in such a way that optimal production in a sustainable manner can be maintained. -Identify ecological game ranching areas and ecosystem characteristics, advise on game species and behaviour patterns and on habitat preferences, diet selection and plant-animal-habitat interactions.
WILD	8900	Wildlife Dissertation	Wildlife Dissertation	MAIN	Student will be able to: Manage supervised planning and execution of a research project in a natural or agricultural science discipline. This project includes hypothesis formulation, collecting appropriate experimental materials, optimising techniques and procedures, data acquisition, analysis and interpretation of results
WILD	9100	Wldlife Thesis	This module contains fundamental knowledge, theories, principles and practices of Wildlife, including: Research project in specialized field of Wildlife as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student must be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Architecture

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CDRA	2604	Computer Draughting	This module contains fundamental knowledge, theories, principles and practices of Computer Draughting, including: The theory and practice of computer aided technical drawing and the graphic presentation of designs. Introduction to various CAD and graphic design software. Theoretical instruction coupled with practical exercises.	MAIN	The student will be able to: - distinguish between the use of different software packages; - demonstrate basic computer design, documentation and graphic skills; - effectively apply the software packages presented for the communication of architectural designs and technical drawings; - prepare and document simple structures, including the annotated production of site plans, floor plans, elevations and sections in 2D; and - adapt the 2D design into basic 3D models using software packages presented.
CONS	1506	Construction	This module contains fundamental knowledge, theories, principles and practices of Construction, including: Theory: The basic structural solutions to design problems for a simple single storey house on a level site. The parts of the building and construction materials for the structure as a whole. Working drawings: (application of theory) Single-storey structure. Site visits: Illustration of theory.	MAIN	The student will be able to: -clarify different enclosure of activities and the application thereof within certain environment s/ contexts; identify, select and apply appropriate materials and skills for construction; -identify, evaluate and solve problems relating to the durability of structure, etc.; -evaluate the factors contributing toward construction of the enclosure of specific human activities and the built environment in general; -identify relevant structural principals and apply principals within a given context and site condition; and -associate alternative means of construction and the impact on local building industry / professionals.
CONS	2600	Construction	This module contains fundamental knowledge, theories, principles and practices of Construction, including: Structural theories associated with the complete construction of a double-storey structure from site investigation, sub structures, waterproofing systems, superstructures, services, elements of framed structures to applicable building regulations. Solving construction problems, related to structural behaviour: Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance. Sanitation seviceability of buildings - South African Regulations Working drawings for a double-storey structure with basement; site visits illustrating of theory. Council submission drawings with focus on site restrictions, parameters, existing services	MAIN	Student will be able to: -describe and consolidate through theoretical application, council submission drawings, and working drawings the regulations and conventions within the build environment; - identify and address building practices during visits to familiar and new building sites; - identify and address theory of structures and the sanitary serviceability of buildings on a theoretical and practical level; - integrate the theoretical knowledge to identify, evaluate and solve structural problems in different design projects (integration with design module: DESN2600); - integrate the theoretical knowledge to identify, evaluate and solve construction problems related to structural behaviour - Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance; - present and communicate complex structural solutions through a accurate and clear set of working drawings appropriate to the architectural conventions and to the design context; and - evaluate and apply elementary conventional and alternative means of construction and the impact on local building industry / professionals / environment.
CONS	2606	Construction	This module contains fundamental knowledge, theories, principles and practices of Construction, including: Structural theories associated with the complete construction of a double-storey structure from site investigation, sub structures, waterproofing systems, superstructures, services, elements of framed structures to applicable building regulations. Working drawings for a double-storey structure with basement; site visits illustrating of theory.	MAIN	The student will be able to: -describe and consolidate through theoretical application and working drawings the regulations and conventions within the build environment; - identify and address building practices during visits to familiar and new building sites; - identify and address theory of structures on a theoretical and practical level; - integrate the theoretical knowledge to identify, evaluate and solve structural problems in different design projects (integration with design module: DESN2600); - present and communicate complex structural solutions through a accurate and clear set of working drawings appropriate to the architectural conventions and to the design context; and - evaluate and apply elementary conventional and alternative means of construction and the impact on local building industry / professionals / environment.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CONS	3700	Construction	This module contains fundamental knowledge, theories, principles and practices of Construction, including: Structural theories associated with the complete construction of a multi-storey structures. Fundamental and physical principles of construction. Solving advanged construction problems, related to structural behaviour: Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance for multi-storey buildings. Mechanical and Electrical sevices of buildings - South African Regulations and supplier information. The study of the tectonics, an introduction to sustainable design, materials and building processes. The study of context relevant building construction and culture. Comprehensive council submission drawings for multi-storey buildings. Working drawings enabling the candidate to be employable in the appropriate category for which they qualify with the South African Council of the Architectural Profession. Site visits illustrating theory.	MAIN	Student will be able to: - Structurally analyse and evaluate different building elements and processes for construction of a multi-storey building; - Structurally analyse and evaluate different mechanical and electrical services and processes for construction of a multi-storey building; - Integrate the theoretical knowledge to identify, evaluate and solve construction problems related to structural behaviour in multi-storey buildings - Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance; - Interpret the regulations and conventions within the build environment, apply the regulations and conventions to complex design solutions and critically reflect on the application of the regulations and conventions through working drawings and council submission drawings; - Justify the properties and appropriate application of different building materials and uses within a specific context and building typology; - Evaluate and demonstrate the studied theory of building construction in different contexts through professional working drawings of different design projects (integration with design module: DESN3600); and - Responsible decide on the application of conventional and alternative means of construction and evaluate the impact of the application on local building industry / professionals / environment.
CONS	3706	Construction	This module contains fundamental knowledge, theories, principles and practices of Construction, including: Structural theories associated with the complete construction of a multi-storey structures. Fundamental and physical principles of construction. The study of the tectonics, an introduction to sustainable design, materials and building processes. The study of context relevant building construction and culture. Working drawings enabling the candidate to be employable in the appropriate category for which they qualify with the South African Council of the Architectural Profession. Site visits illustrating theory.	MAIN	The student will be able to: - structurally analyse and evaluate different building elements and processes for construction of a multi-storey building; - interpret the regulations and conventions within the build environment, apply the regulations and conventions to complex design solutions and critically reflect on the application of the regulations and conventions through working drawings; - justify the properties and appropriate application of different building materials and uses within a specific context and building typology; - evaluate and demonstrate the studied theory of building construction in different contexts through professional working drawings of different design projects (integration with design module: DESN3600); and - responsible decide on the application of conventional and alternative means of construction and evaluate the impact of the application on local building industry / professionals / environment.
DESN	1500	Design	This module contains fundamental knowledge, theories, principles, practices and processes of Architectural Design explored through the theme: the place of the individual (my building/structure) in the natural landscape. The design process is learnt by the completion of prescribed projects in the studio. The projects address inter alia the concepts: Genius Loci (sense of place), enclosure and threshold, typology, geometry, ergonomics, order and space, climate and meaning and architecture. The projects serve to identify and creatively solve problems concerning man's interaction with his physical environment. The design process involves the creation of spaces and artefacts (landscapes, cities, buildings, utility objects), to make the environment (natural, social and cultural) friendly and functional. Aspects such as functional planning, structural integrity and meaningful shaping is emphasised during this course, where the spectrum of design theories, a wide variety of project types and architectural history is utilised in varying combinations in order to integrate all the fields of study into the curriculum. Compulsory excursions form part of the Design module.	MAIN	Student will be able to: -investigate different sources of information pertaining to specific design problems concerning individual shelter; -develop and present an appropriate design solution to a particular architectural situation and context (natural landscape); -apply theoretical and historical principles to design problems and solutions;and -judge principles pertaining to Genius Loci (sense of place), enclosure and threshold, typology, geometry, ergonomics, order and space, climate and meaning and architecture for why, where and how it could be applied.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
DESN	2600	Design	This module contains fundamental knowledge, theories, principles, practices and processes of Architectural Design explored through the theme: the place of the individual group within the urban built environment. Through design projects the concepts topology, typology and morphology and the application thereof on different environmental levels are investigated in the study field of architecture. Compulsory excursions form part of this module.	MAIN	Student will be able to: -Locate and adapt different sources of knowledge pertaining to specific design problems taking into account different aspects influencing the individual group; -illustrate fitting design solution to a particular architectural situation within the built environment on the urban periphery; -translate and interpret universal design principals and individual project criteria applicable to individual urban groups within simple cultural and historical ecologies; -produce institutional spaces and artefacts concerned with plan typology, structural topology and morphological extrapolation. -meaningfully apply and investigate theoretical and historical principles to such design problems and solutions; -present and communicate all ideas of the design work in a reliable and coherent academic and professional manner, graphically as well as verbally; -evaluate appropriate design concepts and to select the sources that led to the design development within a specific context; and -order and deduce knowledge pertaining to topology, typology and morphology to why, where and how it could be applied.
DESN	3700	Design	This module contains fundamental knowledge, theories, principles, practices and processes of Architectural Design explored through the theme: the place of the community and the contextual relationship with the human ecological landscape. Through design projects the human body's relationship to space, the making of place, design methodologies, the use of metaphors, tectonic assembly and urbanity are critically formulated. Compulsory excursions form part of this module.	MAIN	Student will be able to: -Compare, differentiate and arrange different sources of knowledge pertaining to specific design problems taking into account different aspects influencing the complex group within a complex urban setting; -express, analyse, critically reflect on and address specific design problems taking into account all complex environmental, social, cultural and historical aspects, in order to conceptualise and implement fitting and organised design solution to a particular architectural situation within a complex urban environment; -differentiate and combine universal design principals and individual project criteria applicable to the urban public realm within competing cultural and historical ecologies; -design spaces on different environmental levels and public artefacts concerned with functional planning, structural integrity and meaningful shaping. -meaningfully investigate historical principles and investigate and devise a personal theoretical opinion towards design problems and solutions; -identify, research and construct according knowledge to why, where and how it could be applied; -develop, communicate and integrate all ideas of the design work in a clear, direct and unambiguous academic and professional manner, graphically as well as verbally; -develop appropriate design concepts and to independently validate the sources that led to the design development within a specific context; -design projects of three and more storey buildings as is required for the appropriate category for which they qualify for with the South African Council of the Architectural Profession at graduation.
HARC	1504	History of Architecture	This module contains fundamental knowledge, theories, principles and practices of History of Architecture, including: The position of history within the study field of architecture and universal factors influencing the formation of architecture. The application of universal factors as well as the specific significance of architectural development within different periods from pre-historical times up to and including the Gothic period.	MAIN	Student will be able to: -Distinguish between the respective architectural periods dealt with; -Discuss representative buildings of each era; -Review architectural history as a continuously developing process; -Summarise why a study of history and theory of architecture is vital to what is meant by "architecture"; -Locate architecture in the context of a coherent part within the greater whole of man's existence; -Analyse and criticize historical and current precedents in architecture; and -Translate how different attitudes, points of view, philosophies and theories are used to evaluate, analyse and prioritise architecture.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
HARC	2604	History of Architecture	This module contains fundamental knowledge, theories, principles and practices of History of Architecture, including: International architectural history as well as an overview of theoretical and philosophical ideas from the fifteenth century Renaissance to the beginning of the early twentieth century Modern Movement. The precolonial history of architecture in South Africa and the influence of European settlers from 1652 to 1910 on South African architecture.	MAIN	Student will be able to: -Distinguish between the respective art and architectural periods dealt with; -Identify and relate the outstanding characteristics of each period; -Compare and apply the characteristics to contemporary buildings/structures; -Identify historical examples as precedents, interpret the principles applicable to present situation and problems in architecture; -Explain and illustrate architectural history as a continuously developing process, i.e. A collaboration between the past, present and future; -Distinguish between design ideas, design principles and design elements which remains constant and which changes; -Consolidate the cosmology and zeitgeist of each period with design from the period and apply architecture in context as a coherent part of and within the greater whole of man’s culture and his environment that comprise his existence; and -Apply the understanding of different approaches and points of view based on different philosophies though analyses, evaluation and the setting of own design priorities.
HARC	3704	History of Architecture	This module contains fundamental knowledge, theories, principles and practices of History of Architecture, including: The international and local pioneers of Modernism and mutations / revisions / hybrids that occurred within the Modern tradition. Modernism from a South African point of view. South African architecture at the turn of the previous century and the current practice of architecture in SA through in depth study of the work of local architects.	MAIN	Student will be able to: -distinguish and reason the course that Modernism followed in South Africa; -recognise and categorise the pivotal landmarks and players in the field of Modernist architecture internationally and locally; -compare and validate the characteristics to contemporary buildings/structures; -analyse historical examples as precedents, construct the principles applicable to present situation and problems in architecture; -categorise and criticise the mutations, revisions and hybrids that occurred within the Modernist architectural tradition in South Africa; -differentiate between design ideas, design principles and design elements which remains constant and which changes; -consolidate the cosmology and zeitgeist of each period with design from the period and apply architecture in context as a coherent part of and within the greater whole of mans culture and his environment that comprise his existence; and -assemble different approaches and points of view based on different philosophies though analyses, evaluation and the setting of own design priorities.
PHOT	1522	Photography	This module contains fundamental knowledge, theories, principles and practices of Photography, including: Types of cameras, lenses, adjustment, light measurement, types of photographs, enlargements, duplicating, model photography, building photography, composition. Specific focus is awarded to digital photography and digital photo editing programmes and techniques.	MAIN	Student will be able to: -use photographs to demonstrate theoretical knowledge, technical ability and practical skill of photography.
PTEC	1504	Presentation Techniques	This module contains fundamental knowledge, principles and practices of Presentation Techniques, including: The introduction of graphic representation techniques, form studies and the utilisation of different media.	MAIN	Student will be able to: -Use different graphic presentation techniques (watercolour, pencil rendering, pen sketching etc.) and the use of different media ideas relating to architectural design.
TARC	2604	Theory of Architecture	This module comprises the introduction to, and overview of the Theory of Architecture, including: The cosmological, theoretical and philosophical influences on architectural, through an overview, critique, and architectural application of phenomenological concepts and ideas. The ideas behind historical architectural form-giving. The influences of concepts time, enclosure, threshold, harmony, symmetry, geometry, ergonomics, order, space, place, meaning, topology, typology and morphology.	MAIN	Student will be able to: -Review and distinguish between architectural history, architectural critique and architectural theory; -Contrast the different functions and objectives of history, critique and theory; -Select, order and compare different theories for the production of architectural form and elements; -Recognise and apply the different views and thoughts within the different theoretical and philosophical ideas that influenced architectural design and form from the classical to early modern times; -Criticise contemporary building through theoretical analysis; -Associate theoretical analysis to own designs; -Identify traits within the theories covered in the module and correlate past theories with the theories of contemporary architects and architectural theorists; -Examine the ethical and professional practice of architecture at present based on past theories and the theories of contemporary architects and architectural theorists; -Review and devise the coherent context architecture form part of; and -Reason the different relationships of the greater whole of man’s culture and his environment that comprise his existence.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
TARC	3704	Theory of Architecture	This module contains fundamental knowledge, theories, principles and practices of Theory of Architecture, including: The ideologies, theories, philosophies and ethics that influenced the development of architecture over the last century. The synthesis of theory with design, applied to international and South African examples and as a base for design process. A critical view of human ecological landscape. Concepts of body, place; method, metaphor; tectonics, urbanism, and the environment.	MAIN	Student will be able to: - recognise and evaluate the main types of architectural theories produced over the last century; - inspect, apply and question theoretical concepts and principles based on the architectural interpretations of rationalism, idealism, phenomenology and other post-modern theories; - reorder and evaluate architectural theory in relation to the build environment over the last century; - identify, analyse, critically reflect on and address the creative responses to complex contemporary and historical architectural problems and issues by applying different theoretical and philosophical ideas; - develop appropriate research to determine an own theoretical interpretation of the architectural and urban context of Post-Apartheid South Africa; - validate and take responsibility for research and interpretation of local and international theories; - apply and integrate theoretical research into different familiar and new design projects specific to a complex South African context; - compose theory of architecture as only understandable within the greater human existence - holistic approach; and - consolidate architectural theory and practise with the interrelationship between man (individual/social group), environment (natural/manmade), culture (local/universal) and time (historical/contemporary).
TRIG	1512	Trigonometrical Drawing	This module contains fundamental knowledge, theories, principles and practices of Trigonometrical Drawing, including: Orthographical projection, scale, isometry, axonometry, sections through solid bodies, development, horizontal projection. Theoretical instruction coupled with practical exercises.	MAIN	Student will be able to: demonstrate through trigometrical drawings architectural and constructional information.
Postgraduate					
ARCD	9100	Architecture Thesis with Design	This module contains fundamental knowledge, theories, principles and practices of Architectural Design and Design in general, including: Research project in specialized field of Architectural Design as discussed by study leader(s), Academic Departmental Head and student. The research includes the investigative, and creative research of aspects pertaining to Architectural Design and Design in general; identification of design themes and challenges to formulate a research focus; independent planning and conducting of design-based analysis, and reflection upon analytical interpretations of selected material, discussion of interpretations and reflections, compiling the information according in an academically rigorous document and a curated exhibition, which includes written and visual presentation, a specified dissertation structure, grammatical and technical aspects of academic writing. The emphasis is on independent and original research.	MAIN	Student will be able to: - Identify, analysis and reflect upon design themes and challenges present in a selected design subject and design projects; -Formulate a Research Focus; -Do independent planning and design-based analysis; -Evaluations and reflection upon own analytic interpretations of selected material; -Discuss the interpretations and reflections comprehensively by combining and adapting a wide range of suitable theories, methods and principles that facilitate the thesis study; -Compile the information accordingly in an academically rigorous document and a curated exhibition, which includes written and visual presentation, a specified dissertation structure, grammatical and technical aspects of academic writing; and - Write a manuscript and curate an exhibition to communicate and defend the thesis.
ARCH	8900	Architecture Dissertation	Research project in specialized fields of Architecture and another science discipline as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensive - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ARCH	9100	Architecture Thesis	This module contains fundamental knowledge, theories, principles and practices of Architecture , including: Research project in specialized fields of Architecture and another science discipline as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: Identify the problem Formulate a hypothesis do independent planning and then conduct the experiments Analyse and interpret the results Discuss the results comprehensively Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ATRE	7904	Architectural Treatise	This module involves a critical investigation of the theoretical aspects of the specific chosen and approved design subject and project and is complementary to the pursuit of the Design Dissertation (DDIS7900). The module includes: Critical analyses of relevant contemporary theoretical premises, as well as applicable theoretical issues pertaining to the specific design subject and project set out in an academically rigorous treatise.	MAIN	Student will be able to: 1.Critically identify, apply, organise and integrate appropriate research methodologies (abstract, storyline, historical investigation, precedent and case studies, concrete and abstract site investigation, cognitive mapping etc.) To a design strategy for a complex building; 2.Formulate and take responsibility for a grounded and critical point of view of applicable historical, social, environmental and cultural phenomena and related theory; 3.Prepare a criteria for adjudication of own and other theorists' theoretical position; 4.Identify, communicate and evaluate the essence and the extent of complex and challenging design problems within the field of architecture based on the prepared criteria; 5.Conceptualise, apply and integrate the said criteria to address a specific design problem and illustrate the theoretical and practical implication through a synthesis study; and 6.Communicate and defend the aspects of architectural theoretical discourse that is the product of responsible and ethical research developed in a specific human ecological landscape.
CONS	6808	Construction	This module contains fundamental knowledge, theories, principles and practices of Construction, including: The study of construction methods, materials and detailing through the four central themes of urban design, environment responsible design, conservation and housing. Critical discussion and evaluation of construction methods at an appropriate level of complexity, building processes, materials and restrictions. Working drawings enabling the graduates to be employable in the appropriate category for which they qualify with the South African Council of the Architectural Profession. Site visits illustrating theory.	MAIN	The student will be able to: - structurally formulate and assess different building elements and processes for construction of intricate buildings and building facilities; - critically investigate the regulations and conventions within the build environment, validated working drawings through the application of the regulations and conventions of the build industry; - resolve complex design solutions and generate working drawing through research in multiple sources of knowledge within the build environment; - recommend application of certain building materials based on their inherent properties and investigate appropriate application of different building materials and uses within a specific complex unfamiliar context and building typology; - compose professional working drawings of different design projects (integration with design module: DESN6800) through identifying, researching and selecting appropriate theories of building construction; - research and choose responsible conventional and alternative means of construction and critically evaluate the impact of the application on local building industry / professionals / environment; and - manage, produce and take responsibility for working drawings of complex buildings: required for the appropriate category for which graduates qualify with the South African Council of the Architectural Profession.
CONS	7908	Construction	The module comprises the Construction theory and technical investigation (considering: materials, structural systems and construction methods) of the proposed design scheme, including: Detailed design- and technical development of the proposed scheme. Presentation of a technical report and a full set of working drawings enabling the graduates to be employable in the appropriate category for which they qualify with the South African Council of the Architectural Profession. This module takes place parallel to the Design Dissertation module (DDIS7900) but is examined separately.	MAIN	The student will be able to: - research and validate a wide range of specialist theoretical and technical sources particular to the identified design and construction problems; - use a wide range of knowledge and specialised skills in identifying, conceptualising, designing and implemental structural methods and construction materials to address complex and challenging design problems within a specific contextual setting; - design, select and apply appropriate and creative methods, techniques, processes and technologies to complex architectural use a full set of working drawings to communicate and defend substantial building construction ideas that are the products of research; and - independently investigate and arrange technical research and take responsibility for the appropriate technical decisions.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
DDIS	7900	Design Mini-dissertation	This module involves the investigative research and critical judgement of all aspects pertaining to the chosen and approved design subject and project, and is set out in an academically rigorous document, including: The development of the chosen design project with reference to concept development, development and setting out of programme, the integration of all aspects involved in an appropriate design solution and the presentation thereof in a document with the necessary illustrations, sketches, drawings and model(s).	MAIN	Student will be able to: -conceptualise, evaluate, design and apply processes of knowledge to an architectural design process appropriate for the specific chosen and approved design subject and project; -combine, evaluate and adapt a wide range of suitable and inventive design principles, methods, theories, techniques, processes and solutions to a specific architectural problem that attempts to address complex contextual, historical, social and cultural phenomena and/or a theoretical statement; -assess the consequences of an architectural solution generated in a specific human ecological landscape; -make autonomous ethical decisions based on contextual, historical, social, theoretical and technical resources and in accordance with architectural practice that will affect the architectural design; -identify, communicate and evaluate the essence and the extent of complex and challenging design problems within the field of architecture based on comprehensive review of leading and current research completed in ATRE7904 and CONS7908; -integrate all the accumulated skills, from the development of a programme to the detail design into a single architectural intervention; and -communicate and defend the aspects of architectural design solution and theoretical discourse that is the product of responsible and ethical research developed in a specific human ecological landscape.
DESN	6800	Design	This module contains fundamental knowledge, theories, principles, practices and processes of Architectural Design explored through the themes: urban design, environment responsible design (environmental impact, earth construction, alternative technologies, etc.), conservation and housing. A group investigation of each theme precedes the individual critical research of this theme, which then extends to reports and design projects. Every project has its own specific criteria to which it must adhere.	MAIN	Student will be able to: -structure and construct appropriate research pertaining to specific design problems taking into account all relevant aspects and addressing the relevant theme in a responsible manner; -examine, deduce and evaluate specific design problems taking into account all complex environmental, social, cultural and historical aspects specific to the relevant theme, in order to generate and propose a fitting and responsible design solution to a particular architectural situation within the wider context of the built environment; -integrate and arrange universal design principals and individual project criteria applicable to urban design, environmental responsible design, conservation and housing within complex human ecologies; -design spaces on different environmental levels and public artefacts concerned with functional planning, structural integrity and meaningful shaping; -identify, research and construct why, where and how knowledge could be applied to design problems; - apply and integrate historical principles to design problems and solutions and generate a responsible theoretical grounding for the design solutions; -formulate and manage an appropriate design process from concept identification and development to the incorporation of well-reasoned well-grounded theoretical/conceptual position/viewpoint to the finally design proposal which demonstrates the responsible and appropriate choice of material, construction method and articulation of detail; -justify the thought process behind the design solution; -communicate and integrate all work in a clear, direct and unambiguous manner, graphically as well as verbally; and -design multi-storey building: required for the appropriate category for which graduates qualify with the South African Council of the Architectural Profession.
DMET	6812	Design Methods in Architecture	This module contains fundamental knowledge, theories, principles and practices of Design Methods in Architecture, including: An introduction to a wide range of design methods. Research and structuring devices in design, case studies, mediums of representation, participatory research methods and on-site observational and ethnographic techniques. The application of these design methods on the design of buildings are investigated.	MAIN	Student will be able to: -associate with and analyse a wide range of design methods from multiple sources and apply it to the design of buildings; -develop an understanding of and calculate how chronological changes in design investigation influenced design method; -develop analytical skills to evaluate design processes and procedures; applicability to design challenge; -adapt design strategies to best suit specific design problems; -apply participatory design techniques in communities; -evaluate site, building, and precedents critically through direct evaluation -develop skills to systematically assess buildings and urban spaces in real-world setting; -apply unobtrusive observational techniques, ethnographic, participatory, and survey assessment on-site; and -develop the ability to synthesise information, need and process into a final design product.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
HURB	6804	History of Urban Settlement	This module contains fundamental knowledge, theories, principles and practices of History of Urban Settlement, including: The study of the built form of human settlements in history, internationally and in South Africa, with an emphasis on town planning, urban design, housing, conservation and environment responsible design development. An assessment of cities during different periods to non-western, modern, third world and South African cities.	MAIN	Student will be able to: -interrogate and evaluate multiple concepts, facts, principals, rules and theories of the evolutionary history of cities, specifically with regard to town planning, urban design, housing, conservation and environment responsible design; -apply, transfer and critically reflect on the complexities of formative principles within the fragments of the urban settlement history by rigorously interpreting problems within the contemporary city; -Assess, process and manage information pertaining to the history of urban settlement within a context (specifically South Africa) and develop creative responses to urban issues; -develop skills in presenting and articulating formative principles in an appropriate academic and professional way as seminars and orals while offering creative insights into the problems and issues; -evaluate experience gained in projects that embrace the idea of architecture of city sense and to self-critically formulate formative principles as a method of design problem solving specific within a urban context.
PARC	7904	Professional Architect Practice	This module contains fundamental knowledge, theories, principles and practices of Professional Architect Practice, including: General office administration, financial administration, the scope of professional services to clients, communication and presentation of projects and professional marketing, and liaison with consultants and other members of the design team.	MAIN	The student will be able to: - summarise, relate, evaluate and recommend the management processes involved in an architects office; and - make and revise autonomous professional, administrative and ethical decisions which affect general office administration, financial administration, the scope of professional services to clients, communication and presentation of projects and professional marketing, and liaison with consultants and other members of the design team.
RARC	6808	Research in Theory of Architecture	This module contains fundamental knowledge, theories, principles and practices of the Research into Theory of Architecture, including: individual research, reflective assessment and critique of architecture by applying knowledge from contemporary architectural thought, humanities and social and natural sciences. Analyses of relevant contemporary premises. Research into Theoretical aspects applicable to a specific chosen design theme and project. Research into Concepts in contemporary architectural theory relating to urban design, environment responsible design, conservation and housing as applicable to the chosen design problem.	MAIN	Student will be able to: -identify, analyse and evaluate a specific design problem (specific site and specific design type on the site); -differentiate and integrate theories, terms, concepts, principles relating to contemporary architecture, humanities and social and natural sciences; -evaluate types of theoretical concepts and principles based on critical assessment of architecture specifically within the context of urban design, environment responsible design, conservation and housing; -interpret and interrogate the multiple functions, objectives and different aspects of contemporary architectural theory as applicable to a specific design problem; -critically identify and evaluate the theories applicable to a specific design problem from different theoretical and philosophical ideas that influenced architectural and urban design in order to develop creative responses to a specific choses design problem; -draw conclusions from above mentioned in order to analyse, evaluate and determine priorities in their applicability and to better understand the situation in architecture as applicable to a specific chosen design problem; -assess, process and manage information pertaining to the theory of architecture within a context (specifically South Africa) and develop creative responses to urban design, environmental design, conservation and housing issues as applicable to the specific choses design problem; -develop skills in presenting and articulating theoretical principles in an rigorously academic and professional way as seminars while offering creative insights into the problems and issues; -evaluate projects that embrace the idea of contemporary architecture and to self-critically formulate architectural design principles as a method of design problem solving specific within a urban context. -formulate research and take responsibility for the construction of an own theory, based on academic knowledge of contemporary architectural thought, the creative insights into the complex relationship between a specific context, siting, client etc., and the ethical issues based on critical reflection on the problems inherent to urban design, environment responsible design, conservation and housing. -comprehensive individual research into the field of architecture, specifically to include independent research into theoretical aspects illustrating an advance knowledge of a specific chosen site, the historical considerations of the specific human ecological landscape, the identifications of an appropriate architectural design problem, appropriate design hypothesis; -research and evaluate a wide range of suitable and inventive design principles, methods, theories, techniques, processes and solutions to a specific architectural problem that attempts to address complex contextual, historical, social and cultural phenomena and/or a theoretical statement.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
RMET	6822	Research Methods for Architecture	This module contains fundamental knowledge, theories, principles and practices of Research Methods in Architecture, including: Academic writing, selected methods and techniques applicable to research in Architecture and the design of a research proposal. Literature review, annotated bibliography, research methods and techniques in architecture, academic writing, and sources and resources in the field of Architecture.	MAIN	Student will be able to: - develop analytical skills to critically evaluate architectural research; - develop strategies to organize and focus research interests; - develop skills to systematically search and organize literature relevant to a research topic; - apply various research tactics; - apply research skills and methods particular to the built environment; - develop a research proposal; - design their own research, including the appropriate questions and the methods; - weigh the strengths and weakness of a range of research tactics; - structure and write their design treatises/dissertations; - convey research results and findings in the written form.

Centre for Sustainable Agriculture

Undergraduate

Subject	Catalog #	Course Title	Course Description	Campus	Acad Org Description
AGEX	2614	Extension with the Agricultural Innovation System	Detailed knowledge of the Agricultural Extension disciplines and/or practices, including an understanding of and an ability to apply the key terms, concepts, facts, principles, rules and paradigms of this field, discipline or practice; Knowledge of the Agricultural Extension discipline relates to Rural Advisory Services and Agricultural Innovation Systems discourse, and other fields, disciplines or practices.	MAIN	Student will be able to: Explain and discuss the Extension paradigms, methods, approaches, and tools -Explain of the history of agricultural extension paradigms, principles, methods, approaches and systems -discuss and analyse pluralism in extension and the need for and methods of coordination and linkages -Extension as a profession; extension science Explain and discuss the role of extension in innovation and development -explain and analyse the relationship between agricultural extension and Innovation systems List the component of the agricultural innovation systems concept and - defining innovation - agricultural innovations (product innovation and process innovation - define the innovation processes - explain the concept agricultural innovation systems - explain of the concept of the new extensionist - discuss and analyse the New extensionist concept and framework - explain of what these concepts imply for roles of extension and advisory services within the innovation system (Serve as facilitators or knowledge brokers. -explain the links to farmers between the information, markers and other services in order to diversity their farming systems and increase productivity) -Examples of approaches/ cases on the ground inline with the new extensionist concept (GFRAS, PEA, MEAS, the big five etc)
AGEX	2624	Communication for Innovation	Detailed knowledge of the Communication for Innovation disciplines and/or practices, including an understanding of and an ability to apply the key terms, concepts, facts, principles, rules and paradigms of this field, discipline or practice; Knowledge of how Communication for Innovation relates to Extensions, Rural Advisory Services and Agricultural Innovation Systems discourse, and other related fields, disciplines or practices	MAIN	Student will be able to: - Explain why communication is critical for innovation - Discuss different communication models and modes - Explain the dynamics of communication and ways of minimizing barriers - Raise self-awareness - Discuss the principles and methods of knowledge management, learning & sharing Discuss the importance of information and communication technologies (ICTs) and mass media communication, when and how they are appropriate Display public speaking and presentation skills Ability to write for specific purposes and audiences; ability to document processes, structure reports and presentations effectively (reports, policy briefs etc) - Prepare and manage effective meetings (Chaired and facilitated meetings)
AGEX	3714	Facilitation for development	This course `Facilitation of Development' aims to introduce the learner to the basic principles of facilitation and what is means within the agricultural innovation systems context. The course will enhance students' capacity to translate conceptual ideas into actual intervention practice.	MAIN	Student will be able to: -Discuss why facilitation is necessary for development and good understanding of principles of facilitation, -Examine the theories, principles, focus and value of different methodologies used to create multi-stakeholder learning, negotiation, mobilisation and action; -Apply basic facilitation techniques such as the art of questioning & probing, listening skills, feedback, the use of codes etc); -Discuss and recognize group dynamics, process observation and multi-stakeholder learning and negotiation professes; -Coach individuals and groups, and instill the culture of feedback and sharing; and -Do a preliminary assessment of a situation, critically select an appropriate system thinking perspective and related inquiry methodology, and make a plausible process design;

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AGEX	3724	Extension programme management	This course will introduce students to the tools for creating a vision for effective extension programmes, and the important elements in the program planning cycle. Using the different tools such as results based planning, logical framework, theory of change, and impact pathways, the students will be exposed to integrated and systemic planning processes.	MAIN	Student will be able to: -create a vision for a functional agricultural extension systems (what the different actors would do or do differently if extension system would be successful) -discuss the importance of mission, policies, and objectives of the agency or organization - conduct extension programme planning, implementation, monitoring and evaluation and learning (project cycle) -apply different planning tools and different tools to use (Results based planning, logical frameworks, impact pathways, theory of change etc) -discuss the service delivery systems frameworks (Demand side, supply side and support for delivery; Intergrated planning & systemic interventions etc) -interpret the importance of the research-extension-farmer linkages and coordination opportunities & challenges - build strategic partnerships, network and manage stakeholders -apply research methods, data gathering, documentation and reporting -discuss the role of ICT in the management of extension programs
AGEX	3734	Community mobilization and local organizational development	This course aims at introducing the learner to the concepts and principles of community mobilization and local organisational development and how they relate to agricultural development. The course put emphasis on the understanding of the concepts required and the skills that are needed to be able to mobilize communities, develop their local organisational capacities and promote their equitable participation in agricultural innovation processes	MAIN	Student will be able to: -apply methods for the development of a shared vision for communities and their goal; - build local organizational capacities and organise the demands; -discuss aspects that build and break community linkages with actors in the innovation system value chain; -discuss culture and diversity within a community setting, including gender, youth and communication channels; -conduct livelihoods assets assessment; -employ problem solving and decision making approaches; -discuss leadership principles, accountability and leadership development; and -utilise resource mobilisation strategies.
AGEX	3744	Management of change and Adaptation	The course will help the student to develop an understanding of how change acts upon people, and what leadership behaviours are needed to manage it effectively. Using various models, the student will learn key skills for overcoming resistance to change, for supporting oneself and others in times of uncertainty, and for facilitating the transition process. Furthermore, linking these to the climate change adaptation discourse.	MAIN	Student will be able to: -Discuss the concepts and theory behind management of change and adaptation - Use tools and approaches to support farmers and enhance community capacity to adapt to risk and change in climate, markets, and disasters; and farmer coping strategies - Link change and adaptation to the climate change discourse - Analyse tools for adaptation options - Deal with risks, change, and uncertainties - Manage emotions under pressure, manage technological change and deal with ambiguity
AGEX	3754	Agricultural entrepreneurship and value chains	This course aims at introducing the students to the concept of entrepreneurship in the context of agricultural development. The course looks at the principles, qualities and competencies required, and how this links to the value chain discourse.	MAIN	Student will be able to: -apply entrepreneurship concepts and discuss how they relate to agricultural development; -analyse major trends and developments in the environment of the farming business; -examine the value chain concept and the link to agricultural entrepreneurship development; -define entrepreneurship competencies and qualities and ways of developing such; - analyse business opportunities and conduct market analysis, develop agricultural business plans, basic understanding of agricultural economics; and -examine basic concepts and tools in markets and value chains; -discuss market oriented extension- marketing education, coordination, business linkages, types of providers.
AGEX	3764	Adult learning, Behavioural change & Gender	This course will introduce the students to the concept of adult learning, behavioral changes and gender and how they relate to the agricultural development, extension and agricultural innovation systems	MAIN	Student will be able to: -outline adult learning and behavioural change theories; -assess learning needs for adults, design appropriate training and instructional techniques, training evaluation, participatory and collective learning, group learning, personal mastery within the agriculture spectrum; -manage cultural difference and gender diversities in adult learning; -discuss key concepts in gender, gender roles, gender analysis, gender mainstreaming and the application of a gender-sensitive approach, -discuss the importance of gender and youth in extension and rural development and why agricultural extension should be gender sensitive, and sensitive to the diverse needs of different age groups; -examine different approaches to address gender and youth and also how to attract and retain women and youth in agriculture extension; -use ICT to reach women extension staff, build the capacity of women extension advisors and include women in value chains; and -conduct gender analysis within agriculture extension context.

Subject	Catalog #	Course Title	Course Description	Campus	Acad Org Description
SAAM	1716	Fundamentals of Agricultural Economics	Fundamentals of Agricultural Economics and Marketing	MAIN	Student will be able to: - use methods for processing and preserving perishable foodstuffs; - develop alternative marketing strategies; - introduce support systems to implement new marketing strategies; - improve the financial stability of the members of the communities; and - advance improved competitiveness in the markets.
SAAM	1726	Fundamentals of Agricultural Economics	Fundamentals of Agricultural Economics and Marketing	MAIN	Student will be able to: Within the area of production, marketing and adding value: - Outline methods for processing and preserving perishable foodstuffs; - develop alternative marketing strategies; - develop support systems to implement new marketing strategies; - improve the financial stability of the members of the communities; and - advance improved competitiveness in the markets.
SACP	1716	Foundational theories in plant production and practices	Improved biological and economical crop production practices. Conservation of soil structures. Enhancing crop produces for own consumption and marketing. Student will acquire practical skills and know-how to demonstrate the benefits of sustainable crop production practices to the communities to ensure that aforementioned issues are obtained.	MAIN	Student will be able to: - Develop water harvesting techniques; - demonstrate different cultivation practices; - choose correct cultivars for specific areas; - integrate weed control programmes; - establish an integrated pest management approach; - improve biological and economical crop production practices; - conserve soil structures; and - enhance crop produces for own consumption and marketing.
SACP	1726	Introduction to Plant Production Practices	Within the area of managing rural structures and dynamics, be able to -apply acquired skills and know-how to deal with the challenges of rural life; -resolve gender issues; -explain the important role of agriculture in communities; -contrast poverty vs. self-sufficiency; -introduce programmes to alleviate hunger and ensure food security; -initiate improved support structures in all spheres of rural life; -facilitate improved living environments; and -create capacity towards self-sufficiency.	MAIN	Student will be able to: - Design practical rotational grazing systems to avoid over grazing; - develop and apply sound animal husbandry practices; - identify nutritional needs of free ranging animals; - implement correct breeding practices; - introduce sound animal health procedures; - devise sound marketing practices; - improve biological and economical livestock production practices; - curb high mortality and low fertility rates; - improve genetic material for herd progress; - implement sound feeding regimes to avoid excessive mass losses in dry seasons.
SACT	1716	Basic Communication Skills	Improved overall effectiveness due to better communication and understanding of the spoken and written words. Enabled to formulate needs in an understandable context. Better appreciation of the transferred knowledge. Improved writing and oral skills. Students will acquire practical skills and know-how in public speaking, the use of audio and visual aids, formulating concepts into understandable ideas, written and oral skills, interpersonal discussions and the art of listening.	MAIN	Student will be able to: Within the area of written, communication and presentation skills, - Advance overall effectiveness with better communication and understanding of the spoken and written words; - facilitate effective interpersonal discussions; - improve harmony in diverse communities; - enhance writing, oral, communication and presenting skills; - develop skills to formulate needs in an understandable context; and - apply transferred knowledge.
SACT	1726	Basic Communication Skills	Improved overall effectiveness due to better communication and understanding of the spoken and written words. Enabled to formulate needs in an understandable context. Better appreciation of the transferred knowledge. Improved writing and oral skills. Students will acquire practical skills and know-how in public speaking, the use of audio and visual aids, formulating concepts into understandable ideas, written and oral skills, interpersonal discussions and the art of listening.	MAIN	Student will be able to: Within the area of written, communication and presentation skills: - Advance overall effectiveness due to better communication and understanding of the spoken and written words; - facilitate effective interpersonal discussions; - improve harmony in diverse communities; - enhance writing, oral, communication and presenting skills; - develop skills to formulate needs in an understandable context; and - apply transferred knowledge.

Subject	Catalog #	Course Title	Course Description	Campus	Acad Org Description
SALP	1716	Foundation Theories in Animal Production practices	Improved biological and economical livestock production practices. Curbing high mortality and low fertility areas. Improved genetic material for herd progress. Implementation of sound feeding regimes to avoid excessive mass losses in dry seasons. Students will acquire practical skills and know-how to demonstrate sound animal husbandry practices which will ensure improved animal health, breeding, nutrition and pasture management practices.	MAIN	Student will be able to: Within the area of sustainable animal production practices, - Design practical rotational grazing systems to avoid over grazing; - develop and apply sound animal husbandry practices; - identify nutritional needs of free ranging animals; - implement correct breeding practices; - introduce sound animal health procedures; - devise sound marketing practices; - improve biological and economical livestock production practices; - curb high mortality and low fertility rates; - improve genetic material for herd progress; - implement sound feeding regimes to avoid excessive mass losses in dry seasons.
SALP	1726	Foundation Theories in Animal Production practices	Improved biological and economical livestock production practices. Curbing high mortality and low fertility areas. Improved genetic material for herd progress. Implementation of sound feeding regimes to avoid excessive mass losses in dry seasons. Students will acquire practical skills and know-how to demonstrate sound animal husbandry practices which will ensure improved animal health, breeding, nutrition and pasture management practices.	MAIN	Student will be able to: Within the area of sustainable animal production practices, - Design practical rotational grazing systems to avoid over grazing; - develop and apply sound animal husbandry practices; - identify nutritional needs of free ranging animals; - implement correct breeding practices; - introduce sound animal health procedures; - devise sound marketing practices; - improve biological and economical livestock production practices; - curb high mortality and low fertility rates; - improve genetic material for herd progress; - implement sound feeding regimes to avoid excessive mass losses in dry seasons.
SARD	1716	Fundamentals of Rural Development	Improved support structures in all spheres of rural life, thereby improving social, human and family livelihoods. Students will acquire skills and know-how to deal with the challenges of rural life; they will be able to facilitate improved living environments and create capacity towards self sufficiency.	MAIN	Student will be able to: Within the are of managing rural structures and dynamics: - Apply acquired skills and know-how to deal with the challenges of rural life; - resolve gender issues; - explain the important role of agriculture in communities; - contrast poverty vs. self-sufficiency; - introduce programmes to alleviate hunger and ensure food security; - initiate improved support structures in all spheres of rural life; - facilitate improved living environments; and - create capacity towards self-sufficiency.
SARD	1726	Fundamentals of Rural Development	Improved support structures in all spheres of rural life, thereby improving social, human and family livelihoods. Students will acquire skills and know-how to deal with the challenges of rural life; they will be able to facilitate improved living environments and create capacity towards self sufficiency.	MAIN	Student will be able to: Within the are of managing rural structures and dynamics, : - Apply acquired skills and know-how to deal with the challenges of rural life; - resolve gender issues; - explain the important role of agriculture in communities; - contrast poverty vs. self-sufficiency; - introduce programmes to alleviate hunger and ensure food security; - initiate improved support structures in all spheres of rural life; - facilitate improved living environments; and - create capacity towards self-sufficiency.
Postgraduate					
SAAM	7926	National and International Agricultural Marketing	Students will be able to understand the marketing nvironment wherein agriculture operates, as well as the national and international context. The student will acquire skills that relates to the analysis of markets and trades, as well as the composition of marketing strategies.	MAIN	Students will be able to: -explain and describe the marketing environment wherein agriculture operates, as well as the national and international context; and -analyse of markets and trades, as well as the composition of marketing strategies.
SACP	7916	Sustainable Plant Production Systems	This module will enable students to implement sustainable plant succession practices through strategic crop and cultivar choices, soil tillage, plant nutrition and water management and utilization. This module covers both agronomical & horticultural plant production systems.	MAIN	Student will be able to: - Implement and manage sustainable plant succession practices through strategic crop and cultivar choices, soil tillage, plant nutrition and water management and utilization.

Subject	Catalog #	Course Title	Course Description	Campus	Acad Org Description
SACT	7926	Communication and Technology Transfer for Sustainable Agriculture	After completing this module, students will have confidence in the principles of communication and technology transfer, the context of communication and communication strategies in respect of technology transfer.	MAIN	Student will be able to: -examine the principles of communication and technology transfer, the context of communication and communication strategies in respect of technology transfer.
SADR	9100	Sustainable Agriculture Thesis	Sustainable Agriculture This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Sustainable Agriculture as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
SAEC	5806	Economics for sustainable agriculture	Agronomics is the application of the social science of economics to the field of agriculture. This is the branch of economics dealing with the distribution, management, and productivity of land. It is therefore the use of economic methods to optimize decision making by agricultural producers or consultants concerned with the application of economic theory in optimizing the production and distribution of agricultural products. This includes topics like supply and demand, the value chain, micro- and macro-economics and entrepreneurship and strategic planning and management.	MAIN	Student will be able to: -Identify and analyze agricultural environment and resources, enabling them to realize threats of degradation and develop a system to manage the environment and resources in a sustainable way; -Use decision-making tools such as records, budgeting, break even analysis, and capital investment useful to the manager in planning and controlling the agribusiness unit; -Discuss and apply micro-economic theory, including producer- and consumer theory, demand and supply, how markets work and prices are formulated, market failure and other micro-economic principles; -Examine and distinguish macro-economic theory and its linkages to agriculture, including GDP, national income, how interest rates are formed, government spending and its impact on the economy, employment and unemployment, monetary and fiscal policies; and -Analyze factors which affect the decision-making process. These include calculations for depreciation, costs, marginality, revenue, gross margin, profit; understand and use the production and cost function; do cost calculations and use other mathematical equations to make calculated decisions.
SAEC	7906	Economics for Sustainable Agriculture	Agribusiness refers to all the business aspects of agricultural and agricultural-related activities. It has evolved into a huge and very complex system extending far beyond the farm. This include all role-players, throughout the whole value chain, involved in bringing food and fiber to the consumer. Since agribusiness systems has undergone rapid transformation, the traditional farming systems have grown much more specialized forcing and resulting in agribusiness owners and managers to be much more entrepreneurial. Due to the fact that agribusiness innovation is a fundamentally multi-disciplinary endeavor different aspects thereof would be studied in this module. These include strategy creation and development, the economic and financial aspects regarding agribusiness ventures and value chain management.	MAIN	Student will be able to: -analyse an agribusiness unit`s environment using basic tools; design a managerial process forming strategic vision, setting objectives, crafting and implementing a strategic plan enabling the agribusiness unit to create and sustain competitive advantage; -use and construction of integrated financial statements for sound financial planning; as well as the application of financial information, concepts and ratios to agribusiness management and management of the business` overall risk position; -examine and discuss the value chain concept, be able to assess risks and identify strategic opportunities to strengthen value chains, recognize how cohesive value chains can be used to reduce risks and learn how to apply value chain financial products to meet the needs of various factors in the value chain; and -develop an advanced business plan for an agricultural business unit by applying all principles and processes of strategic management.
SAEX	5806	Extension for sustainability	Introduce students to the new role of extension in the context of agricultural innovation systems and sustainable agriculture. The concept of food security and its dimensions will be discussed as an imperative for achieving sustainable agriculture. Explore the concepts of resilience, vulnerability and adaptation in relation to the `rural poor' or smallholder farmers who are often the ultimate target for many sustainable agricultural interventions. The ability of monitor and evaluate programmes towards sustainability is crucial for measuring progress. The module will then introduce the concept of Monitoring and Evaluation (M & E) and the different tools and methods that are deemed practical for fieldwork application.	MAIN	Student will be able to: -Examine the multidimensional nature of the concept of food security and emerging global challenges and opportunities related to it; -Apply the concepts of resilience, vulnerability and adaptation in relation to the rural poor and smallholder farmers; -Apply different tools for assessing household vulnerabilities and promotion of various adaptation strategies; -Construct a management and assessment tool and methods that are deemed practical for fieldwork application; -Contextualize and apply the new role of extension in the context of the sustainable agriculture; and -Promote the core competencies to support sustainable agriculture.
SAEX	7906	Sustainable Agriculture and Extension: Theory and Practice	Provide practical guidance in the monitoring and evaluation (M&E) of the environmental and social sustainability of Agricultural and Rural Development (ARD) programs and project.	MAIN	Students will be able to: -Use the systems theories to make interventions at an appropriate level within a system, based on an understanding of hierarchical relations within the system; and -Address the intended and unintended consequences of interventions.
SAEX	7916	Rural agricultural extension; issues and concepts	Rural agricultural extension; issues and concepts	MAIN	Student will be able to: - Examine the rural characteristics of poverty and decay; and - Select and evaluate alternative strategies to develop and increase food security and economic growth under limited circumstances.

Subject	Catalog #	Course Title	Course Description	Campus	Acad Org Description
SAFM	7926	Farm Management for Sustainable Agriculture	Students will be able to implement financial and risk management systems and analyse and interpret management information systems. Skills in terms of the manager, the management process and personnel management will be acquired.	MAIN	Student will be able to - implement financial and risk management systems and analyse and interpret management information systems. -manage the process of sustainable agriculture and personnel management
SAIT	5814	Introduction to Sustainable Agriculture	This module will explore the concept of sustainable agriculture with emphasis on the triple wins development path based on the inter-connections between economic, environmental and social dimensions. The module will also unpack the policy landscape (mix of actions and instruments) and how they either provide incentives for coherence and synergies, or are hindering factor towards bring agriculture closure to meeting the conditions for sustainability. Different approaches that are deemed to promote sustainable agriculture will also be identified and analyzed.	MAIN	Student will be able to: -Define the concepts of sustainable development and sustainable agriculture and complexities of the economic-environment-social nexus underpinning sustainability; -Unpack the dynamics of Economic, environment and social sustainability --Critically review the agricultural policy landscape and the extent to which they either provide enabling environment or hindering the successful implementation of sustainable agricultural efforts; -Use multiple source of knowledge to identify and analyze the different approaches that are deemed to be promoting sustainable agriculture in terms of effectiveness and efficiency; and -Create a score card to evaluate the sustainability of an agricultural production system.
SALP	7916	Sustainable Live-stock Production Systems	This module will enable the student to apply the three dimensions of livestock production namely nutrition, reproduction physiology and animal breeding within an intensive and extensive production system.	MAIN	Student will be able to: -apply the three dimensions of livestock production namely nutrition, reproduction physiology and animal breeding within an intensive and extensive production system.
SALS	5806	Livestock production for Sustainable Agriculture	Sustainable animal production incorporates a holistic approach which includes all key aspects of animal production. These include animal health, utilization of natural resources as animal feed, basic animal production systems. The focus will be on the whole to demonstrate how the various aspects of animal production inter relate to each other to contribute to sustainable production systems. Animal groups under discussion will include ruminants (small stock and large stock), monogastric animals and game in general. Animal nutrition, breeding and marketing for each grouping will be explained	MAIN	Student will be able to: -Distinguish between different animal diseases and be able to develop basic animal health programs; -Use appropriate techniques to assess rangeland condition and will be able to calculate animal numbers for specific areas. Furthermore they will be able to develop a simple rangeland management system; -Examine and apply the general principles of ruminant production systems and its implementation towards sustainable animal production; and -Examine and apply the general principles of mono-gastric production systems and its implementation towards sustainable animal production.
SALS	7906	Advanced livestock production for sustainable agriculture	Advanced animal production focus on strategic aspects for improved sustainable animal production. Aspects like recognition and treatment of animal diseases, intensive fodder production and fodder flow, advanced animal breeding and nutrition will be mastered. Emphasis will be on small advanced adaptations, to results into large improved outcomes. Animal groups under investigation include ruminants (small stock- sheep & goats and large stock- cattle), monogastric animals (poultry & pigs) and game in general.	MAIN	Student will be able to: -Recognize and treat the most common bacterial, viral and protozoal diseases in livestock and game; -Develop, plan and apply appropriate intensive fodder management systems towards improved fodder flow; -Apply advanced nutritional, breeding and managerial principles for efficient sustainable ruminant production; and -Apply advanced nutritional, breeding and managerial principles for efficient sustainable monogastric production.
SAMD	7900	Mini Dissertation Sustainable Agriculture	Research Project Proposal Short research essay/Pro-posal By the means of the four themes within this module, students will acquire skills to formulate a significant project proposal, which will lead to the accomplishment of a research report.	MAIN	Student will be able to: -formulate a significant project proposal, which will lead to the accomplish-ment of a research report.
SANR	5806	Assessment and management of natural resources	Utilizing the natural resources in a sustainable manner needs a holistic approach, which includes soil quality, utilization of climate data, as well as crop management. The focus will be on the basic principles that are of importance in the sustainable utilization of natural agricultural resources (soil, plant, atmosphere), and how to promote integrated assessment of these natural resources on a viable basis to contribute to a sustainable system.	MAIN	Student will be able to: -Apply principles of soil quality and the ways in which agricultural practices affect soil quality, as well as the maintenance for sustainable agriculture; -Evaluate the sensitivity of soil for degradation; -Discuss and apply the optimal utilization of climate data for agricultural production; and -Basic evaluation on crop production in order to give guidance for management in a sustainable manner.
SANR	7906	Assessment and Management of natural resources	Sustainable management of natural resources such as soil, atmosphere and plants, needs a holistic understanding of the interaction between environmental factors and human activity. One of the requirements of sustainable agriculture is that the quality of the natural agricultural resources must be maintained and if possible even improved. Emphasis will therefore be on soil quality, utilization of climate data, as well as crop management, in order to promote integrated assessment of natural resources on a viable basis to contribute to a sustainable system.	MAIN	Student will be able to: -Examine soil quality and the ways in which agricultural practices affect soil quality, as well as the maintenance for sustainable agriculture; -Evaluate the sensitivity of soil for degradation, and be able to make well-planned proposals on maintaining soil quality in various agricultural production systems to promote sustainability; -Apply advanced knowledge of the optimal utilization of climate data for agricultural production, and to place the atmosphere in perspective as a natural resource within the framework of sustainability; and -Evaluate and manage crop production in interaction with different climate and soil, in a sustainable manner.

Subject	Catalog #	Course Title	Course Description	Campus	Acad Org Description
SAPA	7900	Publishable Article Sustainable Agriculture	Research Report/Article The final output of the research project will be covered through a scientific report in the form of a research essay or article.	MAIN	Student will be able to: - write a research paper on the content they have covered
SAPM	7926	Project Management for Sustainable Agricultural Practices	Project Management for Sustainable Agricultural Practices	MAIN	Student will be able to: -explain, apply and analyze the principles and processes of project management, marketing and planning and to develop a strategic marketing plan.
SARD	7926	Sociology of Sustainability	Students will be able to understand the dynamics of population growth and pressure as variability's in a sustainable community structure and to integrate it with social poverty and sustainable rural development.	MAIN	Student will be able to: -Examine and discuss the dynamics of population growth and pressure as variability's in a sustainable community structure and to integrate it with social poverty and sustainable rural development.
SARP	5826	Research methods for sustainable agriculture	This module introduces students to the basics of scientific research. It aims to establish and understanding of research through critical exploration of research language, ethics, and approaches. The module covers the language of research, ethical principles and challenges, and the elements of the research process within quantitative, qualitative, and mixed methods approaches. Participants will use these theoretical underpinnings to begin to critically review literature relevant to the field of sustainable agriculture and determine how research findings are useful in informing their understanding of the field of study.	MAIN	Student will be able to: -Apply research terminology; -Apply the ethical principles of research, ethical challenges and approval processes; -Conduct a brief literature study and critically analyze published research; -Describe quantitative, qualitative and mixed methods approaches to research; and -Collect and analyze data to inform a short report.
SARP	7900	Mini-dissertation Sustainable Agriculture	The student identifies a topic for completion of their research questionnaire in qualitative of quantitative format - Research report : mini-dissertation formation	MAIN	Student will be able to: -Select a research topic; -Write a literature review; -Do research on the selected topic; and -Write a mini-dissertation.
SASA	7900	Introduction to sustainable agriculture and rural devevelopment	After completing this module the student will be able to evaluate the characteristics of soils and pastures, which serves as indicators of the quality of the resources, to select sustainable agricultural systems, as well as to explain climate, vegetation and energy as natural resources.	MAIN	Student will be able to: -evaluate the characteristics of soils and pastures, which serves as indicators of the quality of the resources, to select sustainable agricultural systems, as well as to explain climate, vegetation and energy as natural resources.
SASC	7900	Sustainable Agriculture: Minor Dissertation	Sustainable Agriculture: Minor Dissertation With the script the students will illustrate the skills they have acquired, and the competence and proficiency to determine, identify and integrate all the factors of sustainability in an agriculture system.	MAIN	Student will be able to: -illustrate the skills they have acquired, and the competence and proficiency to determine, identify and integrate all the factors of sustainability in an agriculture system.
SASM	7926	Strategic Management and Planning in Agriculture	After completing this module, students will be able to apply the principles and processes of strategic management, marketing and planning to develop such a plan for an agricultural enterprise.	MAIN	Student will be able to: -apply the principles and processes of strategic management, marketing and planning to develop such a plan for an agricultural enterprise.
SATN	7916	Agriculture Technology for Developing Countries	Students will be able, among other things, to design and develop different irrigation-practices, to evaluate technology in developing regions and to suggest suitable adjustments.	MAIN	Student will be able to: -design and develop different irrigation-practices, to evaluate technology in developing regions and to suggest suitable adjustments.
SAUR	7916	Sustainable Utilisation of Natural Agricultural Resources and the environment	Students will gain knowledge and insight into the sustainable utilization of natural resources, climate soil, pastures and energy to the efficient use for people without damaging the resources.	MAIN	Students will be able to: -Examine sustainable utilization of natural resources, climate soil, pastures and energy to the efficient use for people without damaging the resources.
SAVA	7926	Agricultural Product Processing and Preserving	Learners will be able to understand the physical methods of food processing and to be able to apply the principles of processing dairy and meat products, vegetables, fruit, as well as cereals, legumes and grains in the practice.	MAIN	Student will be able to: - explain, explore and describe the physical methods of food processing; and -manage and apply the principles of processing dairy and meat products, vegetables, fruit, as well as cereals, legumes and grains in the practice.

Chemistry

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	1512	Introduction to general Chemistry	Discuss and clarifying ambiguous chemistry concepts in the school syllabus as well as critical (generic) outcomes aimed at the development of literacy skills (oral and written reasoning), numeracy and problem solving skills.	MAIN	After successful completion of this module the student will have acquired knowledge, understanding and insight of the fundamental principles of general chemistry regarding: Mathematical skills (Significant numbers, mathematical calculations, handling of logarithms to the base 10 and natural logarithms, the drawing of graphs on scale on graph paper), Classification of matter, The Periodic table, Chemical formulas and nomenclature, Basic structure of the atom, fundamental principles, ions and formation of molecules, relative atomic mass, molar mass, The mole concept, molar concentration, parts per million and percentage concentration, Introduction to acids and bases, relevant acid-base theories and pH-calculation, Introduction to gases ' laws of Boyle, Charles and the combined gas laws as well as the Kelvin temperature, and will have obtained and developed basic analytical skills and techniques (quantitatively and to a lesser degree qualitatively) of physical/chemical applications and will be able to write a short scientific report. The student will also have acquired the ability to effectively interact and work within the learning group.
CHEM	1513	Inorganic and Analytical Chemistry (Mainstream)	Experience critical (generic) outcomes with respect to literacy skills (oral and written reasoning), mathematical skills, problem solving skills and experimental skills. .	MAIN	Student will be able to: -Discuss and apply the fundamental experimental principles regarding Analytical, Physical and Organic Chemistry; -Display basic experimental skills and techniques with regards to analytical skills, (both quantitative and qualitative) of physical/chemical applications; and -Write a short scientific report and will also have acquired the ability to effectively interact and work within the learning group.
CHEM	1551	Inorganic and Analytical Chemistry (Practicle)	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Analytical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry; and -Conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	1623	Physical and Organic Chemistry (Mainstream)	Discuss critical (generic) outcomes with respect to literacy skills in oral and written reasoning, numeracy, experimental and problem solving skills..lhn	MAIN	After successful completion of this module the student will be able to demonstrate knowledge, and understanding or the fundamental principles underpinning physical and organic chemistry with respect to: Phases and Solutions: Description or the phases or matter and the influence or solutes on the phase characteristics or the gas phase (atmospheric pressure, pressure or a column {barometer, manometer} Gas laws {Boyle, Charles, Avogadro, Ideal gas law, Dalton, Henry}), Colligative properties (boiling point elevation and freezing point depression), Thermodynamics: Elementary calculations on heat transfer, the first law or thermodynamics and thermochemical processes. Introductory Electrochemistry (voltaic cell, cell potential, cell notation, spontaneity). Introductory Reaction kinetics: Reaction orders and calculation or reaction rates, reaction times and half-lives. (Emphasis on first order kinetics) Introduction or Organic Chemistry. Hybridization or the carbon atom, properties, synthesis and reactions or hydrocarbons, alkyl halides, alcohols, ketones, aldehydes, carboxylic acids, derivatives or carboxylic acids; introduction to stereoisomerism and simple reaction mechanisms. Everyday applications, including the influence of chemical structure on physical properties and biological activity will be emphasized, as well as skills and techniques with respect to both quantitative and qualitative analysis or physical/ chemical applications such as natural product analysis and syntheses or organic compounds and clear concise scientific reporting or experimental procedures and effective interaction and working relationships within the learning group.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	1643	Physical and Organic Chemistry	Discuss critical (generic) outcomes with respect to literacy skills in oral and written reasoning, numeracy, experimental and problem solving skills. Exclude all practicals.	MAIN	Student will be able to: -Discuss and apply the fundamental principles underpinning physical and organic chemistry with respect to: Phases and Solutions: Description or the phases or matter and the influence or solutes on the phase characteristics or the gas phase (atmospheric pressure, pressure or a column {barometer, manometer} Gas laws {Boyle, Charles, Avogadro, Ideal gas law, Dalton, Henry}), Colligative properties (boiling point elevation and freezing point depression), Thermodynamics: Elementary calculations on heat transfer, the first law or thermodynamics, thermochemical processes and introduction to reaction entropy and free energy. Electrochemistry (voltaic cell, cell potential, cell notation, spontaneity). Reaction kinetics: Reaction orders and calculation or reaction rates, reaction times and half-lives. Quantum chemistry: Introductory concepts with respect to theoretical, structural and spectroscopic aspects. Hybridization of the carbon atom; properties, synthesis and reactions of hydrocarbons, alkylhalides, alcohols, ketones, aldehydes, carboxylic acids and derivatives or carboxylic acids; introduction to stereochemistry and reaction mechanisms, as well as skills and techniques with respect to both quantitative and qualitative analysis or physical/ chemical applications such as natural product analysis and syntheses or organic compounds and clear concise scientific reporting or experimental procedures and effective interaction and working relationships within the learning group.
CHEM	1661	Physical and Organic Chemistry (Practical)	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Physical and Organic Chemistryl Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports	MAIN	Student will be able to: -explain, discuss and analyse fundamental experimental principles with respect to Physical and Organic Practicals; -conduct experiments and use skills and techniques to make observations; -collect data, draw conclusions and write reports.
CHEM	2611	Physical Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Physical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry; and -Conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	2613	Physical Chemistry Theory	Dynamics: Properties of gases and the kinetic molecular theory. Thermodynamics: Advanced application of the first, second and third laws of thermodynamics to chemical systems as well as thermochemical calculations. Phase studies: Properties of liquids and solutions. Phase equilibria: Quantify real gas-, liquid- and solid mixtures. Electrolytic solutions: To quantify electrolytic conductivity and transport. Quantum chemistry: Atomic structure through the Schrodinger equation as well as own functions, own values and amplitudes of selected examples. Quantum mechanics: Application of concepts in practice,	MAIN	Student will be able to: Discuss and apply the fundamental principles underpinning physical chemistry with respect to: Dynamics: Properties of gases and the kinetic molecular theory. Thermodynamics: Advanced application of the first, second and third laws of thermodynamics to chemical systems as well as thermochemical calculations. Phase studies: Properties of liquids and solutions. Phase equilibria: Quantify real gas-, liquid- and solid mixtures. Electrolytic solutions: To quantify electrolytic conductivity and transport. Quantum chemistry: Atomic structure through the Schrodinger equation as well as own functions, own values and amplitudes of selected examples. Quantum mechanics: Application of concepts in practice, as well as the acquisition and development of skills and techniques with respect to analysis of physical/ chemical applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group
CHEM	2621	Organic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Organic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Organic Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	2623	Organic Chemistry Theroy	After successful completion of this module the student will be able to demonstrate knowledge and understanding of the fundamental principles underpinning organic chemistry with respect to: Extension of the chemistry of carbonyl compounds, carboxylic acids and carboxylic acid derivatives. The chemistry of aromatic compounds: structure of benzene, aromaticity, electrophilic substitution, the influence of substituents on electrophilic substitution, aromatic halides and hydrocarbons, carbonyl and nitro compounds, phenols and hydroxycarbonyl compounds. Stereochemistry and conformation: synthesis and reactions of stereo-isomers. As well as the acquisition and development of skills and techniques with respect to analysis of organic/chemical applications such as natural product analysis and syntheses of organic compounds.	MAIN	Student will be able to: Examine and discuss the fundamental principles underpinning organic chemistry with respect to: - Extension of the chemistry of carbonyl compounds, carboxylic acids and carboxylic acid derivatives. - The chemistry of aromatic compounds: structure of benzene, aromaticity, electrophilic substitution, the influence of substituents on electrophilic substitution, aromatic halides and hydrocarbons, carbonyl and nitro compounds, phenols and hydroxycarbonyl compounds. - Stereochemistry and conformation: synthesis and reactions of stereo-isomers, as well as the acquisition and development of skills and techniques with respect to analysis of organic/chemical applications such as natural product analysis and syntheses of organic compounds and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	2631	Analytical Chemistry practical	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning analytical chemistry with respect to: Basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.	MAIN	Student will be able to: -Apply basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.
CHEM	2633	Analytical Chemistry	Discuss critical (generic) outcomes with respect to literacy skills in oral and written reasoning, numeracy, experimental and problem solving skills.	MAIN	Student will be able to: -Apply basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.
CHEM	2641	Inorganic Chemistry Practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Inorganic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Inorganic Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	2643	Inorganic Chemistry Theory	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning inorganic chemistry with respect to: Properties of covalent bonding (localized and delocalized) employing the Molecular Orbital theory, calculations on electronegativity, effective nuclear charge and magnetism, molecular geometry, chemical properties of the 3d transition metal ions, chemistry of '-acid ligands and their complexes such as carbonyls, isocyanide, dinitrogen, phosphines and cyano complexes, nomenclature of complex compounds.	MAIN	Student will be able to: Discuss and apply the fundamental principles underpinning inorganic chemistry with respect to: Properties of covalent bonding (localized and delocalized) employing the Molecular Orbital theory, calculations on electronegativity, effective nuclear charge and magnetism, molecular geometry, chemical properties of the 3d transition metal ions, chemistry of -acid ligands and their complexes such as carbonyls, isocyanide, dinitrogen, phosphines and cyano complexes, nomenclature of complex compounds, as well as the acquisition and development of skills and techniques.
CHEM	3711	Analytical Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Analytical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	3713	Analytical Chemistry Theory	Modern analytical techniques such as nuclear magnetic resonance, spectrometry, electroanalytical methods and classical analytical techniques such as potentiometry, voltammetry and amperometry. Gas chromatography, complexometry and UV/visible spectrometry.	MAIN	Student will be able to: Outline and apply the fundamental principles underpinning analytical chemistry with respect to: -Modern analytical techniques such as nuclear magnetic resonance, spectrometry, electroanalytical methods and classical analytical techniques such as potentiometry, voltammetry and amperometry; and -Gas chromatography, complexometry and UV/visible spectrometry

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	3721	Inorganic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic Chemistry practicals conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	3723	Inorganic Chemistry Theory	Bonding theories and the chemistry of organometallic complexes, solution behaviour of metal complexes, introductory theory of X-ray crystallography (powder and single-crystal X-ray crystallography) in structure analysis in the solid state, Solid state analyse of ionic compounds in centric cubic space groups. Advanced knowledge on coordination chemistry, specifically aimed at the crystal field and molecular orbital theories (as reflected in simple electronic spectra and magnetic properties), organometallic chemistry, substitution mechanisms in square-planar and octahedral complexes and general industrial and catalytic applications of organometallic catalysts.	MAIN	Student will be able to: Discuss and explain the fundamental principles underpinning inorganic chemistry with respect to: -Bonding theories and the chemistry of organometallic complexes, solution behaviour of metal complexes, introductory theory of X-ray crystallography (powder and single-crystal X-ray crystallography) in structure analysis in the solid state, -Solid state analyse of ionic compounds in centric cubic space groups. -Advanced knowledge on coordination chemistry, specifically aimed at the crystal field and molecular orbital theories (as reflected in simple electronic spectra and magnetic properties), organometallic chemistry, substitution mechanisms in square-planar and octahedral complexes and general industrial and catalytic applications of organometallic catalysts, as well as the acquisition and development of skills and techniques required with respect to experimental procedures on samples of environmental related problems and clear concise scientific reporting and effective interaction and co-operation within the learning group.
CHEM	3731	Physical Chemistry Practical	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning physical chemistry as well as the acquisition and development of skills and techniques with respect to analysis of physical/chemical applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.	MAIN	Student will be able to: Outline and apply the fundamental principles underpinning physical chemistry as well as the acquisition and development of skills and techniques with respect to analysis of physical/chemical applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	3733	Physical Chemistry Theory	Dynamics: chemical kinetics and surface chemistry. Thermodynamics: advanced chemical thermodynamics, free energy, chemical equilibrium, multi¬component systems and electrochemistry. Macromolecular chemistry: the syntheses, characterization and molecular mass determination of polymers. Basic principles of nuclear and radiochemistry	MAIN	Student will be able to: Outline and apply the fundamental principles underpinning physical chemistry with respect to: - Dynamics: chemical kinetics and surface chemistry; - Thermodynamics: advanced chemical thermodynamics, free energy, chemical equilibrium, multi component systems and electrochemistry; - Macro-molecular chemistry: the syntheses, characterization and molecular mass determination of polymers; and - Basic principles of nuclear and radiochemistry,
CHEM	3741	Organic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Organic Chemistry practicals in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	MAIN	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Organic Chemistry practicals, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	3743	Organic Chemistry	The principles and applications of physical techniques (e.g. NMR). Introduction to dynamic stereochemistry. Advanced reactions, mechanisms and their stereochemistry including reactions of carbohydrates, the Diels-Alder reaction, the addition of alkenes (e.g. oxymercuration, hydroboration, analyse addition), nucleophilic addition of aldehydes and ketones (e.g. Wittig reaction, Cannizzarro reaction), alpha substitution of carbonyl compounds (e.g. alpha-halogenation, alkylation of enolate ions) and carbonyl condensation reactions (e.g. Claisen condensations).	MAIN	Student will be able to: -Outline and apply fundamental principles underpinning inorganic chemistry respect to: -The principles and applications of physical methods (eg NMR). -Introduction to dynamic stereochemistry. Carbohydrates, the Diels-Alder, advanced reactions, mechanisms and stereochemistry of among others, the addition of alkenes (eg oxymercuration, hydroboration, carbene), nucleophilic addition of aldehydes and ketones (eg Wittig reaction, reaction), alpha-substitution of carbonyl compounds (eg alpha-halogenation, alkylation of ions) and carbonyl (eg aldolreaksie, Claisen condensation, Robinson cancellation); and the acquisition and development of skills and techniques relative quantitative and qualitative analysis or characterization and synthesis of organic compounds and the identification and analysis of natural products and the expertise to make a brief report on the experimental procedures as well as to provide the ability to effectively interaction and co-operation group.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	1513	Inorganic and Analytical Chemistry (Mainstream)	Experience critical (generic) outcomes with respect to literacy skills (oral and written reasoning), mathematical skills, problem solving skills and experimental skills.	QWAQWA	Student will be able to: -Discuss and apply the fundamental experimental principles regarding Analytical, Physical and Organic Chemistry; -Display basic experimental skills and techniques with regards to analytical skills, (both quantitative and qualitative) of physical/chemical applications; and -Write a short scientific report and will also have acquired the ability to effectively interact and work within the learning group.
CHEM	1551	Inorganic and Analytical Chemistry (Practicle)	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Analytical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry; and -Conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	1623	Physical and Organic Chemistry (Mainstream)	Discuss critical (generic) outcomes with respect to literacy skills in oral and written reasoning, numeracy, experimental and problem solving skills..lhn	QWAQWA	After successful completion of this module the student will be able to demonstrate knowledge, and understanding or the fundamental principles underpinning physical and organic chemistry with respect to: Phases and Solutions: Description or the phases or matter and the influence or solutes on the phase characteristics or the gas phase (atmospheric pressure, pressure or a column {barometer, manometer} Gas laws {Boyle, Charles, Avogadro, Ideal gas law, Dalton, Henry}), Colligative properties (boiling point elevation and freezing point depression), Thermodynamics: Elementary calculations on heat transfer, the first law or thermodynamics and thermochemical processes. Introductory Electrochemistry (voltaic cell, cell potential, cell notation, spontaneity). Introductory Reaction kinetics: Reaction orders and calculation or reaction rates, reaction times and half-lives. (Emphasis on first order kinetics) Introduction or Organic Chemistry. Hybridization or the carbon atom, properties, synthesis and reactions or hydrocarbons, alkyl halides, alcohols, ketones, aldehydes, carboxylic acids, derivatives or carboxylic acids; introduction to stereoisomerism and simple reaction mechanisms. Everyday applications, including the influence of chemical structure on physical properties and biological activity will be emphasized, as well as skills and techniques with respect to both quantitative and qualitative analysis or physical/chemical applications such as natural product analysis and syntheses or organic compounds and clear concise scientific reporting or experimental procedures and effective interaction and working relationships within the learning group.
CHEM	1643	Physical and Organic Chemistry	Discuss critical (generic) outcomes with respect to literacy skills in oral and written reasoning, numeracy, experimental and problem solving skills. Exclude all practicals.	QWAQWA	Student will be able to: -Discuss and apply the fundamental principles underpinning physical and organic chemistry with respect to: Phases and Solutions: Description or the phases or matter and the influence or solutes on the phase characteristics or the gas phase (atmospheric pressure, pressure or a column {barometer, manometer} Gas laws {Boyle, Charles, Avogadro, Ideal gas law, Dalton, Henry}), Colligative properties (boiling point elevation and freezing point depression), Thermodynamics: Elementary calculations on heat transfer, the first law or thermodynamics, thermochemical processes and introduction to reaction entropy and free energy. Electrochemistry (voltaic cell, cell potential, cell notation, spontaneity). Reaction kinetics: Reaction orders and calculation or reaction rates, reaction times and half-lives. Quantum chemistry: Introductory concepts with respect to theoretical, structural and spectroscopic aspects. Hybridization of the carbon atom; properties, synthesis and reactions of hydrocarbons, alkylhalides, alcohols, ketones, aldehydes, carboxylic acids and derivatives or carboxylic acids; introduction to stereochemistry and reaction mechanisms, as well as skills and techniques with respect to both quantitative and qualitative analysis or physical/chemical applications such as natural product analysis and syntheses or organic compounds and clear concise scientific reporting or experimental procedures and effective interaction and working relationships within the learning group.
CHEM	1661	Physical and Organic Chemistry (Practical)	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Physical and Organic Chemistryl Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports	QWAQWA	Student will be able to: -explain, discuss and analyse fundamental experimental principles with respect to Physical and Organic Practicals; -conduct experiments and use skills and techniques to make observations; -collect data, draw conclusions and write reports.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	2611	Physical Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Physical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry; and -Conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	2613	Physical Chemistry Theory	Dynamics: Properties of gases and the kinetic molecular theory. Thermodynamics: Advanced application of the first, second and third laws of thermodynamics to chemical systems as well as thermochemical calculations. Phase studies: Properties of liquids and solutions. Phase equilibria: Quantify real gas-, liquid- and solid mixtures. Electrolytic solutions: To quantify electrolytic conductivity and transport. Quantum chemistry: Atomic structure through the Schrodinger equation as well as own functions, own values and amplitudes of selected examples. Quantum mechanics: Application of concepts in practice,	QWAQWA	Student will be able to: Discuss and apply the fundamental principles underpinning physical chemistry with respect to: Dynamics: Properties of gases and the kinetic molecular theory. Thermodynamics: Advanced application of the first, second and third laws of thermodynamics to chemical systems as well as thermochemical calculations. Phase studies: Properties of liquids and solutions. Phase equilibria: Quantify real gas-, liquid- and solid mixtures. Electrolytic solutions: To quantify electrolytic conductivity and transport. Quantum chemistry: Atomic structure through the Schrodinger equation as well as own functions, own values and amplitudes of selected examples. Quantum mechanics: Application of concepts in practice, as well as the acquisition and development of skills and techniques with respect to analysis of physical/ chemical applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group
CHEM	2621	Organic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Organic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: -Explain, discuss and analyse fundamental experimental principles with respect to Organic Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	2623	Organic Chemistry Theroy	After successful completion of this module the student will be able to demonstrate knowledge and understanding of the fundamental principles underpinning organic chemistry with respect to: Extension of the chemistry of carbonyl compounds, carboxylic acids and carboxylic acid derivatives. The chemistry of aromatic compounds: structure of benzene, aromaticity, electrophilic substitution, the influence of substituents on electrophilic substitution, aromatic halides and hydrocarbons, carbonyl and nitro compounds, phenols and hydroxycarbonyl compounds. Stereochemistry and conformation: synthesis and reactions of stereo-isomers. As well as the acquisition and development of skills and techniques with respect to analysis of organic/chemical applications such as natural product analysis and syntheses of organic compounds.	QWAQWA	Student will be able to: Examine and discuss the fundamental principles underpinning organic chemistry with respect to: - Extension of the chemistry of carbonyl compounds, carboxylic acids and carboxylic acid derivatives. - The chemistry of aromatic compounds: structure of benzene, aromaticity, electrophilic substitution, the influence of substituents on electrophilic substitution, aromatic halides and hydrocarbons, carbonyl and nitro compounds, phenols and hydroxycarbonyl compounds. - Stereochemistry and conformation: synthesis and reactions of stereo-isomers, as well as the acquisition and development of skills and techniques with respect to analysis of organic/chemical applications such as natural product analysis and syntheses of organic compounds and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	2631	Analytical Chemistry practical	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning analytical chemistry with respect to: Basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.	QWAQWA	Student will be able to: -Apply basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.
CHEM	2633	Analytical Chemistry	Discuss critical (generic) outcomes with respect to literacy skills in oral and written reasoning, numeracy, experimental and problem solving skills.	QWAQWA	Student will be able to: -Apply basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry, as well as the acquisition and development of skills and techniques required in quantitative analysis and clear concise scientific reporting of experimental procedures on samples of environmental related problems and effective interaction and co-operation within the learning group.
CHEM	2641	Inorganic Chemistry Practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic and Inorganic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Inorganic Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	2643	Inorganic Chemistry Theory	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning inorganic chemistry with respect to: Properties of covalent bonding (localized and delocalized) employing the Molecular Orbital theory, calculations on electronegativity, effective nuclear charge and magnetism, molecular geometry, chemical properties of the 3d transition metal ions, chemistry of ‘-acid ligands and their complexes such as carbonyls, isocyanide, dinitrogen, phosphines and cyano complexes, nomenclature of complex compounds.	QWAQWA	Student will be able to: Discuss and apply the fundamental principles underpinning inorganic chemistry with respect to: Properties of covalent bonding (localized and delocalized) employing the Molecular Orbital theory, calculations on electronegativity, effective nuclear charge and magnetism, molecular geometry, chemical properties of the 3d transition metal ions, chemistry of -acid ligands and their complexes such as carbonyls, isocyanide, dinitrogen, phosphines and cyano complexes, nomenclature of complex compounds, as well as the acquisition and development of skills and techniques.
CHEM	3711	Analytical Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Analytical Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Analytical Chemistry, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports. .
CHEM	3713	Analytical Chemistry Theory	Modern analytical techniques such as nuclear magnetic resonance, spectrometry, electroanalytical methods and classical analytical techniques such as potentiometry, voltammetry and amperometry. Gas chromatography, complexometry and UV/visible spectrometry.	QWAQWA	Student will be able to: Outline and apply the fundamental principles underpinning analytical chemistry with respect to: -Modern analytical techniques such as nuclear magnetic resonance, spectrometry, electroanalytical methods and classical analytical techniques such as potentiometry, voltammetry and amperometry; and -Gas chromatography, complexometry and UV/visible spectrometry
CHEM	3721	Inorganic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Inorganic Chemistry in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic Chemistry practicals conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.
CHEM	3723	Inorganic Chemistry Theory	Bonding theories and the chemistry of organometallic complexes, solution behaviour of metal complexes, introductory theory of X-ray crystallography (powder and single-crystal X-ray crystallography) in structure analysis in the solid state, Solid state analyse of ionic compounds in centric cubic space groups. Advanced knowledge on coordination chemistry, specifically aimed at the crystal field and molecular orbital theories (as reflected in simple electronic spectra and magnetic properties), organometallic chemistry, substitution mechanisms in square-planar and octahedral complexes and general industrial and catalytic applications of organometallic catalysts.	QWAQWA	Student will be able to: Discuss and explain the fundamental principles underpinning inorganic chemistry with respect to: -Bonding theories and the chemistry of organometallic complexes, solution behaviour of metal complexes, introductory theory of X-ray crystallography (powder and single-crystal X-ray crystallography) in structure analysis in the solid state, -Solid state analyse of ionic compounds in centric cubic space groups. -Advanced knowledge on coordination chemistry, specifically aimed at the crystal field and molecular orbital theories (as reflected in simple electronic spectra and magnetic properties), organometallic chemistry, substitution mechanisms in square-planar and octahedral complexes and general industrial and catalytic applications of organometallic catalysts, as well as the acquisition and development of skills and techniques required with respect to experimental procedures on samples of environmental related problems and clear concise scientific reporting and effective interaction and co-operation within the learning group.
CHEM	3731	Physical Chemistry Practical	After successful completion of this module the student will be able to demonstrate knowledge, and understanding of the fundamental principles underpinning physical chemistry as well as the acquisition and development of skills and techniques with respect to analysis of physical/chemical applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.	QWAQWA	Student will be able to: Outline and apply the fundamental principles underpinning physical chemistry as well as the acquisition and development of skills and techniques with respect to analysis of physical/chemical applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	3733	Physical Chemistry Theory	Dynamics: chemical kinetics and surface chemistry. Thermodynamics: advanced chemical thermodynamics, free energy, chemical equilibrium, multi¬component systems and electrochemistry. Macromolecular chemistry: the syntheses, characterization and molecular mass determination of polymers. Basic principles of nuclear and radiochemistry	QWAQWA	Student will be able to: Outline and apply the fundamental principles underpinning physical chemistry with respect to: - Dynamics: chemical kinetics and surface chemistry; - Thermodynamics: advanced chemical thermodynamics, free energy, chemical equilibrium, multi component systems and electrochemistry; - Macro-molecular chemistry: the syntheses, characterization and molecular mass determination of polymers; and - Basic principles of nuclear and radiochemistry,
CHEM	3741	Organic Chemistry practicals	Skills and techniques required for quantitative and qualitative practical laboratory work in Organic Chemistry practicals in relation with the content cover in the theoretical module. Students will conduct experimental procedure, make observations, collect data, draw conclusions and write scientific reports.	QWAQWA	Student will be able to: Explain, discuss and analyse fundamental experimental principles with respect to Inorganic and Organic Chemistry practicals, conduct experiments and use skills and techniques to make observations. collect data, draw conclusions and write reports.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	3743	Organic Chemistry	The principles and applications of physical techniques (e.g. NMR). Introduction to dynamic stereochemistry. Advanced reactions, mechanisms and their stereochemistry including reactions of carbohydrates, the Diels-Alder reaction, the addition of alkenes (e.g. oxymercuration, hydroboration, analyse addition), nucleophilic addition of aldehydes and ketones (e.g. Wittig reaction, Cannizzarro reaction), alpha substitution of carbonyl compounds (e.g. alpha-halogenation, alkylation of enolate ions) and carbonyl condensation reactions (e.g. Claisen condensations).	QWAQWA	Student will be able to: -Outline and apply fundamental principles underpinning inorganic chemistry respect to: -The principles and applications of physical methods (eg NMR). -Introduction to dynamic stereochemistry. Carbohydrates, the Diels-Alder, advanced reactions, mechanisms and stereochemistry of among others, the addition of alkenes (eg oxymercuration, hydroboration, carbene), nucleophilic addition of aldehydes and ketones (eg Wittig reaction, reaction), alpha-substitution of carbonyl compounds (eg alpha-halogenation, alkylation of ions) and carbonyl (eg aldolreaksie, Claisen condensation, Robinson cancellation); and the acquisition and development of skills and techniques relative quantitative and qualitative analysis or characterization and synthesis of organic compounds and the identification and analysis of natural products and the expertise to make a brief report on the experimental procedures as well as to provide the ability to effectively interaction and co-operation group.
CHEM	1532	Organic Chemistry	Experience critical (generic) outcomes with respect to literacy skills (oral and written reasoning) and problem solving skills.	SOUTH	After successful completion of this module the student will have acquired knowledge, understanding and insight of the fundamental principles of organic chemistry regarding: Hybridization of the carbon atom; properties, preparation and reaction of hydrocarbons, alkyl halides, alcohols, ketones, aldehydes, carboxylic acids, derivatives of carboxylic acids; introduction to stereoisomerism and reaction mechanisms, and will have obtained and developed basic analytical skills and techniques (both quantitative and qualitative) of chemical applications, synthesis of organic compounds and the analysis/application of natural products. The student will be able to write a short scientific report and will also have acquired the ability to effectively interact and work within the learning group.
CHEM	1552	Introduction to chemistry-development module	Discuss and clarifying ambiguous chemistry concepts in the school syllabus as well as critical (generic) outcomes aimed at the development of literacy skills (oral and written reasoning), numeracy and problem solving skills.	SOUTH	After successful completion of this module the student will have acquired knowledge, understanding and insight of the fundamental principles of general chemistry regarding: Mathematical skills (Significant numbers, mathematical calculations, handling of logarithms to the base 10 and natural logarithms, the drawing of graphs on scale on graph paper), Classification of matter, The Periodic table, Chemical formulas and nomenclature, Basic structure of the atom, fundamental principles, ions and formation of molecules, relative atomic mass, molar mass, The mole concept, molar concentration, parts per million and percentage concentration, Introduction to acids and bases, relevant acid-base theories and pH-calculation, Introduction to gases ‘ laws of Boyle, Charles and the combined gas laws as well as the Kelvin temperature, and will have obtained and developed basic analytical skills and techniques (quantitatively and to a lesser degree qualitatively) of physical/chemical applications and will be able to write a short scientific report. The student will also have acquired the ability to effectively interact and work within the learning group.
CHEM	1622	Physical Chemistry	Experience critical (generic) outcomes with respect to literacy skills (oral and written reasoning) and problem solving skills.	SOUTH	After successful completion of this module the student will have acquired knowledge, understanding and insight of the fundamentalprinciples of physical chemistry regarding: Phases and Solutions: Description of the phases of matter and the influence of solutes on the phase characteristics of the gas phase (atmospheric pressure, pressure of a column {barometer, manometer}; Gas laws {Boyle, Charles, Avogadro, Ideal gas law, Dalton, Henry}), Colligative properties (boiling point elevation and freezing point depression), Thermodynamics: elementary calculation on heat transfer, the First Law of thermodynamics, thermochemical processes and introduction to reaction entropy and free energy. Reaction kinetics: Reaction orders and calculation of reaction rates, reaction times and half-lives. Electrochemistry (Voltaïc cell, cell notation, cell potential, spontaneity), and will have obtained and developed basic analytical skills and techniques (both quantitative and qualitative) of physical/chemical applications. The student will be able to write a short scientific report and will also have acquired the ability to effectively interact and work within the learning group.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	1642	Inorganic and Analytical Chemistry	Discuss critical (generic) outcomes with respect to literacy skills (oral and written reasoning) and problem solving skills.	SOUTH	After successful completion of this module the student will have acquired knowledge, understanding and insight of the fundamental principles of inorganic and Analytical chemistry regarding: Empirical and molecular formulas as well as stoichiometry, Quantitative analyses (Gravimetry en Volumetry), Oxidation, reduction, oxidation number and balancing of redox reaction equations ; Quantum mechanical atomic theory, Electron distribution, polarity and periodicity, Bonds, Lewis structures and molecular geometry; Chemical equilibrium and solubility products, Acids, bases, pH and buffers,and will have obtained and developed basic analytical skills and techniques (both quantitative and qualitative) of physical/chemical applications. The student will be able to write a short scientific report and will also have acquired the ability to effectively interact and work within the learning group.
Postgraduate					
CHEM	6808	Research Report Chemistry	Students complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: -identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -integrate knowledge obtained from both literature and experimental results; -outline how his / her research fit within the larger picture of Botanical research; -report on how the principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialization; -communicate his / her results in the form of a PowerPoint presentation; -assist in the preparation of the results for publication; and -self-evaluate his / her own development within Chemistry.
CHEM	6813	Inorganic Chemistry	(a) Multi-Nuclear NMR applications with regard to structure/reactivity relationships in Organometallic Chemistry General Principles (Nucleus type; Natural abundance; Relative receptivity; Spin), Specific examples: Coupling, Correlation between first-order coupling and bond distance, Kinetics (b) Industrial processes and chemicals, the chemical industry The production of inorganic chemicals, Summary of the most important sectors of the chemical industry, Some important synthesis/recovery of inorganic chemicals and applications, Separation of platinum group metals, Application of metal complexes in the medical field, Synthesis of glass, Uses of inorganic chemicals, Ore deposits and separation of minerals. (c) Organometallic Chemistry 18 e rule; carbonyls, ligands, carbenes	MAIN	Student will be able to: - explain and explore the fundamental principles underpinning inorganic chemistry of the selected topics; - explain and explore the acquisition and development of skills and techniques with respect to the analysis of inorganic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group
CHEM	6814	Inorganic Chemistry	(a) Multi-Nuclear NMR applications with regard to structure/reactivity relationships in Organometallic Chemistry General Principles (Nucleus type; Natural abundance; Relative receptivity; Spin), Specific examples: Coupling, Correlation between first-order coupling and bond distance, Kinetics (b) Industrial processes and chemicals, the chemical industry The production of inorganic chemicals, Summary of the most important sectors of the chemical industry, Some important synthesis/recovery of inorganic chemicals and applications, Separation of platinum group metals, Application of metal complexes in the medical field, Synthesis of glass, Uses of inorganic chemicals, Ore deposits and separation of minerals. (c) Organometallic Chemistry 18 e rule; carbonyls, ligands, carbenes	MAIN	Student will be able to: - explain and explore the fundamental principles underpinning inorganic chemistry of the selected topics; - explain and explore the acquisition and development of skills and techniques with respect to the analysis of inorganic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	6823	Inorganic Chemistry	This module covers selected aspects of more advanced Inorganic Chemistry topics and consists of theoretical and practical work. (a) Nuclear Medicine A general introduction to Nuclear Medicine is presented, which includes aspects of isotopes utilized, rationale behind the design of a radiopharmaceutical, examples specific agents, etc. (b) Intimate Reaction mechanisms in Coordination Chemistry and Selected studies on reaction mechanisms Derivation of basic intimate Rate laws, Iodomethane Oxidative Addition to [Rh(Bid)(CO)(PPh3)] complexes, Octahedral substitution in the presence of acid/ base equilibria, Square- planar reversible substitution, Multi-order reactions. (c) Homogeneous Catalysis Complete coverage of selected chapters from P v Leeuwen, Homogeneous Catalysis: Understanding the Art, Kluwer 2004. (d) X-Ray Crystallography Practical aspects of single crystal X-ray structure determination will be given, from basic data collection, to utilizing programs such as WinGX, SIR for the refinement and complete structure solution. Students will also utilize databases (CSD) in depth.	MAIN	Student will be able to: -Explain and explore the fundamental principles underpinning inorganic chemistry of the selected topics as well as the acquisition and development of skills and techniques with respect to the analysis of inorganic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	6824	Inorganic Chemistry	This module covers selected aspects of more advanced Inorganic Chemistry topics and consists of theoretical and practical work. (a) Nuclear Medicine A general introduction to Nuclear Medicine is presented, which includes aspects of isotopes utilized, rationale behind the design of a radiopharmaceutical, examples specific agents, etc. (b) Intimate Reaction mechanisms in Coordination Chemistry and Selected studies on reaction mechanisms Derivation of basic intimate Rate laws, Iodomethane Oxidative Addition to [Rh(Bid)(CO)(PPh3)] complexes, Octahedral substitution in the presence of acid/ base equilibria, Square- planar reversible substitution, Multi-order reactions. (c) Homogeneous Catalysis Complete coverage of selected chapters from P v Leeuwen, Homogeneous Catalysis: Understanding the Art, Kluwer 2004. (d) X-Ray Crystallography Practical aspects of single crystal X-ray structure determination will be given, from basic data collection, to utilizing programs such as WinGX, SIR for the refinement and complete structure solution. Students will also utilize databases (CSD) in depth.	MAIN	Student will be able to: Explain and explore the fundamental principles underpinning inorganic chemistry of the selected topics as well as the acquisition and development of skills and techniques with respect to the analysis of inorganic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group. This module has a value of 16 credits, 14 credits for subject specific learning outcomes and 2 credits for critical (generic) outcomes with respect to literacy skills in oral and written reasoning, numeracy, experimental and problem solving skills

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	6833	Physical Chemistry	Selected topics from the following list: Polymer Chemistry: molecular mass and its influence on physical properties of polymers, Step reaction polymerization, degree of polymerisation, impurity effects on polymerization, chemical kinetics, case study Molecular Structure and Spectroscopy: rotational (microwave region), vibrational (infra red region), electronic spectra (UV/vis region), fluorescent emission and phosphorescent emission, application to structural determinations. Thermodynamics: advanced calorimetry and determination of excess thermodynamic quantities. Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Activation parameters and molecular dynamics: The influence and implications of temperature and volume changes on reaction rates and reaction mechanisms are studied with respect to (1) the Arrhenius theory, (2) The transition state theory of absolute reaction rates and (3) activation parameters, including volume of activation and entropy of activation. Physical techniques such as light absorption, dilatometry, polarimetry and conductance to obtain reaction orders and rate constants Electrolytic Chemistry: cell conventions, cell potentials, reversible decomposition potential, real decomposition potential. Electrolysis and polarization. Application of reduction potentials to calculate the the reversible decomposition potential. Over potential, electrode kinetics, concentration polarization of diffusion over potential. Statistical Thermodynamics: Introduction to the terms probability and randomness, micro- and macro state properties. The statistical link between the first and second law of thermodynamics and use of a partition function, Q, that, together with it's first and second derivatives with respect to time allows calculation of all the thermodynamic properties of a system. Applications in terms of the calculation of 'E, and selected problems, Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Bio-Inorganic Chemistry: Blue copper proteins (plastocyanines) ribonucleotide reductase, its function as natural polymers in nature, and how it was revealed by kinetic studies. Coordination and organometallic complexes in anticancer drug research. Electrochemistry: Special emphases on cyclic voltammetry, square wave voltammetry, linear sweep voltammetry, bulk electrolyses, electrode kinetics, reversible and irreversible processes and interpretation of experimentally obtained results. Inorganic polymer chemistry: Silicon polymers ' silicones and polysilylenes. Phosphorus polymers ' polyphosphazenes. Sulphur polymers ' polythiazyl.	MAIN	Student will be able to: - Explain and explore the fundamental principles underpinning physical chemistry of the selected topics as well as - the acquisition and development of skills and techniques with respect to the analysis of physical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	6834	Physical Chemistry	Selected topics from the following list: Polymer Chemistry: molecular mass and its influence on physical properties of polymers, Step reaction polymerization, degree of polymerisation, impurity effects on polymerization, chemical kinetics, case study Molecular Structure and Spectroscopy: rotational (microwave region), vibrational (infra red region), electronic spectra (UV/vis region), fluorescent emission and phosphorescent emission, application to structural determinations. Thermodynamics: advanced calorimetry and determination of excess thermodynamic quantities. Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Activation parameters and molecular dynamics: The influence and implications of temperature and volume changes on reaction rates and reaction mechanisms are studied with respect to (1) the Arrhenius theory, (2) The transition state theory of absolute reaction rates and (3) activation parameters, including volume of activation and entropy of activation. Physical techniques such as light absorption, dilatometry, polarimetry and conductance to obtain reaction orders and rate constants Electrolytic Chemistry: cell conventions, cell potentials, reversible decomposition potential, real decomposition potential. Electrolysis and polarization. Application of reduction potentials to calculate the the reversible decomposition potential. Over potential, electrode kinetics, concentration polarization of diffusion over potential. Statistical Thermodynamics: Introduction to the terms probability and randomness, micro- and macro state properties. The statistical link between the first and second law of thermodynamics and use of a partition function, Q, that, together with it's first and second derivatives with respect to time allows calculation of all the thermodynamic properties of a system. Applications in terms of the calculation of 'E, and selected problems, Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Bio-Inorganic Chemistry: Blue copper proteins (plastocyanines) ribonucleotide reductase, its function as natural polymers in nature, and how it was revealed by kinetic studies. Coordination and organometallic complexes in anticancer drug research. Electrochemistry: Special emphases on cyclic voltammetry, square wave voltammetry, linear sweep voltammetry, bulk electrolyses, electrode kinetics, reversible and irreversible processes and interpretation of experimentally obtained results. Inorganic polymer chemistry: Silicon polymers ' silicones and polysilylenes. Phosphorus polymers ' polyphosphazenes. Sulphur polymers ' polythiazyl.	MAIN	Student will be able to: -Explain and explore the fundamental principles underpinning physical chemistry of the selected topics as well as -the acquisition and development of skills and techniques with respect to the analysis of physical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	6843	Physical Chemistry	Selected topics will be from the following list: Polymer Chemistry: molecular mass and its influence on physical properties of polymers, Step reaction polymerization, degree of polymerisation, impurity effects on polymerization, chemical kinetics, case study Molecular Structure and Spectroscopy: rotational (microwave region), vibrational (infra red region), electronic spectra (UV/vis region), fluorescent emission and phosphorescent emission, application to structural determinations. Thermodynamics: advanced calorimetry and determination of excess thermodynamic quantities. Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Activation parameters and molecular dynamics: The influence and implications of temperature and volume changes on reaction rates and reaction mechanisms are studied with respect to (1) the Arrhenius theory, (2) The transition state theory of absolute reaction rates and (3) activation parameters, including volume of activation and entropy of activation. Physical techniques such as light absorption, dilatometry, polarimetry and conductance to obtain reaction orders and rate constants Electrolytic Chemistry: cell conventions, cell potentials, reversible decomposition potential, real decomposition potential. Electrolysis and polarization. Application of reduction potentials to calculate the reversible decomposition potential. Over potential, electrode kinetics, concentration polarisation of diffusion over potential. Statistical Thermodynamics: Introduction to the terms probability and randomness, micro- and macro state properties. The statistical link between the first and second law of thermodynamics and use of a partition function, Q, that, together with its first and second derivatives with respect to time allows calculation of all the thermodynamic properties of a system. Applications in terms of the calculation of 'E, and selected problems, Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Bio-Inorganic Chemistry: Blue copper proteins (plastocyanines) ribonucleotide reductase, its function as natural polymers in nature, and how it was revealed by kinetic studies. Coordination and organometallic complexes in anticancer drug research. Electrochemistry: Special emphases on cyclic voltammetry, square wave voltammetry, linear sweep voltammetry, bulk electrolyses, electrode kinetics, reversible and irreversible processes and interpretation of experimentally obtained results. Inorganic polymer chemistry: Silicon polymers ' silicones and polysilylenes. Phosphorus polymers ' polyphosphazenes. Sulphur polymers ' polythiazyl.	MAIN	Student will be able to: Explain and explore the fundamental principles underpinning physical chemistry of the selected topics as well as; and the acquisition and development of skills and techniques with respect to the analysis of physical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	6844	Physical Chemistry	Selected topics will be from the following list: Polymer Chemistry: molecular mass and its influence on physical properties of polymers, Step reaction polymerization, degree of polymerisation, impurity effects on polymerization, chemical kinetics, case study Molecular Structure and Spectroscopy: rotational (microwave region), vibrational (infra red region), electronic spectra (UV/vis region), fluorescent emission and phosphorescent emission, application to structural determinations. Thermodynamics: advanced calorimetry and determination of excess thermodynamic quantities. Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Activation parameters and molecular dynamics: The influence and implications of temperature and volume changes on reaction rates and reaction mechanisms are studied with respect to (1) the Arrhenius theory, (2) The transition state theory of absolute reaction rates and (3) activation parameters, including volume of activation and entropy of activation. Physical techniques such as light absorption, dilatometry, polarimetry and conductance to obtain reaction orders and rate constants Electrolytic Chemistry: cell conventions, cell potentials, reversible decomposition potential, real decomposition potential. Electrolysis and polarization. Application of reduction potentials to calculate the reversible decomposition potential. Over potential, electrode kinetics, concentration polarisation of diffusion over potential. Statistical Thermodynamics: Introduction to the terms probability and randomness, micro- and macro state properties. The statistical link between the first and second law of thermodynamics and use of a partition function, Q, that, together with its first and second derivatives with respect to time allows calculation of all the thermodynamic properties of a system. Applications in terms of the calculation of ‘E, and selected problems, Polymer Chemistry: synthetic aspects and chemical kinetics of anionic, cationic and free radical polymerization. Bio-Inorganic Chemistry: Blue copper proteins (plastocyanines) ribonucleotide reductase, its function as natural polymers in nature, and how it was revealed by kinetic studies. Coordination and organometallic complexes in anticancer drug research. Electrochemistry: Special emphases on cyclic voltammetry, square wave voltammetry, linear sweep voltammetry, bulk electrolyses, electrode kinetics, reversible and irreversible processes and interpretation of experimentally obtained results. Inorganic polymer chemistry: Silicon polymers ‘ silicones and polysilylenes. Phosphorus polymers ‘ polyphosphazenes. Sulphur polymers ‘ polythiazyl.	MAIN	Student will be able to: Explain and explore the fundamental principles underpinning physical chemistry of the selected topics as well as; and the acquisition and development of skills and techniques with respect to the analysis of physical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	6853	Organic Chemistry	-Biosynthesis -Organometallic Reactions Palladium catalyzed reactions Olefin metathesis Chromium catalyzed reactions Copper catalyzed reactions - NMR and Mass spectrometry - Protecting Groups in Organic Synthesis Protection/deprotection of carbonyl compounds. Protection/deprotection of alcohols. Protection/deprotection of carboxylic acids.	MAIN	Student will be able to: -Explain and explore the fundamental principles underpinning organic chemistry of the selected topics; and the acquisition and development of skills and techniques with respect to the analysis of organic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	6854	Organic Chemistry	-Biosynthesis -Organometallic Reactions Palladium catalyzed reactions Olefin metathesis Chromium catalyzed reactions Copper catalyzed reactions - NMR and Mass spectrometry - Protecting Groups in Organic Synthesis Protection/deprotection of carbonyl compounds. Protection/deprotection of alcohols. Protection/deprotection of carboxylic acids.	MAIN	Student will be able to: Explain and explore the fundamental principles underpinning organic chemistry of the selected topics; and the acquisition and development of skills and techniques with respect to the analysis of organic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	6863	Organic Chemistry	Radical and photo chemistry, Secondary metabolites, Retrosynthesis, Stereochemistry and stereoselective reactions.	MAIN	Student will be able to: Explain and explore the fundamental principles underpinning organic chemistry of the selected topics: and the acquisition and development of skills and techniques with respect to the analysis of organic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	6864	Organic Chemistry	Radical and photo chemistry, Secondary metabolites, Retrosynthesis, Stereochemistry and stereoselective reactions.	MAIN	Student will be able to: Explain and explore the fundamental principles underpinning organic chemistry of the selected topics: and the acquisition and development of skills and techniques with respect to the analysis of organic chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	6873	Analytical Chemistry	Statistical evaluation of analytical data. Theories of specific molecular analyses like Nuclear Magnetic Resonance Spectroscopy, spectrophotometric methods such as UV/visible spectroscopy, Inductive Coupled Plasma and Atomic Absorption Spectroscopy. Other topics include Infrared spectroscopy and Fundamentals of Chromatographic separations. Chemical analyses using ion exchange and electro-gravimetry as well as method development and validation in line with the requirements of ISO 17025 is also covered in this course	MAIN	Student will be able to: - Explain and explore the fundamental principles underpinning analytical chemistry of the selected topics; and the acquisition and development of skills and techniques with respect to analytical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	6874	Analytical Chemistry	Statistical evaluation of analytical data. Theories of specific molecular analyses like Nuclear Magnetic Resonance Spectroscopy, spectrophotometric methods such as UV/visible spectroscopy, Inductive Coupled Plasma and Atomic Absorption Spectroscopy. Other topics include Infrared spectroscopy and Fundamentals of Chromatographic separations. Chemical analyses using ion exchange and electro-gravimetry as well as method development and validation in line with the requirements of ISO 17025 is also covered in this course	MAIN	Student will be able to: Explain and explore the fundamental principles underpinning analytical chemistry of the selected topics; and the acquisition and development of skills and techniques with respect to analytical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	6883	Analytical Chemistry	Theories on Separation Techniques, XRD/XRF, Mass Spectroscopy, Liquid/liquid extraction. Radiochemical and Thermal Methods as well as surface characterisation are included in this course. Continuation of technical and managerial requirements for method development and validation in line with the requirements of ISO 17025 are also included in the course.	MAIN	Student will be able to: -Explain and explore the fundamental principles underpinning analytical chemistry of the selected topics; and the acquisition and development of skills and techniques with respect to analytical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	6884	Analytical Chemistry	Theories on Separation Techniques, XRD/XRF, Mass Spectroscopy, Liquid/liquid extraction. Radiochemical and Thermal Methods as well as surface characterisation are included in this course. Continuation of technical and managerial requirements for method development and validation in line with the requirements of ISO 17025 are also included in the course.	MAIN	Student will be able to: Explain and explore the fundamental principles underpinning analytical chemistry of the selected topics; and the acquisition and development of skills and techniques with respect to analytical chemistry applications and clear concise scientific reporting of experimental procedures and effective interaction and co-operation within the learning group.
CHEM	8900	Chemistry Dissertation	This module contains fundamental knowledge, theories, principles and practices of Chemistry, including: Research project in specialized field of Chemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.S

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CHEM	9100	Chemistry Thesis	This module contains fundamental knowledge, theories, principles and practices of Chemistry, General including: Research project in specialized field of Chemistry, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CMPA	6814	Polymer Testing and Characterisation I	- Theoretical description of polymers in solution - Number-average molar mass - Scattering methods - Frictional properties of polymers in solution - Chromatographic and polymer separation techniques - Molar mass distribution - Chemical composition and molecular microstructure	QWA	Student will be able to: - examine the principles behind a number of techniques used in polymer analysis and characterization, as well as the instrumental setups and experimental designs of these techniques; and - interpret and explain typical results obtained from the different techniques.
CMPA	6824	Applied Polymer Science	- Polymer processing - Additives in polymers - Biomedical applications of synthetic polymers - Polymers for the electronics industry - Speciality polymer applications - Introduction to paints and adhesives	QWA	Student will be able to: - Compare the different polymer processing techniques; -Discuss the purpose of different types of additives in polymers, as well as the influence these additives have on the polymer properties; and - Examine the use of polymers in biomedical applications, the electronics industry, paints and adhesives, as well as other speciality polymer applications.
CMPB	6824	Polymer Blends, Composites and Nanocomposites	General introduction to polymer blends - Compatibilization methods in polymer blends - Characterization of polymer blends - Properties of polymer blends - General overview of composites science - Polymer composite and nanocomposite research: Case studies	QWA	Student will be able to: - Examine the concept of polymer blending; - Explain the morphology of polymer blends, and its relation to the properties of these blends; - Discuss the different methods used to characterize polymer blends, and be able to interpret and explain the results obtained from these methods; - Discuss and apply the different compatibilization methods used in polymer blending; - Compare the relation between blend morphology and properties; - Calculate a number of aspects related to polymer composites and nanocomposites; and - Examine and explain the results presented and discussed in some research-based case studies.
CMPC	6824	Polymer Testing and Characterization II	- Thermal analysis - Testing of mechanical properties - Testing of thermal and electrical conductivity - Electron and atomic force microscopy	QWA	Student will be able to: - examine the principles behind a number of techniques used in polymer analysis and characterization, as well as the instrumental setups and experimental designs of these techniques; and - interpret and explain typical results obtained from the different techniques.
CMPO	6814	Polymers and Polymerization	- Concepts and nomenclature - Step polymerization - Radical polymerization - Ionic polymerization - Stereochemistry and coordination polymerization - Copolymerization	QWA	Student will be able to: - Examine principles underlying polymer science, and the properties that distinguish polymers from other substances; - Develop a kinetic/mechanistic understanding of step polymerization; - Develop a kinetic/mechanistic understanding of free-radical polymerization; - Compare the differences between step-growth and free-radical addition polymerization; - Develop a kinetic/mechanistic understanding of living and coordination polymerization processes; - Share insight in the possibilities and limitations of the various techniques for living and coordination polymerization; - Display practical insight in the design of polymer structures via implementation of living polymerization techniques; and - Develop a kinetic/mechanistic understanding of co-polymerization.
CMPP	6814	Physical Polymer Science	The amorphous state - The crystalline state - Elastic deformation - Viscoelasticity - Elastomers - Yield and crazing - Fracture and toughening	QWA	Student will be able to: - Understand the chain-like structure of polymers, and be able to describe and explain polymer features like crystalline structure, amorphous structure, glass transitions and melting, models used to explain the morphology in semi-crystalline polymers, and orientation - Know and understand the relationships between polymer structure/morphology and the different physical properties - Understand and be able to apply the different principles and models related to the mechanical properties of solid polymers

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CMPR	6808	Research project	A research project in the field of polymer science, reading and summarising literature and correctly present the results. .	QWA	Student will be able to: Plan and execute a research project in the field of polymer science Search for relevant literature, read content and critically and comparatively summarise the information from the literature. Correctly present and interpret the research results. Neatly write a dissertation in the correct format.
CMPR	6814	Polymers and Polymer Reactions	- Inorganic, organometallic and inorganic-organic polymers - Reactions involving polymers - Properties of commercial polymers - Polymer structure-property relationships	QWA	Student will be able to: - Examine and discuss a number of examples of inorganic, organometallic and inorganic-organic polymers; - Compare the reactions that polymers can undergo, and the structural and morphological factors that have an influence on these reactions; -Examine and discuss the properties of a number of commercially important polymers; and - Relate polymer structures with their thermal and mechanical properties.
GECE	8900	Geochemistry Dissertation	This module contains fundamental knowledge, theories, principles and practices of Geochemistry, including: Research project in specialized field of Geochemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
NSCH	7900	Advanced Nanochemistry	Advanced Nanochemistry Synthesis (3 Weeks) (i) Synthetic methods: Electrosynthesis, chemical, thermal and microwave synthesis. Thin Film Deposition Methods. Physical synthetic methods including carbon arc discharge, laser ablation, thermal chemical vapor deposition (CVD), catalytic synthesis and plasma synthesis. (ii) Properties of nanomaterials: Chemical, electrochemical, spectroscopic, microscopic, mechanical, electrical and optical properties of materials (iii) Synthetic nanomaterials: Ceramics, glasses, polymers, fullerenes, nanotubes, graphenes, carbon nanotubes, metal oxides and catalysts (PGMs etc), nanocrystals, nanocomposites, nano-alloys, quantum dots, zeolites, MOFs and dendrimers.	MAIN	Student should be able to: Discuss the synthesis and characterisation techniques suitable for producing organic and inorganic nanomaterials. Use simple models (e.g. particles in a box, tight binding, molecular orbitals) to describe the electronic structure of molecular and solid state nanosystems. Use simple models and examples to describe how the electronic structure of nanosystems is influenced by electron-electron interactions (charge, spin) and coupling to the vibrations. Explain electronic conduction through nanosystems and identify different regimes (Ballistic, Coulomb Blockade etc)
NSCH	7914	Experimental Techniques in Nano-chemistry	Chemical, electrochemical or physical synthesis of specific nanomaterials and catalysts and their characterization for applications in energy devices, sensors and catalysis. The practical involve the use of spectroscopic (FTIR, Raman, liquid and SS_NMR, UV - VIS, XPS, XRD, XRF), microscopic (TEM, SEM AFM) and physical techniques (Hall Effect, TGA, BET, Contact Angle, fluorescence, etc.) in the analysis of nanomaterials.	MAIN	Student should be able to: - Synthesise, characterize and apply nanomaterials in sensor technology, development of biomaterials, drug delivery and in food preservation and food quality determination. - Use advanced characterization techniques and instruments to study nanomaterials.
PLYS	8900	Polymer Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Polymer Science , including: Research project in specialized field of Polymer Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PLYS	9100	Polymer Science Thesis	Polymer Science This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Chemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: - Produce evidence of advanced study and research characterised by intellectual independence and advanced ability to assess principles of a specialisation area in the subject; -Evaluate his/her own results and as well as that of others by production of a thesis which places his/her research in broader context and which is capable of withstanding international intellectual scrutiny; and -Set up leadership for independant research projects on a doctorate level.

Computer Science and Informatics(103)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BCIS	1513	Introduction to Information Systems	Introduction to information systems, information systems in organisations, hardware: input, processing, output, software: systems and application software, organisation of data and information, telecommunications and networks, the Internet and Intranet. Transaction processing systems, management information systems, decision support systems, information systems in business and society, systems analysis, systems design, implementation, maintenance and revision.	MAIN	The student will be able to: - Discuss how and why information systems are used today; - Explain the technology, people, and organizational components of information systems; - Explain how businesses are using information systems for competitive advantage vs. competitive necessity; - List the major components of an information systems infrastructure; - Understand how information systems are enabling new forms of commerce between individuals, organizations, and governments; - Explain how various types of information systems provide the information needed to gain business intelligence to support the decision making for the different levels and functions of the organization; - Explain how organizations develop and acquire information systems and technologies; and - Describe how to secure information systems resources, focusing on both human and technological safeguards.
BCIS	1623	Introduction to Software Design	The student obtains the ability to specify, visualise and document the components of a simple business software system through flow charts, class diagrams, use case diagrams and other means.	MAIN	The student will be able to: - Elicit specifications for a required system. - Model the optimised solution for the system. - Design graphical representations of the relevant models.
BCIS	2614	Systems Analysis & Design	Systems analysis. Systems design: construction; application architecture; input design; output design; interface design; internal controls; program design; object design; project management; system implementation; use of computer-aided development tools.	MAIN	Student will be able to: - Discuss the types of business needs that can be addressed using information technology-based solutions; - Initiate, specify, and prioritize information systems projects and to determine various aspects of feasibility of these projects; - Clearly define problems, opportunities, or projects; - Use at least one specific methodology for analyzing a business situation (a problem or opportunity), modeling it using a formal technique, and specifying requirements for a system that enables a productive mandates that initiate; - Change in a way the business is conducted; - Within the context of the methodologies they learn, write clear and concise business requirements documents and convert them into technical specifications; - Communicate effectively with various organizational stakeholders to collect information using a variety of techniques and to convey proposed solution characteristics to them; - Manage information systems projects using formal project management methods; - Articulate various systems acquisition alternatives, including the use of packaged systems (such as ERP, CRM, SCM, etc.) and outsourced design and development resources; - Compare the acquisition alternatives systematically; - Incorporate principles leading to high levels of security and user experience from the beginning of the systems development process; - Design high-level logical system characteristics (user interface design, design of data and information requirements); and - Analyze and articulate ethical, cultural, and legal issues and their feasibilities among alternative solutions.
BCIS	2624	Systems Infrastructure & Integration	An overview of systems infrastructure and integration.	MAIN	Student will be able to: - Describe the core computing systems architecture concepts and building blocks. - Describe key principles of data representation and manipulation in computing solutions. - Clearly define and explain the various data storage technologies available in a computer system, including the concept of cloud computing. - Describe the network hardware building blocks and communication technologies available for configuring networking systems in an organisation. - Explain basic operating system concepts. - Describe the principles underlying service virtualization. - Explain the role and structure of the Internet and distributed software architecture. - Describe the role of IT systems administration and control in managing a large-scale organizational IT infrastructure solution. - Configure simple infrastructure security solutions. - Explain what a datacentre entails.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BCIS	3714	Information Systems in Organisations	Information systems in organisations, social and ethical responsibilities, the role of the Informatician. IT end-user relationships; IT management.	MAIN	Student will be able to: -Discuss the various functions and activities within the information systems area, including the role of IT management and the CIO, structuring of IS management within an organization, and managing IS professionals within the firm. -View an organization through the lens of non-IT senior management in deciding how information systems enable core and supportive business processes as well as those that interface with suppliers and customers. -Discuss and apply the concepts of information economics at the enterprise level. -Appreciate how IS represents a key source of competitive advantage for firms. -Structure IS-related activities to maximize the business value of IS within and outside the company. -Examine existing and emerging information technologies, the functions of IS and its impact on the organizational operations -Evaluate the issues and challenges associated with successfully and unsuccessfully incorporating IS into a firm. -Discuss how strategic decisions are made concerning acquiring IS resources and capabilities including the ability to evaluate the different sourcing options and apply this knowledge to scenarios. -Apply information to the needs of different industries and areas. -Examine the role of IT control and service management frameworks from the perspective of managing the IS function in an organization.
CSIE	1606	Object oriented programming for engineers	This module is an introduction to computer systems. Programming language concepts : data types, expressions, conditional statements, flow of control, structuring mechanisms, static data structures. Programming in an appropriate high-level language, such as C#, C++ or Java. Object oriented concepts and programming, classes and objects. Emphasis is placed on modular programming for engineering applications. Object models of simple problems. File handling.	MAIN	Student will be able to: -Analyse and understand a new problem, create and develop an efficient algorithm to solve it (compare to other possible algorithms), do the coding using the appropriate data and object oriented programming structures (classes and objects to generalise the code as much as possible) and evaluate the results; -Understand and interpretate given code; -Apply the key concepts and principles of an appropriate high-level computer programming language; -Identify possible input (including methods to handle extreme values), identify logic errors and apply standard and own methods to find the origin of the error(s) and solve them; -Create a sound structure for the program (or system) by applying object oriented programming to develop classes for reuse in other programs; and -Perform effectively in a team: discuss strategies, set up a task list, identify and address task-specific matters, compare team performance against given criteria, take responsibility for all decisions and team actions, use resources responsibly.
CSIE	2613	Data structures & algorithms for engineers	Advanced programming language concepts in an appropriate high-level language, such as C# or C++ or Java. Dynamic data structures, stacks, queques, lists, trees, searching and sorting algorithms, theory for the design and analysis of algorithms, more advanced strategies for testing and debugging, appropriate design patterns and the implementation of abstraction, encapsulation, inheritance and polymorphism. Enumeration, delegates and recursion.	MAIN	Student will be able to: -Demonstrate detailed knowledge, understanding of, and have the ability to apply the advanced concepts and principles of the programming language; -Analyse and understand a new typical engineering problem, develop an efficient algorithm to solve it, compare possible algorithms; -Understand and apply appropriate design patterns; -Create appropriate data structures to solve a specific problem; -Identify possible input, develop suitable methods to handle extreme inputs, identify logic errors and solve these errors with standard and own methods; -Create a sound structure for the program and apply object oriented programming to develop classes for reuse in other programs; and -Perform effectively in a team: discuss strategies, set up a task list, identify and address task-specific matters, compare team performance against given criteria, take responsibility for all decisions and team actions, use resources responsibly.
CSIL	1511	Computer Literacy: Part 1	This module contains basic knowledge of the principles of microcomputers and microcomputer hardware, the basic commands of the operating system, a general word processing program, a spreadsheet program, presentation program and the Internet. The student must also be able to apply the knowledge.	MAIN	Student will be able to: -Explain the principles of microcomputers and microcomputer hardware; -Describe the basic commands of an operating system and must be able to apply it; -Describe the basic commands of a general word processing program and must be able to apply it; -Describe the basic commands of a spread-sheet program, and must be able to apply it,; -Describe the basic commands of the Internet and must be able to apply it; and -Describe the basic commands of a presentation program and must be able to apply it.
CSIL	1521	Computer Literacy: Part 2	This module covers basic commands of a database program, as well as advanced commands of a general word processing program, a spreadsheet program and a presentation program. The student must also be able to apply the knowledge.	MAIN	Student will be able to: -Describe advanced aspects of word processing, such as tables, table of contents and bibliography, and must be able to apply it; -Describe advanced aspects of spread sheets, including graphs and linking with documents, and must be able to apply it; -Describe advanced aspects of a presentation program and must be able to apply it; and -Describe the basic commands of a database program and must be able to apply it.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIL	1551	Computer Literacy: Part 1	This module contains basic knowledge of the principles of microcomputers and microcomputer hardware, the basic commands of the operating system, a general word processing program, a spreadsheet program, presentation program and the Internet. The student must also be able to apply the knowledge.	MAIN	Student will be able to: -Explain the principles of microcomputers and microcomputer hardware; -Describe the basic commands of an operating system and must be able to apply it; -Describe the basic commands of a general word processing program and must be able to apply it; -Describe the basic commands of a spread-sheet program, and must be able to apply it; -Describe the basic commands of the Internet and must be able to apply it; and -Describe the basic commands of a presentation program and must be able to apply it.
CSIS	1553	Introduction to Computer Hardware	This module contains fundamental knowledge, theories, principles and practices of Information Technology, including the underlying electronics of computer hardware, supporting Microsoft Windows, servicing PC's, operating system overview, computer basic, tools and safety, inside the PC, input/output devices, miscellaneous hardware, troubleshooting, customer service and support.	MAIN	Student will be able to: -Describe a personal computer system; -Discuss lab safety procedures and correct tool usage; -Discuss and perform a computer assembly; -Practice preventive maintenance and troubleshooting; -Describe and use fundamental operating systems; -Discuss the fundamentals of laptops and portable devices; -Discuss the fundamentals of printers and scanners; -Discuss the fundamentals of networks; -Discuss the fundamentals of security; and -Practice correct communication skills.
CSIS	1614	Programming and Problem Solving: Part 1	This module deals with the professional implementation of computerised solutions in an object-oriented, high-level programming environment. The module provides an introduction to problem solving, algorithms, classes, objects, properties and methods. Control structures, e.g. selection and iteration, and input and output are also covered.	MAIN	Student will be able to: -Explain the basic principles of object oriented programming, i.e. classes, objects, properties and methods; -Describe basic control structures; and -Solve problems in an object-oriented, high-level programming environment.
CSIS	1624	Programming and Problem Solving: Part 2	This module deals with information systems and problem solving in business and scientific environments. Advanced object oriented concepts, debugging, storing data in files and access to simple databases.	MAIN	Student will be able to: -Solve programming problems using a modern, object oriented, high-level programming environment; -Program professionally, to design programs and debug them; -Explain methods and parameter transfer, debugging techniques, arrays, file handling and database access; and -Implement simple interfaces, with prompts, sentinels and error conditions.
CSIS	1664	Introduction to the Internet and Web Page Development	This module deals with various web aspects and technologies. This includes the working of the Internet, graphical interfaces, Internet protocols and web page development.	MAIN	Student will be able to: -Discuss the evolution of the Internet and the Web; -Conduct Internet searches; -Explain the working of Internet protocols; and -Apply client-side scripting and style sheets to develop a complete web site.
CSIS	1683	Visual Basic for Applications (VBA) with the focus on Excel	This module covers concepts to insert text strings as macros; automate frequently performed tasks; automate repetitive operations; creating a custom command, toolbar button, menu command, front end, new worksheet functions; create complete macro-driven applications.	MAIN	Student will be able to: -Develop Excel utilities with VBA; -Create a user-form with VBA; -Create interaction of a VBA-application with other applications; and -Apply VBA to automate aspects of Excel, such as Budgeting, Forecasting and Analysing scientific data.
CSIS	2614	Data Structures and Advanced Programming	This module deals with advanced programming that requires an understanding of data structures and the professional implementation thereof.	MAIN	Student will be able to: -Discuss and implement classes, objects, inheritance and polymorphism; -Discuss what data structures are and how to use them; -Demonstrate knowledge of recursion and its use; -Implement and use lists, stacks and queues; -Implement and use binary trees; and -Explain how to design and modify data structures to solve a problem.
CSIS	2624	Human-Computer Interaction	This module provides the user with an introduction to Human-Computer Interaction (HCI). Aspects that are covered include usability, human factors, models of interaction, data collection, the design of user interfaces, visual interfaces and the evaluation of interfaces.	MAIN	Student will be able to: -Examine and discuss the principles of Human-Computer Interaction; -Explain the role of the computer user in the design of computer systems; -Design a user-friendly visual interface by applying all the factors that determine a user-friendly interface; and -Evaluate a user interface while considering all the role-players.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIS	2634	Introduction to Databases and Database Management Systems: Part 1	This module deals with database concepts, design and implementation concepts, transaction management and concurrency control, distributed database management systems, object-oriented databases and database programming.	MAIN	Student will be able to: -Use the fundamental principles of databases; -Design and implement a database; and -Develop applications that make use of databases.
CSIS	2642	Information Technology Service Learning	This module enables the students to serve the community by ploughing back the IT knowledge gained during their studies. While serving the community the students will learn how to work with people with varying computer literacy skills or levels. By teaching or helping others, their own knowledge will be expanded.	MAIN	Student will be able to: -Serve the community with relevant IT skills; and -Learn from practical experience of working with people in the community.
CSIS	2664	Software Design	This module entails an introduction to UML and to class types ('patterns'). Various patterns are discussed and analysed in detail. Various sub-patterns of patterns will be covered. Practical work includes the implementation of patterns in various applications.	MAIN	Student w -Use UML in order to present class diagrams; -Explain the necessity of patterns; -Identify, implement and apply various patterns; and -Combine patterns to design and implement applications.
CSIS	3714	Introduction to Databases and Database Management Systems: Part 2	This module deals with advanced database concepts, advanced queries, optimising queries, distributed databases, cloud computing and administrative tasks related to data and database management. The module also provides an introduction to data warehousing and OLAP.	MAIN	Student will be able to: -Demonstrate an understanding of advanced database concepts; -Write advanced SQL queries; -Optimise SQL queries; -Demonstrate an understanding of distributed databases; -Demonstrate an understanding of cloud computing; -Perform administrative tasks related to data and database management; and -Demonstrate an understanding of basic data warehousing and OLAP principles.
CSIS	3724	Software Engineering	This module provides the student with an introduction to Software Engineering. Aspects covered are requirement definition, program design, programming practice, programming languages, tests and debugging, documentation, maintenance, and aids.	MAIN	Student will be able to: - Demonstrate the principles of Software Engineering, - Discuss aspects of Software Engineering in order to apply it, -Discuss management of a project and be able to apply it, - Successfully participate as a member of a team.
CSIS	3734	Internet Programming	This module deals with server-side Internet programming and web management.	MAIN	Student will be able to: - Do server-side Internet programming; - Develop web applications that utilise databases; and - Publish websites.
CSIS	3744	Computer Networks	This module provides the student with an overview of network concepts. Aspects that are covered are network architecture, network technologies, coupling techniques, internetwork concepts, end-to-end protocols, security, standards and models, transmission basics, and network applications.	MAIN	Student will be able to : -Distinguish between the fundamental network types; -Conceptualise and explain network communications by means of the OSI model, TCP/IP model and TCP/IP protocols; -Describe and explain wired as well as wireless LAN and WAN topologies, transmission methods, network media, access methods and Ethernet standards; -Identify and distinguish between network hardware and explain switching and routing methods; -Explain IP addressing, implement subnetting and troubleshoot network problems; -Explain and discuss network management aspects and network security techniques; and -Implement a virtual network.
CSIQ	1512	Computer Literacy For Computer Science	This module introduces the learner to the world of computers. The course is aimed at students who have little or no background of computers and their functionality. The course covers basic computer literacy, which includes programmes used on a day-to-day basis such as Microsoft Windows and Office. Learners also get the opportunity to explore the internet and email environments. The course prepares the learners how to search for information and stay abreast with current trends in the computing arena.	QWA	Student will be able to: -Discuss basic computer functionality; -Implement intermediate ms office word, excel, powerpoint, access concepts; -Perform basic to intermidiate internet functions; -Discuss software and internet programming terms; and -Analyze global and local trends in computer technologies

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIQ	1531	Computer Literacy: Part 1	This module contains basic knowledge of the principles of microcomputers and microcomputer hardware, the basic commands of the operating system, a general word processing program, a spreadsheet program, presentation program and the Internet. The student must also be able to apply the knowledge.	QWA	Student will be able to: -Explain the principles of microcomputers and microcomputer hardware; -Describe the basic commands of an operating system and must be able to apply it; -Describe the basic commands of a general word processing program and must be able to apply it; -Describe the basic commands of a spread-sheet program, and must be able to apply it; -Describe the basic commands of the Internet and must be able to apply it; and -Describe the basic commands of a presentation program and must be able to apply it.
CSIQ	1533	Introduction to Software Development Concepts	This module introduces the core concepts of writing computer programs - variables, decisions, loops, functions, and objects - which apply regardless of the programming language, but uses concrete examples and exercises in the dynamic environment to apply and reinforce these concepts. The course is aimed at students who have little or no background of computers and their functionality. The course prepares the learner to think logically before delving into complex programming concepts. The use of visual code-less programming tools will be used.	QWA	Student will be able to: -describe basic programming principles -discuss the concepts of a class, object and method -apply programming logic concepts -apply programming concepts using Visual Programming tools -discuss basic software development concepts -use data types and flow control
CSIQ	1541	Computer Literacy: Part 2	This module covers basic commands of a database program, as well as advanced commands of a general word processing program, a spreadsheet program and a presentation program. The student must also be able to apply the knowledge.	QWA	Student will be able to: -Describe advanced aspects of word processing, such as tables, table of contents and bibliography, and must be able to apply it; -Describe advanced aspects of spread sheets, including graphs and linking with documents, and must be able to apply it; -Describe advanced aspects of a presentation program and must be able to apply it; and -Describe the basic commands of a database program and must be able to apply it.
CSIQ	1553	Introduction to Computer Hardware	This module contains fundamental knowledge, theories, principles and practices of Information Technology, including computer hardware from the basic terms, assembly, configuring through to troubleshooting and computer hardware's integration with software.	QWA	Student will be able to: -Describe basic computer physical components functionality; -Discuss computer and laptop assembly; -Perform computer hardware configuration and troubleshooting; -Perform operating system and application software installation; and -Explain Windows system commands.
CSIQ	1614	Programming and Problem Solving: Part 1	This module deals with the professional implementation of computerised solutions in an object-oriented, high-level programming environment. The module provides an introduction to problem solving, algorithms, classes, objects, properties and methods. Control structures, e.g. selection and iteration, and input and output are also covered.	QWA	Student will be able to: -Explain the basic principles of object oriented programming, i.e. classes, objects, properties and methods; -Describe basic control structures; and -Solve problems in an object-oriented, high-level programming environment.
CSIQ	1623	Introduction to Computer Networks	This module introduces the learner to the theory and practice computer networks. The course is aimed at computer science students who have background of computers and their functionality. The course includes topics; computer networks concept, organization, topologies, hardware, media, OSI Model, TCP/IP suite, addressing and basic troubleshooting.	QWA	Student will be able to: -describe computer networks functions -discuss the basics of LANs, MANs and WANs -identify and explain topologies -identify network device and media -discuss OSI model and protocols -discuss IP addresses and wireless networks -apply basic network troubleshooting
CSIQ	1624	Programming and Problem Solving: Part 2	This module deals with information systems and problem solving in business and scientific environments. Advanced object oriented concepts, debugging, storing data in files and access to simple databases.	QWA	Student will be able to: -Solve programming problems using a modern, object oriented, high-level programming environment; -Program professionally, to design programs and debug them; -Explain methods and parameter transfer, debugging techniques, arrays, file handling and database access; and -Implement simple interfaces, with prompts, sentinels and error conditions.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIQ	1634	Introduction to Programming: Part 1	his module provides an extended introduction into the world of computer programming and is aimed at students who do not intend to take CSI modules in the second or third year of study. The module deals with aspects that include the origins and development of the computer, the basic working of a computer, computerised problem solving and an introduction of algorithms, control structures, classes, objects, properties and methods using a high-level programming language.	QWA	Student will be able to: -Explain the working of a computer; -Describe the basic principles of object oriented programming, i.e. classes, objects, properties and methods; and -Do basic problem solving in an object oriented, high-level programming environment.
CSIQ	1644	Introduction to Programming: Part 2	This module deals with the use of control structures, classes, objects, properties and methods to do computerised problem solving in a high-level programming language.	QWA	Students will be able to: -Explain control structures, e.g. selection and iteration; -Do basic problem solving in an object oriented, high-level programming environment; and -Implement basic database access.
CSIQ	1645	Programming and Problem solving	This module covers intermediate to advanced problem solving using object oriented concepts. Students also will learn UML (Unified Modelling Language), multidimensional arrays, event-driven programs, GUIs (Graphical User Interfaces), class inheritance and interfaces, libraries, as well as storing data in files and access to simple databases.	QWA	Student will be able to: -discuss and apply inheritance, abstraction, encapsulation and polymorphism -use arrays, classes, objects and methods -design graphical user interface components -programme stream reading and writing -perform debugging and error handling
CSIQ	1662	Introduction to Computer Networks	This module introduces the learner to the theory and practice computer networks. The course is aimed at computer science students who have background of computers and their functionality. The course includes topic; computer network concepts, organization, topologies, hardware, media, OSI Model, TCP/IP suite, addressing and basic troubleshooting.	QWA	Students will be able to: -Describe computer network functions; -Discuss the basics of LANS, MANs and WANS; -Identify and explain topologies; -Identify network devices and media; -Discuss OSI model and protocols; -Discuss IP addresses and wireless networks; and -Apply basic network troubleshooting.
CSIQ	1681	Introduction to Software Development Part 2	This module deals with the introduction of the core concepts of writing computer programs - Defensive programming, GUI development and Enumerations and Collections - that apply regardless of the programming language, but concrete examples and exercises in the dynamic environment to apply and reinforce these concept.	QWA	Student will be able to: -Develop applications that make use of defensive programming; -Develop applications that makes use of GUI's Graphical User Interface; and -Develop applications that make use of Enumerations and Collections.
CSIQ	2614	Data Structures and Advanced Programming	Change to the new 8-digit module code This module deals with advanced programming that requires an understanding of data structures and the professional implementation thereof.	QWA	Student will be able to: -Discuss and implement classes, objects, inheritance and polymorphism; -Discuss what data structures are and how to use them; -Demonstrate knowledge of recursion and its use; -Implement and use lists, stacks and queues; -Implement and use binary trees; and -Explain how to design and modify data structures to solve a problem.
CSIQ	2624	Human-Computer Interaction	This module provides the user with an introduction to Human-Computer Interaction (HCI). Aspects that are covered include usability, human factors, models of interaction, data collection, the design of user interfaces, visual interfaces and the evaluation of interfaces.	QWA	Student will be able to: -discuss user interface design principles -design user interfaces for desktop and mobile platforms -perform a system usability analysis -evaluate various types of interfaces
CSIQ	2634	Introduction to Databases and Database Management Systems: Part 1	This module deals with database concepts, design and implementation concepts, transaction management and concurrency control, distributed database management systems, object-oriented databases and database programming.	QWA	Student will be able to: -Demonstrate knowledge about the fundamental principles of databases; -Design and implement a database; and -Develop applications that make use of databases.
CSIQ	2642	Information Technology Service Learning	This module enables the students to serve the community by ploughing back the IT knowledge gained during their studies. While serving the community the students will learn how to work with people with varying computer literacy skills or levels. By teaching or helping others, their own knowledge will be expanded.	QWA	Student will be able to: -serve the community with relevant IT skills; and -learn from practical experience of working with people in the community.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIQ	2644	Mobile Development	Today's applications are increasingly mobile. The module introduces the learner to developing mobile applications. Students learn how to write native and web applications for mobile devices such as phones and tablets.	QWA	Student will be able to: -evaluate the capabilities and limitations of mobile platforms that affect application development and execution -develop applications for and take advantage of the capabilities of a mobile platform -work with software/hardware tools to develop, test and debug mobile applications -develop software using design patterns that are applicable to mobile development
CSIQ	2654	Introduction to Website Development	This module introduces the learner to developing web sites. The development of good web pages requires that the programmer has knowledge of various web aspects and technologies. This includes the working of the Internet, graphical interfaces, Internet protocols, web page development with XHTML, HTML5, and CSS. JavaScript will also be introduced.	QWA	Student will be able to: -discuss and apply website development principles; -collect requirements and design a website; -programme in XHTML, HTML5; -create Cascading Style Sheets; and -apply basic JavaScript.
CSIQ	2664	Software Design	This module entails an introduction to UML and to class types ('patterns'). Various patterns are discussed and analysed in detail. Various sub-patterns of patterns will be covered. Practical work includes the implementation of patterns in various applications.	QWA	Student will be able to: -Use UML in order to present class diagrams; -Explain the necessity of patterns; -Identify, implement and apply various patterns; and -Combine patterns to design and implement applications.
CSIQ	3714	Introduction to Databases and Database Management Systems: Part 2	This module deals with advanced database concepts, advanced queries, optimising queries, distributed databases, cloud computing and administrative tasks related to data and database management. The module also provides an introduction to data warehousing and OLAP	QWA	Student will be able to: -Demonstrate an understanding of advanced database concepts; -Write advanced SQL queries; -Optimise SQL queries; -Demonstrate an understanding of distributed databases; -Demonstrate an understanding of cloud computing; -Perform administrative tasks related to data and database management; and -Demonstrate an understanding of basic data warehousing and OLAP principles.
CSIQ	3724	Software Engineering	Software Engineering	QWA	This module provides the student with an introduction to Software engineering. Aspects covered are requirement definition, program design, programming practice, programming languages, tests and debugging, documentation, maintenance and aids. After the successful completion of the module the student should: (a) have a thorough knowledge and understanding of the principles of Software engineering; (b) have a thorough theoretical knowledge of aspects of Software engineering in order to apply it; (c) have knowledge of the management of a project and be able to apply it; (d) be able to successfully participate as a member of a team.
CSIQ	3734	Internet Programming	This module deals with server-side Internet programming and web management.	QWA	Student will be able to: -Do server-side Internet programming; -Develop web applications that utilise databases; and -Publish websites.
CSIQ	3764	Databases and Database Management Systems 2	This module deals with advanced database concepts, advanced queries, optimising queries, distributed databases, cloud computing and administrative tasks related to data and database management. The module also provides an introduction to data warehousing and OLAP.	QWA	Student will be able to: -Apply advanced database concepts; -Write advanced SQL queries; -Optimise SQL queries; -Use distributed databases; -Discuss cloud computing; -Perform administrative tasks related to data and database management; and -Discuss basic data warehousing and OLAP principles.
CSIQ	3784	Software Development Project	The students will experience the process of the system life cycle and will develop the information system by following an iterative incremental development. Students will be expected to formulate a scenario for their chosen topic and develop an information system to meet the customer's requirements.	QWA	Student will be able to: -use principles and practices of an Object Oriented approach to the design and development of computer systems; and -apply these principles in practice

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIL	1551	Computer Literacy: Part 1	This module contains basic knowledge of the principles of microcomputers and microcomputer hardware, the basic commands of the operating system, a general word processing program, a spreadsheet program, presentation program and the Internet. The student must also be able to apply the knowledge.	SOUTH	Student will be able to: -Explain the principles of microcomputers and microcomputer hardware; -Describe the basic commands of an operating system and must be able to apply it; -Describe the basic commands of a general word processing program and must be able to apply it; -Describe the basic commands of a spread-sheet program, and must be able to apply it; -Describe the basic commands of the Internet and must be able to apply it; and -Describe the basic commands of a presentation program and must be able to apply it.
CSIL	1561	Computer Literacy: Part 1	This module contains basic knowledge of the principles of microcomputers and microcomputer hardware, the basic commands of the operating system, a general word processing program, a spreadsheet program, presentation program and the Internet. The student must also be able to apply the knowledge.	SOUTH	Student will be able to: -Explain the principles of microcomputers and microcomputer hardware; -Describe the basic commands of an operating system and must be able to apply it; -Describe the basic commands of a general word processing program and must be able to apply it; -Describe the basic commands of a spread-sheet program, and must be able to apply it; -Describe the basic commands of the Internet and must be able to apply it; and -Describe the basic commands of a presentation program and must be able to apply it.
Postgraduate					
CSIC	6813	Artificial Intelligence	The science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.	MAIN	Student will be able to: -apply the basic principles of artificial intelligence.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIC	6823	Artificial Intelligence	The science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.	MAIN	Student will be able to: - Discuss, describe and apply the principles of artificial intelligence
CSIC	6833	Robotics	The design, construction, operation and application of robots and computer systems for their control, sensory feedback, and information processing.	MAIN	Student will be able to: -apply the principles of robotics.
CSIC	6843	Management Information Systems	All the aspects involved with managing Information Technology in an organization, including: strategic information systems, supply chain management, ERP, electronic commerce, networking, business process reengineering, knowledge management, decision support systems, data management, managing the information services department, managing information resources and security.	MAIN	student will be able to: -Apply the principles of Management Information Systems in a business environment.
CSIC	6853	Capita Selecta	Capita Selecta	MAIN	Student will be able to: Examine and apply principles of the selected field.
CSIC	6863	Capita Selecta	Capita Selecta	MAIN	Student will be able to: -Examine and apply principles of their chosen field.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSID	6813	Business Intelligence	The emphasis here is on business intelligence deployed in corporate environments, including approaches for turning e-commerce data into knowledge that organizations can act upon and tools and techniques for deploying these systems.	MAIN	Student should be able to ; -Learn to analyse data from a data warehouse in order to make relational decisions; -Explored and compared concepts and current methodologies for creating OLAP databases and data mining models; -Investigated the development of Key Performance Indicators (KPIs), dashboards and scorecards; -Been exposed to hands-on exercises with Business Intelligence tools (Microsoft SQL Server 2012 and IBM Cognos 10.2 Workspace); -Investigated the development of three popular machine learning algorithms namely; clustering (k-means), decision trees and artificial neural networks; -Delivered a Business Intelligence solution. This will entail the following: a.compile business requirements from a business of your choice b.design the dimensional model from the business requirement specification c.load the dimensional model with your own data using ETL routines d.develop at least two OLAP cube(s) e.include at least two Key Performance Indicators (KPI) in the cube(s) f.develop at least one data mining model g.develop your own BI frontend using C# and Visual Studio which will demonstrate your own interpretation of a Scorecard and a Dashboard
CSID	6833	Advanced Databasis	The administration of a database requires thorough knowledge from planning through to creating the database, the database users, their privileges and determining backup and recovery strategies, including: architecture and installation options, physical structures and settings of the database, and queries of data dictionary views to manage a database.	MAIN	Student should be able to ; -Explain and use the following aspects of databases: Architecture, Database administrator tools, Database Instance, Physical Architecture and Data Dictionary, Basic Storage Concepts and Settings, Basics of Querying a Database, Table management, Index and Constraints Management, Basic Data Management, Advanced Data Management, Security Management, Backup and Recovery; and -Write the two certified Oracle Associate (OCA) exams

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSID	6843	Advanced Databases	The administration of a database requires thorough knowledge from planning through to creating the database, the database users, their privileges and determining backup and recovery strategies, including: architecture and installation options, physical structures and settings of the database, and queries of data dictionary views to manage a database.	MAIN	Student will be able to ; -Explain and use the following aspects of databases: Architecture, Database administrator tools, Database Instance, Physical Architecture and Data Dictionary, Basic Storage Concepts and Settings, Basics of Querying a Database, Table management, Index and Constraints Management, Basic Data Management, Advanced Data Management, Security Management, Backup and Recovery; and -Write the two certified Oracle Associate (OCA) exams
CSID	6853	Data Warehousing	The development of a data warehouse requires thorough knowledge from planning through to implementing the warehouse, as well as the mining of the information in the warehouse.	MAIN	Student will be able to ; -Learnt the fundamentals of data warehousing and how to apply their existing knowledge of database systems in a data warehouse environment; -Gained the theoretical knowledge around the development lifecycle of a data warehouse developed by Ralph Kimball; -Been exposed to hands-on exercises in constructing a STAR schema from a relational entity relationship diagram (ERD) using the Ralph Kimball methodology; -Learnt to compile information packages on the business requirements for a STAR schema for a data warehouse; -Explored and compared ETL concepts including slow changing dimensions for creating and loading a data warehouse; -Combined all the above mentioned theory to design and deliver a data warehouse solution. This will entail the following: -compile business requirements; -design the dimensional model from the business requirement specification; -develop all the necessary ETL routines using SQL Server SSIS; and -develop a front-end browser in C# connecting to the data warehouse

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSID	6863	Data Warehousing	The development of a data warehouse requires thorough knowledge from planning through to implementing the warehouse, as well as the mining of the information in the warehouse.	MAIN	Student will be able to; -Learnt the fundamentals of data warehousing and how to apply their existing knowledge of database systems in a data warehouse environment; -Gained the theoretical knowledge around the development lifecycle of a data warehouse developed by Ralph Kimball; -Been exposed to hands-on exercises in constructing a STAR schema from a relational entity relationship diagram (ERD) using the Ralph Kimball methodology; -Learnt to compile information packages on the business requirements for a STAR schema for a data warehouse; -Explored and compared ETL concepts including slow changing dimensions for creating and loading a data warehouse; -Combined all the above mentioned theory to design and deliver a data warehouse solution. This will entail the following: -compile business requirements; -design the dimensional model from the business requirement specification; -develop all the necessary ETL routines using SQL Server SSIS; and -develop a front-end browser in C# connecting to the data warehouse
CSIE	6813	Knowledge-based Systems	The basic knowledge management principles, concepts, technologies and systems, including knowledge discovery systems, knowledge capture systems, knowledge sharing systems and knowledge application systems, as well as the evaluation and application thereof in practice.	MAIN	Student will be able to; -Demonstrate basic knowledge management principles and concepts; -Use and demonstrate technologies for knowledge management; -Explain knowledge management systems which include knowledge discovery systems, knowledge capture systems, knowledge sharing systems and knowledge application systems; -Discuss the future of knowledge management;and -Explain the evaluation of an organisation’s knowledge management system.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIE	6833	Management Information Systems	All the aspects involved with managing Information Technology in an organization, including: strategic information systems, supply chain management, ERP, electronic commerce, networking, business process reengineering, knowledge management, decision support systems, data management, managing the information services department, managing information resources and security.	MAIN	Student will be able to; -apply the principles of Management Information Systems in a business environment.
CSIE	6853	IT Project Management	Basic principles of Project Management, including: the differences between Project Management and IT Project Management, how to perform as a Project Manager and to be part of a project team in al the 9 knowledge areas of Project Management, using a Project Management software tool in order to manage an IT project.	MAIN	Student will be able to: -perform as a project manager.
CSIE	6863	IT Project Management	Basic principles of Project Management, including: the differences between Project Management and IT Project Management, how to perform as a Project Manager and to be part of a project team in al the 9 knowledge areas of Project Management, using a Project Management software tool in order to manage an IT project.	MAIN	Student will be able to: -perform as a project manager.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIE	6873	Decision Support Systems	A decision support system (DSS) is a computer-based information system that supports business or organizational decision-making activities. DSSs include knowledge-based systems. Students learn how to help decision makers compile useful information from a combination of raw data, documents, and personal knowledge, or business models to identify and solve problems and make decisions.	MAIN	Student will be able to: -apply the concepts of decision support systems to support the decision making processes of managers in business environments.
CSIE	6883	Decision Support Systems	A decision support system (DSS) is a computer-based information system that supports business or organizational decision-making activities. DSSs include knowledge-based systems. Students learn how to help decision makers compile useful information from a combination of raw data, documents, and personal knowledge, or business models to identify and solve problems and make decisions.	MAIN	Student will be able to: -apply the concepts of decision support systems to support the decision making processes of managers in business environments.
CSII	6813	Information Security	Fundamental concepts of computer security, including: security threats, harden internal systems and services, harden internetwork devices and services, secure network communications, security best practices for creating and running web-based applications, managing public key infrastructure (PKI), managing certificates, enforcing organisational security policies, monitoring the security infrastructure and security incidents.	MAIN	Student will be able to: -identify fundamental concepts of computer security; -identify security threats; -establish security best practices; -manage public key infrastructure (PKI); -enforce organisational security policies;and -manage security incidents.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSII	6823	Information Security	Fundamental concepts of computer security, including: security threats, harden internal systems and services, harden internetwork devices and services, secure network communications, security best practices for creating and running web-based applications, managing public key infrastructure (PKI), managing certificates, enforcing organisational security policies, monitoring the security infrastructure and security incidents.	MAIN	Student will be able to: -identify fundamental concepts of computer security; -identify security threats; -establish security best practices; -manage public key infrastructure (PKI); -enforce organisational security policies; -manage security incidents.
CSII	6833	Human-Computer Interaction	Theoretical background and practical experience in Human-Computer Interaction, with specific emphasis on Usability Engineering. The module provides an in-depth knowledge and understanding of issues involved in the evaluation of user interfaces for interactive computer systems.	MAIN	Student will be able to: -Explain the issues involved in the evaluation of interactive systems; -Identify the different types of metrics used in evaluating the user experience; -Plan and design a usability study;and -Conduct a usability study, making use of the usability laboratory and its equipment in the department.
CSII	6843	Human-Computer Interaction	Theoretical background and practical experience in Human-Computer Interaction, with specific emphasis on Usability Engineering. The module provides an in-depth knowledge and understanding of issues involved in the evaluation of user interfaces for interactive computer systems.	MAIN	Student will be able to: -Explain the issues involved in the evaluation of interactive systems; -Identify the different types of metrics used in evaluating the user experience; -Plan and design a usability study;and -Conduct a usability study, making use of the usability laboratory and its equipment in the department.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSII	6853	Computer Ethics	Computer Ethics is a branch of practical philosophy which deals with how computing professionals should make decisions regarding professional and social conduct. It is a set of moral principles that regulate the use of computers. Some common issues of computer ethics that are covered include intellectual property rights (such as copyrighted electronic content), privacy concerns, and how computers affect society.	MAIN	Student will be able to: -examine and apply the principles of Computer Ethics and be able to advise on the ethical use of computers.
CSII	6863	Computer Ethics	Computer Ethics is a branch of practical philosophy which deals with how computing professionals should make decisions regarding professional and social conduct. It is a set of moral principles that regulate the use of computers. Some common issues of computer ethics that are covered include intellectual property rights (such as copyrighted electronic content), privacy concerns, and how computers affect society.	MAIN	Student will be able to: -Examine the principles of Computer Ethics and be able to advise on the ethical use of computers.
CSII	6883	Digital Forensic Science	The module introduces the student to the world of digital forensics through the application of information security concepts to perform a high-tech cyber investigation from acquiring digital evidence to reporting on its findings.	MAIN	Student will be able to: - describe and explain the digital forensics profession and investigations; - setup an investigators office and laboratory; - apply information security concepts to gather digital forensic data; - process a crime and incident scene; - effectively work with GUI and CLI systems; - work with different digital forensic tools; - report on the findings of the digital evidence.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIM	6813	Theory of Algorithms	The theory of algorithms is a subfield of information theory and computer science that concerns itself with the relationship between computation and information. Algorithmic information theory principally studies complexity measures on strings (or other data structures). Because most mathematical objects can be described in terms of strings, or as the limit of a sequence of strings, it can be used to study a wide variety of mathematical objects, including integers and real numbers.	MAIN	Student will be able to: -Explain current theories on the origins of life and how it unfolds in nature; -Describe the structure of living cells and how complex molecules in cells interact with each other to make the flow of energy, material and information possible in the cell; -Explain the transfer of genetic information and how it influences the patterns of inheritance between generations of organisms;and -Understand the fundamental principles regarding the biology of the different levels of organization in living organisms from viruses to eukaryotic micro-organisms.
CSIM	6823	Theory of Algorithms	The theory of algorithms is a subfield of information theory and computer science that concerns itself with the relationship between computation and information. Algorithmic information theory principally studies complexity measures on strings (or other data structures). Because most mathematical objects can be described in terms of strings, or as the limit of a sequence of strings, it can be used to study a wide variety of mathematical objects, including integers and real numbers.	MAIN	Student will be able to: -Explain current theories on the origins of life and how it unfolds in nature; -Describe the structure of living cells and how complex molecules in cells interact with each other to make the flow of energy, material and information possible in the cell; -Explain the transfer of genetic information and how it influences the patterns of inheritance between generations of organisms; -Understand the fundamental principles regarding the biology of the different levels of organization in living organisms from viruses to eukaryotic micro-organisms.
CSIM	6833	Automata Theory and Applications	Automata theory is the study of mathematical objects called abstract machines or automata and the computational problems that can be solved using them.	MAIN	Student will be able to: -apply the principles of automata theory to solve computational problems.
CSIM	6843	Automata Theory and Applications	Automata theory is the study of mathematical objects called abstract machines or automata and the computational problems that can be solved using them.	MAIN	Student will be able to: -apply the principles of automata theory to solve computational problems.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIN	6823	Network Management	This module covers the fundamental management principles, practices and technologies for managing networks, systems, applications and services.	MAIN	Student will be able to: -Apply and discuss the foundations of network management and the different technologies involved. -Discuss, compare and implement different network management architectures. -Discuss and compare different management communication protocols. -Apply network management principles to practical aspects of network management.
CSIN	6833	Advanced Computer Networks	Detailed investigation and study of computer networks, standards, communications concepts, hardware concepts, internetworking layer concepts, dialup, baseband, broadband and wireless networking concepts and network security issues.	MAIN	Student will be able to: - Use and apply his/her knowledge of the technical aspects of computer networks to set u pand maintain such networks.
CSIN	6843	Advanced Computer Networks	Detailed investigation and study of computer networks, standards, communications concepts, hardware concepts, internetworking layer concepts, dialup, baseband, broadband and wireless networking concepts and network security issues.	MAIN	Student will be able to: -use and apply his/her knowledge of the technical aspects of computer networks to set u pand maintain such networks.
CSIP	6813	Object Design	Emphasis and deeper knowledge in the design of objects in the object-oriented design paradigm.	MAIN	Student will be able to: - Use the advanced concepts of object oriented design to develop high-quality software systems.
CSIP	6823	Object Design	Emphasis and deeper knowledge in the design of objects in the object-oriented design paradigm.	MAIN	Students must be able to: - Use the advanced concepts of object oriented design to develop high-quality software systems.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIP	6833	Advanced Internet Programming	Client side programming of web sites, scripting languages, cookies and session objects, request & response objects, and server side programming.	MAIN	Student will be able to: - Do client-side Internet Programming; - Do server-side Internet Programming; - Write secure code; - Effectively use AJAX; - Develop web applications that utilise databases; and - Publish web sites.
CSIP	6843	Advanced Internet Programming	Client side programming of web sites, scripting languages, cookies and session objects, request & response objects, and server side programming.	MAIN	Student will be able to: - Do client-side Internet Programming; - Do server-side Internet Programming; - Write secure code; - Effectively use AJAX; - Develop web applications that utilise databases; and - Publish web sites.
CSIP	6853	Advanced Proramming 1	The programming skills of the students are taken to the next higher level compared to pre-graduate programming.	MAIN	Student will be able to: - Work effectively as individuals or members of a team/group in achieving the required programming outcomes; - Plan a complex class hierarchy to develop a robust application; - Design and develop robust class hierarchies; and - Apply advanced programming concepts.
CSIP	6863	Advanced Proramming 1	The programming skills of the students are taken to the next higher level compared to pre-graduate programming.	MAIN	Student will be able to: -Work effectively as individuals or members of a team/group in achieving the required programming outcomes; - Plan a complex class hierarchy to develop a robust application; - Design and develop robust class hierarchies; and - Apply advanced programming concepts.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIP	6873	Advanced Programming 1	The programming skills of the students are taken to the next higher level compared to pre-graduate programming.	MAIN	Student will be able to: - Work effectively as individuals or members of a team/group in achieving the required programming outcomes; - Plan a complex class hierarchy to develop a robust application; - Design and develop robust class hierarchies; and - Apply advanced programming concepts.
CSIP	6883	Advanced Programming II	Learning advanced programming concepts through e.g. game programming.	MAIN	Student will be able to: -Work effectively as individuals or members of a team/group in achieving the required programming outcomes. -Plan a complex class hierarchy to develop a robust application. -Design and develop robust class hierarchies;and -Apply advanced programming concepts to complex problems
CSIQ	6809	Computer Information Technology Research Project	The development of a complete working computer project to solve a real life or theoretical problem.	QWA	Student will be able to: -Design and create a complete working computer project; -Design and create a User Manual based on the project; -Design and create a Technical Manual based on the project; -Demonstrate the project to staff and students.
CSIQ	6824	Advanced Mobile Development	This module deals with advanced mobile development concepts, advanced user interface and components, compatibility, mapping and location based services, server-side programming, client access to software agent system, connectivity and testing strategies.	QWA	Student will be able to: -design and implement mobile applications with interface support for various screen sizes. -design and implement mobile applications with underlying database supports -demonstrate a critical understanding of making use of multimedia based applications for mobile devices -demonstrate a critical understanding of making use of location based applications for mobile devices -develop mobile applications that can smartly communicate with a server applications

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIQ	6833	Human-Computer Interaction	Theoretical background and practical experience in Human-Computer Interaction, with specific emphasis on Usability Engineering. The module provides an in-depth knowledge and understanding of issues involved in the evaluation of user interfaces for interactive computer systems.	QWA	Student will be able to: -Explain the issues involved in the evaluation of interactive systems; -Identify the different types of metrics used in evaluating the user experience; -Plan and design a usability study;and -Conduct a usability study, making use of the usability laboratory and its equipment in the department.
CSIQ	6844	Gamification	Gamification is the concept of applying game mechanics and game design techniques to engage and motivate people to achieve their goals. It is the application of game-design elements and game principles in non-game contexts.	QWA	Student will be able to: -apply game theory, gamification and simulation. -discuss the different techniques of gamification. -explain the different gamification application areas. -thoroughly explore a case study of gamification. -design and development of a goal-based, computer game for learning

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIQ	6853	Gamification	Gamification is the concept of applying game mechanics and game design techniques to engage and motivate people to achieve their goals. It is the application of game-design elements and game principles in non-game contexts.	QWA	Student will be able to: -apply game theory, gamification and simulation; -discuss the different techniques of gamification; -explain the different gamification application areas; -thoroughly explore a case study of gamification; and -design and development of a goal-based, computer game for learning.
CSIQ	6863	IT Project Management	Basic principles of Project Management, including: the differences between Project Management and IT Project Management, how to perform as a Project Manager and to be part of a project team in al the 9 knowledge areas of Project Management, using a Project Management software tool in order to manage an IT project.	QWA	Student will be able to: -Perform as a project manager.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIQ	8900	Computer Informatics Systems Dissertation	This module contains fundamental knowledge, theories, principles and practices of Computer Informatics Systems, including: Research project in specialized field of Computer Informatics Systems as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	QWA	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CSIQ	9100	Computer Informatics Systems Thesis	This module contains fundamental knowledge, theories, principles and practices of Computer Informatics Systems, General including: Research project in specialized field of Computer Informatics Systems, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research	QWA	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIS	6808	Computer Information Technology Project	The development of a complete working computer project to solve a real life or theoretical problem.	MAIN	Student will be able to: -Design and create a complete working computer project; -Design and create a User Manual based on the project; -Design and create a Technical Manual based on the project; -Demonstrate the project to staff and students.
CSIS	6809	Computer Information Technology Research Project	The development of a complete working computer project to solve a real life or theoretical problem.	MAIN	Student will be able to: -Design and create a complete working computer project; -Design and create a User Manual based on the project; -Design and create a Technical Manual based on the project; -Demonstrate the project to staff and students.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIS	6813	Introduction to Research	Guidance on how to conduct research in a structured, methodical manner, to analyze collected data and subsequently how to write a well-structured report/article.	MAIN	Student will be able to: -Provide an overview of the principles of conducting research; -Analyse collected data;and -Report on the data collected.
CSIS	6823	Introduction to Research	Guidance on how to conduct research in a structured, methodical manner, to analyze collected data and subsequently how to write a well-structured report/article.	MAIN	Student will be able to: -Provide an overview of the principles of conducting research; -Analyse collected data; and -Report on the data collected.
CSIS	6853	Capita Selecta	Capita Selecta	MAIN	No learning outcomes provided.
CSIS	7910	Extended Research Essay	Mini-dissertation based on one of the research areas in the Department of Computer Science & Informatics.	MAIN	Students will be able to : - Produce a mini-dissertation containing the following: -an introduction, literature study, problem statement, research questions, methodology, and research results after data gathering, as well as conclusions reached on one of the chosen research topics.
CSIS	7915	Human-Computer Interaction	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in Human-Computer Interaction, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a a document that contains an introduction and literature study based on the chosen research topic in Human-Computer Interaction, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7920	Extended Research Essay	Mini-dissertation based on one of the research areas in the Department of Computer Science & Informatics.	MAIN	Student will be able to : -Produce a mini-dissertation containing the following: -an introduction, literature study, problem statement, research questions, methodology, and research results after data gathering, as well as conclusions reached on one of the chosen research topics.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIS	7925	Human-Computer Interaction	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in Human-Computer Interaction, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a a document that contains an introduction and literature study based on the chosen research topic in Human-Computer Interaction, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7935	Data Warehousing	This module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in data warehousing, as well as the problem statement and research questions of a possible mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a document that contains an introduction and literature study based on the chosen research topic in data warehousing, as well as the problem statement and research questions of a possible mini-dissertation that might flow from it.
CSIS	7945	Data Warehousing	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in data warehousing, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a document that contains an introduction and literature study based on the chosen research topic in data warehousing, as well as problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7955	Educational Technology	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in educational technology, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a document that contains an introduction and literature study based on the chosen research topic in educational technology, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7965	Educational Technology	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in educational technology, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a document that contains an introduction and literature study based on the chosen research topic in educational technology, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSIS	7975	Eye-tracking	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in eye-tracking, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a a document that contains an introduction and literature study based on the chosen research topic in eye-tracking, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	7985	Eye-tracking	The module is adapted each year in order to stay abreast in this research area. The outcome of this module is a document that contains an introduction and literature study based on the chosen research topic in eye-tracking, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.	MAIN	Student will be able to: -Produce a a document that contains an introduction and literature study based on the chosen research topic in eye-tracking, as well as the problem statement and research questions of a possible research mini-dissertation that might flow from it.
CSIS	8900	Computer Informatics Systems Dissertation	This module contains fundamental knowledge, theories, principles and practices of Computer Informatics Systems, including: Research project in specialized field of Computer Informatics Systems as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Centre for Environmental Management (106)

Postgraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BDCM	7910	Biodiversity and Conservation Management	This module contains fundamental knowledge, theories, principles and practices relevant to measurement of biodiversity; conservation and biodiversity planning; legislation relevant to biodiversity and conservation; community-based conservation; and the conservation of cultural landscapes. Students take part in a one-day fieldtrip for practical experience in the measurement of biodiversity.	MAIN	Students will be able to: - apply and demonstrate the principles of measuring biodiversity, spatial biodiversity planning, community-based conservation and the conservation of cultural landscapes within the context of environmental management; - use a range of specialised skills to select and apply suitable biologial indicator groups, sampling methods and biodiversity indices to address complex and challenging ecological problems; - formulate requirements and objectives of biological monitoring programmes; - independently design, implement and manage programmes for measuring and monitoring ecological diversity and integrity; - evaluate the relevancy of, and to apply, environmental legislation in the field of Biodiversity and Conservation Management; - make autonomous ethical decisions and to contribute to the development of ethical standards in the context of biodiversity measurement, planning, monitoring and management; and - use academic and professional resources, appropriate to the field of biodiversity and conservation management, to effectively communicate and defend substantial ideas and theories in the field of Biodiversity and Conservation Management.
CEMT	5820	Corporate Environmental Management and Sustainability	This module contains fundamental knowledge, theories, principles and practices: -of social and economic sustainability (including sustainable living, population dynamics, conflict management, resource economics, disaster risk assessment), development planning and sustainability (such as settlement and environment, legislation, urban sustainability) and qualitative research (design, analysis); and -relevant to conducting environmental impact assessments, including project management, public participation, social and ecological impact assessments.	MAIN	Student will be able to: - Apply theories relating to sustainability issues to relevant contexts; - Provide proof of high-level understanding of the systemic nature of environmental sustainability processes by illustrating insight into complexities arising from the interaction between the major components of global ecosystem functioning, and between human development and the environment; - Use tools, including project management and a variety of assessment tools, to identify, analyse and address complex or abstract problems relating to social and economic sustainability and development planning; - Consult and evaluate multiple knowledge sources, including quantitative and qualitative data, scientific reports, and strategies, policies, legislation and plans relating to environmental sustainability issues; - Identify, analyse and address complex or abstract problems as they relate to the sustainability and environmental management; - Identify and address ethical issues, such as those involved in development planning and conflict management; - Critically review, synthesise, evaluate and manage information in order to develop creative responses to problems and issues relating to sustainability and development; - Communicate ideas, solutions and conclusions to academic, professional and public audiences, verbally, in writing or by means of other media, and participate in interdisciplinary collaboration in relation to resources and processes relating to environmental management; and - Participate in interdisciplinary collaboration for the purposes of, for instance, risk assessments, conflict management and development planning.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
EMTE	7920	Mini-thesis Environemntal Management	This module contains fundamental knowledge, theories, principles and practices relevant to conducting research on a suitable topic that the student identifies; collecting, analysing and interpreting data; and reporting and communicating findings in an extended mini-thesis.	MAIN	Student will be able to: - critically evaluate current research and practices, and have the ability to design and implement strategies for the processing and management of information, in order to conduct a comprehensive review of leading and current research in the area of environmental management to produce significant insights. - identify problems worthy of research by developing a research proposal; demonstrating holistic thinking and research abilities, using appropriate processes of enquiry to conduct research, and presenting information in a logical and well-structured format to produce a mini-thesis. - apply a wide range of specialised multidisciplinary skills, in order to identify, conceptualise, design and implement methods of enquiry for addressing complex and challenging problems within a field, discipline or practice. - design, select and apply appropriate and creative methods, techniques, processes or technologies to complex practical and theoretical problems in the field of environmental management, and having an understanding of the consequences of any solutions or insights generated within the context of environmental management. - make autonomous ethical decisions and to contribute to the development of ethical standards in the context of environmental management. - use the resources of academic, professional/occupational discourses to communicate and defend substantial ideas that are the products of research or development in the field of environmental management. - operate independently and take full responsibility for own work, to develop own learning strategies for sustaining independent learning and academic or professional development, and to interact effectively within the learning or professional group as a means of enhancing learning.
ENMT	5810	Resources and Processes	This module contains fundamental knowledge, theories, principles and practices relevant to environmental management, including introductions to the science of the pedosphere, atmosphere, lithosphere and hydrosphere.	MAIN	Student will be able to: - Apply principles relating to environmental management resources and processes to relevant contexts; - Provide proof of high-level understanding of the systemic nature of environmental processes by illustrating insight into complexities arising from the interaction between the major components of global ecosystem functioning, and between human development and the environment; - Consult and evaluate multiple knowledge sources, including quantitative and qualitative data, scientific reports, and strategies, policies and plans; - Identify, analyse and address complex or abstract problems as they relate to the resources and processes relevant to environmental management; - Critically review, synthesise, evaluate and manage information in order to develop creative responses to problems and issues; - Participate in self-study activities, manage their own learning processes, effectively address their professional and ongoing learning needs, and demonstrate the ability to take full responsibility for their work, decision-making and use of resources; and - Communicate ideas, solutions and conclusions to academic, professional and public audiences, verbally, in writing or by means of other media, and participate in interdisciplinary collaboration in relation to resources and processes relating to environmental management.
ENMT	5820	Corporate environmental management and sustainability	This module contains fundamental knowledge, theories, principles and practices of social and economic sustainability (including sustainable living, population dynamics, conflict management, resource economics, disaster risk assessment), development planning and sustainability (such as settlement and the environment, legislation, urban sustainability) and quantitative and qualitative research (design, analysis).	MAIN	The students will be able to: -discuss and interrogate fundamental, theories, principles and practices of social and economic sustainability (including sustainable living, population dynamics, conflict management, resource economics, disaster risk assessment), development planning and sustainability (such as settlement and the environment, legislation, urban sustainability) and quantitative and qualitative research (design, analysis); and -critically analyse related policies and apply relevant knowledge to develop environmental plans
ENMT	8900	Environmental Management Dissertation	This module contains fundamental knowledge, theories, principles and practices of Environmental Management, including: Research project in specialized field of Environmental Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ENMT	9100	Environmental Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Environmental Management, including: Research project in specialized field of Environmental Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
IWRM	5810	Introduction to Integrated Water Resources, Resource Economics and Governance	This module contains fundamental knowledge, theories, principles and practices relating to integrated water resources (IWR) science (e.g. resource integrity and its measurement; social and economic aspects of water), ecosystem components, drivers and indicators (e.g. meteorology, hydrology, geohydrology, chemistry, hydraulics, geomorphology, riparian vegetation, fish communities etc.), and technical aspects relating to pollution and rehabilitation, and waste water engineering.	MAIN	Student will be able to: - Demonstrate an understanding of the systemic nature of hydrological processes and the complex pathways linking the various components of the global hydrological cycle to the global ecosystem (soil and rocks, ground water, atmosphere, surface water, oceans, aquatic organisms, etc.) by applying this knowledge and understanding to develop, implement and manage integrated solutions to complex real-life water-related environmental problems; -Interrogate multiple sources from various disciplines, such as geology, pedology, atmospheric and aquatic sciences, ecology and resource economics, to evaluate and integrate knowledge from these disciplines and to apply this integrated understanding to develop creative responses to multifaceted water-related problems and issues within the present day legal and policy environment; - Consult and evaluate multiple knowledge sources, including quantitative and qualitative data, scientific reports, and strategies, policies and plans; - Identify, analyse and address complex or abstract problems as they relate to the resources and processes relevant to water resources management; - Critically review, synthesise, evaluate and manage information in order to develop creative responses to water-related problems and issues; - Participate in self-study activities, manage their own learning processes, effectively address their professional and ongoing learning needs, and demonstrate the ability to take full responsibility for their work, decision-making and use of resources; - Communicate ideas, solutions and conclusions to academic, professional and public audiences, verbally, in writing or by means of other media, and participate in interdisciplinary collaboration to solve and manage complex water-related problems.
IWRM	5820	Integrated Water Resources Science	This module contains fundamental knowledge, theories, principles and practices relating to integrated water resources (IWR) science (e.g. resource integrity and its measurement; social and economic aspects of water), ecosystem components, drivers and indicators (e.g. meteorology, hydrology, geohydrology, chemistry, hydraulics, geomorphology, riparian vegetation, fish communities etc.), and technical aspects relating to pollution and rehabilitation, and waste water engineering.	MAIN	Student will be able to: - Examine the theories and terminologies relating to a variety of disciplines (considering the interdisciplinary nature of integrated water management) in order to analyse real-life case studies and situations that relate to integrated water management; - Consult multiple knowledge sources, including quantitative and qualitative data, scientific reports, and strategies, policies and plans, in order to critically, synthesise, evaluate and manage information, and develop creative responses to complex water-related problems and issues; - Communicate ideas, solutions and conclusions to academic, professional and public audiences, verbally, in writing or by means of other media, and be able to participate in interdisciplinary collaboration with regard to water impact assessments, environmental water assessments etc.; - Show insight into complexities arising from the interaction between the major components of the global water cycle, and between human development, water use and the environment; - Conduct self-study activities, manage their own learning processes, effectively address their professional and on-going learning needs, and take full responsibility for their work, decision-making and use of resources.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
IWRM	5846	Integrated Water Resources Management and Legislation	This module contains fundamental knowledge, theories, principles and practices relating to integrated water resources (IWR) science (e.g. relevant governance and legislation, as well as topics related to catchment management, water health, risk management and project management.	MAIN	Student will be able to: - Discuss, explain and analyse theories and terminologies relating to water health and risks, water governance, water policies, and relevant legislation in order to analyse real-life case studies and situations that relate to integrated catchment and risk management; - - Identify and take into consideration ethical issues, such as those involved in good governance, public participation and other relevant practices relating to legislation when applying appropriate tools and knowledge to matters relating to water management; - Consult multiple knowledge sources, including quantitative and qualitative data, scientific reports, and strategies, policies and plans, in order to critically, synthesise, evaluate and manage information, and develop creative responses to water health and risk problems and issues; - Communicate ideas, solutions and conclusions to academic, professional and public audiences, verbally, in writing or by means of other media, with regard to resource integrity, water availability and scarcity, water health risks, water drinking standards, waste and disaster management and to manage conflict that may arise from these issues; - Work effectively in an interdisciplinary team to solve complex water-related problems and to develop negotiating and conflict management skills.
LIMG	9100	Limnology Thesis (PhD)	This module contains fundamental knowledge, theories, principles and practices of Limnology, General including Research project in specialized field of Limnology, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
LIMH	6808	Research essay	Research essay	MAIN	
LIMH	6814	Scientific methodology	This module contains fundamental knowledge, theories, principles and practices relevant to the basic scientific methods needed to conduct limnological research. It includes topics such as laboratory procedures and protocols, measurement of basic water and environmental parameters, completing field data forms, development and management of data bases, basic statistical analyses, quality control, and scientific writing.	MAIN	Student will be able to: -apply the research methodologies, methods and techniques relevant to limnology and how to apply this knowledge in limnological research; -examine the complexities and uncertainties involved in selecting and applying appropriate standard procedures and techniques to unfamiliar problems in limnology; -Use a range of specialised skills to identify, analyse and address complex problems, drawing systematically on the body of knowledge and methods appropriate to limnology; -Critically review information gathering, evaluation, analyses, and management processes in limnology in order to develop creative responses to aquatic problems and issues; and -Present and communicate academic and professional ideas and texts to a range of audiences, offering insight, interpretation and solutions to aquatic/limnological problems.
LIMH	6824	Advanced specialised module	Advanced specialised module	MAIN	
LIMH	6834	Introduction to ecological monitoring of aquatic systems	This module contains fundamental knowledge, theories, principles and practices relevant to the ecological monitoring of wetlands, rivers and dams. The module provides an overview of the basic requirements and components of aquatic monitoring programmes; the development and implementation of such programmes; and evaluation of these programmes' effectiveness. The module content also covers implementation of adaptations to monitoring programmes based on the evaluation, and communicating the programme's results to society, including local communities, other scientists and water resources managers.	MAIN	Student will be able to: -apply the research methodologies, methods and techniques relevant to the ecological monitoring of aquatic systems and ways of applying this knowledge in conducting ecological monitoring; -discuss the complexities and uncertainties of selecting, applying and transferring appropriate standard procedures, processes and techniques to design, implement and evaluate customised aquatic monitoring programmes; -Use a range of specialised skills to identify, analyse and address complex aquatic problems by drawing systematically on the existing body of knowledge and methods appropriate to the ecological monitoring of wetlands, rivers and dams; -Design, implement and evaluate an ecological monitoring programme based on an understanding of the roles and relationships between the various components within an aquatic ecosystem; and -Present and effectively communicate results, insights and creative solutions, based on the feedback of the ecological monitoring process, to a range of audiences, including local communities, the scientific community and water resources managers.
LIMH	6844	Water Resource Management	Water Resource Management	MAIN	

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
LIMH	6856	Research: Literature study	Research: Literature study	MAIN	
MOB	708	Corporate Environmental Management and Sustainability	Social and economic sustainability, development planning and environmental sustainabolity, project management for environmental management systems	MAIN	Module outcome: At the end of the semester, the students should be able to have an basic knowledge and understanding of corporate environmental management.
MOB	791	Mini-Dissertation	The students are already introduced during the first contact session on campus to the idea of the mini-dissertation and during the following sessions, specialist lectures take place to prepare the students for the mini-dissertation.	MAIN	Module outcome: At the end of the module, the student would have to demonstrate the ability to plan, execute and report on a specific research topic with the guidance of a supervisor.
WLMT	7910	Wetland Management	This module contains fundamental knowledge, theories, principles and practices relevant to the management of wetlands, including wetland classification, delineation, ecology, functioning and services; social aspect and uses of wetlands; wetland process modelling; the application of wetland assessment methods e.g. Wet-origin, Wet-health and Wet-eco services; legislation and policies relevant to wetland conservation and management. Students take part in an excursion to nearby wetland-areas to gain practical experience in wetland classification, delineation and integrity assessment.	MAIN	Student will be able to: - apply the principles of wetland classification, delineation, ecology, functioning, ecological integrity assessment, process modeling ecosystems; and the social aspects of resource use. - use a range of specialised skills and methods to classify, delineate and assess the ecological integrity of wetlands; - formulate requirements and objectives of wetland assessment and management programmes; - independently design, implement and manage programmes for assessing and managing wetland ecosystems; - evaluate the relevancy of, and to apply, environmental legislation in the field of Wetland Conservation and Management; - make autonomous ethical decisions and to contribute to the development of ethical standards in the context of conserving and managing wetalnds; - use appropriate academic and professional resources to effectively communicate and defend substantial ideas and theories in the field of Wetland Conservation and Management.
WPRN	7910	Water, Pollution and Rehabilitation Management	This module contains fundamental knowledge, theories, principles and practices relevant to the management of surface and sub-surface water pollution, soil pollution and atmospheric pollution; the evaluation, rehabilitation and remediation of natural and disturbed ecosystems, including wetlands; the management of waste and clean energies; legislation relevant to pollution and the rehabilitation and management thereof; and social aspects of water use. Students take part in an excursion to various projects relevant to the course, for example mines, sewage works, and solar farms.	MAIN	Student will be able to: - apply the principles of assessing and rehabilitating polluted ecosystems; managing surface- and subsurface pollution, soil pollution and atmospheric pollution; managing various waste streams; and the social aspects of resource use. - use a range of specialised skills to detect, and assess the extent and impact of, surface- and subsurface water pollution, soil pollution and atmospheric pollution and to identify and implement appropriate remedial and rahabilitating measures and techniques; - formulate requirements and objectives of rehabilitation and remediation programmes; - independently design, implement and manage programmes for rehabilitating and remediating disturbed and/or polluted ecosystems; - evaluate the relevancy of, and to apply, environmental legislation in the field of Water, Pollution and Rehabilitation Management; - make autonomous ethical decisions and to contribute to the development of ethical standards in the context of managing surface- and sub-surface pollution, soil pollution and atmospheric pollution and the rehabilitation of affected systems; - use academic and professional resources, appropriate to the field of biodiversity and conservation management, to effectively communicate and defend substantial ideas and theories in the field of Water, Pollution and Rehabilitation Management.
WRMT	8900	Integrated Water Recourse Management Dissertation	This module contains fundamental knowledge, theories, principles and practices of Water Resource Management, including: Research project in specialized field of Water Resource Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	The student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing..

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
WRMT	9100	Water Recourse Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Limnology, including: Research project in specialized field of Limnology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing..

Geography(107)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEOH	1624	Introduction to Human Geography	This module aims to introduce the student to basic Human Geography concepts divided into three themes: Cultural geography describes the origin of and spread of cultures, and differentiates between dominant, popular and folk culture using examples from our communities. Population geography describes population dynamics, economics and spread if disease. Urban Geography focusses on the development of and origin of rural and urban settlements, urbanisation, and informal settlements in cities. Practicals build on the basic map work and cartography principles introduced in the first semester and continue with advanced map interpretation, ellipsoids, datums, and map projections.	MAIN	Student will be able to: • Describe and discuss the scope of the discipline of Human Geography; • Discuss the roots and meaning of culture and culture hearths; • Define and discuss the dynamics of population growth and consider the implications of global geographies of disease; • Define and discuss the economic inequalities between and within countries; • Define and describe factors and concepts influencing rural and urban development and the movement of people; • Describe the interaction of people on the environment and critically reflect on human impacts on the environment; and • Interpret and analyse topographical maps.
GEOH	2614	Urban Geography	This is a human geography module that explores various urban theories and urban concepts involved in the social development planning of cities from a global perspective. Components of development: theoretical framework: development and criteria of measuring, spatial models, characteristics of third world countries, local development. Urban components: human settlements, spatial models, intra urban structure, urbanisation in first and third world context, impact of urbanisation on the physical and social environment, economic activities, residential function, housing and services, transport, social dynamics, institutional framework,problems and challenges of first and third world cities, case studies.Spatial analysis: theoretical, conceptual techniques of urban spatial analysis, statistical analysis of urban spaces from a quantitative perspective, comparative qualitative analysis of urban case studies.	MAIN	Student will be able to: • explain the causes of city development in terms of population and economic growth and decline; • explain triggers of rural-urban migration; • discuss the transport problems experienced in cities; • contextualize global environmental problems caused by, and experienced in, cities; • analyse housing for the urban poor and changing land-use patterns in cities; • conceptualize cities of the future; and • use conceptual tools and theoretical methods to solve / explain urbanization processes.
GEOH	3714	Applied Urban Development and Spatial Transformation	Geography of apartheid, inequality and post-apartheid, spatial transformation of urban areas, changing urbanisation processes and patterns and the spatial re-integration of the former homelands are topics of discussion in this module.	MAIN	Student will be able to: • analyse the geography of apartheid scientifically; • interpret the geography of inequality on a national, regional and local level; • examine the geography of post-apartheid and to be able to apply the concept; • critically analyse urbanisation and urban growth as spatial processes; • identify challenges associated with fast growing cities and to propose possible solutions; • critically analyse the spatial transformation of urban areas, to identify future challenges and to propose possible solutions in this regard.
GEOH	3724	Rural Geography	The course aims to provide the historical development of rural areas focusing on the policies that were active in creating the homelands. It investigates the debates centred around the marginalization of rural areas (social, economically and politically). Students are introduced to post-apartheid policies formulated to address the lack of development in former homelands as well addressing the issues of land administration in rural areas.	MAIN	Student will be able to: • Reflect on how betterment planning impacted on the development of rural areas using case studies; • Reflect on the social and economic impacts of betterment planning on the livelihoods of people in rural areas; • Explain the challenges and constraints experienced with regard to land reform; • Evaluate local economic development in rural areas; • Evaluate the developmental challenges experienced in former homelands; and • Assess the future of rural areas
GEOP	1514	Introduction to Physical Geography	The module offers an introduction to the working of the universe, solar system, earth, climatology, hydrogeography, soilgeography, biogeography, weathering and erosion, geomorphology, and environmental geography. Practicals: Elementary cartography and the representation and interpretation of map data.	MAIN	Student will be able to: • Describe the basic factors and issues influencing weather and climate and be able to apply that knowledge to the South African situation; • Describe and discuss internal and external earth processes and apply the knowledge to the South African geomorphological landscape; • Describe the concepts influencing biogeography and the environment; and • Interpret topographical maps and do basic cartographical calculations
GEOP	2614	Process Geomorphology	The module builds on physical geography with a focus on geomorphological processes and landforms. This course deals with geomorphic processes and landforms in selected environments and relate it to humans by briefly highlighting some of the related hazards that pose risks to humanity.	MAIN	Student will be able to: • Identify relevant geomorphic processes at work in different environments; • explain how these processes create certain related landforms; • discuss what hazards some processes and landforms pose to humans; and • explain how geomorphologists monitor these processes.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEOP	2624	Environment and climate studies	Environmental problems and causes, history of the use and conservation of resources, ecosystems and how they work, population dynamics and the influence on the environment, pollution and solid waste. Weather and climate systems of the Souhern hemisphere and climate variability.	MAIN	Student will be able to: • Identify and discuss the problems associated with resource use; • Discuss and identify environmental problems and their causes; • Identify and compare developmental options in terms of their environmental impacts; • Identify and interpret weather and climate systems that affect the South African situation; and • Assesses the link between environmental problems and climate variability.
GEOP	3714	Environmental Geomorphology	Students are familiarized with the development of geomorphology as a discipline in environmental management. More specifically, students are familiarized with applied geomorphology and micro-scale geomorphology, including soil geography and fluvial geomorphology. Latter focus on important hydrological processes such as hydrological and sedimentological connectivity, catchment response, water erosion processes, causes, assessment and control. Furthermore, aeolian processes including wind erosion processes, causes, assessment and control.	MAIN	Student will be able to: • Explain and compare micro-scale approaches used to reconstruct geomorphic history; • Identify properties that influence the development of soil and movement of soil water, as well as soil erodibility; • Evaluate the use of digital soil mapping as an approach to map soils; • Analyse and relate hydrological processes such as connectivity, catchment response; • Explain and compare water erosion processes, causes, assessment and control; • Explain and compare wind erosion processes, causes, assessment and control.
GEOP	3724	Environmental management and analysis	Environmental management as a broad field of study, with a focus on the South African situation. Processes and systems in the environment, envronmental management plans, integrated environmenta management procedures, environmental impact analyses, environmental auditing, evaluation models.	MAIN	Student will be able to: • Interpret South African environmental law; • Distinguish between various environmental management tools, and be able to evaluate the use of different environmental management options under various situations; • Apply various environmental management tools (EIA, SIA, EA, SEA); and • evaluate the effective use of environmental management tools in various case studies.
GISC	2624	Introduction to Geographical Information Science	The modules provides a theoretical framework of GIS, including: visual perception, graphicacy, cartographic communication , symbolization , computer cartography, data structures and databases, collection and verification of data, spatial analysis and spatial modelling and the presentation of information with the aid of GIS. The modules also looks at coordinated transformations, projection-to-projection transformations, identification of features on aerial photographs and introductory photogrammetry.	MAIN	Student will be able to: • Describe and discuss theoretical concepts in GIS; • Identify what possibilities and constraints a GIS has; • Identify and collect the most suitable data for specific objectives; • calculate coordinate and projection transformations and photogrammetric quantities; • Evaluate data collection methods regarding data quality, • Identify sources for spatial and attribute data; • Plan and execute a GIS project; and • Be proficient in the use of a GIS software package.
GISC	3704	Professional practice, Ethics and legal aspects of Geographical Information Science	The module investigates professionalism and professional ethics in GIS, private practice, partnerships and relevant legislation. It further focusses on the SA geospatial profession, SA Geomatics Council (including all relevant legislation and rules). Social responsibility including topics on social issues in GIS such as public participation , data privacy, project management and participatory GIS are also discussed.	MAIN	Student will be able to: • Interpret the purpose of the Geomatics Act and other legislation pertaining to GISc Practice; • Apply and comment on the concepts of corporate strategy, budgeting, the pricing decision, decentralised control and standard costing as they relate to the processes of planning and control; • Assess and evaluate ethical conduct as expected from registered persons; and • Identify the ethical issues that typically arise in GISc Projects, evaluating existing codes of ethical conduct in various situations.
GISC	3724	Geographic Information Science	Geographical data and the computer, data collection and data transfer, data verification, quality control, interpolation, spatial analysis and spatial modelling with raster and vector data, the management of a GIS. Digital processing of multispectral, thermal, hyperspectral and microwave images as data source, representation of information, practical GIS research and report writing.	MAIN	Student will be able to: • Justify data collection and transfer techniques in relation to data quality and analysis methods; • Evaluate modelling and analytical methods used with different data models; • Recommend a suitable management and implementation model for GIS deployment in the private or public sector; and • Develop, apply and report on a suitable methodology to solve a spatial analysis problem.
GEOE	1514	Introduction to Physical Geography	The module offers an introduction to the working of the universe, solar system, earth, climatology, hydrogeography, soilgeography, biogeography, weathering and erosion, geomorphology, and environmental geography. Practicals: Elementary cartography and the representation and interpretation of map data.	QWA	Student will be able to: • Describe the basic factors and issues influencing weather and climate and be able to apply that knowledge to the South African situation; • Describe and discuss internal and external earth processes and apply the knowledge to the South African geomorphological landscape; • Describe the concepts influencing biogeography and the environment; and • Interpret topographical maps and do basic cartographical calculations

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEOE	1624	Introduction to Human Geography	This module aims to introduce the student to basic human Geography concepts including: Population dynamics, development of rural and urban settlements, urbanisation, agriculture and the provision of food, rural land use, sources of energy, and economic geography. Practicals build on the basic map work and cartography principles introduced in the first semester and continue with advanced map interpretation, ellipsoids, datums, and map projections.	QWA	Student will be able to: • Describe and discuss population dynamics and the movement of people and apply this knowledge to the South African situation; • Explain the factors and concepts influencing rural and urban development and land use and apply the knowledge to the South African situation; • Describe energy availability and economic geography and how these factors influence human movement; and • Interpret and analyse topographical maps and aerial photographs
GEOG	1514	Introduction to Physical Geography	The module offers an introduction to the working of the universe, solar system, earth, climatology, hydrogeography, soilgeography, biogeography, weathering and erosion, geomorphology, and environmental geography. Practicals: Elementary cartography and the representation and interpretation of map data.	QWA	Student will be able to: • Describe the basic factors and issues influencing weather and climate and be able to apply that knowledge to the South African situation; • Describe and discuss internal and external earth processes and apply the knowledge to the South African geomorphological landscape; • Describe the concepts influencing biogeography and the environment; and • Interpret topographical maps and do basic cartographical calculations
GEOG	1624	Introduction to Human Geography	This module aims to introduce the student to basic human Geography concepts including: Population dynamics, development of rural and urban settlements, urbanisation, agriculture and the provision of food, rural land use, sources of energy, and economic geography. Practicals build on the basic map work and cartography principles introduced in the first semester and continue with advanced map interpretation, ellipsoids, datums, and map projections.	QWA	Student will be able to: • Describe and discuss population dynamics and the movement of people and apply this knowledge to the South African situation; • Explain the factors and concepts influencing rural and urban development and land use and apply the knowledge to the South African situation; • Describe energy availability and economic geography and how these factors influence human movement; and • Interpret and analyse topographical maps and aerial photographs
GEOG	2614	Process Geomorpholgy	Fluvial geomorphology, hydrology and hydraulics, flow modelling, aeolian geomorphology, karst geomorphology, slopes and slope processes. .	QWA	Student will be able to: • Explain how geomorphic processes (i.e. fluvial, aeolian, karst and slope) shape/create landforms; • Compare and contrast the role of surface and subsurface processes in landscape development; • Discuss the interaction between landforms, geomorphic processes and human activities; • Defend why certain landscapes are not suitable for human activities; and • Propose a number of solutions on how certain landscapes should be managed
GEOG	2624	Environment and climate studies	Environmental problems and causes, history of the use and conservation of resources, ecosystems and how they work, population dynamics and the influence on the environment, pollution and solid waste. Weather and climate systems of the Souhern hemisphere and climate variability.	QWA	Student will be able to: • Identify and discuss the problems associated with resource use; • Discuss and identify environmental problems and their causes; • Identify and compare developmental options in terms of their environmental impacts; • Identify and interpret weather and climate systems that affect the South African situation; and • Assesses the link between environmental problems and climate variability.
GEOG	2634	Housing and Urban development	Components of development: theoretical framework: development and criteria of measuring, spatial models, characteristics of third world countries, local development. Urban components: human settlements, spatial models, intra urban structure, urbanisation in first and third world context, impact of urbanisation on the physical and social environment, economic activities, residential function, housing and services, transport, social dynamics, institutional framework,problems and challenges of first and third world cities, case studies.Spatial analysis: collection and preparation of data, statistical principles of application in spatial analysis, application programs, interpretation of results, case studies.	QWA	Student will be able to: -discuss the urban processes and economic activities in urban settlements; b) knowledge of residential areas and problems occurring in the city; -examine the concept development and the role of urban areas in this process; -discuss the theoretical paradigms describing the concept of development; -discuss the implementation of this theoretical development framework in the South African space economy; as well as the knowledge to identify and interpret urban phenomena and problems in practise; • use the interpretation and description of data; and • interpret maps.
GEOG	2644	Biogeography and climate of Southern Africa	The module aimed at introducing learners to Biogeography and climatic processes affecting regional South African environment. It adopts a multi-disciplinary approach which looks at the interactions between the Biogeography and Climate and explains, in terms of systems theory, how the environment is modified and the role that humans have on these processes within the Southern African Context.	QWA	Student will be able to: -Discuss how history of Biogeography and Climate shaped the environment of Southern Africa -Identify the Climatic indices and classifications in relation to the biogeography of southern Africa -Explain the factors responsible for climatic seasons of Southern Africa

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEOG	3714	Environmental Geomorphology	Development of geomorphology as a discipline. Micro-scale geomorphologic processes. Introduction to geomorphology in Quaternary studies. Soils and sediments in geomorphology. Applied geomorphology. Geomorphology for	QWA	Student will be able to: • Compare different approaches used by geomorphologists in studying landforms; • Explain the principles underlying the different types of absolute dating; • Evaluate different methods for dating quaternary and holocene material in terms of their advantages and limitations; • Justify why knowledge of the engineering properties of soil and sediment is important for geomorphologists; and • Discuss different types of geomorphological evidence for environmental change during the late Quaternary in southern Africa.
GEOG	3724	Rural Geography	The course aims to provide an intoduction to rural development issues globally. It investigates the sustainable development of rural areas, the impact of migration on the development of rural areas, poverty as it manifests itself in different forms in rural areas, how poverty can be reduced in rural areas and studies rural• urban linkages.	QWA	Student will be able to: • Evaluate the basic issues in rural development globally; • Critically analyse theories governing sustainable development of rural areas; • Evaluate the impact of migration in rural areas; • Analyse polocies addressing poverty reduction in rural areas; and • Discuss and apply rural• urban linkages in the South African context.
GEOG	3734	Applied Urban Development and Spatial Transformation	Geography of apartheid, inequality and post-apartheid, spatial transformation of urban areas, changing urbanisation processes and patterns, spatial re-integration of the former homelands.	QWA	Students will be able to: • analyse the geography of apartheid scientifically; -interpret the geography of inequality on national, regional and local level; -discuss the geography of post-apartheid and to be able to apply the concept; -critically analyse urbanisation and urban growth as spatial processes, to identify challenges associated with fast growing cities and to propose possible solutions; -critically analyse the spatial transformation of urban areas, to identify future challenges and -propose possible solutions in this regard.
GEOG	3744	Environmental management and analysis	Environmental management as a broad field of study, with a focus on the South African situation. Processes and systems in the environment, envronmental management plans, integrated environmenta management procedures, environmental impact analyses, environmental auditing, evaluation models.	QWA	Student will be able to: • Interpret South African environmental law; • Distinguish between various environmental management tools, and be able to evaluate the use of diffferent environmental management options under various situations; and • Apply various environmental management tools (EIA, SIA, EA, SEA).
GEOG	3754	Economic Geography	The module is designed for students to understand economic geography as a dynamic, diverse and contested body of knowledge that aims to provide critical insights into the workings of contemporary societies and economies. The module will introduce the students to basic approaches, concepts and theories that economic geographers use; it will help students to understand how these concepts and theories may be applied in the context of the globalising world economy; and it will make learners aware of the ways in which economic geography approaches can inform policymaking.	QWA	Student will be able to: • explain the importance of economic geography in analysing contemporary societies and economies discuss and analyse the basic concepts and key theoretical approaches in economic geography - discuss the dynamic, diverse and contested body of knowledge of economic geography • apply this knowledge to key social and economic issues in the context of economic globalisation • evaluate policy options for overcoming inequality and uneven development in the globalising world.
GEOG	3764	Ethical debates in Geography	This course will examine many of the current major environmental issues related to the atmosphere, the hydrosphere, the lithosphere, and the biosphere as well as looking at major threats posed by the environment itself in the form of natural hazards. In addition, the issue of nuclear threat and the ever-increasing demand for energy are explored. It explores environmental materials in a variety of media and teaches students how to navigate these materials; how to analyze and evaluate information; how to balance information from a variety of scientific and non-scientific, objective and subjective sources; and how to develop arguments surrounding environmental problems. Finally, the matter of sustained development and intelligent management of the planet for this and future generations is addressed.	QWA	Student will be able to: • identify and discuss a number of major global, regional and local environmental issues and link them to contemporary socio-economic and political considerations while maintaining a geographical perspective -use basic environmental literacy, take part in informed debate and apply this skills to develop action plans
GEOR	1514	Introduction to Physical Geography	The module offers an introduction to the working of the universe, solar system, earth, climatology, hydrogeography, soilgeography, biogeography, weathering and erosion, geomorphology, and environmental geography. Practicals: Elementary cartography and the representation and interpretation of map data.	QWA	Student will be able to: • Describe the basic factors and issues influencing weather and climate and be able to apply that knowledge to the South African situation; • Describe and discuss internal and external earth processes and apply the knowledge to the South African geomorphological landscape; • Describe the concepts influencing biogeography and the environment; and • Interpret topographical maps and do basic cartographical calculations

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEOT	1624	Tourism Geography	The aim of the module tourism geography is to introduce students to the geographical distribution of tourism, travel patterns, and the impact of tourism on the natural environment, economics and social behaviour of local communities and destinations.	QWA	Student will be able to: • Describe geographical spatial patterns on the economic, environmental and social impacts of tourism and travel on communities -Explain and discuss the facts that tourism occurs in places involving the movement and activities through the creation of relationships among places, landscapes and people -Determine the social impact of tourism and travel on communities -Identify and explain the economic impact of tourism on geographical areas and destinations • appreciate the role of tourism in the past, present and future in terms of its importance of places, countries and tourists.
GEOT	2614	Global Tourism Studies	The aim of this module is to introduce students to the basic concepts and systems underlying scientific tourism studies. It also defines the concept tourist, different types of tourists, the reasons why visitors travel and the different experiences that enhance the tourism industry. It includes the understanding of tourism from an historical and global society perspective. Identify the social and economic impact of tourism on the community	QWA	Student will be able to: -Define, describe and compare different tourism systems and products -Identify the type of tourist, travel patterns and experiences -Identify the primary and secondary aspects of tourism -Explain tourism development from a historical perspective -Indicate and understand global travel trends in tourism -Explain the social and economic impact of tourism on the community
GEOT	2624	Primary and Secondary Aspects of Tourism Studies	The aim of this module is to build on and improve the knowledge on basic concepts and systems underlying the development of the tourism industry. The content also emphasises the role of the following industrial sectors in the promotion tourism at national and international level; the transport industry, accommodation and catering sector, natural and cultural attractions.	QWA	Student will be able to: Explain the important role and spatial implication of the transport industry in tourism Discuss the different modes of transport on the distance-decline effect Identify the role of accommodation and catering in the tourism industry Identify and discuss aspects pertaining to the development of accommodation Identify and explain the role of natural and cultural attractions in the tourism industry
GEOT	3714	Tourism Development and Policy	This module aims to introduce the student to different theories of development and to emphasise the relationship between tourism and development. The study includes concepts of pro-poor tourism and responsible tourism. Four themes are covered in the first semester. These are; 1. Development theories and tourism theory, 2. Relationship between development and tourism, 3. Barriers to tourism development and, 4.Tourism policy in South Africa	QWA	Student will be able to: -Explain the evolution of the main theories of development -Define and discuss the various concepts of tourism -Analyse the relationship between tourism and development -Discuss the various barriers to tourism development -Discuss tourism policies and their implementation in South Africa with reference to Responsible Tourism.
GEOT	3724	Nature Tourism Studies	The aim of this module is to introduce various policies, institutional and management practices that can enhance nature tourisms contribution to biodiversity conservation, economic and community development. The focus is on those tourist experiences that are related to natural attractions and includes ecotourism, adventure tourism, wildlife tourism and nature retreats.	QWA	Student will be able to: • Identify the impact of various conservation policies, institutional and management practises on the enhancement of the nature tourism industry -Identify and understand parks and protected areas management contribution to sustainable nature tourism -Asses the economic and social contribution of nature tourism to local economies and disadvantage communities -Explore the impact of different nature tourism activities contribution towards biodiversity conservation -Examine the major managerial option to improve the resource base of conservation -Explore the contribution of environmental communication and education to enhance enjoyment of natural resource and to facilitate public participation in decision making processes.
GEOT	3734	Tourism Cultural Studies	The aim of the module is to provide students with the theoretical framework to understand cultural tourism in the broader context of heritage studies. Students are introduced to the most important cultural historical activities in South Africa, with a specific focus on conserving cultural tourism in practice.	QWA	Student will be able to: -Explain an discuss the theoretical concept of cultural heritage within a broader community context. -Explain an discuss policies and regulations that governing cultural heritage in South Africa -Explain the role of different stakeholders and methods to ensure the conservation of cultural heritage -Identify specific strategies for local tourism organisations and communities to conserve cultural heritage -Investigate the positive and negative impacts of cultural tourism on local communities.
GEOT	3744	Tourism and Local Development in South Africa	The aim of the module is to assist students to recognise and understand the important role of tourism in Local Economic Development in South Africa. The emphasis is on the presence and or absence of pro-poor tourism development programmes, plans and projects in the South African context.	QWA	Student will be able to: -Discuss tourism and Local Economic Development Impacts -Analyse Pro-poor tourism and rural development • Discuss tourism and urban development -Describe pro-poor tourism and sustainable development • Analyse Pro-poor tourism and rural development

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GISS	2614	Introduction to Remote Sensing	The module is designed for students who are interested in the spatial dynamics of the environments with special focus on geographic information systems (GIS) students and more importantly imagery analysis. The module introduces students to the basics of remote sensing, characteristics of remote sensors, and remote sensing applications in academic disciplines and professional industries.	QWA	Student will be able to: -discuss the conceptual foundations and technical skills to apply remote sensing for problem solving in the environment; and -demonstrate the concepts and techniques of basic remote sensing practically.
GISS	2624	Introduction to Geographical Information Science	Theoretical framework of GIS, visual perception, graphicacy, cartographic communication , symbolization , computer cartography, data structures and databases, collection and verification of data, spatial analysis and spatial modelling and the presentation of information with the aid of GIS. Coordinated transformations, projection-to-projection transformations. Identification of features on aerial photographs and introductory photogrammetry.	QWA	Student will be able to: • Describe and discuss theoretical concepts in GIS; • Calculate coordinate and projecion transformations, photogrammetric quantities; • Evaluate data collection methods regarding data quality; and • Be proficient in the use of a GIS software package.
GISS	3724	Geographic Information Science	Geographical data and the computer, data collection and data transfer, data verification, quality control, interpolation, spatial analysis and spatial modelling with raster and vector data, the management of a GIS. Digital processing of multispectral, thermal, hyperspectral and microwave images as data source, representation of information, practical GIS research and report writing.	QWA	Student will be able to: • Justify data collection and transfer techniques in relation to data quality and analysis methds; • Evaluate modelling and analytical methods used with different data models; • Recommend a suitable management and implementation model for GIS deployment in the private or public sectpr; and • Develop, apply and report on a suitable methodology to solve a spatial analysis problem.
TURM	3714	Tourism and Policy	Tourism and Policy	QWA	Student will be able to: -Explain the evolution of the main theories of development -Define and discuss the various concepts of tourism -Analyse the relationship between tourism and development -Discuss the various barriers to tourism development -Discuss tourism policies and their implementation in South Africa with reference to Responsible Tourism.
TURM	3724	Tourism and Local Economic Development	Tourism and Local Economic Development	QWA	Student will be able to: -Discuss tourism and Local Economic Development Impacts. • Analyse tourism and rural development . • Discuss tourism and urban development. -Describe pro-poor tourism and sustainable development. -Identify and discuss the role of nature tourism in the industry. • Identify and discuss the role of cultural tourism in the industry.
Postgraduate					
BIOG	6826	Biogeography	Biogeography aims to understand the origin and distribution of species and the processes that cause them to change over time. The module introduces students to classic biogeographical theory and current research topics such as biological invasions and species distribution. In addition, the module will discuss how biogeographic information can be used to predict biological responses to future environmental change, and it will review concepts on biodiversity conservation.	MAIN	Students will be able to • compare the main theories underlying biogeographical research • describe the historical factors that influence current species distributions • analyse processes such as extinctions, biological invasion, and dispersal in interpreting biogeographical patterns • apply biogeographical concepts to a wide range of environmental problems
ENVG	6816	Environmental Policy and Practice	The course examines the nature of the environment, our environmental right and responsibilities towards nature and the environment. Subsequently, various environmental laws and the implications these have on environmental management are dealt with.	MAIN	Student will be able to: • Critically analyse the concept of nature and the environment; • Argue and motivate humanity's responsibility towards nature and the environment; • Identify and interpret various environmental laws pertaining to various environmental management tools; and • Apply various environmental laws to a case study.
ENVG	6826	Environmental Policy and Practice	The course examines the nature of the environment, our environmental right and responsibilities towards nature and the environment. Subsequently, various environmental laws and the implications these have on environmental management are dealt with.	MAIN	Student will be able to: • Critically analyse the concept of nature and the environment; • Argue and motivate humanity's responsibility towards nature and the environment; • Identify and interpret various environmental laws pertaining to various environmental management tools; and • Apply various environmental laws to a case study.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ENVG	6846	Integrated Environmental Management	The module starts with an in depth discussion on sustainability, sustainable development and sustainable assessment which forms the background on which Integrated Environmental Management is based. The module continues to investigate various IEM tools including, EIA, EMS, SIA, SEA, etc. from an academic and theoretical point of view by trying to answer questions regarding the goal, achievement, success, quality and contribution towards sustainability.	MAIN	Student will be able to: • Critically evaluate and compare various sustainability theories and principles; • Critically analyse various IEM tools in terms of goal, success and quality; and • Critically analyse the contribution of various IEM tools towards sustainability
ENVR	8900	Environmental Management Dissertation	This module contains fundamental knowledge, theories, principles and practices of Environmental Management, including: Research project in specialized field of Environmental Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: • Identify the problem • Formulate a hypothesis • Do independent planning and then conduct the experiments • Analyse and interpret the results • Discuss the results comprehensively • Compile the information according to a specified dissertation structure • Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ENVR	9100	Environmental Science Thesis	This module contains fundamental knowledge, theories, principles and practices of Environemental Science, including: Research project in specialized field of Environemental Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified thesis structure; and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEOF	6816	Theoretical Foundations of Geography	The module aims to familiarise students with philosophy of science in general, and the philosophy of geography in particular. It starts with a brief introduction to philosophy in general, the universe around us, and the general ethics behind scientific enquiry and research. It proceeds to examine the development of geographical thought and the evolution of the discipline. Conceptions in geography from the late seventeenth century, through positivism and into post modernism are assessed and evaluated.	MAIN	Student will be able to: • Formulate and express his or her own opinion based on philosophical principles and viewpoints, regarding Nature in general, and Geography in particular; • Identify and uphold responsible conduct as an essential part of “good” research; • Review and analyse the main trends in Geographical research over the past 20 years; and • Reflect on his or her own contribution to Geography as a discipline.
GEOH	6816	Urban Geography	The aim of this course is to understand the dynamic constitution of urban geography as a sub-discipline, as well as to gain insight into the relationship between past and present approaches to cities. Furthermore, this course aims to engage a selection of themes that represent significant foci in current urban geographical research. There is a central focus on what “ordinary cities” are, the core debates concerning “world cities”, gentrification, gated communities and our “right to the city”.	MAIN	Student will be able to: • Critically analyse and reflect on different historical and contemporary theoretical conceptualisations of cities; • Identify and critically analyse urban processes that shape contemporary urban places; and • Reflect on the relevance of historical and contemporary conceptualisations of the cities and the processes shaping them.
GEOH	6836	Rural Geography	The course aims to discuss spatial transformation of rural areas in South Africa from 1950s to the present. History of rural areas will be uncovered and debates on issues of the economy, betterment planning, background on homeland development and relocation camps in rural areas are discussed. Post-apartheid policies towards rural development that address issues of economy, society, politics and environment will be analysed. Finally, beyond the rural-urban divide, the role of women in rural-urban linkages is assessed.	MAIN	Student will be able to: • Assess the historical development of rural areas, • Evaluate the impact of post-apartheid policies on rural development, • Analyse land reform issues in South Africa, • Assess local economic development in rural areas, and • Evaluate the role of women in rural-urban linkages
GEOH	8900	Geography Dissertation	This module contains fundamental knowledge, theories, principles and practices of Geography, including: Research project in specialized field of Geography as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Displayed independent research skills and the ability to present the results in a dissertation written according to academic standards; -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEOH	9100	Geography Thesis	This module contains fundamental knowledge, theories, principles and practices of Environmental Management, including: Research project in specialized field of Environmental Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: Identify the problem Formulate a hypothesis Do independent planning and then conduct the experiments Analyse and interpret the results Discuss the results comprehensively Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEOP	6816	Applied Geomorphology	The module familiarise students with the role of geomorphology as an important branch of physical earth sciences. Specifically, the module deals with: Applied geomorphology in the context of land management, and in particular fluvial and aeolian processes; The combined application of GIS and remote sensing techniques, and in particular mapping and modelling of soils and erosion risk in South Africa; The development of twentieth and twenty first century geomorphology, including the shift to more process-oriented studies and a range of new methodologies (microgeomorphology) over the past few decades; Selected landforms that occur in a variety of environments, and investigate their development through past or present climate-driven processes as well as the materials & methods used to investigate and monitor these landforms; Discuss biological factors that act as landscape development agents; The future of process geomorphology• looking towards Mars.	MAIN	Student will be able to: • Critically analyse how the discipline of Geomorphology, and particularly the focus and approach to geomorphological research, has changed since the late nineteenth century; • Evaluate the role of remote sensing and GIS techniques in geomorphology; • Justify why Geomorphologists look at processes at the macro• and the micro-scale; and • Motivate the role that Geomorphologists play in identifying, assessing and managing problems in the physical environmental
GEOP	6826	Applied Geomorphology	The module familiarise students with the role of geomorphology as an important branch of physical earth sciences. Specifically, the module deals with: Applied geomorphology in the context of land management, and in particular fluvial and aeolian processes; The combined application of GIS and remote sensing techniques, and in particular mapping and modelling of soils and erosion risk in South Africa; The development of twentieth and twenty first century geomorphology, including the shift to more process-oriented studies and a range of new methodologies (microgeomorphology) over the past few decades; Selected landforms that occur in a variety of environments, and investigate their development through past or present climate-driven processes as well as the materials & methods used to investigate and monitor these landforms; Discuss biological factors that act as landscape development agents; The future of process geomorphology - looking towards Mars.	MAIN	Student will be able to: • Critically analyse how the discipline of Geomorphology, and particularly the focus and approach to geomorphological research, has changed since the late nineteenth century; • Evaluate the role of remote sensing and GIS techniques in geomorphology; • Justify why Geomorphologists look at processes at the macro• and the micro-scale; and • Motivate the role that Geomorphologists play in identifying, assessing and managing problems in the physical environmental
GEOR	6808	Geography Research Report	This module includes deciding on a paradigm; using literature; writing an introduction; stating a purpose for the study; identifying research questions and hypotheses; using theory; defining, delimiting and stating the significance of the study and advancing methods and procedures for data collection and analysis. The objective of this course is to guide the research student through this process in a structured manner.	MAIN	Student will be able to: • Critically analyse the practical considerations that would influence the success of his/her research project; • Confidently prepare and present presentations regarding the progress of his/her project using appropriate technology; • Evaluate and appropriately address critique against the project; and • Present his/her research project in a well written report incorporating all aspects as discussed in the theory sessions, including the research findings, discussion of findings, drawing logical conclusions from the findings and linking it to published literature in the field of study.
GEOR	8900	Geography Disseration	This module contains fundamental knowledge, theories, principles and practices of Geography, including: Research project in specialized field of Geography as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Reflect critically on theory and its application -Deal with complex issues both systematically and creatively, -Design and critically appraise research, -Make sound judgement using data and information at their disposal -Communicate their conclusions clearly to specialist and non-specialist audiences -Demonstrate self-direction and originality in tackling and solving problems, -Act autonomously in planning and implementing tasks with a theoretical underpinning and continue to advance their knowledge, understanding and skills.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEOR	9100	Geography Thesis	This module contains fundamental knowledge, theories, principles and practices of Geography, including: Research project in specialized field of Geography, as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure; and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
GISC	6816	Spatial analysis and modelling	Organising concepts of geospatial analysis and their methodological context, core components of geospatial analysis including distance and directional analysis, geometrical processing, map algebra and grid models, the use of exploratory spatial data analysis and spatial statistics, spatial auto correlation and spatial regression, surface analysis, interpolation and analysis of form, network and locational analysis, geocomputational methods such as cellular automata, agent based modelling, neural networks and genetic algorithms.	MAIN	Student will be able to: • Appraise various geo-analytical methods and techniques with reference to the contextual background of spatial analysis and modelling; • Construct suitable analytical models for the solution of spatial problems; • Motivate and apply suitable statistical techniques in the analysis of spatial data; and • Develop and deploy suitable methods for the solution of geocomputational problems.
GISC	8900	Geographical Informatic Sience Disseration	This module contains fundamental knowledge, theories, principles and practices of GIS, including: Research project in specialized field of GIS as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: • Identify the problem; • Formulate a hypothesis; • Do independent planning and then conduct the experiments; • Analyse and interpret the results; • Discuss the results comprehensively; • Compile the information according to a specified dissertation structure; and • Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GISC	9100	Geography Thesis	Geography This module contains fundamental knowledge, theories, principles and practices including: Research project in the specialized field of Geographical Information Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GISR	6826	Remote Sensing and Image processing	Topics for discussion include the fundamentals of remote sensing, elements and basic principles of photogrammetry, visual image interpretation, multispectral, thermal and hyperspectral sensing, recourse satellites such as Landsat and Spot as well as microwave and radar sensing. Basic practical procedures include image rectification and enhancement, contrast and spatial manipulation and various classification methods.	MAIN	Student will be able to: • Differentiate and undertake various calculations relating to photogrammetry; • Analyse various methods used in image interpretation; • Compare and critique Landsat and Spot; as well as high versus low resolution remote sensing systems; and • Successfully complete software based calculations, processes and manipulations of images.
GEOG	6808	Research Report in Geography	This module includes deciding on a paradigm; using literature; writing an introduction; stating a purpose for the study; identifying research questions and hypotheses; using theory; defining, delimiting and stating the significance of the study and advancing methods and procedures for data collection and analysis. The objective of this course is to guide the research student through this process in a structured manner.	QWA	Student will be able to: • Critically analyse the practical considerations that would influence the success of his/her research project; • Confidently prepare and present presentations regarding the progress of his/her project using appropriate technology; • Evaluate and appropriately address critique against the project; and • Present his/her research project in a well written report incorporating all aspects as discussed in the theory sessions, including the research findings, discussion of findings, drawing logical conclusions from the findings and linking it to published literature in the field of study.
GEOG	6814	Intermediate geographic information systems	This module aims to provide a working knowledge of GIS to students with little or no previous experience of the science After successful completion of the module, the student should have a thorough knowledge of the basic principles of Geographic Information Systems and be able to do simple data import, processing, analyses and presentation on a computer. The student will have basic cartographic and surveying skills; be able to identify features on photographs; and have basic knowledge of satellite images and image processing.	QWA	Student will be able to: • Examine possibilities and constraints of a GIS and Remote Sensing is; • Identify and collect the most suitable data for specific objectives; • Apply GIS and Remote Sensing to different projects ; • Plan and execute a GIS and Remote Sensing project, and • Use a GIS and Remote Sensing programme.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEOG	6816	Theoretical Foundations of Geography	The module aims to familiarise students with philosophy of science in general, and the philosophy of geography in particular. It starts with a brief introduction to philosophy in general, the universe around us, and the general ethics behind scientific enquiry and research. It proceeds to examine the development of geographical thought and the evolution of the discipline. Conceptions in geography from the late seventeenth century, through positivism and into post modernism are assessed and evaluated.	QWA	Student will be able to: • Formulate and express his or her own opinion based on philosophical principles and viewpoints, regarding Nature in general, and Geography in particular; • Identify and uphold responsible conduct as an essential part of 'good' research; • Review and analyse the main trends in Geographical research over the past 20 years; and • Reflect on his or her own contribution to Geography as a discipline
GEOG	6826	Environmental policy and Practice	The course examines the nature of the environment, our environmental right and responsibilities towards nature and the environment. Subsequently, various environmental laws and the implications these have on environmental management are dealt with.	QWA	Student will be able to: • CriticalLy analyse the concept of nature and the environment; • Argue and motivate humanitys responsibility towards nature and the environment; • Identify and interpret various environmental laws pertaining to various environmental management tools; and • Apply various environmental laws to a case study
GEOG	6836	Applied Geomorphology	Students are familiarised with: the development of nineteenth, twentieth and twenty first century geomorphology, the move towards process-oriented studies and new methodologies (micro-geomorphology) , southern African geomorphology and the Quaternary of southern Africa, the geomorphology of semi-arid and arid southern Africa, including the Free State province, applied geomorphology in the context of land management in the Free State and its impacts on landforms and the agricultural base.	QWA	Student will be able to: • Critically analyse how the discipline of Geomorphology, and particularly the focus and approach to geomorphological research, has changed since the late nineteenth century; • Explain how process geomorphology and historical geomorphology inform each other; • Evaluate the role of remote sensing and GIS techniques in geomorphology; • Justify why Geomorphologists look at processes at the macro• and the micro-scale; and • Motivate the role that Geomorphologists play in identifying, assessing and managing problems in the physical environmental.
GEOG	6846	Integrated Environmental Management	The module starts with an in depth discussion on sustainability, sustainable development and sustainable assessment which forms the background on which Integrated Environmental Management is based. The module continues to investigate various IEM tools including, EIA, EMS, SIA, SEA, etc. from an academic and theoretical point of view by trying to answer questions regarding the goal, achievement, success, quality and contribution towards sustainability.	QWA	Student will be able to: • Critically evaluate and compare various sustainability theories and principles; • Critically analyse various IEM tools in terms of goal, success and quality; and • Critically analyse the contribution of various IEM tools towards sustainability
GEOG	8900	Geography : Disseration	This module contains fundamental knowledge, theories, principles and practices of Geography, including: Research project in specialized field of Geography as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	QWA	Student will be able to: • Identify the problem; • Formulate a hypothesis; • Do independent planning and then conduct the experiments; • Analyse and interpret the results; • Discuss the results comprehensively; • Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and • Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEOG	9100	Geography Thesis	This module contains fundamental knowledge, theories, principles and practices of Geography, General including: Research project in specialized field of Geography, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student should be to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GISS	6816	Spatial analysis and modelling	Organising concepts of geospatial analysis and their methodological context, core components of geospatial analysis including distance and directional analysis, geometrical processing, map algebra and grid models, the use of exploratory spatial data analysis and spatial statistics, spatial auto correlation and spatial regression, surface analysis, interpolation and analysis of form, network and locational analysis, geocomputational methods such as cellular automata, agent based modelling, neural networks and genetic algorithms.	QWA	Student will be able to: • Appraise various geo-analytical methods and techniques with reference to the contextual background of spatial analysis and modelling; • Construct suitable analytical models for the solution of spatial problems; • Motivate and apply suitable statistical techniques in the analysis of spatial data; and • Develop and deploy suitable methods for the solution of geocomputational problems

Geology (108)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGY	1614	Introduction to Geology	Universe, solar system, earth, internal structure of the earth, palaeomagnetism and age determination, plate tectonics, crystallography, mineralogy, rock types, structural geology, stratigraphical principles metamorphism, igneous, metamorphic and sedimentary petrology, volcanism, erosion, transport and deposition, weathering and pedogenesis, groundwater, geological time, geomorphology, mineral and energy resources and sustainability. Practical work: Crystallographic systems, identification of the most common minerals and rock formations.	MAIN	Student will be able to: -Describe processes acting on and in the earth including execution of processes to solve problems and explain natural phenomena related to minerals, rocks and geological process -Recognise and classify minerals, rocks and geological structures;and -Evaluate, select and apply appropriate methods, procedures and/or techniques in processes of investigation or application within a defined context.
GLGY	1624	General Geology	This module contains fundamental knowledge, theories, principles and practices of Geology, including: -Mineralogy: crystal structure, minerals; -Igneous rocks: volcanism, origin, nature and composition; -Sedimentary rocks: origin, nature and composition; -Metamorphic rocks: origin, nature and composition; -Plate tectonics: processes and products; -Palaeontology: fossils, geological timetable; -Stratigraphy: principles, South African stratigraphy, with reference to economic mineral deposits and fossil content; and -African Plate: origin and development.	MAIN	Student should be able: -Explore and explain natural geological processes active in, on and under the Earth's crust; -Apply the basic skills and techniques to identify, compile and interpret geological processes and phenomena; -Explore the stratigraphy and associated rocks and fossils of Southern Africa
GLGY	2612	Petrographical minerology	This is a practical course, where basic principles and techniques of crystallography, optical mineralogy, crystal chemistry and mineralogy, as well as the identification and classification of rock-forming and ore minerals in hand samples as well as rock-forming minerals under the microscope.	MAIN	Student will be able to: - Identify minerals in hand specimens; - Use a petrographic microscope and identify minerals under the microscope; and - Identify crystal structures and lattices and discuss and present on these structures.
GLGY	2614	Advance mineralogy	This module contains fundamental knowledge, theories, principles and practices of Geology, including: Crystallography: space lattices, Bravais lattices, Hermann-Mauguin symbols and twinning in crystals. Mineralogy and crystal chemistry: bonds in metals and minerals. Applications of mineralogy: study of the most important minerals in each mineral class with special reference to chemical composition, crystal structure, physical characteristics, formation conditions and uses.	MAIN	Student will be able to: -Identify minerals; -Identify Crystal systems and lattices; -Identify Physical properties; -Identify Chemical properties; -Discuss the difference between rock-forming and ore minerals and their implication; and -Discuss and apply the theoretical principles of crystallography and the crystal chemistry of ore and rock-forming minerals.
GLGY	2622	Sedimentological applications	This module contains fundamental knowledge, theories, principles and practices of Geology, including, practical application of sedimentological principles in borehole core logging, measurement of geological profiles and the compilation of geological maps in order to define palaeo depositional environments.	MAIN	Student will be able to: - Compile and interpret sedimentological maps; - Measure and compile geological profiles; - Log borehole core and compile geological profiles; and - Interpret and discuss sedimentary units and reconstruct the palaeo depositional environment.
GLGY	2624	Advanced Sedimentology	This module contains fundamental knowledge, theories, principles and practices of Geology, including introduction to sedimentology, physical characteristics, composition and classification of sedimentary rocks, sedimentary structures and depositional environments, sedimentary facies and basin analysis, stratigraphic definitions, analysis of selected depositional basins in southern Africa, reconstruction of Gondwana.	MAIN	Student will be able to: - Discuss and apply processes, which operate on the surface of the Earth and will also be able to identify the products of these processes; and - Interpret all stratigraphic data in a competent manner in order to forecast where minerals and rocks of economic and strategic importance could occur.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGY	2626	Sedimentology principles and applications	Theory: This module contains fundamental knowledge, theories, principles and practices of Geology, including introduction to sedimentology, physical characteristics, composition and classification of sedimentary rocks, sedimentary structures and depositional environments, sedimentary facies and basin analysis, stratigraphic definitions, analysis of selected depositional basins in southern Africa, reconstruction of Gondwana. Practical: fundamental knowledge, theories, principles and practices of Geology, including, practical application of sedimentological principles in borehole core logging, measurement of geological profiles and the compilation of geological maps in order to define palaeo depositional environments.	MAIN	Student will be able to: - Discuss and apply processes, which operate on the surface of the Earth and will also be able to identify the products of these processes; - Interpret all stratigraphic data in a competent manner in order to forecast where minerals and rocks of economic and strategic importance could occur; and -Examine and discuss sedimentology and sedimentological principles. Practical: - Compile and interpret sedimentological maps; - Measure and compile geological profiles; - Log borehole core and compile geological profiles; and - Study sedimentary units and reconstruct the palaeo depositional environment.
GLGY	2632	Geological techniques: uses and applications	This module contains fundamental knowledge, including: - Geohydrological principles: groundwater, structures and dewatering - Stratigraphy: depositional basins and rock types - Structural geology: basic structures and tectonites - Sedimentology: rock types, principles and techniques - Igneous geology: rock types and characteristics - Metamorphic geology: rock types, structures and textures - Economic geology: rock types and associated ore - Geological field techniques: geophysical techniques, compass use, mapping, statigraphic profiling, core mapping, GPS, collecting, documentation and interpretation of field observations and report writing - Geotechnical properties of rocks.	MAIN	Student will be able to: - Discuss and apply techniques that may be employed in field-based geological analyses - Apply theoretical knowledge on a practical basis - Map areas geologically, measure profiles, make geological observations and write reports.
GLGY	2641	Geology for Engineering Practical	Environmental geology practicals	MAIN	Student will be able to: -Apply Geographical principles.
GLGY	2642	Geological Environmental Management	This module contains fundamental knowledge, theories, principles and practices of Geology, Continuous evaluation by means of tasks and tests The identification and handling of environmental problems, pollution of surface and underground water, visits to waste storage and/or reclaimed mining areas.	MAIN	Student will be able to: - Familiarise with the practical techniques in the identification of heavy metal pollution. - Interpret data with sound judgement and discuss the observations in a report.
GLGY	2643	Geology for Engineering	This module contains fundamental knowledge, theories, principles and practices of Geology, Geochemistry and Geohydrology, weathering, engineering geological aspects, impact studies, geological risk areas, waste management, earth and human health, legal aspects.	MAIN	Student will be able to: - Describe and apply the basic principles related to natural processes; - Describe the influence of these processes on man and his environment and the influence of man on the environment; and - Apply theoretical knowledge with sound judgement to identify and manage geological hazards.
GLGY	2644	Environmental Geology	This module contains fundamental knowledge, theories, principles and practices of Geology, Geochemistry and Geohydrology, weathering, engineering geological aspects, impact studies, geological risk areas, waste management, earth and human health, legal aspects.	MAIN	The student should be able to: - Describe and apply the basic principles related to natural processes; - Describe the influence of these processes on man and his environment and the influence of man on the environment; and - Apply theoretical knowledge with sound judgement to identify and manage geological hazards.
GLGY	2646	Environmental Geology	This module contains fundamental knowledge, theories, principles and practices of Geology, Continuous evaluation by means of tasks and tests The identification and handling of environmental problems, pollution of surface and underground water, visits to waste storage and/or reclaimed mining areas.The identification and handling of environmental problems, pollution of surface and underground water, visits to waste storage and/or reclaimed mining areas.	MAIN	Student will be able to: - Describe and apply the basic principles related to natural processes; - Describe the influence of these processes on man and his environment and the influence of man on the environment; and - Apply theoretical knowledge with sound judgement to identify and manage geological hazards. - Be familiar with the practical techniques in the identification of heavy metal pollution. - Be able to interpret data with sound judgement and discuss the observations in a report
GLGY	2652	Geological structures and maps	This module contains fundamental knowledge, theories, principles and practices of Geology, including geological structures, maps and stratigraphic sections.	MAIN	Student will be able to: - Interpret geological structures and maps; - Apply the basic principles and techniques used in the construction of sections; and - Apply theoretical knowledge to practical problems with sound judgement

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGY	2662	Geology of Southern Africa: genesis and age relationships	This module contains fundamental knowledge, theories, principles and practices of Geology, including stratigraphic relationships, occurrences and origin of rocks and ores.	MAIN	Student will be able to: - Identify and classify rocks and minerals in nature - Apply theoretical knowledge with sound judgement - Discuss ore-deposits in southern Africa and to have a thorough knowledge of their occurrence.
GLGY	3714	Igneous Petrology	Principles of igneous petrogenesis: magma and the formation of igneous bodies, fractional crystallisation and magmatic differentiation. Igneous rocks within specific tectonic provinces: layered complexes, granites, basalt occurrences, alkaline rocks, kimberlite and carbonate associations and massive-type anorthosite. Microscopic description and classification of igneous rocks.	MAIN	Student will be able to: - Provide names to examples of common igneous rocks; - Describe the properties of igneous rocks from the viewpoints of both macro and microscopic format; - Provide probable origins for specific intrusions and complexes - Discuss and apply the essential characteristics of important South African occurrences such as the Bushveld Igneous Complex.
GLGY	3724	Economic Geology	Processes of ore formation with southern African examples: Orthomagmatic, hydrothermal (magmatic-), sedimentary, supergene and metamorphic, aspects of industrial minerals and fossil fuel formation. Mineral economics: Mineral legislation, mineral resource and ore reserve estimation and evaluation. The process of geological modelling, identification of ore minerals and textures in hand specimen, calculation of ore reserves, mine visit.	MAIN	Student will be able to: - Discuss and apply the ore-forming processes under different conditions and in different environments, how ore deposits form in the evolving Earth system and global tectonics. - Evaluate ore deposits and to make educated recommendations regarding the exploitation of the ore-body. - Explore for non-renewable ore deposits by means of sophisticated exploration techniques
GLGY	3734	Advanced structural Geology	This module contains fundamental knowledge, theories, principles and practices of Geology, including principles of deformation: geometry of stress, mechanical behaviour of crystals and rocks, shearing models, analysis of deformation. Structures: faults, joints, folds and fabrics. Practicals: Study of stress, faults, folds and deformation.	MAIN	Student will be able to: - Discuss and apply the principles and techniques associated with structural geology; - Apply this knowledge conceptually and practically for the purpose of a professional geological service; and - Develop suggested proposal to display readiness for independent post-graduate studies.
GLGY	3744	Metamorphic petrology	This module contains fundamental knowledge, theories, principles and practices of Geology, Macro-characteristics of metamorphites, classification, typomorphic minerals, chemographic representation. Processes of metamorphism. Practicals: Identification of typomorphic minerals, metamorphic textures, metamorphic rocks.	MAIN	Student will be able to:- Discuss the role the process of metamorphism plays in determining rock properties and which properties may be instrumental in unravelling the geological history (ore history) of an area; - Differentiate between the various metamorphic rocks and be able to apply internationally acceptable names to these rocks; and - Proceed with the mapping of metamorphic terrains
GLGY	3754	Introduction to Geochemistry	The processes by which chemical elements form in stars, and element distribution in the universe and our solar system; geochemical classification of elements, and element distribution in the rock cycle (chemical differentiation of the earth, including geochemical aspects of tectonic processes); calculation of reaction boundaries of geochemical reactions; the use of mineral geochemistry to construct geothermobarometric constraints; geochemistry of sedimentary rocks; multi-element normalised diagrams; the basic principles and uses of radioactive, radiogenic and light stable isotopes in geochronology and petrology; the use of major element data for rock classification. Practicals: Mineral chemistry calculations and whole rock normative mineralogy. Graphic representation of geochemical data. Self-study and the preparation of a geochemical research report; presentation of the report to a peer group audience.	MAIN	Student will be able to: -Discuss and explain distribution of elements in rocks; -Discuss and describe the classification schemes for elements and their applications; - Apply the application of distribution coefficients in geochemical interpretation; - Apply the principles and basic applications of geochronology and isotope geochemistry; -Define and discuss geothermobarometry and its application; -Define and discuss the basic applications of geochemistry on sedimentary cycles;and -Formulate and interpret the calculations of mineral formulas and normative mineralogy, using major element oxide data.
GLGY	3764	Exploration Geology	This module contains fundamental knowledge, theories, principles and practices of Geology, including Geochemical dispersion, anomalies, weathering effects on geochemical anomalies and geochemistry as a prospecting aid, volatile components, fluid inclusions, model systems and isochores. The secondary environment as a prospecting medium. Mineral economics and exploration; reconnaissance exploration; prospect and predevelopment; remote sensing; geophysical methods; exploration geochemistry; evaluation techniques; feasibility studies; case studies. Practicals: Analytical techniques in exploration geochemistry, threshold calculation in probability plots, statistical processing of data, modelling and interpretation of geochemical data, solving practical exploration problems according to Levinson.	MAIN	Student will be able to: - Discuss the factors that influence geochemical dispersion and the principles controlling the distribution and migration of elements in the Earth's crust; - Apply analytical techniques to geochemical exploration problems; - Interpret geochemical anomalies and their relationship to mineral deposits; and - Describe indicator minerals and pathfinder elements as proximity indicators to ore.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGY	3774	Analytical geochemistry	This module contains fundamental knowledge, theories, principles and practices of Geology, including the use and interpretation of geochemical data in a responsible manner; sampling of rocks, soils and water for geochemical analysis; methods for data quality assurance; the principles of instrumental analysis; the interpretation of electromagnetic and mass spectra; common analytical methods; statistical concepts needed for the intelligent reduction of geochemical data; the basic principles of physical metallurgy; interpretation of; geochemical maps and profiles. Practicals: Reduction, manipulation and interpretation of geochemical data; analytical methods for isotope analysis; methods for mineral separation prior to chemical analysis; preparation and presentation of geochemical reports.	MAIN	Student will be able to: - Reduce geochemical data in a sensible way for application to geological problems; - Prepare rocks for chemical analysis, especially by XRF; - Assess the quality of geochemical data; - Describe the role of the geologist within the mineral beneficiation cycle; - Discuss and apply the principles on which instrumental spectrometry is based; - Separate dense and magnetic minerals from a silicate matrix; and - Write a geochemical report and present conclusions.
GLGY	3784	Environmental Geochemistry	This module contains fundamental knowledge, theories, principles and practices of Geology, including basic principles of the distribution and geochemical behaviour of chemical elements in soil, water and air; interaction of surface geochemistry with humans; techniques for prediction and location of pollution; remediation and protection of the natural environment; the geochemical implications to the environment of various methods to generate energy on an industrial scale. Practicals: Geochemical modelling; field-based project.	MAIN	Student will be able to: - Apply pH-Eh reactions in water and soils and the ability to construct and interpret simple pH-Eh diagrams; - Discuss air chemistry and possible causes of atmospheric pollution; - Outline the manipulation water chemistry; - Describe the effects of mining and associated contamination on the natural environment, especially acid mine drainage; - Describe trace element distribution of typical soil profiles and the effect of grain size on concentration; - Familiarity with the most important factors that lead to toxicity in the natural environment and its rehabilitation; and - Discuss the application of isotopes in environmental geochemistry.
Postgraduate					
GECE	9100	Geochemistry Thesis	This module co3ntains fundamental knowledge, theories, principles and practices of Geochemistry, General including Research project in specialized field of Geochemistry, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
GLGA	7913	Overview of Geology, Mining, Metallurgy and Business Processes	This module introduces learners to the different functional disciplines through an overview of the important principles of Mineral Resource Management in strategic, tactical and operational environments, each in the different functional areas. The functional areas include geology, mining, beneficiation (plant), marketing, finance, human resources, plant maintenance, planning and scheduling, budgeting, maintenance and supporting processes, which in turn help to develop an adequate level of understanding in each of the functional areas and the interdependencies between functional areas present in the production environment with specific emphasis on product production, income, costs and market demand.	MAIN	Student will be able to: - Discuss and apply the fundamental concepts and principles of Geology, Mining, Metallurgy and Business Processes and the interdependency between these processes in the mining value chain. - Access, evaluate and synthesise scientific information. - Generate scientific information. - Communicate scientific understanding in writing and orally.
GLGA	7923	Overview of Geology, Mining, Metallurgy and Business Processes	This module introduces learners to the different functional disciplines through an overview of the important principles of Mineral Resource Throughput Management in strategic, tactical and operational environments, each in the different functional areas. The functional areas include geology, mining, beneficiation (plant), marketing, finance, human resources, plant maintenance, planning and scheduling, budgeting, maintenance and supporting processes, which in turn help to develop an adequate level of understanding in each of the functional areas and the interdependencies between functional areas present in the production environment with specific emphasis on product production, income, costs and market demand.	MAIN	Student will be able to: -Outline principles of fundamental concepts and principles of Geology, Mining, Metallurgy and Business Processes and the interdependency between these processes in the mining value chain. -Access, evaluate and synthesise scientific information. -Generate scientific information; and -Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGA	7933	Mineral Resource Management I (Methodology)	This module highlight the principles and methodology of Mineral Resource Management through the identification and quantification of process variables. The development of a business process concept with emphasis on product delivery, cost, income and market demand for the strategic, tactical and operational environments. Included are strategic evaluation of the long-term environment, as well as management and control of operations in terms of the budget and short-term plan. To enable learners to apply MRM principles to a business analysis with the purpose of identifying variables and dependencies that impact product delivery. To align the variables through planning and operations processes of the functional areas as a single business process.	MAIN	Student will be able to: - Describe MRM principles; - Apply MRM principles in a mining business analysis; - Identification and alignment of variables and dependencies impacting mining value chain performance; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGA	7943	Mineral Resource Management I (Methodology)	This module highlight the principles and methodology of Mineral Resource Management through the identification and quantification of process variables. The development of a business process concept with emphasis on product delivery, cost, income and market demand for the strategic, tactical and operational environments. Included are strategic evaluation of the long-term environment, as well as management and control of operations in terms of the budget and short-term plan. To enable learners to apply MRM principles to a business analysis with the purpose of identifying variables and dependencies that impact product delivery. To align the variables through planning and operations processes of the functional areas as a single business process.	MAIN	Student will be able to: -Explain MRM principles -Apply MRM principles in a mining business analysis -Identify and align variables and dependencies impacting mining value chain performance -Access, evaluate and synthesise scientific information. -Generate scientific information. -Communicate scientific understanding in writing and orally.
GLGA	7953	Applied Geology	This module assists the student with the identification of the influence of geological variables in the Mineral Resource Management environment in terms of the exploitation needs in the longterm and production environments. The learners will be lectured in the application of geology and geological information to the total production process to achieve optimum ore-utilisation through the application of a product focus. To enable the learner to determine and quantify variables pertaining to ore and ore- body morphology that has a critical influence on product delivery and profit. To equip the learner to structure and apply geological information in the Mineral Resource Management environment in order to better exploit the resource and utilise information to do target driven grade control.	MAIN	Student will be able to: - Identify of geological variables impacting mining value chain performance; - Identify of ore and ore body morphological factors impacting mining value chain performance; - Use geological data and information within the MRM context to improve ore extraction and grade control; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGA	7963	Applied Geology	This module assists the student with the identification of the influence of geological variables in the Mineral Resource Management environment in terms of the exploitation needs in the longterm and production environments. The learners will be lectured in the application of geology and geological information to the total production process to achieve optimum ore-utilisation through the application of a product focus. To enable the learner to determine and quantify variables pertaining to ore and ore- body morphology that has a critical influence on product delivery and profit. To equip the learner to structure and apply geological information in the Mineral Resource Management environment in order to better exploit the resource and utilise information to do target driven grade control.	MAIN	Student will be able to: -Identify of geological variables impacting mining value chain performance; -Identify of ore and ore body morphological factors impacting mining value chain performance; -Use geological data and information within the MRM context to improve ore extraction and grade control; -Access, evaluate and synthesise scientific information; -Generate scientific information; and -Communicate scientific understanding in writing and orally.
GLGA	7973	Applied Mining	This module teaches the students to develop and apply condition-driven standards in mine planning, scheduling and production management and control. Methods to determine the influence of “run-of-mine” quality on plant efficiency and product delivery. Exposure to the quantification, application and relevance of mining information to the production process (beneficiation, stockpile management). Included are the effects of maintenance performance and strategy in terms of condition-driven standards. The learner will be exposed to methods to align the “run-of-mine” volume and quality with the plant process, as well as determine the impact of variable ore and ore body morphology on the budget, economic evaluations and ore reconciliation. The practical application of the concepts in a production environment to optimise and improve income and profit on a daily basis will be emphasised.	MAIN	Student will be able to: - Develop and apply condition-driven standards in mine planning, scheduling and production management and control; - Determine the influence of “run-of-mine” quality on plant efficiency and product delivery; - Quantify and apply mining information to the production process (beneficiation, stockpile management). Included are the effects of maintenance performance and strategy in terms of condition-driven standards; - Align the “run-of-mine” volume and quality with the plant process, as well as determine the impact of variable ore and ore body morphology on the budget, economic evaluations and ore reconciliation; - Apply these concepts in a production environment to optimise and improve income and profit on a daily basis will be emphasised; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGA	7983	Applied Mining	This module teaches the students to develop and apply condition-driven standards in mine planning, scheduling and production management and control. Methods to determine the influence of "run-of-mine" quality on plant efficiency and product delivery. Exposure to the quantification, application and relevance of mining information to the production process (beneficiation, stockpile management). Included are the effects of maintenance performance and strategy in terms of condition-driven standards. The learner will be exposed to methods to align the "run-of-mine" volume and quality with the plant process, as well as determine the impact of variable ore and ore body morphology on the budget, economic evaluations and ore reconciliation. The practical application of the concepts in a production environment to optimise and improve income and profit on a daily basis will be emphasised.	MAIN	Student will be able to: -Develop and apply condition-driven standards in mine planning, scheduling and production management and control. -Determine the influence of run-of-mine quality on plant efficiency and product delivery. -Quantify and apply mining information to the production process (beneficiation, stockpile management). Included are the effects of maintenance performance and strategy in terms of condition-driven standards. -Sign the run-of-mine volume and quality with the plant process, as well as determine the impact of variable ore and ore body morphology on the budget, economic evaluations and ore reconciliation. -Apply these concepts in a production environment to optimise and improve income and profit on a daily basis will be emphasised. -Access, evaluate and synthesise scientific information. -Generate scientific information; and -Communicate scientific understanding in writing and orally.
GLGB	7913	Applied Metallurgy	The main objective of mineral resource management is to effectively integrate the relevant fields of expertise so as to manage mining activities in the most cost effective manner possible. The programme will consist of four separate parts taken over a period of at least two years. In phase one candidates will be exposed to basic Geology, Mining, Metallurgy and Business Principles as an introduction before being exposed to more detail in the applied modules. Phase two modules will contain more detail and will also address other skill deficiencies of the candidates. Some of the modules have compulsory contact time used for lectures, case studies, practicals, tasks and tutorials, while others will be interactive internet based. The fourth phase comprises the completion of an extended research essay.	MAIN	Student will be able to: - Identify plant conditions and standards that impact the long-term and production environments, with particular focus on product range; - Discuss the value of beneficiation information when focusing on adding value to the production process (beneficiation, stockpile management and product specifications) as well as the way in which the information is used to achieve optimum product delivery; - Structure and apply the process variables in terms of the influence on product delivery, production cost and income by using beneficiation information; - Align plant processes, process efficiencies, plant feed quality and product recovery/ yield; - Determine which critical variables have to be managed; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGB	7923	Applied Metallurgy	This module introduce learners to the influence of plant conditions and standards on the long-term and production environments, with particular focus on product range, will be examined using Mineral Resource Management principles. The value of beneficiation information when focussing on adding value to the production process (beneficiation, stockpile management and product specifications) will be highlighted as well as the way in which the information is used to achieve optimum product delivery. To equip the learner to identify, structure and apply the process variables in terms of the influence on product delivery, production cost and income by using beneficiation information. The learner will be exposed to methods to align the process, process efficiency, plant feed quality and optimum yield to determine which critical variables have to be managed.	MAIN	Student will be able to: - Identify plant conditions and standards that impact the long-term and production environments, with particular focus on product range; - Discuss the value of beneficiation information when focusing on adding value to the production process (beneficiation, stockpile management and product specifications) as well as the way in which the information is used to achieve optimum product delivery; - Structure and apply the process variables in terms of the influence on product delivery, production cost and income by using beneficiation information; - Align plant processes, process efficiencies, plant feed quality and product recovery/ yield; - Determine which critical variables have to be managed; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGC	7913	MRM Implementation Practices	The applicability of project management as a major critical performance area in sustainable Mineral Resource Management will be examined and discussed. The module will emphasise the practical application of TOC thinking processes in structuring projects on how to deal with the challenges in implementing MRM in a mining operation. Examples and exercises will be presented in the course to equip learners to design, implement and operate a Mineral Resource Management programme.	MAIN	Student will be able to: - Discuss applicability of project management as a major critical performance area in sustainable Mineral Resource Management; - Describe the practical application of TOC thinking processes in structuring projects on how to deal with the challenges in implementing MRM in a mining operation; - Equip learners to design, implement and operate a Mineral Resource Management programme; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGC	7923	MRM Implementation Practices	The applicability of project management as a major critical performance area in sustainable Mineral Resource Management will be examined and discussed. The module will emphasise the practical application of TOC thinking processes in structuring projects on how to deal with the challenges in implementing MRM in a mining operation. Examples and exercises will be presented in the course to equip learners to design, implement and operate a Mineral Resource Management programme.	MAIN	Student will be able to: -Outline the applicability of project management as a major critical performance area in sustainable Mineral Resource Management. -Explain the practical application of TOC thinking processes in structuring projects on how to deal with the challenges in implementing MRM in a mining operation. -Equip learners to design, implement and operate a Mineral Resource Management programme. -Access, evaluate and synthesise scientific information. -Generate scientific information. -Communicate scientific understanding in writing and orally.
GLGC	7933	MRM Information Practices	Availability of flow information is an important component for sustainable Mineral Resource Management. This module will examine all the key elements of data structures, recording challenges, validation issues and presentation. The question of information provision to management structures and the timeliness impact on the mining value chain will be examined. Examples and exercises will be presented in the course to equip learners to understand, identify, implement and manage the flow information environment for the mining value chain.	MAIN	Student will be able to: - Identify all the key elements of data structures, recording challenges, validation issues and presentation; - Discuss the requirements of information provision to management structures and the timeliness impact on the mining value chain will be examined; - Identify, implement and manage the flow information environment for the mining value chain; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGC	7943	Mineral Resource Management Information Practices	Availability of flow information is an important component for sustainable Mineral Resource Management. This module will examine all the key elements of data structures, recording challenges, validation issues and presentation. The question of information provision to management structures and the timeliness impact on the mining value chain will be examined. Examples and exercises will be presented in the course to equip learners to understand, identify, implement and manage the flow information environment for the mining value chain.	MAIN	Student will be able to: Identify all the key elements of data structures, recording challenges, validation issues and presentation. Outline the requirements of information provision to management structures and the timeliness impact on the mining value chain will be examined. Identify, implement and manage the flow information environment for the mining value chain. Access, evaluate and synthesise scientific information. Generate scientific information. Communicate scientific understanding in writing and orally.
GLGC	7953	MRM Organizational Change Practices	Change management and practices are often misunderstood and methodologies are used with little visible return on investment. The reason is that typical training approaches are neither appropriate nor effective within this environment. The subject-matter will be examined and discussed in four broad areas under the heading of enterprise resource alignment. These areas are strategy and guidance mapping, mobilisation, enablement and performance, and competence tracking. The process methodologies and how they apply within Mineral Resource Management will be discussed. Practical and simplistic management procedures to ensure HR optimisation are imparted for continuous measurable results. To equip the learner to understand the broad change management issues applicable when implementing MRM. The learner will be enabled to identify critical performance areas of change management, to design a basic change management strategy and learn how to execute that strategy.	MAIN	Student will be able to: - Obtain visible return on investment on succesful implementation of the MRM principles. - Describe the role of enterprise resource alignment within mining and the MRM context. - Implement change through strategy and guidance mapping, mobilisation, enablement and performance, and competence tracking. - Ensure HR optimization through practical and simplistic management procedures - Discuss the broad change management issues applicable when implementing MRM. - Identify critical performance areas of change management, to design a basic change management strategy and learn how to execute that strategy. - Access, evaluate and synthesise scientific information. - Generate scientific information. - Communicate scientific understanding in writing and orally.
GLGC	7963	MRM Organizational Change Practices	Change management and practices are often misunderstood and methodologies are used with little visible return on investment. The reason is that typical training approaches are neither appropriate nor effective within this environment. The subject-matter will be examined and discussed in four broad areas under the heading of enterprise resource alignment. These areas are strategy and guidance mapping, mobilisation, enablement and performance, and competence tracking. The process methodologies and how they apply within Mineral Resource Management will be discussed. Practical and simplistic management procedures to ensure HR optimisation are imparted for continuous measurable results. To equip the learner to understand the broad change management issues applicable when implementing MRM. The learner will be enabled to identify critical performance areas of change management, to design a basic change management strategy and learn how to execute that strategy.	MAIN	Student will be able to: -Obtain visible return on investment on succesful implementation of the MRM principles; -Explain the role of enterprise resource alignment within mining and the MRM context; -Implement change through strategy and guidance mapping, mobilisation, enablement and performance, and competence tracking; -Ensure HR optimization through practical and simplistic management procedures; -Discuss the broad change management issues applicable when implementing MRM; -Identify critical performance areas of change management, to design a basic change management strategy and learn how to execute that strategy; and -Access, evaluate and synthesise scientific information. Generate scientific information. Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGC	7973	Virtual Mining: Simulation and Optimisation	The main objective of mineral resource management is to effectively integrate the relevant fields of expertise so as to manage mining activities in the most cost effective manner possible. The programme will consist of four separate parts taken over a period of at least two years. In phase one candidates will be exposed to basic Geology, Mining, Metallurgy and Business Principles as an introduction before being exposed to more detail in the applied modules. Phase two modules will contain more detail and will also address other skill deficiencies of the candidates. Some of the modules have compulsory contact time used for lectures, case studies, practicals, tasks and tutorials, while others will be interactive internet based. The fourth phase comprises the completion of an extended research essay.	MAIN	Student will be able to: - calculate the design of a cost and production simulation model based on the total production process (reserve to market). -explain the simulation model and incorporate relevant variables and dependencies. develop a strategic, tactical and operational plan and budget to addressed the terms of key throughput and performance variables and condition-driven standards. -apply the model in an operational management and control environment will be covered.
GLGC	7983	Virtual Mining: Simulation and Optimisation	This module covers the design of a cost and production simulation model based on the total production process (reserve to market). The simulation model will incorporate relevant variables and dependencies. Strategic, tactical and operational planning and budgeting will be addressed in terms of the variables and condition-driven standards, as well as the application of the model in an operational management and control environment. To equip the learner to build strategic, tactical and operational simulation models. To enable the learner to apply simulation models in the management and process control environments.	MAIN	Student will be able to: -Design cost and production simulation models based on the total production process (reserve to market). Identify relevant variables and dependencies to be used in strategically, tactical and operational planning and budgeting. -Develop and use condition-driven standards in financial modelling and simulation. -Apply financial models in an operational management and control environment. -Build strategic, tactical and operational simulation models. -Access, evaluate and synthesise scientific information. -Generate scientific information. -Communicate scientific understanding in writing and orally.
GLGD	7900	Mineral Resource Management Mini Dissertation	This module contains fundamental knowledge, theories, principles and practices of of Mineral Resource Management. The research project stretches over a year under the guidance of a supervisor. The topic is selected in consultation with the supervisor and in collaboration with the departmental chair. The supervisor and an external examiner will evaluate the research dissertation.	MAIN	Student will be able to: - Discuss and apply principles of fundamental concepts, principles and processes of mining and MRM principles; - Access, evaluate and synthesise scientific information; - Generate scientific information; - Solve scientific problems; and - Communicate scientific understanding in writing and orally.
GLGD	7913	Mineral Resource Management II (Advanced)	The methodology for the evaluation of strategic drivers for the total production process are discussed. The variables to be evaluated include quality and reliability of information, dilution, production rate, mining method, etc. and how these variables influence one another as well as the final product quality, quantity and cost. In the production environment, the identification and implementation of working procedures for grade control, an ore balance sheet, ore-utilisation and measurement of production rate, system availability and utilisation are covered. Determination of economically recoverable ore and its associated processes will also be included.	MAIN	Student will be able to: - Identifiy and implement working procedures for grade control, an ore balance sheet, ore-utilisation and measurement of production; - Determine economically recoverable ore according to MRM principles; - Identify the critical business process variables through evaluation of a production process; - Design and implement suitable business changes to enhance value; - Evaluate the influence of variables on final product volume and quality and production cost in the production process; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGD	7923	Mineral Resource Management II (Advanced)	The methodology for the evaluation of strategic drivers for the total production process are discussed. The variables to be evaluated include quality and reliability of information, dilution, production rate, mining method, etc. and how these variables influence one another as well as the final product quality, quantity and cost. In the production environment, the identification and implementation of working procedures for grade control, an ore balance sheet, ore-utilisation and measurement of production rate, system availability and utilisation are covered. Determination of economically recoverable ore and its associated processes will also be included.	MAIN	Student will be able to: -Identify and implement working procedures for grade control, an ore balance sheet, ore-utilisation and measurement of production. -Determine economically recoverable ore according to MRM principles -Identify the critical business process variables through evaluation of a production process. -Design and implement suitable business changes to enhance value. -Evaluate the influence of variables on final product volume and quality and production cost in the production process. -Access, evaluate and synthesise scientific information. -Generate scientific information.Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGD	7933	Geological Modelling and Applied Geo-Statistics	The importance of accurate and reliable geological information to the short-term mine schedule and production environment is significant. In the mining environment, the most important information is contained in the geological models. Understanding the role of geo-statistics in Mineral Resource Management and how it is used to determine optimum ore-utilisation and product delivery is imperative. The learner is empowered to ensure that relevant and accurate geological information is made available to all role players in the production process to enable them to make better decisions.	MAIN	Student will be able to: -Explain the importance of accurate and reliable geological information to the short-term mine schedule and production environment; -Outline the role of geo-statistics in Mineral Resource Management and how it is used to determine optimum ore-utilisation and product delivery; -Use geo-statistical approaches strategically to optimise ore-utilisation and maximise product delivery in the long-term; -Make relevant and accurate geological information available to all role players in the production process to enable them to make better decisions; -Access, evaluate and synthesise scientific information; -Generate scientific information; and -Communicate scientific understanding in writing and orally.
GLGD	7943	Geological Modelling and Applied Geo-Statistics	The importance of accurate and reliable geological information to the short-term mine schedule and production environment is significant. In the mining environment, the most important information is contained in the geological models. Understanding the role of geo-statistics in Mineral Resource Management and how it is used to determine optimum ore-utilisation and product delivery is imperative. The learner is empowered to ensure that relevant and accurate geological information is made available to all role players in the production process to enable them to make better decisions.	MAIN	Student will be able to: -Explain the importance of accurate and reliable geological information to the short-term mine schedule and production environment; -Outline the role of geo-statistics in Mineral Resource Management and how it is used to determine optimum ore-utilisation and product delivery; -Use geo-statistical approaches strategically to optimise ore-utilisation and maximise product delivery in the long-term; -Make relevant and accurate geological information available to all role players in the production process to enable them to make better decisions; -Access, evaluate and synthesise scientific information; -Generate scientific information; and -Communicate scientific understanding in writing and orally.
GLGE	7913	Capita Selecta	Capita selecta	MAIN	Capita selecta
GLGE	7923	Capita Selecta (course place holder)	Capita selecta (course place holder)	MAIN	Capita selecta
GLGE	7933	Mining Throughput Accounting and Modelling	Application of throughput accounting, so that the learner understands how to calculate and make operational financial decisions that guarantee/deliver the required financial returns. Learning what determines optimal profitability, cash-flow and a healthy balance sheet as applied to daily and practical operational performance and improvement decisions, considering efficiencies and productivity. Understanding what necessary inputs are required, why, where and how to obtain it. Basic understanding of financial statements and how it is used in financial decisionmaking. Making of decisions that are based on financial statements and where these decisions lead to. Learn how to define a goal (its boundaries), what should be evaluated and the function and purpose of assumptions in financial models.	MAIN	Student will be able to: - Apply the basics of throughput accounting; - Calculate and make operational financial decisions that guarantee/deliver the required financial returns; - Describe what determines optimal profitability, cash-flow and a healthy balance sheet as applied to daily and practical operational performance and improvement decisions, considering efficiencies and productivity; - Apply the basics of financial statements and what they mean; - Define a goal (its boundaries) and what should be evaluated and the function and purpose of assumptions; - Create a relevant operational financial decision model, and to calculate this into a net profit, with some basic simulation scenarios for investment ranking; - Utilise MS Excel with some practical examples to decide whether an investment or change should either proceed or not; - Discuss what differentiates cash-flow and net profit, and apply it; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGE	7943	Mining Throughput Accounting and Modelling	Application of throughput accounting, so that the learner understands how to calculate and make operational financial decisions that guarantee/deliver the required financial returns. Learning what determines optimal profitability, cash-flow and a healthy balance sheet as applied to daily and practical operational performance and improvement decisions, considering efficiencies and productivity. Understanding what necessary inputs are required, why, where and how to obtain it. Basic understanding of financial statements and how it is used in financial decisionmaking. Making of decisions that are based on financial statements and where these decisions lead to. Learn how to define a goal (its boundaries), what should be evaluated and the function and purpose of assumptions in financial models.	MAIN	Student will be able to: -Apply the basics of throughput accounting -Calculate and make operational financial decisions that guarantee/deliver the required financial returns. -Explain what determines optimal profitability, cash-flow and a healthy balance sheet as applied to daily and practical operational performance and improvement decisions, considering efficiencies and productivity. -Explain the basics of financial statements and what they mean. -Define a goal (its boundaries) and what should be evaluated and the function and purpose of assumptions. -Create a relevant operational financial decision model, and to calculate this into a net profit, with some basic simulation scenarios for investment ranking. -Utilise MS Excel with some practical examples to decide whether an investment or change should either proceed or not. Explain what differentiates cash-flow and net profit, and how to apply it. -Access, evaluate and synthesise scientific information. -Generate scientific information. -Communicate scientific understanding in writing and orally.
GLGE	7953	MRTM Risk Practices	Application of risk management principles as applied to the minerals industry. To equip the learner with sufficient knowledge, background and understanding of what a risk is and practical tools to identify and evaluate risks typically encountered in the mining industry. Risks that could hamper the performance of the production process and the implementation of the MRTM programme will be highlighted. The learner will further be exposed to risk management principles that could ensure a safe and healthy working environment.	MAIN	Student will be able to: - Describe what a risk is; - Identify and evaluate risks typically encountered in the mining industry; - Apply risk management principles in the minerals industry; - Discuss how risks could hamper the performance of the production process and the implementation of the MRM programme; - Discuss and apply risk management principles that could ensure a safe and healthy working environment; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGE	7963	MRM Risk Practices	Application of risk management principles as applied to the minerals industry. To equip the learner with sufficient knowledge, background and understanding of what a risk is and practical tools to identify and evaluate risks typically encountered in the mining industry. Risks that could hamper the performance of the production process and the implementation of the MRM programme will be highlighted. The learner will further be exposed to risk management principles that could ensure a safe and healthy working environment.	MAIN	Student will be able to: -Explain what a risk is; -Identify and evaluate risks typically encountered in the mining industry; -Apply risk management principles in the minerals industry; -Describe how risks could hamper the performance of the production process and the implementation of the MRM programme; -Apply risk management principles that could ensure a safe and healthy -working environment; -Access, evaluate and synthesise scientific information; -Generate scientific information; abd -Communicate scientific understanding in writing and orally.
GLGE	7973	Modern Mining Supply Chain Principles	An overview of the traditional and MRTM-adjusted supply chain principles and mining supply chain optimisation through systems and business process integration, internal and external collaborative planning and studying the interlinked nature of downstream processes with the ore characteristics and what can be done about it. A case study is discussed to aid the learner in identifying and exploring the hurdles in supply chain optimisation. Understanding and applying supply chain management principles will maximize the current and future profitability of the organisations. The mining supply chain management module aims to highlight the key aspects of the process of optimizing the flow of materials, intermediary and final products throughout the chain of operations.	MAIN	Student will be able to: - Discuss and apply the traditional and MRM-adjusted supply chain principles; - Discuss and apply the mining supply chain optimisation through systems and business process integration, internal and external collaborative planning and studying the interlinked nature of downstream processes with the ore characteristics and what can be done about it; - Identify and explore the hurdles in supply chain optimisation; - Apply supply chain management principles to maximize the current and future profitability of an organisation; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGE	7983	Modern Mining Supply Chain Principles	An overview of the traditional and MRM-adjusted supply chain principles and mining supply chain optimisation through systems and business process integration, internal and external collaborative planning and studying the interlinked nature of downstream processes with the ore characteristics and what can be done about it. A case study is discussed to aid the learner in identifying and exploring the hurdles in supply chain optimisation. Understanding and applying supply chain management principles will maximize the current and future profitability of the organisations. The mining supply chain management module aims to highlight the key aspects of the process of optimizing the flow of materials, intermediary and final products throughout the chain of operations.	MAIN	Student will be able to: - Discuss and apply the traditional and MRM-adjusted supply chain principles; - Discuss and apply the mining supply chain optimisation through systems and business process integration, internal and external collaborative planning and studying the interlinked nature of downstream processes with the ore characteristics and what can be done about it; - Identify and explore the hurdles in supply chain optimisation; - Apply supply chain management principles to maximize the current and future profitability of an organisation; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGE	8900	Environmental Geology Dissertation	AThis module contains fundamental knowledge, theories, principles and practices of Environmental Geology, including: Research project in specialized field of Environmental Geology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.The candidate will present at least one seminar/ research report in each year in accordance with departmental regulations.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GLGE	9100	Environmental Geology Thesis	This module contains fundamental knowledge, theories, principles and practices of Environmental Geology, General including Research project in specialized field of Environmental Geology, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GLGY	6806	Research Essay	This module contains fundamental knowledge, theories, principles and practices of Geology. The research project stretches over a year under the guidance of a supervisor. The topic is chosen in consultation with the supervisor and in collaboration with the departmental chair. The supervisor and an external examiner will evaluate the short research essay.	MAIN	Student will be able to: - Access, evaluate and synthesise scientific information; - Generate scientific information; - Solve scientific problems; and - Communicate scientific understanding in writing and orally.
GLGY	6808	Research Report Geology	This module contains fundamental knowledge, theories, principles and practices of advanced aspects, applications and processes related to the geological environment.	MAIN	Student will be able to: - Explain, explore and apply fundamental concepts and principles of Geology; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6816	Plate Tectonics	Honours modules in Geology/Geochemistry constitute the elaboration of undergraduate modules on a high level where students have to demonstrate independent thought and research methodology. Analytical interpretation and the presentation of literature and research results form part of the honours modules.	MAIN	Student will be able to: -Provide evidence of the acquisition of sophisticated theoretical and practical insight of Geology/Geochemistry as a discipline; and - Examine and apply analytical and interpretative procedures and techniques, critical appreciation of literature and independent analysis of information and observed field and geochemical data in support of conclusions and deductions.
GLGY	6818	Geology Research Report	This module contains fundamental knowledge, theories, principles and practices of advanced aspects, applications and processes related to the geological environment.	MAIN	Student will be able to: -Explain, explore and apply fundamental concepts and principles of Geology; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGY	6823	Sedimentology	This module contains fundamental knowledge, theories, principles and practices of Sedimentology, providing experience building in sedimentological principles in both the understanding and the practical application thereof.	MAIN	Student will be able to: - Outline the fundamental concepts and principles of Sedimentology; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6826	Economic Geology	This module contains fundamental knowledge, theories, principles and practices of Economic Geology, providing a useful backdrop for understanding economic geology, metallogenesis, geometallurgy, industrial minerals and fossil fuels covering aspect such as aspects of mining, metallurgy, reserves, grades, resources, environmental and legal issues. A small metallogenic research project focusing on deposit description, geological setting, ore-forming processes, economic significance and results of microscopic descriptions. A literature assignment on primary literature of metallogenetic case studies (e.g. Economic Geology, Mineralium Deposita) will be requested, including the acquisition of articles.	MAIN	Student will be able to: - Describe, discuss and explain fundamental concepts and principles of Economic Geology; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6828	Geology Research Report	This module contains fundamental knowledge, theories, principles and practices of advanced aspects, applications and processes related to the geological environment.	MAIN	Student will be able to: - Explain, explore and apply fundamental concepts and principles of Geology; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6836	Mineralogy	This module contains fundamental knowledge, theories, principles and practices of Advanced Mineralogical techniques and instruments, including: reflected light petrographic microscopy (for the study of ore minerals), X-ray diffraction and scanning electron microscopy, systematic mineralogy, mineralogical principles and processes and their applications in various industries. Applied mineralogy focused on the use of mineralogical knowledge in the optimisation of extraction and purification of ores.	MAIN	Student will be able to: - Outline fundamental concepts and principles of Mineralogy; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6843	Metamorphic Geology	This module contains fundamental knowledge, theories, principles and practices of Metamorphic Geology, providing a study of topical themes within the subject area with reference to recently published works. Students are also introduced to techniques that can be used to decipher the petrogenesis of metamorphic rocks.	MAIN	Student will be able to: - Examine and apply concepts and principles of Metamorphic Geology; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6846	Advanced Geochemistry	This module contains fundamental knowledge, theories, principles and practices of Geochemistry, based around sophisticated isotopic systematics to investigate geochemical problems. The topics include geometric dating, radiogenic isotope geochemistry, extinct radio-isotopes and their uses, fractionation of light isotope ratios and their application to igneous and environmental geochemistry, and the use of isotope geochemistry to investigate ore forming processes.	MAIN	Student will be able to: - Outline fundamental concepts and principles of Geochemistry; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6853	Igneous Geology	This module contains fundamental knowledge, theories, principles and practices of Igneous Geology and involves a study of topical themes within the subject area with reference to recently published works. Students are also introduced to techniques that can be used to decipher the petrogenesis of igneous rocks.	MAIN	Student will be able to: - Examine and apply of fundamental concepts and principles of Igneous Geology; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6856	Structural Geology	This module contains fundamental knowledge, theories, principles and practices of Sedimentology and entails experience building in sedimentological principles in both the understanding and the practical application thereof.	MAIN	Student will be able to: - Examine and apply fundamental concepts and principles of Structural Geology and Processes; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	6863	Mineral Exploration	This module contains fundamental knowledge, theories, principles and practices of Mineral Exploration, metallogenesis, geochemical and geophysical exploration methods for various commodities, recent findings worldwide, and exploration techniques; aspects of exploration, as well as environmental and legal issues. Own involvement in exploration projects compiling a SAMREC-compliant exploration report is required. A literature assignment on primary literature of exploration case studies (e.g. Journal of Exploration Geochemistry, Journal of Environmental Geochemistry) is required.	MAIN	Student will be able to: - Discuss and examine the fundamental concepts and principles of Mineral Exploration; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GLGY	6873	Environmental Geochemistry	This module deals with environmental impacts from anthropogenic activities, with a focus on mining and metal extraction from a geochemical point of view. The course focuses on the source-pathway-receptor methodology by focusing on pollution sources and sinks as well as the processes that follow logically from source to sink. Sampling and laboratory analysis and basic data interpretation methodologies are discussed from a practical perspective. Environmental laws and regulations are broadly discussed from a South African perspective.	MAIN	Student will be able to: - Examine and apply the concepts and practical application of conceptual and numeric geochemical modelling from an equilibrium thermodynamic point of view as well as global element cycling.
GLGY	6883	Capita Selecta Geology	This module contains fundamental knowledge, theories, principles and practices of advanced aspects, applications and processes related to the geological environment.	MAIN	Student will be able to: - Explain, explore and apply fundamental concepts and principles of Geology; - Access, evaluate and synthesise scientific information; - Generate scientific information; and - Communicate scientific understanding in writing and orally.
GLGY	8900	Geology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Geology, including: Research project in specialized field of Geology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GLGY	9100	Geology Thesis	This module contains fundamental knowledge, theories, principles and practices of Geology, General including Research project in specialized field of Geology, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MRTM	8900	Mineral Resource Throughput Management Dissertation	This module contains fundamental knowledge, theories, principles and practices of Mineral Resource throughput, including: Research project in specialized field of Mineral Resource throughput as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MRTM	9100	Mineral Resource Throughput Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Mineral Resource throughput Management, General including Research project in specialized field of Mineral Resource throughput Management, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Institute for Groundwater Study (109)

Postgraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEHI	8900	Geohydrology Interdisciplinary Dissertation	This module consists of a research project that the student must complete under guidance of his/her supervisor.	MAIN	Student will be able to: -Displayed independent research skills and the ability to present the results in a dissertation written according to academic standards -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEHI	9100	Thesis Geohydrology Interdisciplinary	This module consists of a research project that the student must complete under guidance of his/her supervisor.	MAIN	Student will be able to: Identify the problem; Formulate a hypothesis; Do independent planning and then conduct the experiments; Analyse and interpret the results; Discuss the results comprehensively; Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEHR	8900	Geohydrology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Geohydrology, including: Research project in specialized field of Geohydrology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEHR	9100	Geohydrology Thesis	This module consists of a research project that the student must complete under guidance of his/her supervisor.	MAIN	Student will be able to: Identify the problem Formulate a hypothesis Do independent planning and then conduct the experiments Analyse and interpret the results Discuss the results comprehensively Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GEOH	6815	Groundwater Hydraulics	This module focuses on the fundamental knowledge, theories, principles and practices of groundwater hydraulics. Students will obtain theoretical and practical knowledge on the assessment of groundwater resources in terms of the volumes that can be sustainably abstracted.	MAIN	Student will be able to: - Develop a conceptual model of a specific groundwater-related problem; - Apply practical knowledge gained to conduct various hydraulic tests; - Explain and apply the theory related to pumping tests; - Evaluate hydraulic test data and interpret the results in order to estimate the sustainable yield of a borehole; - Analyse the data from laboratory scale tests on samples to determine hydraulic conductivity or permeability and porosity and effective porosity; - Discuss the relation between field and laboratory observations; and - Summarise the results of pumping tests in a professional fashion.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEOH	6825	Groundwater Modelling	This module will provide students with a basic understanding of numerical groundwater flow and mass transport models. The module will combine and apply all knowledge students have gained in the first semester honours modules to develop conceptual models, basic numerical models and to assess groundwater models. This module will further expose students to various types of groundwater models, and will discuss the advantages and disadvantages of each model.	MAIN	Student will be able to: - Explain the principles of groundwater flow and transport; - Prepare the necessary input data for mathematical models; - Interpret hydrogeological data and to develop site-specific conceptual models based on these data as a prerequisite for the application of mathematical models; - Select suitable mathematical models for a given problem; - Solve analytical equations and develop finite-difference equations; - Develop and document site-specific finite-difference flow and transport models; and - Critically evaluate groundwater model related parameters like porosity, hydraulic conductivity/ transmissivity, storativity/specific yield, recharge, etc.
GEOH	6835	Hydrochemistry and Pollution	Due to the fact that groundwater pollution is the key issue regarding the study of groundwater chemistry, this module focuses on geochemical principles and an understanding of geochemical processes with regard to groundwater. Special emphasis is placed on the understanding of the interaction between groundwater, the geological environment and anthropogenic waste to provide the student with integrated understanding of groundwater chemistry and contaminant hydrogeology as preparation for a career as a geohydrologist or geohydrochemist. Students will also be prepared to provide expert hydrochemical input to the industry.	MAIN	Student will be able to: - Plan groundwater sampling, develop monitoring programs as well as sampling and sample preparation procedures; - Use interpretation programmes to present and interpret hydrochemical data and to solve problems; - Use statistical methods to interpret hydrochemical data; - Apply the principles of low temperature geochemistry, including the interactions between groundwater, the geological environment and anthropogenic waste to interpret hydrochemical data; - Explain the principles of redox, sorption and ion exchange reactions; - Explain the principles of contaminant transport and the use of environmental isotopes in hydrogeology; and - Explain the formation of Acid Mine Drainage and analyse common geochemical tests.
GEOH	6845	Mining Geohydrology and Hydrology	This module focuses on groundwater influxes in mines, dewatering of mines, water quality management at mines, groundwater risk management, water balances, monitoring of groundwater, as well as modelling of groundwater flows and qualities in the mining environment. It deals with hydrology field techniques with a strong emphasis of surface water- groundwater interaction. It also explains basic flood hydrology and discusses the management of flood levels.	MAIN	Student will be able to: - Analyse and interpret groundwater influxes in mines; - Calculate dewatering volumes and describe dewatering schemes; Apply groundwater models to estimate the volumes of groundwater influxes; - Calculate water balances of a mine; - Describe water management systems at a mine; - Describe the risks associated with groundwater influxes and dewatering, and perform risk assessments; - Apply hydrology field techniques in mines; - Discuss surface water- groundwater interactions at a mine; - Interpret the results of basic flood hydrology calculations; and - Explain every- day management of flood levels at a mine.
GEOH	6855	Groundwater Geophysics	This module will provide students with an understanding of the physical principles on which the geophysical methods routinely used in groundwater studies are based. Students will be able to plan and execute geophysical surveys aimed at addressing geohydrological problems, such as groundwater exploration and contaminant plume mapping. In addition, students will be able to process, analyse and interpret geophysical data in terms of the geological and geohydrological conditions within the surveyed area.	MAIN	Student will be able to: - Describe the physical principles on which various geophysical methods operate; - Define key concepts of the various geophysical techniques most commonly used in groundwater studies; - Plan and execute geophysical surveys with the various geophysical techniques during geohydrological investigations; and - Process, analyse and interpret the geophysical data in terms of the ambient geological and geohydrological conditions.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GEOH	6865	Groundwater Management	This module will provide students with a global understanding of managing and protecting groundwater resources. They will also learn to combine and apply all their knowledge gained in the other honours modules to develop an understanding of groundwater systems by assessing all available data and using all available tools. Once this is understood, management and protection strategies can be developed taking into account South African guidelines and legislation.	MAIN	Student will be able to: - Design a risk plan according to a specific risk matrix; - Develop a risk register and risk evaluation plan for a company; - Describe interpolation and the differences between the various methods; - Generate interpolated data and maps using the software provided; - Estimate groundwater recharge using different methods; - Explain the importance of the groundwater reserve; - Name and discuss the four levels of the groundwater reserve determination; - Name and discuss the groundwater reserve determination activities and post-groundwater reserve determination activities; - Name and discuss the groundwater-dependent ecosystem classification to recognise the various groundwater-dependent systems; - Illustrate the protocol to identify groundwater-dependent vegetation and set groundwater resource quality objectives; - Determine a groundwater reserve as part of a case study; - Develop a risk management plan; - Illustrate their understanding and application of the future groundwater planning within the Department of Water Affairs; - Interpret the Environmental Management Act; - Prepare a Basic Assessment Report, a Scoping Report, Environmental Impact Assessment Report, Specialist Reports, and an Environmental Management Programme; - List notices related to any water aspects; - Interpret the purpose of the National Mineral and Petroleum Resources Development Act; - Interpret the purpose of the Waste Act and the application thereof; - Interpret and apply the National Water Act together with the National Strategies.

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATA	1614	Engineering Statics	Vector operations; resultants of forces;moments of forces about points and axes; equilibrium of forces acting on a point or a rigid body; friction;center of gravity and centroid;moments of inertia	MAIN	Student will be able to: - add and subtract forces - calculate moments of forces - calculate projections of forces along given lines - analyse the equilibrium of given force systems - calculate centroids and centers of gravity; and - calculate certain moments of inertia
MATA	1624	Engineering Dynamics	Particle kinematics, including continuous, erratic, rectilinear, curvilinear and relative motion. Particle kinetics, including equations of motion for particles and systems of particles in several types of coordinate systems; work and energy; impulse and momentum.	MAIN	Student will be able to: - analyse the motion of particles acted upon by given force systems - apply the principles of work and energy, as well as conservation of energy - calculate power and efficiency - apply the principles of momentum and conservation of momentum to collisions and other relevant mechanical situations.
MATA	2614	Dynamics of rigid bodies	Planar kinematics of a rigid body, including translation, rotation about a fixed axis, absolute and relative motion analysis, rotating axes. Planar kinetics of a rigid body, including moments of inertia, equations of motion for translation, rotation about a fixed axis and general planar motion; Work and energy; Impulse and momentum;vibrations	MAIN	Student will be able to: - analyse the motion of a rigid body subject to a given system of planar forces. - calculate power and energy, and apply the principles of energy and the conservation of energy to the motion of rigid bodies where suitable. - calculate the momentum of a rigid body, and apply the principles of momentum and impulse to the motion of rigid bodies under suitable circumstances; and - analyse vibrating systems.
MATA	2634	Introduction to Mathematical Modelling	Principles of modelling. Optimisation models. Physical, chemical, biological and financial models. Decision and Game Theory.	MAIN	Student will be able to: - Apply modelling techniques, such as difference and differential equations, proportionality, dimensional analysis, curve fitting and interpolation techniques, and elementary optimisation techniques; - Use the basic steps to build a model, in conjunction with the techniques; and - Construct a simple model on his own, or as part of a small team.
MATA	2644	Ordinary Differential Equations	Non-linear first order differential equations: substitution techniques, exact equations, integration factors. Non-homogeneous higher order differential equations with constant coefficients. Series methods. Systems of linear differential equations. Applications such as mixtures, orthogonal trajectories and the logistic equation.	MAIN	Student will be able to: -Solve various non-linear first order differential equations, linear second order differential equations with constant coefficients, as well as some with non-constant coefficients; and -Apply ordinary differential equations to solve some basic scientific problems from various disciplines.
MATA	3764	Industrial Mathematics	Introduction to linear programming. Actual problems from industry with the necessary mathematics to model it mathematically and solve the models. Communication of results. Project.	MAIN	Student should be able to ; -Solve linear programs; -Describe several case studies from industry; and -Solve simple similar problems and communicate the results.
MATA	3774	Numerical Analysis	Non-linear equations in one variable: iterative methods, error analysis. Polynomial interpolation: Lagrange, barycentric, Newton, Chebyshev and Hermite interpolation ; splines; error estimation. Numerical differentiation and integration. Initial-value problems in ordinary differential equations: elementary theory, high-order Taylor, Runge-Kutta and multistep methods, stability.	MAIN	Student should be able to: - Implement the theory of numerical techniques such as the iterative solution of non-linear equations, interpolation, numerical differentiation and integration, and the numerical solution of ordinary differential equations on a computer. - Perform accuracy and reliability tests.
MATA	3784	Dynamical Systems	Elementary stability considerations in systems of linear first order ordinary differential equations: chemical, medical, biological and other applications. Systems of non-linear first order ordinary differential equations. Local stability and the classification of fixed points: Applications to biological and medical models. Global stability and limit cycles: Forced non-linear oscillations. First order perturbation techniques. Applications of ordinary differential equations.	MAIN	Student should eb able to ; -Use phase diagrams to analyze equilibrium points and trajectories of non-linear ordinary differential equations; -Use techniques from asymptotic analysis to obtain approximate solutions of such differential equations; -Apply these techniques to manipulate models in Chemistry, Physics, Medical Science and Biology.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATM	1502	Introductory Calculus and Statics	Calculus: polynomial, trigonometric and logarithmic functions, curve sketching, the function concept, and outline of differentiation and integration. Statics: forces and moments, stress and strain, shear force and bending moment, trusses.	MAIN	Student will be able to: -apply basic differentiation, integration and strength of materials and be able to use calculus to solve construction problems.
MATM	1534	Calculus	This module contains introductory theory and applications of one variable calculus including the concept of a function, polynomial, exponential, trigonometric and logarithmic functions, graphs, limits, continuity, derivatives, curve sketching, applications of the derivative, the definite and indefinite integral and some integration techniques	MAIN	Student will be able to: - find the domain and range of a given function. - find the inverse of an invertible function - shift and stretch a given function - solve simple problems involving exponential functions, including population growth and radioactive decay - solve equations using logarithmic functions - solve problems involving sinusoidal and tangent functions - find the horisontal and vertical asymptotes of rational functions - identify parts of a function which are continuous, and points at which it is not - calculate limits, including left hand and right hand limits of a function - identify the inner and outer functions of a composite function - construct a composite function from given functions - calculate the derivative of polynomial functions using the definition of the derivative at a point and as a function - use the rules of differentiation to calculate derivative functions for polynomial, exponential, logarithmic, trigonometric and inverse trigonometric functions - find the derivatives of implicit functions - finding and identifying local maxima and minima and inflection points of functions - find the global maximum and minimum of a given function and apply this to simple optimisation problems - calculate indefinite integrals using some simple rules - calculate definite integrals using the fundamental theorem of calculus - use simple substitutions to calculate definite and indefinite integrals; and - use integration by parts to calculate definite and indefinite integrals
MATM	1542	Introductory Calculus and Statics	Calculus: polynomial, trigonometric and logarithmic functions, curve sketching, the function concept, and outline of differentiation and integration. Statics: forces and moments, stress and strain, shear force and bending moment, trusses.	MAIN	Student will be able to: -apply basic differentiation, integration and strength of materials and be able to use calculus to solve construction problems.
MATM	1544	Calculus and Algebra	This module contains some theory and applications of Calculus and Algebra, including: calculation of definite and indefinite integrals by substitution and partial fractions, solving separable ordinary differential equations, complex numbers, vectors in 2 and 3 dimensions, vector equations of lines and planes, solving systems of linear equations, introduction to matrix algebra.	MAIN	Student will be able to: - Recognise and calculate indefinite and definite integrals which can be calculated by algebraic, sine, and cosine substitutions. - Recognise and calculate both definite and indefinite integrals which can be solved by partial fractions. - Recognise a separable ordinary differential equation and solve it. - Calculate the absolute value and conjugate of a complex number. - Add, subtract, multiply and divide complex numbers and write the result in standard form. - Covert a complex number to polar form and back. - Calculate an integer power of a complex number. - Calculate all the roots of a complex number for a given integer root. - Convert a vector from its geometrical definition to component form and back. - Add and subtract vectors - Calculate the dot and vector product of two vectors. - Use the vector product to calculate the areas of triangles and parallelograms. - Calculate the box product of three vectors. - Use the box product to calculate the volume of a parallelopiped. - Write the equation of a line in vector and parametric form in two and three dimensions. - Write the equation of a plane in vector and parametric form in three dimensions. - Calculate relationships between lines and lines and planes using vector methods. - Add, subtract and multiply matrices. - Calculate the determinant of a matrix. - Calculate the inverse of an invertible matrix by both the cofactor and Gauss-Jordan method.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATM	1574	Precalculus I	Number systems. Properties of real numbers. Notations. Exponents and radicals. Special product formulas. Factorizing. Distance and midpoint formulas. Simplify algebraic expressions. Solve equations. Modeling. Applications: Interest; speed; distance; time; percentages; depreciation; inflation; ratio and proportion. Exponential and logarithmic laws. Functions. Domain and Range. Graphs: Linear; Quadratic; circles ; Half-circle and hyperbola; exponentials and logarithms graphs ; absolute value. Elimination and substitution. Principles of geometry. Perimeter, circumference, area, volume and total area. principles of trigonometry and solving triangles; applications and modeling. Arithmetic and Geometric series.	MAIN	Student will be able to: - identify natural numbers, integers, rational and real numbers, and be able to prove theorems by induction. - derive the sum formulas for geometric and arithmetic series, and apply these, as well as induction to the solution of financial problems involving compound interest, mortgages, depreciation and inflation. - use the concepts of ratio and proportion to solve practical problems, such as determining the approximate height of buildings. - demonstrate a comprehension of exponentials and logarithms, and be able to solve appropriate problems using the exponential and logarithmic laws. - demonstrate a thorough comprehension of graphs of lines, parabolas and circles. - factor polynomial expressions up to cubic, and find zeros of more complicated functions by numerical methods not involving derivatives. - demonstrate a thorough comprehension of the basic geometry of triangles, circles, quadrilaterals, cylinders and spheres. - use the various trigonometric functions to solve triangles and to do some basic surveying; and - do some basic modelling, using the mathematical concepts above.
MATM	1584	Precalculus II	Definition of a function, domain and range; symmetry; even and odd functions; translating and combining functions; composite functions; inverse functions; linear and quadratic functions; power functions and polynomials; rational functions and their properties; exponential and logarithmic functions; the exponential and logarithmic laws; the trigonometric functions and their inverses; trigonometric identities; limits and continuity; basic statistics and probability theory.	MAIN	Student will be able to: - determine the domain and range of given functions. - recognize symmetric functions, and make use of it in manipulating such functions. - translate functions horisontally and vertically and combine it with other functions. - determine the inverses of given functions, either graphically, or analytically, or both. - investgate and explain the properties of linear and quadratic functions and their graphs. - explain the properties and graphs of power functions and polynomial functions. - explain the properties of the sin cos and tan functions, and be able to solve practical problems involving sinoidal functions. - derive trigonometric identities and use these to simplify and manipulate appropriate functions. - explain the properties and graphs of the inverse trigonometric functions. - explain the properties and graphs of exponential and logarithmic functions. - identify when and how to use logarithms to solve equations. - model exponential growth and decay processes. - demonstrate a sufficient explanation of continuity and the concept of a limit to be well prepared for a calculus module. - use some simple statistical techniques as well as some probability theory in order to process experimental data; and - do some basic modelling, using the mathematical concepts above.
MATM	1614	Calculus	Single variable calculus, including: the real numbers, functions, limits, continuity, differentiation (theory,techniques and applications), the mean value theorem, curve sketching, inverse functions, transcendental functions, integration (theory, techniques and applications).	MAIN	Student will be able to: - Find the domain and range of given functions including complicated functions - Find the inverse of a given function including complicated functions - Investigate the continuity and differentiability of given functions - Calculate limits of given functions using L-Hospital's rule and other techniques - Calculate the derivative of a given function, including transcendental functions - Find the tangent line to a given curve at a point - State and prove the mean value theorem - Apply the mean value theorem - Calculate rates of change - Calculate local and global minima and maxima as well as inflection points of given functions - Investigate the concavity of a given function - Sketch the graph of a given function - Evaluate definite and indefinite integrals using partial fractions, integration by parts, and substitution techniques. - Calculate areas with curved boundaries.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATM	1624	Algebra and logic	Logic. Algebra, including the binomial theorem, complex numbers, conical sections, vectors in R^2 and R^3, systems of linear equations, matrices, and determinants.	MAIN	Student will be able to: -Use the principals of logic to prove results -Prove and use the binomial theorem -Perform algebraic operations on complex numbers -State and prove de Moivre's theorem and related results -Solve algebraic equations involving complex numbers -Derive various vector identities -Perform algebraic operations on vectors in R^2 and R^3. -Calculate inner products, norms and vector products -Use vectors to describe the geometrical properties of lines and planes -Calculate areas and volumes by means of vector methods -Perform algebraic operations on matrices -Calculate the determinant and inverse of a matrix -Use projections of vectors on lines -Use elementary matrices to perform Gaussian elimination -Prove various theorems involving elementary matrices -Solve systems of linear equations using Gaussian elimination Investigate the properties of given conical sections
MATM	2614	Vector Analysis	Vector functions: limits, derivatives and integrals. Curves: parameterization, tangent vectors, arc length. Multivariable functions: qua¬dratic surfaces, partial derivatives, limits, continuity, differentiability, gra¬dients and directional derivatives, the Mean Value theorem, the chain rule for partial derivatives, tangent planes. Multiple and line integrals: Theory and applications.	MAIN	Student will be able to: -Describe and prove the theory of more ad¬vanced calculus, including vector calculus, multivariable functions, line integrals and surface integrals. -Apply the theory in 1. to solve both mathematical and real life problems.
MATM	2624	Linear Algebra	Real vectors/spaces, subspaces, basis, dimension, rank, nullity, matrix transformations. Eigenvectors and diagonalisation. Inner products and Gram-Schmidt process. Orthogonal matrices and orthogonal diagonalisation. General linear transformation and isomorphism.	MAIN	Student will be able to: -Describe and prove the theory of linear algebra, and specifically the algebra of abstract vector spaces which includes linear mappings, inner products, orthogonality, quadratic forms, symmetric matrices and diagonalisation; and -Apply the theory in 1. to solve mathematical and certain real life problems.
MATM	2654	Scientific Computing	Programming with Matlab. Scientific computing. Introductory numerical techniques	MAIN	Student will be able to: -Implement mathematical formulas, computations and algorithms on a computer; and -Use the techniques in 1. To solve simple scientific problems numerically.
MATM	2664	Sequences and Series	Sequences of real numbers: convergence, limits, boundedness, indeterminate forms, LHospitals rule. Improper integrals. Infinite series: tests for convergence, absolute and conditional convergence. Taylor series. Power series: intervals of convergence. Fourier analysis.	MAIN	Student will be able to: -Describe and prove the theory of sequences and series of real numbers. -Solve linear first and second order difference equations with constant coefficients. -Investigate the convergence of sequences and calculate their limits when applicable. -Test series for convergence -Calculate the interval of convergence of power series -Expand given functions into Taylor or Fourier series.
MATM	3714	Complex Analysis	The complex numbers. Functions of a complex variable. Limits, continuity and differentiability. The Cauchy-Riemann equations. Power series. Analytic functions. Cauchy's theorem. Residue theory and applications.	MAIN	Student should be able to ; -Describe and prove the basic theory of complex functions; and -Apply the theory in 1. To solve various mathematical problems, including the calculation of integrals.
MATM	3724	Real Analysis	Axiomatic construction of the real numbers. Sequences of real numbers. The Weierstrass-Bolzano theorem. Limits and continuity. The intermediate value theorem. The Riemann integral.	MAIN	Student should be able to; -Describe and prove the basic theory of the field of real numbers, including continuity, differentiablity and Riemann integrability
MATM	3734	Discrete Mathematics	Predicate Logic, methods of proof, set theory, functions and relations, Division Algorithm, Pigeonhole Principle, elementary number theory, induction, effectivity of algorithms, combinatorics, graph theory.	MAIN	Student will be able to ; -Describe the foundation of mathematics; -Show when sentences are logically equivalent; -Describe and use notions such as countability and infinity; and -Study and understand the theory of algorithms .

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATM	3744	Algebra	Integers: Induction, greatest common divisors, well-ordering principle, equivalence relations, arithmetic modulo n. Groups: Finite and infinite groups, subgroups, cyclic groups, dihedral groups, permutation groups, Lagrange's theorem, cosets, conjunction, homomorphisms, isomorphism theorems. Rings: Commutative rings, rings with unity, integral domains, polynomial rings, fields, principle ideal domains, ideals, homomorphisms, fields of fractions of an integral domain, isomorphism theorems	MAIN	Student will be able to; -Describe notions around certain algebraic structures such as groups, rings and fields; -Apply these notions; -Determine the possibility of certain geometric constructions; and -Study coding theory.
MATR	1534	Calculus	This module contains introductory theory and applications of one variable calculus including the concept of a function, polinomial, exponential, trigonometric and logarithmic functions, graphs, limits, continuity, derivatives, curve sketching, applications of the derivative, the definite and indefinite integral and some integration techniques	MAIN	Student will be able to: - find the domain and range of a given function. - find the inverse of an invertible function - shift and stretch a given function - solve simple problems involving exponential functions, including population growth and radioactive decay - solve equations using logarithmic functions - solve problems involving sinoidal and tangent functions - find the horisontal and vertical asymptotes of rational functions - identify parts of a function which are continuous, and points at which it is not - calculate limits, including left and right limits of a function - identify the inner and outer functions of a composite function - construct a composite function from given functions - calculate the derivative of polynomial functions using the definition of the derivative at a point and as a function - use the rules of differentiation to calculate derivative functions for polynomial, exponential, logarithmic, trigonometric and inverse trigonometric functions - find the derivatives of implicit functions - finding and identifying local maxima and minima and inflection points of functions - find the global maximum and minimum of a given function and apply this to simple optimisation problems - calculate indefinite integrals using some simple rules - calculate definite integrals using the fundamental theorem of calculus - use simple substitutions to calculate definite and indefinite integrals; and - use integration by parts to calculate definite and indefinite integrals.
MATA	6814	Algebra	Axiom of Choice, order, Zorn's lemma, Free Groups, Free Products, Generators and Relations.	MAIN	Student should be able to ; Solve fundamental problems in algebra.
MATA	6824	Algebra	Axiom of Choice, order, Zorn's lemma, Free Groups, Free Products, Generators and Relations.	MAIN	Student should be able to ; Solve fundamental problems in algebra.
MATA	7914	Algebra	Axiom of Choice, order, Zorn's lemma, Free Groups, Free Products, Generators and Relations. Ring extensions, Dedekind domains. The Hilbert Nullstellensatz, Algebras, Division Algebras.	MAIN	Student will be able to: Solve problems in advanced algebra, especially in group theory, ring theory and algebras.
MATA	7924	Algebra	Axiom of Choice, order, Zorn's lemma, Free Groups, Free Products, Generators and Relations. Ring extensions, Dedekind domains. The Hilbert Nullstellensatz, Algebras, Division Algebras.	MAIN	Student will be able to: Solve advanced algebra, especially in group theory, ring theory and algebras.
MATA	8900	Mathematics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Mathematics, including: Research project in specialized field of Mathematics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: Identify the problem; Formulate a hypothesis; Do independent planning and then conduct the experiments; Analyse and interpret the results; Discuss the results comprehensively; Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATA	9100	Applied Mathematics Thesis	This module contains fundamental knowledge, theories, principles and practices of Applied Mathematics, General including Research project in specialized field of Applied Mathematics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
MATB	6814	Galois Theory	Introduction to Galoiss theory. Multiplicative and additive Kummer theory. Infinite Galois extensions.	MAIN	Student will be able to ; -Solve fundamental problems related to Galois and Kummer'stheories.
MATB	6824	Galois Theory	Introduction to Galois's theory. Multiplicative and additive Kummer theory. Infinite Galois extensions.	MAIN	Student should be able to ; Solve fundamental problems related to Galois and Kummer's theories.
MATB	7914	Galois Theory	Introduction to Galois's theory. Multiplicative and additive Kummer theory. Infinite Galois extensions. The Kull topology, inverse limits, valuation theory, Extensions of valuated fields.	MAIN	Student will be able to: Use advanced results and techniques from Galois theory and field extensions.
MATB	7924	Galois Theory	Introduction to Galois's theory. Multiplicative and additive Kummer theory. Infinite Galois extensions. The Kull topology, inverse limits, valuation theory, Extensions of valuated fields.	MAIN	Student will be able to: Use advanced results and techniques from Galois theory and field extensions.
MATC	6814	Introduction to Topology	Basic topological constructions and definitions. Connectedness; Compactness and metrization theorems	MAIN	Student should be able to; -Read and understand papers in topology; -Carrying on with more advanced topology courses such as modern topology; and -Apply his/her knowledge in topology to other areas of pure mathematics
MATC	6824	Introduction to Topology	Basic topological constructions and definitions. Connectedness; Compactness and metrization theorems.	MAIN	Student should be able to; -Read and understand papers in topology; -Carrying on with more advanced topology courses such as modern topology; and -Apply his/her knowledge in topology to other areas of pure mathematics
MATC	7914	Introduction to Topology	In depth covererage of topological constructions and definitions. Advanced topics in connectedness, compactness and Tychonov's theorem.	MAIN	The student should be able to: - Read and understand papers in topology; - Carrying on with more advanced topology courses such as modern topology; - Apply his/her knowledge in topology to other areas of pure mathematics
MATC	7924	Introduction to Topology	In depth covererage of topological constructions and definitions. Advanced topics in connectedness, compactness and Tychonov's theorem.	MAIN	The student should be able to: - Read and understand papers in topology; - Carrying on with more advanced topology courses such as modern topology; and - Apply his/her knowledge in topology to other areas of pure mathematics
MATD	6814	Modern Topology	The course covers topics in pointless topology, the interaction of Sober spaces with spatial frames via the Stone duality, as well as an introduction to Category theory.	MAIN	Student should be able to; -Read and understand papers in pointless topology; -Carrying on with a course in Category theory; and -Explain the concept of duality
MATD	6824	Modern Topology	The course covers topics in pointless topology, the interaction of Sober spaces with spatial frames via the Stone duality, as well as an introduction to Category theory.	MAIN	Student should be able to ; -Read and understand papers in pointless topology; -Carrying on with a course in Category theory; and -Explain the concept of duality
MATD	7914	Modern Topology	The course covers some of the deepest results in pointless topology, the interaction of Sober spaces with spatial frames via the Stone duality, as well as covering reflective Sub-Category of constructs.	MAIN	The student should be able to: -Read and understand papers in pointless topology; -Carrying on with a course in Category theory; and -Explain the concept of duality

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATD	7924	Modern Topology	The course covers some of the deepest results in pointless topology, the interaction of Sober spaces with spatial frames via the Stone duality, as well as covering reflective Sub-Category of constructs.	MAIN	The student should be able to: -Read and understand papers in pointless topology; -Carrying on with a course in Category theory; and -Outline the concept of duality
MATE	6814	Analysis	Metric spaces; open and closed sets; convergence, Cauchy sequences, completeness of metric spaces. Vector spaces, normed spaces, subspaces, banach spaces, compactness and finite dimension, bounded and continuous linear operators, linear functional, dual spaces.	MAIN	Student will be able to: - Analyse metric spaces; vector spaces, normed spaces, Banach spaces; - Prove or disprove convergence of sequences. Prove or disprove completeness of any metric space; and - Duals and algebraic duals of those spaces.
MATE	6824	Analysis	Metric spaces; open and closed sets; convergence, Cauchy sequences, completeness of metric spaces. Vector spaces, normed spaces, subspaces, banach spaces, compactness and finite dimension, bounded and continuous linear operators, linear functional, dual spaces.	MAIN	Student will be able to: - Analyse metric spaces; vector spaces, normed spaces, Banach spaces; - Prove or disprove convergence of sequences. Prove or disprove completeness of any metric space; and - Duals and algebraic duals of those spaces.
MATE	7914	Analysis	Banach spaces, Hilbert spaces. Zorn’s lemma, Hahn-Banach theorem. Uniform boundeness theorem.	MAIN	Student will be able to: - Proving Reisz’s theorem, Hahn-Banach theorem and the uiform boundness theorem; and - Linear operators, Hilbert adjoint operator and annihilators of sets.
MATE	7924	Analysis	Banach spaces, Hilbert spaces. Zorn’s lemma, Hahn-Banach theorem. Uniform boundeness theorem.	MAIN	Student will be able to: - Proof Reisz’s theorem, Hahn-Banach theorem and the uiform boundness theorem; and - Linear operators, Hilbert adjoint operator and annihilators of sets.
MATF	6814	Measure and Integration Theory	Introduction to the theory of sigma algebra, measure and measurable spaces. Borel sets and integration. The Lebesgue integral and its relation to the Riemann integral.	MAIN	Student should be able to ; -Read and understand articles on measure and integration theory; -Carry on with courses on probability theory and functional analysis; and -Understand the notion of sigma algebra, measure and integration theory
MATF	6824	Measure and Integration Theory	Introduction to the theory of sigma algebra, measure and measurable spaces. Borel sets and integration. The Lebesgue integral and its relation to the Riemann integral.	MAIN	Student should be able to ; -Read and understand articles on measure and integration theory; -Carry on with courses on probability theory and functional analysis; and -Explain the notion of sigma algebra, measure and integration theory
MATF	7914	Measure and Integration Theory	An advanced course on the theory of sigma algebras, measure and measurable spaces, Borel sets and integration. The Lebesgue integral and its relation to the Riemann integral.	MAIN	Student will be able to: - Read and understand articles on measure and integration theory; - Carry on with courses on probability theory and functional analysis; and - Apply the notions of sigma algebra, measure and integration theory.
MATF	7924	Measure and Integration Theory	An advanced course on the theory of sigma algebras, measure and measurable spaces, Borel sets and integration. The Lebesgue integral and its relation to the Riemann integral.	MAIN	Student will be able to: - Read and understand articles on measure and integration theory; - Carry on with courses on probability theory and functional analysis; and - Apply the notions of sigma algebra, measure and integration theory.
MATG	6814	CodingTheory	Introduction to the notions of coding theory. Presentations of the basic algorithms relative to coding theory.	MAIN	Student should be able to; -Explain the notions of coding theory; and -Use the basic algorithm of coding theory
MATG	6824	CodingTheory	Introduction to the notions of coding theory. Presentations of the basic algorithms relative to coding theory.	MAIN	Student should be able to ; Explain the notions of coding theory; and Use the basic algorithm of coding theory
MATG	7914	Coding Theory	Introduction to the notions of coding theory. Presentations of advanced algorithms relative to coding theory.	MAIN	Student will be able to: - Apply the notions of coding theory; and - Use the advanced algorithms of coding theory.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATG	7924	Coding Theory	Introduction to the notions of coding theory. Presentations of advanced algorithms relative to coding theory.	MAIN	Student will be able to: - Apply the notions of coding theory; and - Use the advanced algorithms of coding theory.
MATH	6814	Discrete Mathematics	Introduction to the notions and definitions of discrete mathematics. Fundamental theorems and results of discrete mathematics.	MAIN	Student will be able to: - Outline the notions of discrete mathematics; and - Use the basic theorems and results of discrete mathematics.
MATH	6824	Discrete Mathematics	Discrete Mathematics (Second Semester MATH6814)	MAIN	
MATH	7914	Discrete Mathematics	Introduction to the notions and definitions of discrete mathematics. Advanced theorems and results of discrete mathematics.	MAIN	Student will be able to: Apply the notions of discrete mathematics; and Use the advanced theorems and results of discrete mathematics.
MATH	7924	Discrete Mathematics	Introduction to the notions and definitions of discrete mathematics. Advanced theorems and results of discrete mathematics.	MAIN	Student will be able to: Apply the notions of discrete mathematics; and Use the advanced theorems and results of discrete mathematics.
MATI	6814	Set Theory	Axioms of set theory. The natural number system and arithmetic. Finite, countable and infinite sets. Zorn's lemma and applications.	MAIN	Student should be able to ; -Be familiar with set theoretic language and tools.
MATI	6824	Set Theory	Axioms of set theory. The natural number system and arithmetic. Finite, countable and infinite sets. Zorn's lemma and applications.	MAIN	Student should be able to; -Be familiar with set-theoretic language and tools.
MATI	7914	Set Theory	The well-ordering theorem. Ordinal numbers. Equipotency, the Schroder/Bernstein Theorem. Cantor's Theorem.	MAIN	Student will be able to: Put into practise set theory and its applications.
MATI	7924	Set Theory	The well-ordering theorem. Ordinal numbers. Equipotency, the Schroder/Bernstein Theorem. Cantor's Theorem.	MAIN	Student will be able to: Put into practise set theory and its applications.
MATJ	6814	Group Theory	Periodic, torsion-free and mixed Abelian group. Schreier's theorem, semidirect products, extensions of Abelian groups	MAIN	Student should be able to ; - solve basic problems in group theory.
MATJ	6824	Group Theory	Periodic, torsion-free and mixed Abelian group. Schreier's theorem, semidirect products, extensions of Abelian groups.	MAIN	Student should be able to: Solve basic problems in group theory.
MATJ	7914	Group Theory	Periodic, torsion-free and mixed Abelian group. Schreier's theorem, semidirect products, extensions of Abelian groups. The Wreath product and the Sylow subgroups of the symmetric groups. Nilpotent and supersoluble groups.	MAIN	Student will be able to: Solve basic problems in advanced group theory.
MATJ	7924	Group Theory	Periodic, torsion-free and mixed Abelian group. Schreier's theorem, semidirect products, extensions of Abelian groups. The Wreath product and the Sylow subgroups of the symmetric groups. Nilpotent and supersoluble groups.	MAIN	Student will be able to: Solve basic problems in advanced group theory.
MATK	6814	Ring Theory	Localization of integral domains, semisimple modules chain conditions, modules with finite length and tensor product	MAIN	Student should be able to; Solve basic problems in ring theory.
MATK	6824	Ring Theory	Localization of integral domains, semisimple modules chain conditions, modules with finite length and tensor product.	MAIN	Student should be able ; Solve basic problems in ring theory.
MATK	7914	Ring Theory	Localization of integral domains, semisimple modules chain conditions, modules with finite length and tensor product. Modules over PDI's, prime and primitive ideals, the Jacobson radical, semisimple Artinian rings.	MAIN	Student will be able to: Solve advanced problems in ring theory.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATK	7924	Ring Theory	Localization of integral domains, semisimple modules chain conditions, modules with finite length and tensor product. Modules over PDI's, prime and primitive ideals, the Jacobson radical, semisimple Artinian rings.	MAIN	Student will be able to: Solve advanced problems in ring theory.
MATL	6814	Category Theory	Categories, functors, natural transformations, monics, epis, zeros, large categories.	MAIN	Student should be able to; - solve basic problems in category theory.
MATL	6824	Category Theory	Categories, functors, natural transformations, monics, epis, zeros, large categories.	MAIN	Student should be able to ; - solve basic problems in category theory.
MATL	7914	Category Theory	Categories, functors, natural transformations, monics, epis, zeros, large categories. Duality, functor categories, universals and limits, adjoints.	MAIN	Student will be able to: - Solve problems in category theory; and - Use technique from category theory to solve problems in other areas of mathematics.
MATL	7924	Category Theory	Categories, functors, natural transformations, monics, epis, zeros, large categories. Duality, functor categories, universals and limits, adjoints.	MAIN	Student will be able to: Solve problems in category theory; and Use technique from category theory to solve problems in other areas of mathematics.
MATM	6814	Methods of Mathematics	General system of coordinates, ordinary differential equations, special functions	MAIN	Student should be able to; -Solve problems involving change of coordinates systems; and -Apply ordinary differential equations and using properties of special functions to compute specific results.
MATM	6818	Research Report	Research on a subject provided by the supervisor of the research report.	MAIN	Student will be able to ; - Conduct guided research; and - Write a scientific research report.
MATM	6819	Research Report Mathematics	Research on a subject provided by the promoter of the Research Report.	MAIN	Student will be able to: -Perform guided research; and -Write a scientific report.
MATM	6824	Methods of Mathematics	General system of coordinates, ordinary differential equations, special functions	MAIN	Student should be able to; -Solve problems involving change of coordinates systems; and -Use ordinary differential equations and using properties of special functions to compute specific results.
MATM	6828	Mini Dissertation	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: - Do guided research ; and - Formulate a scientific report.
MATM	6829	Research Report Mathematics	Research on a subject provided by the promoter of the Research Report	MAIN	Student will bea ble to: -Perform guided research;and -Write a scientific paper.
MATM	7910	Mini Dissertation	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: -Do guided research; and -Write a scientific report.
MATM	7914	Methods of Mathematics	General system of coordinates, ordinary differential equations, special functions. Complex functions. Integral equations. Laplace and Fourier transforms.	MAIN	Student will be able to: - Solve problems involving change of coordinates systems, ordinary differential equations and using properties of special functions to compute specific results; and - Solve integral equations and use Laplace and Fourier transforms.
MATM	7920	Mini Dissertation	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: Conduct guided research; and Write a scientific report.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATM	7924	Methods of Mathematics	General system of coordinates, ordinary differential equations, special functions. Complex functions. Integral equations. Laplace and Fourier transforms.	MAIN	Student will be able to: - Solve problems involving change of coordinates systems, ordinary differential equations; - Use properties of special functions to compute specific results; and - Solve integral equations and use Laplace and Fourier transforms.
MATM	7930	Mini Dissertation Mathematics	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: -Do guided research; and -Write a scientific report.
MATM	7940	Mini Dissertation Mathematics	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: Conduct guided research; and Write a scientific mini -dissertation
MATM	8900	Mathematics Dissertation	Research on a subject provided by the promoter of the dissertation.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MATM	9100	Mathematics Thesis	This module contains fundamental knowledge, theories, principles and practices of Mathematics, General including Research project in specialized field of Mathematics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MATN	6814	Digital Image Processing	Concepts of Digital Images, Point Processing, Spatial and Frequency Domain Image Enhancement, Image Compression, Transforms	MAIN	Student should be able to; -Have a good general theoretical background of Image Processing techniques; and -Develop some skill in implementation of common algorithms for Image Enhancement.
MATN	6824	Digital Image Processing	Concepts of Digital Images, Point Processing, Spatial and Frequency Domain Image Enhancement, Image Compression, Transforms	MAIN	Student should be able to; -Have a good general theoretical background of Image Processing techniques ;and -Develop some skill in implementation of common algorithms for Image Enhancement.
MATN	7914	Digital Image Processing	Image Restoration. Segmentation, Representation, Description, Recognition and Interpretation of Images. Processing of Color Images.	MAIN	Student will be able to: - Implement more advanced Image Processing algorithms; and - Discuss and apply both the theory and the practical ability of working with the extraction of information from images Image Enhancement.
MATN	7924	Digital Image Processing	Image Restoration. Segmentation, Representation, Description, Recognition and Interpretation of Images. Processing of Color Images.	MAIN	Student will be able to: - Implement more advanced Image Processing algorithms; and - Discuss and apply both the theory and the practical ability of working with the extraction of information from images Image Enhancement.
MATO	6814	Numerical Linear Algebra	Fundamental numerical methods for solving linear algebraic systems of equations.	MAIN	Student should be able Use numerical methods for solving algebraic systems of equations.
MATO	6824	Numerical Linear Algebra	Fundamental numerical methods for solving linear algebraic systems of equations.	MAIN	Student should be able: Use numerical methods for solving algebraic systems of equations.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATO	7914	Numerical Linear Algebra	Advanced numerical methods for solving linear algebraic systems of equations.	MAIN	Student will be able to: - Use general theoretical background on advanced numerical methods for solving algebraic systems of equations.
MATO	7924	Numerical Linear Algebra	Advanced numerical methods for solving linear algebraic systems of equations.	MAIN	Student will be able to: - Use general theoretical background on advanced numerical methods for solving algebraic systems of equations.
MATP	6814	Numerical Solution of Differential Equations	Ordinary differential equations: Euler's method;multistep methods; Explicit and implicit Runge-Kutta methods; Collocation; Linear stability; Difference operators. Partial differential equations: Finite difference schemes for Poisson's equation; Algebraic solution of large systems	MAIN	Student should be able to ; -Discretise ordinary differential equations according to different numerical methods; and -Will be able to investigate the stability of these different schemes.
MATP	6824	Numerical Solution of Differential Equations	Ordinary differential equations: Euler's method;multistep methods; Explicit and implicit Runge-Kutta methods; Collocation; Linear stability; Difference operators. Partial differential equations: Finite difference schemes for Poisson's equation; Algebraic solution of large systems.	MAIN	Student should be able to; -Discretise ordinary differential equations according to different numerical methods ;and -Will be able to investigate the stability of these different schemes.
MATP	7914	Numerical Solution of Differential Equations	Ordinary differential equations: Euler's method;multistep methods; Explicit and implicit Runge-Kutta methods; Collocation; Linear stability; Difference operators. Partial differential equations: Finite difference schemes for Poisson's equation; Algebraic solution of large systems.	MAIN	Student ahould be able to; -Discretise ordinary differential equations according to different numerical methods; and -Investigate the stability of these different schemes.
MATP	7924	Numerical solution of differential equations	Ordinary differential equations: Advanced Euler method;multistep methods; Explicit and implicit Runge-Kutta methods; Collocation; Linear stability; Difference operators. Partial differential equations: Advanced finite difference schemes for Poisson's equation; Algebraic solution of large systems.	MAIN	Student will be able to: - Discretise ordinary differential equations according to different numerical methods; and - Investigate the stability of these different schemes.
MATQ	6814	Optimisation	Basic methods and algorithms for optimization.	MAIN	Student will be able to: - discretise problems according to different numerical optimisation methods.
MATQ	6824	Optimisation	Basic methods and algorithms for optimization.	MAIN	Student will be able to: - Discretise problems according to different numerical optimisation methods.
MATQ	7914	Optimisation	Advanced methods and algorithms for optimization.	MAIN	Student will be able to: - discretise problems according to different advanced numerical optimisation methods.
MATQ	7924	Optimisation	Advanced methods and algorithms for optimization.	MAIN	Student will be able to: - discretise problems according to different advanced numerical optimisation methods.
MATR	6814	Cryptography	Basic methods and algorithms of cryptography.	MAIN	Student will be able to: - apply the different methods of cryptography.
MATR	6824	Cryptography	Basic methods and algorithms of cryptography.	MAIN	Student will be able to: - apply the different methods of cryptography.
MATR	7914	Cryptography	Advanced methods and algorithms of cryptography.	MAIN	Student will be able to: - apply the different advanced methods of cryptography.
MATR	7924	Cryptography	Advanced methods and algorithms of cryptography.	MAIN	Student will be able to: - apply the different advanced methods of cryptography.
MATS	6814	Partial differential equations	Formulation of partial differential equations (PDE). PDE with constant coefficients and 2 variables. The Cauchy problem for first order PDE. Characteristic curves. Non-linear PDE with 2 variables.	MAIN	Student will be able to: - analyse and solve various PDE with 2 variables.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATS	6824	Partial differential equations	Formulation of partial differential equations (PDV). PDV with constant coefficients and 2 variables. The Cauchy problem for first order PDV. Characteristic curves. Non-linear PDV with 2 variables.	MAIN	Student will be able to: - analyse and solve various PDV with 2 variables.
MATS	7914	Partial differential equations	Formulation of partial differential equations (PDE). PDE with constant coefficients and 2 variables. The Cauchy problem for first order PDE. Characteristic curves. Non-linear PDV with 2 variables. Second order PDE: canonical forms, method of separation of variables, D'Alember method of solutions.	MAIN	Student will be able to: -analyse and solve various PDV with 2 variables and apply these.
MATS	7924	Partial differential equations	Formulation of partial differential equations (PDE). PDE with constant coefficients and 2 variables. The Cauchy problem for first order PDE. Characteristic curves. Non-linear PDV with 2 variables. Second order PDE: canonical forms, method of separation of variables, D"Alember method of solutions.	MAIN	Student will be able to: -analyse and solve various PDV with 2 variables apply this.
MATT	6814	Fluid mechanics	Euler equation of motion. Ideal fluids. Method of singularity. Bidimensional motions and complex functions. Viscous flows.	MAIN	Student will be able to: - analyse and solve various problems of fluid mechanics.
MATT	6824	Fluid mechanics	Euler equation of motion. Ideal fluids. Method of singularity. Bidimensional motions and complex functions. Viscous flows.	MAIN	Student will be able to: - analyse and solve various problems of fluid mechanics.
MATT	7914	Fluid mechanics	Euler equation of motion. Ideal fluids. Method of singularity. Bidimensional motions and complex functions. Viscous flows. Geophysical fluids. Compressible fluids.	MAIN	Student will be able to: - analyse and solve various problems of fluid mechanics including those pertaining to the fields of geophysical and compressible fluids.
MATT	7924	Fluid Mechanics	Euler equation of motion. Ideal fluids. Method of singularity. Bidimensional motions and complex functions. Viscous flows. Geophysical fluids. Compressible fluids.	MAIN	Student will be able to: - Analyse and solve various problems of fluid mechanics including those pertaining to the fields of geophysical and compressible fluids.
MATU	6814	Biological Modelling	Introduction to continuous and discrete population models for single speciesas well as interacting species. Modelling of epidemics. Selected subjects from the field of mathematical biology.	MAIN	Student will be able to: - have a good theoretical background on what has become the basis for the field of mathematical biology.
MATU	6824	Biological Modelling	Introduction to continuous and discrete population models for single species as well as interacting species. Modelling of epidemics. Selected subjects from the field of mathematical biology.	MAIN	Student will be able to: - have a good theoretical background on what has become the basis for the field of mathematical biology.
MATU	7914	Biological Modelling	Introduction to continuous and discrete population models for single species as well as interacting species. Advanced modelling of epidemics. Selected subjects from the field of mathematical biology.	MAIN	Student will be able to: - have a good theoretical background on what has become the basis for the field of mathematical biology; and - have some practical experience with advanced mathematical models will be gained.
MATU	7924	Biological Modelling	Introduction to continuous and discrete population models for single species as well as interacting species. Advanced modelling of epidemics. Selected subjects from the field of mathematical biology.	MAIN	Student will be able to: - apply a good theoretical background on what has become the basis for the field of mathematical biology; and - apply practical experience with the advanced mathematical model to theoretical principles.
MATV	6814	Fractional Calculus	Introduction to fractional calculus. Integral methods. Laplace Transform. Riemann and Liouville fractional integrals. Riemann and Liouville fractional derivatives. Ordinary differential equations of fractional order.	MAIN	Student will be able to: - Have theoretical background on what has become the basis for the field of fractional calculus; and - Solve ordinary differential equations involving fractional order derivatives.
MATV	6824	Fractional Calculus	Introduction to fractional calculus. Integral methods. Laplace Transform. Riemann and Liouville fractional integrals. Riemann and Liouville fractional derivatives. Ordinary differential equations of fractional order.	MAIN	Student will be able to: - reason using a theoretical background on what has become the basis for the field of fractional calculus; and - solve ordinary differential equations involving fractional order derivatives.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATV	7914	Fractional Calculus	Introduction to fractional calculus. Integral methods. Laplace Transform. Riemann and Liouville fractional integrals. Riemann and Liouville fractional derivatives. Ordinary differential equations of fractional order. System of differential equations of fractional order. The Weyl fractional derivative.	MAIN	Student will be able to: -Have a good theoretical background on what has become the basis for the field of fractional calculus; - Solve system of ordinary differential equations involving fractional order derivatives; and - compute the Weyl derivative of various functions.
MATV	7924	Fractional Calculus	Introduction to fractional calculus. Integral methods. Laplace Transform. Riemann and Liouville fractional integrals. Riemann and Liouville fractional derivatives. Ordinary differential equations of fractional order. System of differential equations of fractional order. The Weyl fractional derivative.	MAIN	Student will be able to: - Discuss the theoretical background on what has become the basis for the field of fractional calculus; - Solve system of ordinary differential equations involving fractional order derivatives; and - Compute the Weyl derivative of various functions.
MATW	6814	Financial Mathematics	Introduction to financial mathematics. The money market. Pricing algorithms.	MAIN	Student will be able to: - apply advance principles of financial mathematics; and - analyse basic money market situations.
MATW	6824	Financial Mathematics	Introduction to financial mathematics. the money market and pricing algorithms.	MAIN	Student will be able to: - Apply notional principles of financial mathematics; and - Analyse basic money market situations.
MATW	7914	Financial Mathematics	Advanced subject in financial mathematics.	MAIN	Student will be able to: - Apply principles of financial mathematics, and - Analyse advanced money market situations.
MATW	7924	Financial Mathematics	Advanced subject in financial mathematics.	MAIN	Student will be able to: - Have a good notional knowledge of financial mathematics; and - Analyse advanced money market situations.
MATX	6814	Graph Theory	Definition of graphs and fundamental parameters, operation on graphs, eccentricity and related concepts. The reconstruction problem, Automorphism groups of graphs, Arim algorithm and Kruskal algorithm, and Menger's theorem.	MAIN	Students will be able to answer questions on: - Fundamental graph parameters; - Eccentricity; - The reconstruction problem; and - Automorphism of groups of graphs.
MATX	6824	Graph Theory	Definition of graphs and fundamental parameters, operation on graphs, eccentricity and related concepts. The reconstruction problem. Automorphism groups of graphs. Prim algorithm and Kruskal algorithm. Menger's theorem.	MAIN	Students will be able to answer questions on: - Fundamental graph parameters; - Eccentricity; - The reconstruction problem; and - Automorphism of groups of graphs.
MATX	7914	Graph Theory	Definition of graphs and fundamental parameters, operation on graphs, eccentricity and related concepts. The reconstruction problem. Automorphism groups of graphs. Prim algorithm and Kruskal algorithm. Menger's theorem. Hamiltonian and Eulerian Graphs, planar graphs. Vertex colouring of planar graphs.	MAIN	Students will be able to answer questions on: - Fundamental graph parameters; - Eccentricity; - The reconstruction problem; - Automorphism of groups of graphs; - State and prove characterization of trees; - Solve simple problems on Hamiltonian and Eulerian graphs; and - Prove Euler identity and prove the Five Colour theorem for planar graphs.
MATX	7924	Graph Theory	Definition of graphs and fundamental parameters, operation on graphs, eccentricity and related concepts. The reconstruction problem. Automorphism groups of graphs. Prim algorithm and Kruskal algorithm. Menger's theorem. Hamiltonian and Eulerian Graphs, planar graphs. Vertex colouring of planar graphs.	MAIN	Student will be able to: Examine and rule on: - Fundamental graph parameters; - Eccentricity; - The reconstruction problem; - Automorphism of groups of graphs; - State and prove characterization of trees; - Solve simple problems on Hamiltonian and Eulerian graphs; and - Prove Euler identity and prove the Five Colour theorem for planar graphs.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MATY	6814	Asymptotic methods	Order symbols and their operations. Asymptotic sequences. Asymptotic power series. Asymptotic expansion of functions defined by an integral.	MAIN	Student will be able to: - Apply advanced principles of order symbols; and - Analyze asymptotic sequences and power series as well as asymptotic expansion of functions defined by an integral.
MATY	6824	Asymptotic methods	Order symbols and their operations. Asymptotic sequences. Asymptotic power series. Asymptotic expansion of functions defined by an integral.	MAIN	Student will be able to: - Apply advanced principles of order symbols; and - Analyze asymptotic sequences and power series as well as asymptotic expansion of functions defined by an integral.
MATY	7914	Asymptotic Methods	Asymptotic Methods	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATY	7924	Asymptotic Methods	Asymptotic Methods	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	6814	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	6824	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	6834	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	6844	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	6854	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Blooms taxonomy.
MATZ	6864	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7914	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7924	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7934	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7944	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7954	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.
MATZ	7964	Capita Selecta	The content will be decided by the international guest lecturer in the department at the time	MAIN	The outcomes of the module will be decided by the international guest lecturer in the department at the time, in agreement with the course level as requested by Bloom's taxonomy.

Microbial Biochemical Food Biotechonology (112)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGRI	1664	Microbiological principles in Agriculture	Students who successfully complete this module will be qualified to describe the basic characteristics and importance of micro-organisms, with specific reference to their role in agriculture. This knowledge is based on the introductory cell structure, taxonomy, nutrition, microbial physiology, interaction between micro-organisms and plants or animals, the production of high-quality food products, as well as the factors that corrupt food. Practical work: Students that complete the practical part successfully will be equipped to conduct basic microbiological investigations relevant to the Agriculture sector.	MAIN	Students should be able to: - demonstrate basic knowledge and understanding, skills, qualities and other attributes in the microbial principles within the agricultural sector and should be able to; -Apply and demonstrate a clear understanding of knowledge and insight regarding the basic concepts and principles of micro-organisms such as the, morphology and nomenclature of bacteria, isolation and identification of food bacteria, industrial microbiology (making of cheese and bread), food spoilage and the control thereof, food pathogens and their life cycles, impact of plant and animal diseases, function and symbiosis of micro-organisms in the digestive tract of ruminant animals, manipulation of micro-organisms by nutrition, metabolic disorders and diseases caused by micro-organisms in animals and plants; and -Communicate efficiently through visual, numeric and/or language proficiency during oral/ written feedback regarding any relevant topic within the basic microbial principles as applicable within the Agricultural sector.
BLGY	1683	Introductory Biochemistry and Microbiology	This module contains fundamental knowledge, theories, principles and practices of Biochemistry and Microbiology on life in its various forms and the biochemical processes behind it including: - Water, acids and bases - Functional groups and their importance - The structure and function of large biological molecules - The cytoskeleton - Introduction to energy metabolism, enzymes and their regulation - Cellular respiration and fermentation - Basic cell structure of prokaryotic and eukaryotic cells, cell morphology, organelles, membranes and cell surface structures and their function - Evolution and Diversity of Microbial Cells - A history and the importance of Microbiology and the impact and role of microorganisms on humans and the environment - Tools to visualise microbial cells - Microbial locomotion and the phylogenetic tree of life.	MAIN	Student will be able to: -Explain the dissociation of water, acids and bases, buffers and acidification. -Discuss the importance of functional groups. -Explore the synthesis and diversity of macromolecules. -Compare parts of the cytoskeleton and discuss its role in cells. -Explore and explain free energy and know its relation to metabolism and energy coupling. -Explore and explain enzymes and their regulation. -Analyse the structure, hydrolysis and regeneration of ATP and how ATP is coupled to cellular work. -Use fundamental concepts and scientific knowledge to define the following enzymes catalyse reactions, substrate specificity, the principles of redox reactions, cellular respiration, its stages and regulation as well as its relation to other metabolic pathways, anaerobic respiration and fermentation.
BOCB	2616	Biochemistry of biological compounds	This module contains fundamental knowledge, theories, principles and practices of Biochemistry, including: An introduction to the most important principles governing biochemistry. The module is designed to expand on the foundation that the student has acquired in chemistry and biology modules and to provide a biochemical framework that allows understanding of new phenomena.	MAIN	Student will be able to: - Describe the building blocks of living organisms and explain how biomolecules eventually form single cells and ultimately multi-cellular organisms; - Distinguish between prokaryotes and eukaryotes and describe in detail the differences between them; - Explain the properties of water and its importance as biological solvent; - Define and explain acids, bases, pH and buffers and use the relevant equations to calculate pH and buffer composition; - Recognise, draw, name and describe the four major types of molecules (sugars, amino acids, lipids, nucleotides) and three major types of polymers (carbohydrates, polypeptides, nucleic acids) found in all living organisms; - Describe and explain the properties and functions of these four major types of molecules and three major types of polymers; - Describe and explain the flow of genetic information in living organisms through the processes of replication, transcription and translation; - Appreciate and observe laboratory safety practices; - Perform the following tasks after acquiring the necessary problem-solving and psychomotor skills: a. calculations to prepare solutions of specified composition an pH b. titrations of amino acids and proteins. c.colorimetric assays to follow biochemical reactions. d. separation and analysis of biochemical compounds. - Have developed positive interests, attitudes and values with regard to biochemistry.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BOCE	2626	Enzymology and introductory metabolism	An introduction to the most important principles controlling enzyme action and the flow of energy through living systems. The module is designed to make students aware of the principles of Michaelis-Menten kinetics of single substrate reactions, inhibitors and activators, the regulation of allosteric enzymes, coenzymes, the theory of catalysis, enthalpy, entropy and free energy, the living cell as open thermodynamic system, coupled reactions, redox reactions, the role of ATP, introduction to metabolism, glycolysis and fermentation, gluconeogenesis, glycogen metabolism, the pentose phosphate pathway, the Krebs cycle, electron transfer and oxidative phosphorylation, glyoxylate cycle and fatty acid oxidation, fatty acid biosynthesis and catabolism, the metabolism of cholesterol and phospholipids, an overview of amino acid biosynthesis and catabolism including the urea cycle, an overview of photosynthesis.	MAIN	Student will be able to: - Explain the principles of enzyme action, including the effect of activators, inhibitors and allosteric effectors; - Interpret kinetic data for single substrate reactions; - Explain the mechanisms employed by enzymes for catalysis; - Explain the overall process and the details of the chemical changes occurring during carbohydrate and fat metabolism; - Explain the flow of energy through the metabolic pathways; - Examine and explain the control of selected metabolic processes; - explain and calculate the energy balance of the metabolic pathways; -Form an integrated view of the metabolic pathways and how it integrates with nutritional metabolism; - Explain the origin and effect of selected metabolic disorders in the context of global metabolic processes; - Explain the basic biochemical processes of photosynthesis; - Interpret enzyme kinetic data illustrating the effect of effectors; - Apply some of the techniques used in the study of metabolism; - Do different types of enzymatic assays; - Use laboratory equipment presented in practical sessions; and - Plan experiments and write a scientific report.
BOCE	3714	Advanced enzyme kinetics and metabolism	In this module the student undertakes an advanced study of mono and bisubstrate enzyme reactions, the mechanisms used to regulate enzymes, introduction to metabolism, study of several metabolic pathways, principles of the regulation of metabolic pathways, anabolism and catabolism.	MAIN	Student will be able to: - Apply the basic chemical kinetic, thermodynamic and mathematical principles used in describing enzyme kinetics with rate equations, for single-substrate and multisubstrate reactions - Incorporate the effects of regulatory compounds such as inhibitors for single substrate reactions into rate equations - Describe specific examples of regulation with respect to rate limiting enzymatic reactions and integrate this effect in metabolic outcome - Apply a variety of enzyme kinetic assays, including inhibition assays - Apply a variety of data analytical methods to obtain kinetic parameters - Discuss and explain a variety of enzyme regulation mechanisms - Explore the outcomes of specific regulatory actions of the metabolism of prokaryotes and eukaryotes - Discuss and explain some of the techniques used in the study of metabolism - Discuss and explain details regarding the integrated nature and the control of metabolism - Explain the overall process and the details of the chemical changes occurring during carbohydrate and fat metabolism - Explain the flow of energy through the metabolic pathways with respect to specific controlled reactions - Explain the flow of carbon through the metabolic pathways - Plan experiments and write a scientific report - Observe the correct use of laboratory equipment presented in practical sessions
BOCH	2614	Biochemistry for agriculture and health sciences	The role of water and salts in the cell, survey of the chemistry of carbohydrates, lipids, proteins and nucleic acids, the flow of information. Survey of the flow of energy and material through the cell, catabolic pathways, anaerobic and aerobic metabolism, anabolic pathways, integration of metabolic pathways, metabolic diseases.	MAIN	Student will be able to: - Discuss the basic structure of, and the differences between prokaryotic and eukaryotic cells; - Evaluate any chemical structure in terms of its likelihood to be soluble in water taking into account chemical groups and elements in the structure; - Perform basic calculations involving pH, pKa and buffers; - Recall and draw the general structures, properties and functions of amino acids, lipids, carbohydrates and nucleic acids; - Provide the correct nomenclature and common names of relevant amino acids, carbohydrates, lipids and nucleotides; - Discuss the role of enzymes, regarding enzyme kinetics, enzyme classes, the function and properties of enzymes in metabolism; - Discuss the main features of metabolism and the role of reducing equivalents and ATP in energy metabolism; and - Discuss how the metabolic pathways integrate and function under aerobic and anaerobic conditions.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BOCM	3714	Molecular Biology	The module focus on the "Central Dogma of Molecular Biology:" DNA replication, transcription and translation. Topics in DNA/RNA structure-function, DNA repair and regulation of gene expression in pro- and eukaryotes are discussed. In addition, an introduction into recombinant DNA technology and molecular cloning is offered and include restriction enzymes, cloning and expression vectors, recombinant protein production, an introduction into reporter genes, PCR and nucleotide sequencing.	MAIN	Student will be able to: - Discuss and explain the principles of recombinant DNA technology - Explain nucleic acid structures - Explain pro- and eukaryotic DNA replication, including DNA repair mechanisms - Evaluate and discuss transcription, including the regulation of gene expression - Explore the mechanism of translation.
BOCP	3724	Protein Biochemistry	In this module the student will be trained in protein biochemistry. Students will gain knowledge of protein properties that allow separation by liquid chromatography, the three-dimensional structure of proteins and how they fold into globular structures and the forces involved in maintaining the structural integrity of the folded state. Post-translational modifications of proteins, with a focus on glycoproteins, will be introduced together with concepts in protein sorting and trafficking through the cell. Modern and classical methods in primary structure determination of proteins will be taught, leading to concepts of protein evolution and bioinformatics. The catalytic mechanisms employed by enzyme will also be introduced. Students will be trained in technical skills through wet laboratory and computer based practical sessions.	MAIN	The student will be able to: - Describe and apply techniques of protein purification - Describe and discuss the three-dimensional structures of proteins - Describe and discuss protein folding, dynamics and structural evolution - Describe, analyze and discuss glycoproteins and other post-translational modifications - Describe and discuss protein sorting and trafficking - Describe, discuss and analyze protein primary structure determination, evolution and bioinformatics - Analyze and discuss enzymatic catalysis
BOCS	3724	Cell membranes, signal transduction and immunology	In this module the student is exposed to advanced aspects of membrane structure, compounds associated with membranes such as glycoproteins, membrane lipids, glycolipids, membrane proteins, membrane transport systems, receptors, various signal transduction systems (with emphasis on the senses and the immune system), in pro and eukaryotic cells and their role in metabolic regulation, synthesis of proteins in membranes, techniques used to study membranes and the characterisation of membrane components.	MAIN	The student will be able to: Discuss and explain and must be able to give a detailed description of listed components and be able to draw all discussed structures, unless otherwise stated: - Composition of membranes, exploiting lipids, proteins, carbohydrates and cholesterol. - Biosynthesis of membrane lipids focussing on various biosynthetic pathways. - Structure of membranes with focus on the erythrocyte membrane by looking at bilayer formation, fluidity and factors affecting structure. - Membrane proteins, focussing on all related aspects such as transport, receptors, intracellular communication, structural proteins and membrane bound enzymes - Biosynthesis of membrane proteins, appreciating the site of synthesis and translocation in membranes Explore terminology such as, receptors, ligands, antagonist, agonist, hormones, steroids, and immunity-related terms (e.g. interferons, and various lymphokines). Apply knowledge obtained to more complex systems, such as signal transduction pathways, hormonal action, control, regulation and immune systems with focus on viral infections. Compare signalling of pathways by stimulation of hormones to that of steroids. Comparisons and appreciation of various signalling pathways and apply knowledge to more complex pathways, such as the visual system, phosphoinositide system and lipolysis.
FSCA	3714	Food products from animals	Principles of quality and processing of meat and milk will be addressed. Meat: The composition of animal tissue and the effect of certain production factors on the chemical quality of meat. The conversion of muscle to meat. Pigments of meat and its effect on meat processing. Biophysical and enzymatic aspects of meat tenderness. Fresh meat and meat quality. Quality of fresh meat. Cold storage of meat. Packaging of meat. An introduction to meat processing. Meat classification. Carcass measurements. Colour and tenderness measurements of meat. Basic chemical analysis of meat. Meat processing Dairy: Milk bio-synthesis. Chemical and biochemical composition of milk. Milk destabilisation in the processes homogenization, separation, evaporation and fermented products. Practical work related to theory of the course.	MAIN	Student should be able to: -Explain the nutrient composition of meat and milk -Demonstrate and discuss the processing technology of meat and milk -Examine the main areas of food science in understanding the chemical behaviour and changes of meat and milk components during processing -Evaluate information and develop appropriate food processes regarding animal material.
FSCB	3724	Food Microbiology	The student will become acquainted with the microbiology of plant- and animal products in terms of contamination, spoilage and pathogens in food products; organisms involved in the processing of food products; quality management and control in the food industry; quality assurance programmes (PRP, HACCP, ISO, etc.); sanitation with regard to quality and food safety assurance. Practical work relating to microbiological quality control of food and the food factory environment.	MAIN	Student will be able to: - Discuss and explain, by using integrated knowledge of the main areas of Food Science, the role of microorganisms in the spoilage, safety and processing of food; - Explore, discuss and apply quality management and sanitation in the food industry; - Apply microbial techniques in the quality evaluation of food products and the food environment; and - Evaluate information and develop appropriate food processes regarding the control of food spoilage by microorganisms.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FSCC	2613	Food Chemistry	Chemical and physical properties of water, carbohydrates, proteins, lipids, minerals, vitamins and additives and their reactions and functions in food. Minerals: chemical reactions and functions in food.	MAIN	Student should be able to : -explain and discuss how the specialized knowledge of food chemistry relates to other disciplines and practices; -explain and explore the nutrient composition of foods; -discuss and analyse the chemical behaviour of food nutrients; and -discuss chemical functions and behaviour of additives in food.
FSCC	2622	Chemical analysis of food	The student will learn techniques that are applied in the chemical analysis of food regarding water content, water activity, carbohydrates, proteins, lipids, minerals, vitamins and additives based on gravimetric, photometric and chromatographic techniques.	MAIN	Student should be able to: -explain, discuss and apply the basic concepts of food analysis. Carry out qualitative and quantitative analysis of the chemical compounds of food; and - select appropriate information for specific food analyses.
FSCD	4814	Dairy Science	Scientific and technological principles of the industrial processing of cheese and other fermented dairy products such as yogurt and cottage cheese. Practicals: processing of cheese and fermented products followed by analysis, quality control and packaging aspects.	MAIN	Student will be able to: -Analyse the nutrient composition of milk; -Discuss the processing technology of milk; -Examine and discuss the chemical behaviour and changes of milk components during processing; -Evaluate the food processes regarding the processing of dairy material; and - Take responsibility of decision making when processing dairy material.
FSCG	4826	Product Development and Sensory Analysis	Process of product development in the food industry; the role of the food scientist in the process and the interdisciplinary nature of food product development; manner in which a large food company would approach the food product development process; generation of new ideas and testing of the concepts; the sensory evaluation process and everything it involves.	MAIN	Student will be able to: -process of product development in the food industry. -discuss the role of the food scientist in the process and the interdisciplinary nature of food product development. -examine the way in which the principles of subjects studied until now can be applied in the development of a food product. -examine the manner in which a large food company would approach the food product development process. -discuss the factors that should be taken into consideration during the development of a new product. -generation of new ideas and testing of the concepts. -Discuss the sensory evaluation process and everything it involves (also including elementary data analysis).
FSCI	2613	Introductory Food Science	The student will become acquainted to the nutritional aspects of food components and to the processing of milk, meat, fish, poultry, eggs, fruit and vegetables, cereals, legumes and oil seeds, fats and oil products, alcoholic and non-alcoholic beverages, banquetry and chocolate products.	MAIN	Student will be able to: - Explain the role of the food industry in the processing of raw food material into edible products; - Discuss how the knowledge of the food science specialization relates to other disciplines and practices; and - Identify, evaluate and solve problems in food processing.
FSCL	4806	Food Science Literature Study	The student prepares a comprehensive scientific literature review on a specific topic which is presented in the form of a seminar and oral presenation. After completion of this module the student will be capable of unlocking literature, organizing information, concluding this information according to a structured format, as well as written and oral communication.	MAIN	Student will be able to: - Integrate and select specialized knowledge of food science to identify, analyse and address problems; - Outline literature, organize information, conclude this information according to a structured format, as well as written and oral communication; and -Take responsibility and accountability of decisions made in the selection of existing knowledge in the choice of problem solving attempts.
FSCM	4814	Meat Science	Principles involved in manufacturing whole-muscle, minced and emulsified meat products. Restructured, canned, fermented, dried and intermediary moisture meat products. Curing, smoking and cooking of meat products. Additives in meat products. Non-meat ingredients in meat products. Formulation of a meat product. In the practical work case studies will be performed regarding the slaughter line at poultry and red meat abattoirs. Practicals on meat product formulation and manufacturing of different types of products will be done.	MAIN	Student should be able to ; - Explain the functional properties of meat proteins; - Explain the processing technology of meat and meat products; - Formulate chemical analysis of processed meat products; - Evaluate knowledge of food processes regarding the processing of meat - Take responsibility of decision making when processing meat.
FSCP	3724	Food products from plants	The student will be qualified with knowledge for the processing of sorghum, barley, rice, malting and brewing practices, starch technology and extrusion practices. Plant pigment and flavours will be studied, as well as after-harvest technology of vegetables and fruit, minimal processing requirements, fruit juices, dehydration and drying of plant products, packaging of liquid and solid foods. Appropriate practical work.	MAIN	Student should be able to: - Evaluate the nutrient composition of plant material; - Explain the processing technology of plant material; - Discuss the integrated knowledge of the main areas of food science in understanding the chemical behaviour and changes of plant material components during processing; and - Evaluate information and develop appropriate food processes regarding plant material.

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FSCP	4814	Food products from plants	The student studies the functional, biochemical and quality aspects of the components of wheat and their importance in baked goods. Functional biochemical and quality aspects of soy and their importance in soy products. Concerning vegetables and fruit: quality before and after processing, shelf life, microbiology with relationship to different processing techniques, biological and chemical changes during modified atmosphere storage of minimally processed vegetables and fruit. Appropriate practical work.	MAIN	Student should be able to; - Explain the nutrient composition of plant material; - Explain the processing technology of plant material; - Discuss the chemical behaviour and changes of plant material components during processing; - Discuss the knowledge of food processes regarding the processing of plant material; and - Take responsibility of decision making when processing plant material.
FSCR	4808	Food Science Research Project	Students will carry out under supervision of a study leader a reasearch project on aspects of Food Science. It is expected of the student to hand in a report and prepare the results in the format of a scientific article as would be expected at a scientific congress, and deliver an oral presentation. During the project the student will develop skills in problem identification, hypothesis formulation, planning, carrying out experimental work in Food Science, as well as interpretation and communication of results in both written and oral presentation. The independence and scientific insight developed in this module will provide the student with the necessary background for further postgraduate studies.	MAIN	After successful completion of this module the student should be able to: develop skills in problem identification, hypothesis formulation, planning, carrying out experimental work in Food Science, as well as interpretation and communication of results in both written and oral presentation.
FSCR	4813	Literature Study	The student prepares a comprehensive scientific literature review on a specific topic which is presented in the form of a seminar and oral presenation. After completion of this module the student will be capable of unlocking literature, organizing information, concluding this information according to a structured format, as well as written and oral communication.	MAIN	Student will be able to: - Integrate and select specialized knowledge of food science to identify, analyse and address problems; - Outline literature, organize information, conclude this information according to a structured format, as well as written and oral communication; and -Take responsibility and accountability of decisions made in the selection of existing knowledge in the choice of problem solving attempts.
FSCS	2614	Food Systems	The student will become acquainted with the classification and preparation of the food systems solids, liquids, gels, foams, emulsions, analogues and combinations thereof. The student will become acquainted with the nutrients and additives that are employed to obtain the different food systems and will integrate food chemistry knowledge to be able to understand the physical-chemical properties of the food systems. Practical work: The students will use the classification, composition of the structure and application of food additives practically.	MAIN	Student should be able to: - Explain how nutrients and additives are employed to attain the different food systems; - Explain the physical-chemical properties of the different food systems; - Demonstrate how the knowledge of the food science specialization relates to other disciplines and practices; and - Apply selected information appropriately for the preparation of specific food systems.
FSCS	2624	Food Systems	The student will become acquainted with the classification and preparation of the food systems solids, liquids, gels, foams, emulsions, analogues and combinations thereof. The student will become acquainted with the nutrients and additives that are employed to obtain the different food systems and will integrate food chemistry knowledge to be able to understand the physical-chemical properties of the food systems. Practical work: The students will use the classification, composition of the structure and application of food additives practically.	MAIN	Student should be able to: - Explain how nutrients and additives are employed to attain the different food systems; - Explain the physical-chemical properties of the different food systems; - Demonstrate how the knowledge of the food science specialization relates to other disciplines and practices; and - Apply selected information appropriately for the preparation of specific food systems.
FSCS	2644	Food Systems	The student will become acquainted with the classification and preparation of the food systems solids, liquids, gels, foams, emulsions, analogues and combinations thereof. The student will become acquainted with the nutrients and additives that are employed to obtain the different food systems and will integrate food chemistry knowledge to be able to understand the physical-chemical properties of the food systems. Practical work: The students will use the classification, composition of the structure and application of food additives practically.	MAIN	Student should be able to: - Explain how nutrients and additives are employed to attain the different food systems; - Explain the physical-chemical properties of the different food systems; - Demonstrate how the knowledge of the food science specialization relates to other disciplines and practices; and - Apply selected information appropriately for the preparation of specific food systems.
IQMQ	2622	Industrial quality management	This module contains fundamental knowledge, theories, principles and practices of Quality Management, including: introductory quality management, control charts, implementation of HACCP as well as quality control. Emphasis is placed on application which is highlighted with relevant case studies.	MAIN	The student will be able to: - Construct a quality control program for any kind of industry; - develop a overview of quality management systems as applied in industry; and - Have the skills to apply knowledge obtained in this module in quality accreditation systems.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MCBC	3724	Commercial microbial products and biotechnology	The module provides an overview of how microbes (e.g., bacteria, viruses and yeast) are manipulated to solve practical problems through biotechnology. Topics include the application of microbial life, ecology, genetic engineering and metabolism in biotechnological processes. Topics that will be covered include microbial technology, industrial microbiology, microbes in drug, chemicals and enzyme production and development, microbes in alcoholic beverages and biofuels production, microbes in food microbiology, application of microbes in the environment, metagenomics, genetic manipulation of organisms and others.	MAIN	Student will be able to: -Evaluate the applications of technologies recently developed from fundamental research in bacterial genetics -Identify and describe the type and application of different “omics” technologies in the study of genomes. -Describe the technologies to study the genome of an organism including bioinformatics, annotation of genomes and functional and environmental genomics -Explain the application of recombinant DNA technology as well as the application of genetically modified organisms in the field of biotechnology -Describe/explain the application of microorganisms in biotechnology for the production of drugs, other chemicals and enzymes as well as alcoholic beverages and biofuels -Describe/explain the application of microorganisms for the production of primary and secondary metabolites.
MCBE	3724	Microbial ecology and environmental microbiology	The science of microbial ecology focuses on how microbial populations assemble to form communities and how these communities interact with each other and their environments. In microbial ecology we investigate the microorganisms present in specific habitats (biodiversity) and the activities they carry out. To study biodiversity, microorganisms must be identified and quantified in their habitats. To study microbial activity, microbial metabolic processes in habitats must be measured. This module starts with the analysis of microbial communities through culturing of microorganisms, microscopy and molecular genetic analysis. Microbial communities in different environments will then be outlined. Next the involvement of microorganisms in nutrient cycles in nature will be covered, followed by the ecology of microorganisms in man-made environments such as mining. Symbiotic associations among microorganisms and between microorganisms and higher life forms will also be studied. Finally we will consider the water and food we consume as attractive habitats for microorganisms which include dangerous pathogens.	MAIN	Student will be able to: -describe/explain/interpret the methods used in the enumeration of microorganisms and measuring their metabolic activities in their natural habitats; -describe/explain the advantages and limitations of each of these methods; -design experimental strategies for the detection of microbes and their activities in given environments; -describe/explain how microorganisms interact with each other and their terrestrial or aquatic environments; -explain why different natural environments result in different microbial populations; -describe/explain the role of microorganisms in the cycling of nutrients in nature; -describe/explain how microorganisms impact negatively on the built environment; -describe/explain how microorganisms are applied in the built environment to benefit humans; -describe/explain the symbiotic relationships among microorganisms and between microorganisms and other forms of life; -name the diseases spread through different water and food sources; -describe/explain how the spread of food and water borne diseases can be prevented; and -describe the diagnosis, treatment, epidemiology and pathology of these diseases.
MCBG	3714	Growth, nutrition and death of microoganisms	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: quantitative enumeration techniques for microorganisms, microbial growth and death, the principles of and methods for the determination of microbial concentration, growth and death and the fundamental kinetics involved, the principles of microbial nutrition and the effects of physical and chemical antimicrobial agents, enumeration methods, the construction of microbial growth and survival curves and the calculation of kinetic parameters, bacterial isolations on selective and differential media.	MAIN	Students will be able to: - Explain, appraise and apply the principles and techniques used for microbial enumeration, including the ability to select the most appropriate method; - Explain and apply the principles of microbial growth and death kinetics, including the calculation of kinetic parameters; - Demonstrate a fundamental knowledge of antimicrobial agents, their mechanisms of action and their applications; - Demonstrate and apply knowledge of the nutritional requirements for microbial growth and formulate microbial culture media; - Explain the use of selective and differential media for microbial isolations and counts; - Demonstrate skills in the use of various techniques, including microscopy, for the quantitative determination of microorganisms; - Demonstrate proficiency in the construction of growth and survival curves from experimental data and in the use of graphical and mathematical techniques for the calculation of kinetic parameters; and - Design experiments related to microbial growth and death and analyse and interpret the results.
MCBH	2614	Introduction to Microbiology for health and consumer sciences	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: a basic overview on the historical development of microbiology, including the classification, cell structure, and characteristics of bacteria, fungi and protista, microbial symbiotic relationships, basic virology, the growth and survival of microorganisms, factors affecting cell growth and death, microbial growth control and principles of immunology.	MAIN	The student will be able to: - Describe the important aspects of the development of microbiology; - Describe the groups of microorganisms and their symbiotic relationships; - Give an overview of viruses; - Carry out aseptic techniques and differentiate between important microorganisms; - Describe microbial cell growth and death; - Demonstrate insight on how to control and eliminate microbial growth; and - Describe the mechanism and principles of immunity.

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MCBH	2624	Introduction to Microbial Pathogenicity for health and consumer sciences	This module contains fundamental knowledge, theories, principles and practices of pathogenicity and immunology, including: the concepts of epidemiology, nosocomial infections, immunization, immune testing and an introduction to the major groups of pathogenic microorganisms, occurrence and spread of pathogens, the mechanisms of disease transmission, control measures for application outside the body, the control of pathogens inside the body with the aid of immunization and treatment with antibiotics.	MAIN	Student will be able to: -Describe the concepts of adaptive immunity, immunization and immune testing - Describe important concepts of epidemiology and nosocomial infections; - Describe antimicrobial drugs and antimicrobial drug resistance - Describe pathogenicity and virulence - Describe infectious diseases and their transmission - Describe eukaryotic pathogens: fungal and parasitic diseases - Describe the incidence of TB, Influenza, Malaria and HIV in South Africa - Carry out aseptic techniques to investigate: normal microbiota of the human body, microbiota in the environment and food; the effect of antimicrobial drugs on the growth of different microbial species
MCBM	3724	Metabolic diversity	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: the use of light energy in phototrophy, the use of inorganic compounds as energy sources, major biosyntheses during which atmospheric carbon and nitrogen are fixed by microorganisms, the catabolism of organic compounds by fermentation and anaerobic respiration, aerobic chemoorganotrophic processes and nutrient cycles in nature.	MAIN	The student will be able to: - Describe how bacteria harvest and use light energy to produce organic molecules; - Compare the ways in which different bacteria carry out photosynthesis; - Describe how chemolithotrophic bacteria use inorganic molecules as energy sources; - Explain the energetics of chemolithotrophy; - Describe major biosynthetic processes and explain the importance of each; - Describe and differentiate between fermentation and anaerobic respiration; - Describe how organic sources of carbon and energy are metabolised; and - Solve problems in microbial metabolism through the application of their knowledge and comprehension of the principles and processes of metabolism.
MCBP	2616	The basic principles of Microbiology	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: an introduction to molecular biology, transmission of genetic information, protein and RNA synthesis, the influence of nutrition and the environment on microbial growth, handling and investigating various microorganisms, preparation and sterilisation of microbiological media, isolation and cultivation of microorganisms, microscopic investigation of microorganisms, aspects of the metabolism of microorganisms, the effects of environmental conditions and inhibitors on microorganisms, metabolic regulation and signal transduction, the basic principles of virology including replication, diversity and ecology of viruses.	MAIN	Student will be able to: Explain the science of microbiology by referring to the living world of microscopic organisms and our understanding of microbial life processes for the benefit of humankind and our planet; Explain the impact of microorganisms on human affairs by referring to disease; Explain how microorganisms are studied by different microscopic methods; Describe the diversity of microorganisms as well as their respective metabolisms; Describe the morphology of cells in relation to function; Explain the integral parts of microbial cells such as membranes, cell walls, and other inclusions; Describe how microorganisms are cultivated; Explain how temperature and other environmental factors influence microbial growth; Describe how viruses differ from other microorganisms; Describe how viruses can be used for the benefit of man; Perform basic microbiological techniques; Isolate microorganisms and investigate their basic properties; Accurately carry out experiments according to instructions and collect and report data; Interpret data collected in the light of existing knowledge on the level of introductory microbiology; and Work together as member of a team.
MCBP	2626	Microbial evolution and diversity	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: the evolution of microbial life, methods for discerning evolutionary relationships and for systematic classification of organisms, major lineages of microorganisms, the diversity in energy metabolism and their functional diversity, including major habitats of microorganisms and animal-microbial and plant-microbial symbioses.	MAIN	Student will be able to: -Define and correctly use the terminology employed in microbial systematics; -Explain the different genotypic, phenotypic and phylogenetic analyses used in microbial systematics; -Explain and argue about the phylogeny of the Bacteria, Archaea and Eukarya; -Explain the origin and evolution of cellular life and how it gave rise to current microbial diversity within the Bacteria, Achaea and Eukarya; -Describe the endosymbiotic link between eukaryotic and prokaryotic cells; -Distinguish between different groups within major lineages of the Bacteria, Achaea and Eukarya based on morphology, physiology, energy metabolism, habitats, survival mechanisms and phylogeny; -Compare and contrast the lifestyles of selected groups within major lineages of the Bacteria, Achaea and Eukarya; -Describe the physiological features of selected groups within major lineages of the Bacteria, Achaea and Eukarya; -Perform basic microbiological techniques to investigate functional diversity of microorganisms -Apply knowledge of habitat and metabolism to explain influence of microbial populations on a self-constructed closed system (Winogradsky column) -Prepare and present oral presentations regarding their observations

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MCBP	3714	Pathogens and immunity	One of the main problems associated with microorganisms is that they cause diseases in all living systems. This module will concentrate on animal diseases. The interaction between the pathogen and the host will be investigated as well as the requirements which a microorganism must adhere to in order to become pathogenic. The difference between the normal microbiota and pathogens will be discussed. Aspects of non-specific host defence mechanisms as well as control methods through the use of antibiotics and vaccines will be covered as well as a basic presentation of the immune system and methods of vaccine production. An introduction to epidemiology, as well as the methods used for the laboratory-based diagnosis of disease-causing agents will be presented. This will include the isolation and identification of viruses and bacteria as well as the detection of antibodies. In the last part of this module, selected important diseases of man, poultry, avian species, fish and insects will be covered as well as the role that microbiologists can play in the control of these diseases through different diagnostic approaches as well as the development of treatments. Aspects related to the protection against biological weapons will also be covered.	MAIN	Student will be able to: -Explain the differences between pathogenic and non-pathogenic microorganisms and the elements needed for pathogenicity can be transferred to the non-pathogenic organism. -Discuss the pathogenic potential of bacteria and viruses and differentiate between primary pathogens and opportunistic pathogens. -Explain the functioning of the innate and adaptive immunity in humans and animals, including definitions of antibodies and antigens, autoimmune diseases and hypersensitivity reactions. -Compare the different approaches to methods of vaccine production and the use of vaccines to stimulate the immune response.. -Discuss various disease control options, including the use of vaccines, antibiotics and antimicrobial agents and differentiate between when these different options should be used for disease control. -Work within a group in the laboratory to design experiments to isolate and identify bacteria from samples and determine antimicrobial activities, perform the experiments and communicate the results in the form of oral and written presentations. -Use fundamental concepts and scientific knowledge to define the following; pathogenicity, innate immunity, adaptive immunity, vaccine development, primary and secondary immune responses, production of polyclonal and monoclonal antibodies, antibiotics and antibiotic resistance, antiviral medications, physical control of pathogens, epidemiology and ways in which pathogens are spread.
BOCB	6814	Enzymology and catalysis	Enzyme structure and the theory of catalysis, mechanisms applied in catalysis. General principles of catalytic mechanisms employed by enzymes. Reaction mechanism of selected enzymes from defined catalytic classes. Applications of enzymes. Discovery and development of enzymes by rational design and directed evolution for specific applications.	MAIN	Students will be able to: - identify the different enzyme classes and reactions; - Describe the different types of catalysis generally found in organic chemistry; - discuss the principles behind enzyme catalysis - analyse Catalytic mechanisms of selected enzymes with structural detail; - Discuss the experimental evidence leading to the elucidation of or supporting the catalytic mechanism; - explore the effect of mutations on the catalytic properties of the enzymes; - read a published paper on any unknown enzyme and use the evidence supplied to work out a catalytic mechanism; - identify Enzymes used in biocatalysis and the developingment of a successful biocatalysis process. - explore and analyse rational design, directed evolution and immobilization. - apply the following enzymes in biocatalysis: lipases and esterases, epoxide hydrolases and haloalcohol dehalogenases; nitrilases and nitrile hydratases, reductases and dehydrogenases; monooxygenases - Conduct cofactor regeneration - Discuss kinetic resolution, kinetic dynamic resolution and desymmetrization
BOCB	6834	Bioinformatics and omics sciences	Survey and use of a variety of bioinformatics databases. Genome sequence assembly, annotation and tools. Molecular phylogenetics. Systems biology and modelling of biochemical pathways. Analysis of large phenotypic datasets such as microarrays and RNAseq	MAIN	Student will be able to: -discuss the principles involved in molecular sequence alignment and other methods employed in bioinformatics -perform a variety of database searches, selecting the best method, based on thorough understanding of the principles involved - perform molecular phylogenetics -Execute simple command-line bioinformatics programs -analyse large functional genomic datasets with computational tools, such as microarray, RNAseq, proteomics or metabolomics - use and create systems biology models of biochemical pathways and perform simulations in a graphical user interface.
BOCD	9100	Biochemistry Thesis	This module contains fundamental knowledge, theories, principles and practices of Biochemistry, General including Research project in specialized field of Biochemistry, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	the student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format);and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BOCE	6814	Enzymology and catalysis	Enzyme structure and the theory of catalysis, mechanisms applied in catalysis. General principles of catalytic mechanisms employed by enzymes. Reaction mechanism of selected enzymes from defined catalytic classes. Applications of enzymes. Discovery and development of enzymes by rational design and directed evolution for specific applications.	MAIN	Students will be able to: - identify the different enzyme classes and reactions; - Describe the different types of catalysis generally found in organic chemistry; - discuss the principles behind enzyme catalysis - analyse Catalytic mechanisms of selected enzymes with structural detail; - Discuss the experimental evidence leading to the elucidation of or supporting the catalytic mechanism; - explore the effect of mutations on the catalytic properties of the enzymes; - read a published paper on any unknown enzyme and use the evidence supplied to work out a catalytic mechanism; - identify Enzymes used in biocatalysis and the developingment of a successful biocatalysis process. - explore and analyse rational design, directed evolution and immobilization. - apply the following enzymes in biocatalysis: lipases and esterases, epoxide hydrolases and haloalcohol dehalogenases; nitrilases and nitrile hydratases, reductases and dehydrogenases; monooxygenases - Conduct cofactor regeneration - Discuss kinetic resolution, kinetic dynamic resolution and desymmetrization.
BOCE	6844	Enzymology and catalysis	Enzyme structure and the theory of catalysis, mechanisms applied in catalysis. General principles of catalytic mechanisms employed by enzymes. Reaction mechanism of selected enzymes from defined catalytic classes. Applications of enzymes. Discovery and development of enzymes by rational design and directed evolution for specific applications.	MAIN	Students will be able to: - identify the different enzyme classes and reactions; - Describe the different types of catalysis generally found in organic chemistry; - discuss the principles behind enzyme catalysis - analyse Catalytic mechanisms of selected enzymes with structural detail; - Discuss the experimental evidence leading to the elucidation of or supporting the catalytic mechanism; - explore the effect of mutations on the catalytic properties of the enzymes; - read a published paper on any unknown enzyme and use the evidence supplied to work out a catalytic mechanism; - identify Enzymes used in biocatalysis and the developingment of a successful biocatalysis process. - explore and analyse rational design, directed evolution and immobilization. - apply the following enzymes in biocatalysis: lipases and esterases, epoxide hydrolases and haloalcohol dehalogenases; nitrilases and nitrile hydratases, reductases and dehydrogenases; monooxygenases - Conduct cofactor regeneration - Discuss kinetic resolution, kinetic dynamic resolution and desymmetrization.
BOCL	6826	Research: Literature study	Students carry out a literature survey on a topic supplied to them by a lecturer acting as mentor. This topic is generally linked to the research that will be done in BOCR6828. A literature review covering the chosen topic is written and also presented orally. The written portion of the module is evaluated by the mentor as well as an internal and external assessor and marks are allocated by all three.	MAIN	Student will be able to: - apply the principles obtained during his literature survey to answer questions; - discuss and explain the variety of approaches observed in the literature and how they relate to what has been achieved as well as the intended research; - justify and evaluate key aspects of the proposed research project from the literature; and -discuss and explain what has been observed in the literature, both orally (with the help of visual aids) and in a well compiled literature review.
BOCM	6814	Advanced Molecular Biology	In the Advanced Molecular Biology module, concepts of nucleic acid structure and the Central Dogma of Molecular Biology not addressed in the third year are discussed. Emphasis is placed on epigenetic mechanisms, RNA processing, genome editing, genome analysis, gene therapy and genetically modified organisms. Recombinant expression systems and tools for analysing gene expression are also included. Training in the evaluation and interpretation of subject specific literature is included.	MAIN	Student will be able to: -Discuss, argue, critically assess and hypothesize current concepts and models regarding the molecular basis of prokaryotic and eukaryotic cellular processes; and -Apply principles, design recombinant DNA technology experiments; and be able to interpret and evaluate published literature on related topics.
BOCM	8900	Biochemistry	This module contains fundamental knowledge, theories, principles and practices of Biochemistry: Research project in specialized field of Biochemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	At the end of the module, the student is expected to be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BOCO	6822	Biochemistry oral examination of theory and Practical	The oral examination is normally scheduled for November. A panel consisting of lecturers from the division of Biochemistry, including an external assessor, is convened for this purpose. The general knowledge of the student with regard to the subject area as well as aspects of the Biochemistry Honours course will be assessed during the oral examination.	MAIN	The student will be able to: - Apply general and specific knowledge obtained in undergraduate and honours Biochemistry courses; - Appreciate and observe the application of Biochemistry; - Justify key aspects of his research project; and - Discuss and explain specific techniques used as well as general trends in Biochemistry
BOCR	6828	Research Essay	Students conduct research on a topic supplied to them during the first semester by a lecturer acting as mentor (in consultation with the Departmental Chairperson). A written research report is prepared and also presented orally. The written portion of the module is evaluated by the mentor as well as an internal- and external assessor and marks are allocated by all three.	MAIN	Student will be able to: -discuss obtained during his research to answer questions. - discuss and explain the various techniques applied in the project as well as the results obtained - justify and evaluate key aspects of his research project - discuss and explain his research, both orally with the help of visual aids and in a well compiled written report
BOCT	6814	Techniques in Biochemistry	Research techniques in biochemistry and biotechnology: chromatography, spectroscopy, electrophoresis, microbial cultivation techniques, PCR, Sanger sequencing, an introduction to mass spectrometry and other analytical techniques for the analysis of biomolecules and products. Science writing skills, nature and philosophy of science, research ethics, statistics.	MAIN	Student will be able to: -Discuss and explain the theory of the various techniques; -Apply the techniques to various problems; -Collect, organize, analyze and critically evaluate information; and -Interpret, analyse and report data obtained through the use of all the various techniques.
FSCD	6814	Dairy Science	The course consists of 5 modules on advanced aspects in dairy science. This includes residues in milk and milk products such as residues and contaminants, antimicrobials, paraciticides, pesticides and mycotoxins. Bactieriophages in the cheese industry. Accelerated cheese ripening with enzyme technology. HACCP in the dairy industry. Finaly an assignment is required on the latest developments in Dairy Science.	MAIN	Student will be able to: -examine the nutrient composition of milk. -manage the processing technology of milk. -examine and discuss the chemical behaviour and changes of milk components during processing. -discuss and apply food processes regarding the processing of dairy material. -manage the decision making when processing dairy material.
FSCG	6826	Product Development and Sensory Analysis	Process of product development in the food industry; the role of the food scientist in the process and the interdisciplinary nature of food product development; manner in which a large food company would approach the food product development process; generation of new ideas and testing of the concepts; the sensory evaluation process and everything it involves.	MAIN	Student will be able to: process of product development in the food industry. the role of the food scientist in the process and the interdisciplinary nature of food product development. way in which the principles of subjects studied until now can be applied in the development of a food product. manner in which a large food company would approach the food product development process. factors that should be taken into consideration during the development of a new product. generation of new ideas and testing of the concepts. The sensory evaluation process and everything it involves (also including elementary data analysis).
FSCI	8900	Food Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Food Science, including: Research project in specialized field of Food Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FSCI	9100	Food Science Thesis	This module contains fundamental knowledge, theories, principles and practices of Food Science, General including Research project in specialized field of Food Science, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FSCL	6806	Food Science Literature Study	The student prepares a comprehensive scientific literature review on a specific topic which is presented in the form of a seminar and oral presenation. After completion of this module the student will be capable of unlocking literature, organizing information, concluding this information according to a structured format, as well as written and oral communication.	MAIN	Student will be able to: - Integrate and select specialized knowledge of food science to identify, analyse and address problems; - Outline literature, organize information, conclude this information according to a structured format, as well as written and oral communication; and -Take responsibility and accountability of decisions made in the selection of existing knowledge in the choice of problem solving attempts.
FSCM	6814	Meat Science	Principles involved in manufacturing whole-muscle, minced and emulsified meat products. Restructured, canned, fermented, dried and intermediary moisture meat products. Curing, smoking and cooking of meat products. Additives in meat products. Non-meat ingredients in meat products. Formulation of a meat product. In the practical work case studies will be performed regarding the slaughter line at poultry and red meat abattoirs. Practicals on meat product formulation and manufacturing of different types of products will be done.	MAIN	Student should be able to ; - Explain the functional properties of meat proteins; - Explain the processing technology of meat and meat products; - Formulate chemical analysis of processed meat products; - Evaluate knowledge of food processes regarding the processing of meat - Take responsibility of decision making when processing meat.
FSCP	6814	Food products from plants	The student studies the functional, biochemical and quality aspects of the components of wheat and their importance in baked goods. Functional biochemical and quality aspects of soy and their importance in soy products. Concerning vegetables and fruit: quality before and after processing, shelf life, microbiology with relationship to different processing techniques, biological and chemical changes during modified atmosphere storage of minimally processed vegetables and fruit. Appropriate practical work.	MAIN	Student should be able to; - Explain the nutrient composition of plant material; - Explain the processing technology of plant material; - Discuss the chemical behaviour and changes of plant material components during processing; - Discuss the knowledge of food processes regarding the processing of plant material; and - Take responsibility of decision making when processing plant material.
FSCR	6808	Research Project Food Science	A subject specific project will be completed under the guidance of a supervisor and it is expected of students to submit a research report in the format of a scientific publication and to prepare and orally present the results in the format required by scientific conferences.	MAIN	Student will be able to: - perform problem solving, hypothesis formulating, planning, execution and analysis of animal science experiments/research, - use a range of specialised skills to identify, analyse and address complex problems drawing systematically on the body of knowledge and methods appropriate to the field of animal science. - interpret results and prepare scientific report - communicate effectively through visual, numeric and/or language proficiency during oral and written presentations. -work effectively in a team or group, and to take full responsibility for own decisions and actions, and full accountability for the decisions and actions of others where appropriate. -demonstrate insight developed in this module provides a background for further post graduate studies.
FSCR	6813	Literature Study	The student prepares a comprehensive scientific literature review on a specific topic which is presented in the form of a seminar and oral presenation. After completion of this module the student will be capable of unlocking literature, organizing information, concluding this information according to a structured format, as well as written and oral communication.	MAIN	Student will be able to: - Integrate and select specialized knowledge of food science to identify, analyse and address problems; - Outline literature, organize information, conclude this information according to a structured format, as well as written and oral communication; and -Take responsibility and accountability of decisions made in the selection of existing knowledge in the choice of problem solving attempts.
MBBT	8900	Microbial Biotechnology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Microbial Biotechnology, including: Research project in specialized field of Microbial Biotechnology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MBBT	9100	Microbial Biotechnology Thesis	This module contains fundamental knowledge, theories, principles and practices of Microbial Biotechnology, General including Research project in specialized field of Microbial Biotechnology, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MCBC	6814	Continuous and Batch Cultivation of Microorganisms	Growth kinetics of batch cultures. Oxygen as substrate: volumetric oxygen transfer coefficient; critical dissolved oxygen concentration. Chemostat theory: material balances; Monod model; autoregulation; determination of kinetic and stoichiometric parameters. Deviations from the Monod model: maintenance energy; double substrate-limited growth; growth on mixtures of carbon substrates. Effect of growth rate on cell composition and size. Product formation: kinetics; effect of environmental factors. Complex chemostat systems and applications. Kinetics of fed-batch cultures. Degree of reduction and carbon balances.	MAIN	The student will be able to: - Discuss the growth kinetics of batch cultures; - Describe the theory and kinetics of continuous culture systems, in particular of chemostat systems, as well as a good comprehension of the fundamentals of fed-batch cultivation; - Describe the uses and applications of continuous culture and fed-batch systems in research and industry; - Use continuous culture and fed-batch systems in research and design experiments; -Use graphical and mathematical techniques for computing kinetic and stoichiometric parameters from experimental data; - Interpret the data from the above systems; - Construct and interpret carbon balances and degree of reduction balances; and - Use MS Excel for advanced spreadsheet-based data processing, manipulation and modelling of experimental data related to bioprocesses.
MCBD	6834	Microbial Diversity	Yeasts: Identification of yeasts as required for quality assurance in the biotechnology industry. Yeast taxonomy. Fungi: Ecological concepts in mycology, endophytes, ecological succession, mating types and vegetative compatibility. Taxonomy, collection, preservation and description of fungi. Mycological techniques and the use of identification keys. Bacteria: Bacterial nomenclature and classification including numerical taxonomy. Understanding of the phylogenetic and phenotypic classification systems. Training in advanced methods in serology and chemotaxonomy and nucleic acids in bacterial classification. Putative taxa of prokaryotes. Polyphasic taxonomy. Viruses: Characteristics of viruses which infect humans, animals, insects, plants, bacteria and fungi. Practical aspects of the propagation of viruses and the use of different methods for the identification of viruses.	MAIN	The student will be able to: - Identify yeasts as required for quality assurance in the biotechnology industry; - Apply taxonomic principles to the classification of yeasts; - Discuss and describe the taxonomy of yeasts, moulds, bacteria and viruses; - Demonstrate an understanding of the difference between identification and classification of bacteria; - Demonstrate a clear understanding of diversity of microbial life on earth and how they can interact with each other; - Demonstrate an understanding of how to work with viruses, particularly in the molecular era; - Describe how to isolate, purify, and identify fungi to species level; - Describe how fungi disperse in nature and relate to other living organisms; - Describe how fungi propagate and develop; and - Describe how fungi affect human, animal and plant health.
MCBL	6826	Research : Literature Study	Students carry out a literature survey on a topic supplied to them by a mentor. A literature review covering the chosen topic is written and also presented orally. The written portion of the module is evaluated by the mentor, an internal assessor as well as an external assessor.	MAIN	Student will be able to: - Collect, analyse, organise and critically evaluate information; - Compose and present research literature in written form in a scientific report and in oral form to a scientific audience; and - Communicate effectively orally, visually and in writing.
MCBM	6814	Microbial Molecular Biology	Training in the reading and interpretation of publications in molecular biology and the presentation of a seminar on a current molecular biology topic. The use of advance molecular biology techniques as well as training in computer usage that is associated with the analysis of DNA information. Students will also be expected to do self-study on selected topics that are related to molecular biology, these may include concepts of nucleic acid structure and the Central Dogma of Molecular Biology, epigenetic mechanisms, RNA processing, genome editing, genome analysis, gene therapy and genetically modified organisms. Recombinant expression systems and tools for analysing gene expression will also be included.	MAIN	Student will be able to: -Discuss, argue, critically assess and hypothesize current concepts and models regarding the molecular basis of prokaryotic and eukaryotic cellular processes; - Apply principles; -Design recombinant DNA technology experiments; and - Interpret and evaluate published literature on related topics.
MCBO	6822	Oral examination in Microbiology	The oral examination is taken in November. A panel consisting of lecturers from the Microbiology division and an external examiner is constituted for this purpose. Students are expected to answer questions about their research project (MCBR6828) as well as microbiology in general. Evaluation is not limited to completed course contents.	MAIN	Student will be able to: - Apply general and specific knowledge obtained in undergraduate and honours Microbiology courses; - Appreciate and observe the application of Microbiology; - Justify key aspects of his/her research project; and - Discuss and explain specific techniques used as well as general trends in Microbiology.
MCBP	6814	Applied Microbial Physiology	Food Microbiology: Physiology of food spoilage microorganisms. The application of micro-organisms in biological control. Food spoilage and its prevention. Mycotoxins. The application of microorganisms in food processing. Microbial product formation: Principles and application of the metabolism of the microorganisms involved. Metabolic regulation and its implication for microbial product formation. Industrial processes based on microbial physiological activities.	MAIN	The student will be able to: - Express familiarity with the commercial process for the production of citric acid, lysine, cephalosporin, beer and industrial ethanol; - Discuss the involvement of the relevant metabolic pathways in the commercial production these commodities; and - Solve metabolic problems related to the formation of these products. Food Microbiology - Discuss the importance of functional foods; - Prevent food spoilage during an outbreak; - Discuss food-borne diseases and food poisoning; and - Discuss microbial interactions associated with fermented foods.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
MCBP	6844	Applied Microbial Physiology	Principles and application of the metabolism of the microorganisms involved in selected commercial production processes. Metabolic regulation and its implication for microbial product formation. Industrial processes based on microbial physiological activities.	MAIN	Student will be able to: - Express familiarity with the commercial process for the production of citric acid, lysine, cephalosporin, beer and industrial ethanol; - Discuss the involvement of the relevant metabolic pathways in the commercial production these commodities; and - Solve metabolic problems related to the formation of these products.
MCBR	6828	Research Report	Students conduct research on a topic supplied to them by a mentor. A written research report is prepared and also presented orally. The written portion of the module is evaluated by the mentor, an internal assessor as well as an external assessor.	MAIN	Student will be able to: - Identify and solve problems using critical and creative thinking; - Apply appropriate theoretical and practical methods to the analysis and solution of a research problem; - Plan, organize, direct and control tasks and resources so as to accomplish set goals effectively within the allotted time; and - Compose and present research results in written form in a scientific report and in oral form to a scientific audience.
MCBT	6814	Techniques in Microbiology	Research techniques in biochemistry and microbiology: chromatography, spectroscopy, electrophoresis, microbial cultivation techniques, PCR, Sanger sequencing, an introduction to mass spectrometry and other analytical techniques for the analysis of biomolecules and products. Science writing skills, nature and philosophy of science, research ethics, statistics.	MAIN	The student will be able to: - Discuss and explain the theory of the various techniques; - Apply the techniques to various problems; - Collect, organise, analyse and critically evaluate information; and - Interpret, analyse and report data obtained through the use of various techniques.
MCBT	8900	Microbiology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Microbiology, including: Research project in specialized field of Microbiology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
MCBT	9100	Microbiology Thesis	This module contains fundamental knowledge, theories, principles and practices of Microbiology, General including Research project in specialized field of Microbiology, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Physics

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYA	1554	Introductory astronomy	The sky as a celestial sphere, including the visibility of stars and constellations; Cycles of the moon, the seasons and eclipses; Heliocentric universe and Kepler`s laws of planetary motion; Stars, their types, structure, spectral classification and the Hertzsprung-Russell diagram; formation, evolution and death of stars; neutron stars and black holes; Galaxies and the Milky way; The big bang and the age of the universe; Astronomical measurements and techniques applicable to multi-wavelength astronomy.	MAIN	The student will be able to: - define basic astronomical terms and explain phenomena associated with the motion of the Earth and Moon. - describe and interpret the laws governing the motion of the planets. - describe the birth, evolution and death of stars. - describe the structure and basic properties of galaxies, and the theory of the big bang, and - interpret data obtained from different wavelength observations (multi-wavelength astronomy).
PHYA	1664	Principles and Practice of Observational Astronomy	(a) Astronomical Instrumentation: Optical Telescopes and a brief introduction to Radio, Infrared, X-ray and Gamma-Ray astronomy (b) Telescope Optics (Resolving Power and Magnification), Mounts (c) Astronomical Observations and Measurements: Preparing finding charts, Light detectors, CCD Photometry, Atmospheric effects (extinction, seeing, atmospheric and galactic colour extinction), Spectroscopy, Parallax applications to determine distances to stars, Quantitative statistical interpretation of astronomical data (d) Introduction to the Celestial Sphere, Basics of spherical geometry (e) Coordinate systems: Equatorial (RA-Dec), Brief introduction to Alt-Az system, Ecliptic coordinates, Galactic Coordinates, Sidereal Time	MAIN	Student will be able to: Apply the basic principles of observational astronomy in problems and practice with astronomical instrumentation, astronomical measurements, photometry and spectroscopy and interpretation of astronomical data. - Use astronomical planetarium software like Stellarium and The Sky to explore the night sky - Use the Boyden telescopes to observe astronomical objects like the Moon, planets and stars - Observe the Moon, Identify features of the Moon`s surface - Measure the brightness of a star using CCD camera and IRAF photometry package - Determine the pulsation period of a star with CCD camera - Determine the orbital period of a binary system with CCD camera.
PHYA	2613	Astrophysics	This module provides an introduction to the physics of stars using the mathematical techniques and physics background from 1st level modules. Concepts like luminosity, inverse-square law and blackbody spectrum is used to explain the stellar photometric system and the stellar classification scheme. Thermal properties of matter, i.e. the Maxwell-Boltzmann equation and the Saha ionization equation are introduced to explain the strength of different species of spectral lines. Kepler's laws are introduced to explain binary star motion. The binary star mass function to determine the masses of starts, which leads to the well known and the mass-luminosity relation. Classification of different binary systems. Solutions to the equations of stellar structure are obtained under some simplifying assumptions. Applying these models to different stages of stars, their evolution from clouds of gas to final states such as white dwarfs or neutron stars can be traced. The Sun is studied as an example of a typical star, and the methods of classifying stars are described.	MAIN	Student will be able to: - Determine stellar data from a set of photometric data; - Examine the time scales associated with stellar formation and evolution; - Derive equations for stellar structure and solve them under certain simplifying situations - Derive and understand the consequences of the Virial theorem - Know what nuclear processes are important at certain stages of stellar evolution - Classify stars according to their properties like temperature and spectra - Describe how protostars are born in molecular clouds and their subsequent evolution into main sequence and post main sequence stars.
PHYA	2614	Astrophysics	This module provides an introduction to the physics of stars using the mathematical techniques and physics background from 1st level modules. Concepts like luminosity, inverse-square law and blackbody spectrum is used to explain the stellar photometric system and the stellar classification scheme. Thermal properties of matter, i.e. the Maxwell-Boltzmann equation and the Saha ionization equation are introduced to explain the strength of different species of spectral lines. Kepler's laws are introduced to explain binary star motion. The binary star mass function to determine the masses of starts, which leads to the well known and the mass-luminosity relation. Classification of different binary systems. Solutions to the equations of stellar structure are obtained under some simplifying assumptions. Applying these models to different stages of stars, their evolution from clouds of gas to final states such as white dwarfs or neutron stars can be traced. The Sun is studied as an example of a typical star, and the methods of classifying stars are described.	MAIN	Student will be able to: - Determine stellar data from a set of photometric data; - Discuss the time scales associated with stellar formation and evolution; - Derive equations for stellar structure and solve them under certain simplifying situations; - Derive and understand the consequences of the Virial theorem; - List and discuss the important nuclear processes at certain stages of stellar evolution; - Classify stars according to their properties like temperature and spectra; and - Describe how protostars are born in molecular clouds and their subsequent evolution into main sequence and post main sequence stars.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYA	2623	The structure and evolution of galaxies	This module gives an introduction to the properties of galaxies, how they evolve and the large-scale structure of the Universe. Our Solar System resides in the galaxy called the Milky Way.The components and dynamics of our Milky Way galaxy are examined as they provide a basis for the study of all other galaxies. We look at star formation rates within galaxies and how stellar populations evolve to understand how measured properties, such as the colour of a galaxy, change with time. Because the Universe is expanding, the module looks at how properties of galaxies change as we look back in time.	MAIN	Student will be able to - Recognise the various components of our Milky Way galaxy and know what their properties are; - Calculate how stars move within the Milky Way; - Distinguish morphological types for galaxies and different types of classification schemes; - Examine and discuss the evolution of galaxies; - Discuss the morphology of the large scale structure of the universe and how the distances to galaxies/galaxies clusters are determined; - Discuss the model of Active Galaxies; and - Explain how properties of the large-scale structure of the Universe are determined.
PHYA	3708	Astronomy Practicle	A hands-on experimental solid state mini research project, with the possibility of a publication in a peer reviewed international journal. The subject will be determined by the departmental chair. The different phases include a literature study, specimen preparation, characterization, data analysis and preparation of a manuscript. Assessment is done by written and oral reports at the end of each quarter.	MAIN	Explore basic and advanced methods and instruments used to collect observational data in astronomy, as well as the theory and methods implemented to reduce and present the data in an internationally acceptable standard format.
PHYA	3709	Astronomy Practicle	This module exposes the student to the fundamental experimental techniques of optical astronomy (photometry and spectroscopy) as well introduces the concepts of radio, X-ray and Gamma-ray astronomy. In addition the students are introduced to practical programming, data analysis, scientific reporting and interpretation. This is a year-module which is presented modular with each of these modules (optical photometry, optical spectroscopy, multi-wavelength astronomy, data scripting and report writing) lasting approximately 5 weeks	MAIN	Student will be able to: - Explore basic and advanced methods and instruments used to collect observational data in astronomy; and - Examine and discuss the theory and methods implemented to reduce and present the data in an internationally acceptable standard format.
PHYA	3772	Radiative Processes I	Fundamentals of radiative transport, intensity, radiative momentum and transfer, thermal radiation, the Einstein coefficients, scattering effects random walks and radiative diffusion and radiative transport. A brief introduction of Maxwell's equations, plane electromagnetic waves, The radiation of moving charges: the Larmor formula, Thomson scattering, radiation from harmonically bound charges.	MAIN	Student will be able to: -Examine and discuss the properties of the radiation field, i.e. radiation flux, intensity, energy density and radiation force and pressure. The radiation of individual charged particles, Thomson scattering, as well as radiation reaction and the radiation of harmonically bound particles as a mechanical model for the emission of bounded particles; and -Solve basic problems in this discipline, and apply basic concepts to solve problems related to radiation transport in astrophysical environments.
PHYA	3782	Radiative Processes II	Relativistic effects on the radiation field like time dilation, length contraction, Doppler boosting and relativistic beaming, Lorentz invariants, emission of single speed electrons in the vicinity of a massive nucleus, thermal Bremsstrahlung emission, relativistic Bremsstrahlung, synchrotron emission, expressions for the total emitted power,, Compton and Inverse-Compton scattering, cross section.	MAIN	Student will be able to: -Explain the fundamental effects of special relativity on the radiation field and emission from relativistic particles; -Explain the fundamental aspects of radiation processes of single charged particles, and be familiar with Bremsstrahlung, the basic properties of Synchrotron radiation, Compton and Inverse-Compton scattering; and -Solve basic problems in this discipline, and apply fundamental concepts introduced above to solve basic problems related to: Bremsstrahlung, Synchrotron radiation of single particles, Compton and Inverse-Compton radiation.
PHYC	2623	Introduction to Numerical Analysis and Quantitative Methods	Introduction to numerical analysis and quantitative methods: Students will be introduced to numerical integration and differentiation. Students will learn to implement numerical integral methods (e.g Newton-Cotes Formula, trapezoidal rule, Simpson rule) which will be used to solve numerical integrals. Improper integrals: the students will be introduced to techniques that can be used to help evaluate improper integrals. First-order differential equations: students will be introduced to the Euler method to solve for first-order differential equations. Students will be required to implement the methods in a programming language. Students are also exposed to the quantitative analysis and evaluation of experimental data, for example, basic error analysis, error propagation of measurements, significance estimation of experimentally determined quantities.	MAIN	Student will be able to: -Implement techniques of numerical differentiation and integration to solve basic problems in mechanics and dynamics; -Program and solve problems using Matlab or Python; -Determine and evaluate errors on experimental measurements as well as to know how errors propagate; and - Perform significance estimation of experimentally measured data.
PHYM	2613	Analytical mechanics for physicists and engineers	This module provides an introduction to basic analytical techniques of mechanical systems, i.e. basic vector fields, scalar fields, vector algebra and analysis, general motion of particles in three dimensions, non-inertial reference frames (rotation), gravitation and central forces, dynamics of systems of particles (collisions and scattering), Lagrange and Hamiltonian principles of solving problems related to dynamical systems, i.e. the calculus of variations, e.g. the Brachistrochrone problem.	MAIN	Students will be able to: - solve basic mechanical and dynamical problems - solve basic mechanical and dynamical problems applying Lagrange principles - solve basic mechanical and dynamical problems using the Hamiltonian approach - apply the calculus of variation to optimize mechanical and dynamical systems.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYS	1502	Physics for Building Science students	Mechanics: Revision of the concepts displacement, velocity, acceleration, force, work, energy, power and momentum. Addition and resolving of vectors. Equilibrium. Moment of force and equili¬brium. Equations of motion: Linear motion. Newton's second law, mass, weight. Work and energy. Elasticity and surface tension. Heat and thermodynamics: Temperature and its measurement, thermal expansion. Heat, units and transfer. Electricity: Potential, electrical current and circuits, electromagnetic introduction, electromagnetic waves, alternating currents and transformers. Light, sound and colour: Nature and propagation, optics, reflection, refraction, illumination.	MAIN	Student will be able to: -describe the basic phenomena and theory concerning mechanics, heat, sound, optics and electricity, as well as the applications thereof in the building sciences, and - solve problems, applied to the above topics.
PHYS	1512	Physics for Building Science students	Mechanics: Revision of the concepts displacement, velocity, acceleration, force, work, energy, power and momentum. Addition and resolving of vectors. Equilibrium. Moment of force and equili¬brium. Equations of motion: Linear motion. Newton's second law, mass, weight. Work and energy. Elasticity and surface tension. Heat and thermodynamics: Temperature and its measurement, thermal expansion. Heat, units and transfer. Electricity: Potential, electrical current and circuits, electromagnetic introduction, electromagnetic waves, alternating currents and transformers. Light, sound and colour: Nature and propagation, optics, reflection, refraction, illumination.	MAIN	Students will be able to: -Describe the basic phenomena and theory concerning mechanics, heat, sound, optics and electricity, as well as the applications thereof in the building sciences, and -Solve problems, applied to the above topics.
PHYS	1514	Mechanics, Optics and Electricity	Logical exposition of fundamental principles and the development of problem solving skills are addressed. Mechanics: Revision of the elementary concepts: displacement, velocity, acceleration, force, work, energy, power, projectile motion and rotation. In the above vector quantities and simple calculus is used wherever needed. Geometrical optics: The electromagnetic spectrum, plane mirrors, spherical mirrors, image formation, thin lenses, optical instruments. Electricity: Electrical charge, electrical field, electrical potential, current, resistance, circuits.	MAIN	Student will be able to: -Describe the basic phenomena and theory concerning mechanics, geometrical optics and electricity, and -Solve problems, applied to the above topics, as well as collect, analyse, order and critically evaluate information.
PHYS	1534	Mechanics, Optics, Electricity and Biological and Medical Relevant Topics	Applications of physics in biology and medicine are discussed in this module. Mechanics: Revision of the elementary concepts: displacement, velocity, acceleration, force, work, energy, power. Treatment of the above without calculus. Geometrical optics: The electromagnetic spectrum, plane mirrors, spherical mirrors, image formation, thin lenses, optical instruments. Electricity: Electrical charge, electrical field, electrical potential, current, resistance, circuits. Biologically and medically relevant topics: Physical principles of apparatus used in biology and medicine, some applications of physics in these fields.	MAIN	Student will be able to: -Describe the basic phenomena and theory concerning mechanics, geometrical optics and electricity as well as the applications thereof in biology and medical science; -Apply the skills to solve problems, related to the above topics; and -Collect, analyse, order and critically evaluate information.
PHYS	1543	Physics for physiotherapists	Applications of physics in biology and medicine are discussed in this module. Mechanics: Momentum, collisions, rotation, gravitation, oscillations, waves. Thermodynamics: Temperature, heat, first law of thermodynamics, kinetic theory of gases, entropy, second law of thermodynamics. Electricity and magnetism: Gauss's law, capacitance, magnetic field, Amperé's law, induction and inductance, simple alternating current circuits. Biologically and medically relevant topics: Physical principles of apparatus used in biology and medicine, some applications of physics in these fields.	MAIN	The student will be able to: Describe the basic phenomena and theory concerning mechanics, thermodynamics, electricity and magnetism, as well as the application thereof in biology and medical science, and have the skills to solve problems, applied to the above topics, as well as collect, analyse, order and critically evaluate information
PHYS	1624	Mechanics, Thermodynamics, Electricity and Magnetism	Logical exposition of fundamental principles and the development of problem solving skills are addressed. Mechanics: Momentum, collisions, rotation, gravitation, oscillations, waves. Thermodynamics: Temperature, heat, first law of thermodynamics, kinetic theory of gases, entropy, second law of thermodynamics. Electricity and magnetism: Gauss's law, capacitance, magnetic field, Ampere's law, induction and inductance, simple alternating current circuits.	MAIN	Student will be to: -Describe the basic phenomena and theory concerning mechanics, thermodynamics, electricity and magnetism; -Solve problems, applied to the above topics; and -Collect, analyse, order and critically evaluate information.
PHYS	1644	Electricity, Magnetism, Biologically and Medically Relevant Topics	Applications of physics in biology and medicine are discussed in this module. Mechanics: Momentum, collisions, rotation, gravitation, oscillations, waves. Thermodynamics: Temperature, heat, first law of thermodynamics, kinetic theory of gases, entropy, second law of thermodynamics. Electricity and magnetism: Gauss's law, capacitance, magnetic field, Amperé's law, induction and inductance, simple alternating current circuits. Biologically and medically relevant topics: Physical principles of apparatus used in biology and medicine, some applications of physics in these fields.	MAIN	Student will be able to: -Describe the basic phenomena and theory concerning mechanics, thermodynamics, electricity and magnetism, as well as the application thereof in biology and medical science; and -Solve problems, applied to the above topics, as well as collect, analyse, order and critically evaluate information

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYS	2614	Mechanics, Waves and Optics	Much of physics and engineering demands a thorough knowledge of vibrating systems and wave behaviour. After a review of Newtonian dynamics, it is applied to systems experiencing a restoring force, leading to simple harmonic motion. This theory is generalized to the cases of damped and driven oscillators. The wave equation is derived, and standing waves, as well as the reflection and transmission of waves are explained. Polarization, interference and diffraction of light, illustrating its wave nature, are then discussed.	MAIN	Student will be able to: - solve dynamics problems for forces that are constant, time dependent, position dependent and velocity dependent, for arbitrary initial conditions; - explain the concept of a restoring force, be able to apply Hooke's Law and explain briefly its applicability to elasticity theory; - derive and apply equations describing an undamped vibrating system (simple harmonic oscillator) and describe the associated physical quantities; - derive and apply equations describing damped harmonic motion (with or without a driving force), and to explain the concept of resonance; - decompose periodic functions into Fourier series; - discuss the wave equation, standing waves and the transmission and reflection of waves; - explain superposition, coherence and Young's experiment, and perform calculations of the interference of light in a Michelson interferometer and thin films; and - derive and apply an equation for the intensity pattern as light passes through a single slit, be able to apply equations for the diffraction through a circular aperture and through a double slit, explain the Rayleigh criterion for resolving power end derive and apply equations describing the properties of a diffraction grating.
PHYS	2624	Electronics	Electronics: Basic concepts, theory and operation of electronic devices and circuits. Topics include the properties of semiconductors, diodes, rectifier circuits, zener diodes, power supplies, transistors, transistor amplifiers, operational amplifiers, operational amplifiers in feedback circuits, timer circuits and basic digital circuits. Practical work in electronics: Diodes, power supplies, transistors, operational amplifiers in feedback circuits, timer circuits and digital circuits. A project and seminar.	MAIN	Student will be able to: -Describe and apply the basic theory regarding semi-conductors, diodes, rectifier circuits, zener diodes, power supplies, transistors, transistor amplifiers, operational amplifiers, operational amplifiers in feedback circuits, timer circuits and digital circuits; and -Read electronic circuits and be able to know how the circuit operates; and Design smaller electronic circuit.
PHYS	2632	Practical Work: Physics	Practical work on oscillations, waves and optics: experiments with mechanical oscillations, light interference, and computer simulations of waves and Fourier analysis.	MAIN	The student will be able to: Use common experimental apparatus and measuring systems (e.g. multi-meter, oscilloscope, vernier scale, etc.); Work with apparatus; and Write a scientific report.
PHYS	2642	Electromagnetism	The electromagnetic force is one of the four fundamental forces in nature. It dominates the interaction of matter on the atomic scale and governs the behaviour of the full spectrum of electromagnetic waves.	MAIN	Student will be able to: -Practically apply vector calculus to 3D problems of differentiation and integration in Cartesian, spherical and cylindrical coordinate systems, including the fundamental theorems and basic application of the Dirac delta function; -Calculate electrostatic fields from a charge distribution, either by direct integration following from Coulomb`s law or in problems of sufficient symmetry using Gauss`s law; -Calculate and interpret the divergence and curl of the electrostatic field; -Calculate electric potential and well as the energy stored in an electrostsic configuration; -Define an ideal conductor and prove its fundamental electrostic properties; -Calculate the capacitance of a system; -Derive and work with the electrostatic fields in material, including the concepts of polarization, bound charges, the displacement field and linear dielectrics; -Apply the Lorentz force law in general to moving charges and prove the magnetic fields do no work; -Calculate the magnetic field created by steady current configurations directly using the Biot-Savart law, or in problems of sufficient symmetry using Ampere`s law; Calculate and interpret the divergence and curl of the magnetostaic field -Motivate the concept of the magnetic (vector) potential -Define and calculate emf, including a description of the experiments of Faraday that lead to Faraday`s law; -Motivate and describe the changes Maxwell made to produce the classical laws of electromagnetism -Prove the continuity equation for the conservation of charge; -Define the Poynting vector and its relation to the conservation of energy; and -Show that Maxwell`s equations in vacuum lead directly to electromagnetic waves having a speed predicted by electromagnetic constants correlating experimentally to the speed of light, and the implication this has for the understanding of teh nature of light Show that electromagnetic waves in vacuum are transverse waves with perpendicular electric and magnetic fields and carry energy distributed equally between the fields at the speed of light.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYS	2654	Ophthalmic Optics/ Visual Optics	This module starts with a brief overview of the basic properties of light and optical mediums, as well as the fundamental principles of geometrical and paraxial optics. The refraction and reflection of light by plane and spherical surfaces are investigated in detail, as well as refraction by spherical thin and thick lenses. For each type of system, the focal properties as well as the image formation properties are analyzed in detail for the paraxial region.	MAIN	Student will be able to: -Describe an optical system mathematically, predict the imaging for an optical system and calculate the properties of the system and the image;exhibit creative, critical thinking, and -Apply the theory practically in efficient problem solving. A systematic and structured approach to mathematical derivations and calculations is critical.
PHYS	2664	Special Ophthalmic Optics	Schematic eye models are discussed, including the Gullstrand model. The focal properties of emmetropic and ametropic eyes are investigated, with consideration of both spherical and astigmatic ametropia. The focal properties of contact lenses are described, whereafter the correction of ametropia with spectacle and contact lenses is analyzed. The influence of a stop in an optical system is investigated, as well as the five first-order aberrations. The optical properties and operation of a keratometer is discussed. The module concludes with a section on the quantification of luminance in radiometry and photometry.	MAIN	Student will be able to: -Derive and describe the refractive errors for the different types of spherical and astigmatic ametropia, and calculate an appropriate spectacle or contact lens prescription, as well as the associated magnification of the retinal image; -Derive the keratometer equation, and describe the optics of the keratometer mathematically; -Explain the five monochromatic aberrations according to third-order theory, as well as chromatic aberrations, and apply mathematically to solve problems; describe the effects of aperture stops and the associated field of view,and -Apply in various problems, the concepts of radiant and luminous energy, flux, intensity, radiance, luminance, irradiance, illuminance, Lambertian radiator, Weber's law, and the Airy disc.
PHYS	3714	Modern Physics	Special relativity: Galilean and Lorentz transformations, length contraction, time dilation, relativistic Doppler shift and aspects of relativistic mechanics. Particle properties of waves: Black-body radiation, photo-electric effect, Compton effect, gravita¬tional red and blue shift, Mössbauer effect and applications. Wave properties of particles: Electron diffraction, de Broglie waves, probability waves, Heisenberg's uncertainty principle. Introductory quantum physics: Schrödinger's equation, one dimensional potential well, quantum mechanical tunnelling and its applications, hydrogen atom, orbital angular momentum and electron spin, Zeeman effect and applications. Nuclear Physics: The atomic nucleus, radioactivity, quantum mechanical treatment of alpha-decay, nuclear fission and fusion reactions, reaction rate, neutron transport in reactors.	MAIN	The student will be able to: Apply the basic aspects and theories with respect to special relativity, introductory quantum mechanics and nuclear physics, and the necessary skills to solve relevant problems in these disciplines.
PHYS	3724	Solid state physics	Structure of solids: Crystallography: crystal planes, crystal lattice, reciprocal lattice, Defects: point defects, dislocations, X-ray diffraction. Lattice dynamics: Lattice vibrations: Einstein and Debye models, normal modes and density of states, thermal properties, Brillouin zones. Free electron model: Electrical and thermal conduction, Fermi level, Hall effect. Periodic Potential: Band theory: nearly free electron and tight binding approach.	MAIN	Student will be able to: -Examine and discuss crystal structures and the interatomic forces responsible for these structures; -Examine diffraction by crystals (x-rays, electrons and neutrons); -Examine and discuss lattice vibrations and the effects on thermal, acoustic, and optical properties; -Discuss the free-electron model in metals; and -Discuss energy bands in solids.
PHYS	3732	Statistical Physics I	Phase space, distribution function, the most probable distribution, Lagrange multipliers, Boltzmann distribution, degeneracy of energy levels, the Maxwell-Boltzmann velocity distribution, the Maxwell-Boltzmann speed and energy distributions, the derivation of the equation of state of an ideal gas using the Maxwell-Boltzmann distribution, paramagnetism. Applications in terms of transport processes like effusion and diffusion, derivation of the hydrodynamic equations of motion of gases and fluids, heat conduction, propagation of sound waves, and viscosity.	MAIN	Students will be able to: -Apply the basic aspects of statistical physics and transport theory in the classical limit; and -Solve problems in kinetic theory, thermodynamics and fluid dynamics.
PHYS	3742	Statistical Physics II	Quantum statistical physics, transition from classical to quantum gases, fermion and boson gases and applications in physics and astrophysics	MAIN	The student will be able to: -Apply quantum principles to determine the transition from classical gases to quantum gases; -Examine and discuss the properties of non-relativistic and relativistic fermion gases, their equation of state and their relevance in physical and astrophysical environments; -Examine and discuss boson gases (photons and phonons) and their relevance in physical and astrophysical environments; and -Solve basic problems related to this discipline.
PHYS	3752	Practical Work: Physics	Practical work on phenomena that are explained by modern physics, as well as a few experiments in statistical physics and thermodynamics.	MAIN	The student will be able to: Use physical apparatus and measuring systems; Work with physical apparatus; and Write a scientific report.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYS	3762	Practical Work: Physics	Practical work on phenomena that are explained by solid state theory as well as a few experiments in statistical physics and thermodynamics.	MAIN	be familiar with physical apparatus and measuring systems; be confident in working with physical apparatus; and be able to write a scientific report.
PSYA	3782	Radiative Processes II	The emission of single speed electrons in the vicinity of a massive nucleus, thermal bremsstrahlung emission, relativistic bremsstrahlung, synchrotron emission, expressions for the total emitted power, beaming, Compton and Inverse-Compton scattering, cross section, energy transfer and spectral regimes, atomic structure (review of the Schrodinger equation and fundamentals of atomic physics), Zeeman effect and hyperfine structure, thermal distribution of ionized energy levels leading to the Saha equation, radiative transitions (Milne relations) and line broadening mechanisms, e.g. Doppler broadening, natural broadening and collisional broadening mechanisms.	MAIN	- have a useable background in the fundamental aspects of radiation processes of single charged particles, and be familiar with bremsstrahlung, the basic properties of synchrotron radiation, Compton and Inverse-Compton scattering, atomic processes related to radiation, e.g. Zeeman splitting, hyperfine structure, the Saha equation and radiative transitions and line broadening mechanisms; and - have the necessary background to solve basic problems in this discipline, and apply fundamental concepts introduced above to solve basic problems related to: bremsstrahlung, synchrotron radiation of single particles, Compton and Inverse-Compton radiation, atomic processes related to radiation and radiation transport.
NSFP	7911	Foundations of nanophysics for non-physicists	Quantum physics: atoms and nanoparticles Nanomaterials: semiconductors, fullerenes, graphene, carbon nanotubes, inorganic nanostructures, metal oxides, nano-powders, nanocomposites and quantum dots. Structural properties in nanophysics: crystallography (introduction to bonding, crystal structures and properties), reactivities of nanostructured materials, physical properties of nanoparticles and interfaces, processing of nanostructured materials. Analysis tools in nanophysics.	MAIN	Student should be able to: Classify nanomaterials identifying their various structural aggregations and applications. Explain the structural, bonding and physical properties of different classes of nanomaterials. Discuss the use of spectroscopic, microscopic and analytical techniques in structure and property elucidation.
PHYA	6808	Atrophysics Research Essay	A Practicle course in Solid State Physics where the student master the principles, characterization and operation of the surface techniques AES, XPS, ISS and EDS	MAIN	Student will be able to: - formulate a research question -frame the research question in the form of a hypothesis - test the hypothesis applicable to experimental investigations using AES, XPS, ISS, EDS -describe the principle of operation of the following instruments: thickness monitor, ionization vacuum gauge, thermocouple gauge, pirani vacuum gauge, turbomolecular pump, ion pump, oil rotation pump - reach UHV conditions in the chamber -position the sample on the focal spot of the analyser - do a wide energy scan of the surface, investigating the influence of: scan rate, amplification, time constants, modulation energies, position of the sample, multiplier voltage - operate the ion gun to remove contaminants and accomplish a depth profile - do data analyses -extract concentrations and energy parameters governing a typical multicomponent segregation system - draw conclusions about the hypothesis - present the results in a written scientific report - present the results in an oral scientific report.
PHYA	6814	Astrophysics	The main aspects of this module are star formation, main sequence stars and binary stars.	MAIN	Student will be able to: -Examine the fundamentals of stellar astrophysics, e.g. star formation, stellar structure and stellar evolution (The course will also focus on some selected applications of fluid dynamics in astrophysical environments, for example stellar winds, convective instabilities in stars, stellar pulsations, accretion discs)
PHYA	6824	Astrophysics	The main aspects of this module are star formation, main sequence stars and binary stars.	MAIN	Student will be able to: -Examine the fundamentals of stellar astrophysics, e.g. star formation, stellar structure and stellar evolution (The course will also focus on some selected applications of fluid dynamics in astrophysical environments, for example stellar winds, convective instabilities in stars, stellar pulsations, accretion discs)

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYA	6834	General Relativity and Cosmology	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	After the successful completion of this course the student should have a sound foundation in the fundamentals of astrophysical fluid dynamics and transport principles. The course will build on the principles of basic transport theory to develop the equations of fluid dynamics. These equations will then be applied to astrophysical environments like , e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.
PHYA	6844	General Relativity and Cosmology	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: - discuss and apply the fundamentals of astrophysical fluid dynamics and transport principles. (The course will build on the principles of basic transport theory to develop the equations of fluid dynamics.); and - apply equations to astrophysical environments like, e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.
PHYA	6854	Astrophysical Fluid Dynamics	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: -Examine the fundamentals of astrophysical fluid dynamics and transport principles. The course will build on the principles of basic transport theory to develop the equations of fluid dynamics. -Apply equations to astrophysical environments like, e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.
PHYA	6864	Astrophysical Fluid Dynamics	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: -Examine the fundamentals of astrophysical fluid dynamics and transport principles. The course will build on the principles of basic transport theory to develop the equations of fluid dynamics -Apply equations to astrophysical environments like, e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.
PHYA	6874	High Energy Astrophysics	This module provides an introduction to the fundamentals of high energy astrophysics. The student is introduced to the fundamentals of the radiation processes in high energy astrophysics, as well as the physics of compact objects (white dwarfs, neutron stars and black holes), compact binaries and active galactic nuclei. The production, transport and detection methods of high energy radiation from these exotic objects are investigated in detail.	MAIN	Student will be able to: -Apply the fundamentals of the multi-wavelength production and detection of radiation in high-energy cosmic sources; and -Apply the fundamentals of the physics related to compact objects and binaries as well as active galaxies.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYA	6884	High Energy Astrophysics	This module provides an introduction to the fundamentals of high energy astrophysics. The student is introduced to the fundamentals of the radiation processes in high energy astrophysics as well as the physics of compact objects (white dwarfs, neutron stars and black holes), compact binaries and active galactic nuclei. The production, transport and detection methods of radiation from these exotic objects are investigated in detail.	MAIN	Student will be able to: -Apply the fundamentals of the multi-wavelength production and detection of radiation in high energy cosmic sources; and -Apply the fundamentals of the physics related to compact objects and binaries as well as active galaxies.
PHYA	7900	Astrophysics Mini-dissertation	This module contains fundamental knowledge, theories, principles and practices of Astrophysics: Research project in specialized field of Astrophysics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHYA	7970	Astrophysics and Space Science	Astrophysics and Space Science (NASSP MSc Theory), module content completed at the University of Cape Town.	MAIN	Theoretical course component of this MSc completed at UCT.
PHYA	8900	Astrophysics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Astrophysics, including: Research project in specialized field of Astrophysics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHYA	9100	Physics Thesis	Physics This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Physics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHYC	6814	Capita Selecta I	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: - Discuss and apply foundation principles of the fundamentals of astrophysical fluid dynamics and transport principles; and - Use basic transport theory to develop the equations of fluid dynamics. These equations will then be applied to astrophysical environments like, e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYC	6834	Capita Selecta II	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: -Evaluate the fundamentals of astrophysical fluid dynamics and transport principles. The course will build on the principles of basic transport theory to develop the equations of fluid dynamics. These equations will then be applied to astrophysical environments like , e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.
PHYC	6844	Capita Selecta IV	Modelling the Solar Corona Accretion Discs in Astrophysics. Astrophysical shocks One dimensional flow: Jets, Supernova explosions (Taylor-Sedov solution) Convective instability: Convective heat transport in stars. Perturbations on a two fluid interface, Rayleigh-Taylor, Kelvin-Helmholtz instability Jeans instability: Star formation, stellar structure, compact stars Introduction to astrophysical turbulence- Kolmogorov spectrum Turbulent diffusion Rayleigh stability criterion in rotating fluids-accretion discs Rotating reference frames: geostrophic approximation, vorticity, Taylor-Proudman theorem Self gravitating rotating masses Magnetic braking and magnetized winds App: Magnetic Virial Theorem	MAIN	Student will be able to: -Examine and discuss the fundamentals of astrophysical fluid dynamics and transport principles. The course will build on the principles of basic transport theory to develop the equations of fluid dynamics. -Apply equasions to astrophysical environments like, e.g. star formation, stellar structure, stellar winds, convective instabilities in stars, stellar pulsations, accretion discs.
PHYE	6814	Electrodynamics	Time varying fields and Maxwells equations, Plane waves in vacuum, and in a conducting or dissipative medium, Polarization, Reflection and Refraction, Dispersion of a wave in a dissipative medium, Radiating systems (Antennas, dipole, and center driven linear antenna), Rayleigh scattering, Dispersion of waves through a medium , Faraday rotation, Whistlers, Relativistic electrodynamics, Relativistic eqn's of motion of particles in magnetic fields, Special Relativity, field transformations, the electromagnetic stress Tensor, covariance, Liénard-Wiechert potentials, Power radiated by accelerated charge, Larmor's formula and its relativistic generalization, angular and frequency distribution-spectrum of radiation, Thomson scattering	MAIN	Student will be able to: - Examine the basic aspects of electrodynamics and magnetohydrodynamics. - Solve basic problems in electrodynamics.
PHYE	6824	Electrodynamics	Time varying fields and Maxwells equations, Plane waves in vacuum, and in a conducting or dissipative medium, Polarization, Reflection and Refraction, Dispersion of a wave in a dissipative medium, Radiating systems (Antennas, dipole, and center driven linear antenna), Rayleigh scattering, Dispersion of waves through a medium , Faraday rotation, Whistlers, Relativistic electrodynamics, Relativistic eqn's of motion of particles in magnetic fields, Special Relativity, field transformations, the electromagnetic stress Tensor, covariance, Liénard-Wiechert potentials, Power radiated by accelerated charge, Larmor's formula and its relativistic generalization, angular and frequency distribution-spectrum of radiation, Thomson scattering	MAIN	Student will be able to: -Examine and discuss the basic aspects of electrodynamics and magnetohydrodynamics. -Solve basic problems in electrodynamics.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYE	6834	Electronics	Programming: Visual Basic 6.0, Open and Save data files, displaying data, RS232 communication, parallel port communication, digital to analogue and analogue to digital program. Electronics: Properties and uses of transistors, operational ampli¬fiers, multiplexers, programmable Interface, digital to analogue converters, analogue to digital converters, computers ports RS232 and parallel, sensors and transducers, optimised measurements and control systems Practical work in electronics: A project consisting of a DA/DA converter connected to a sensor and/or transducer and a control program.	MAIN	After successful completion of the module a successful learner should -be able to describe and apply the basic theory regarding, transistors, operational amplifiers, multiplexers, programmable Interface, digital to analogue converters, analogue to digital converters, computers ports RS232 and parallel, sensors and transducers, optimised measurements and control systems -have the skill to read electronic circuits and be able to know how the circuit operates. -have the skill to design smaller electronic circuit. -have the skill to interface a computer with an electronic circuit. -have the skill to write control and measure programs in Visual Basic
PHYE	6844	Electronics	Programming: Visual Basic 6.0, Open and Save data files, displaying data, RS232 communication, parallel port communication, digital to analogue and analogue to digital program. Electronics: Properties and uses of transistors, operational ampli¬fiers, multiplexers, programmable Interface, digital to analogue converters, analogue to digital converters, computers ports RS232 and parallel, sensors and transducers, optimised measurements and control systems Practical work in electronics: A project consisting of a DA/DA converter connected to a sensor and/or transducer and a control program.	MAIN	After successful completion of the module a successful learner should - be able to describe and apply the basic theory regarding, transistors, operational amplifiers, multiplexers, programmable Interface, digital to analogue converters, analogue to digital converters, computers ports RS232 and parallel, sensors and transducers, optimised measurements and control systems - have the skill to read electronic circuits and be able to know how the circuit operates. - have the skill to design smaller electronic circuit. - have the skill to interface a computer with an electronic circuit. - have the skill to write control and measure programs in Visual Basic
PHYI	6814	Statistical Physics	Transport theory: Boltzmanns transport equations in the collisional and collisionless regimes. Derivation of Maxwell-Boltzmann distribution, Boltzmann's H-theorem. Incorporation of transport properties. Applications of transport theory, e.g. collision rate per unit volume in a gas, average mean-free path, collision frequency, effusion, diffusion (complete solution), heat conduction, viscosity. Derivation of the moment equation, as well as the hydrodynamical conservation properties of a fluid. Concepts like the pressure tensor which contains hydrostatic pressure and viscosity will be derived in great detail. Transport theory will be used to calculate expressions for the coefficient of heat conduction, as well as the diffusion coefficient. Pressure in an ideal gas, equipartition of energy, speed distribution, rms-speed, entropy and occupation number fluctuations. Statistical mechanics: Description of statistical mechanics using the canonical and grand canonical ensembles. Derivation of the partition function, and the derivation of thermodynamic functions using the partition function. Energy and occupation number fluctuations. Description of quantum gases in the grand canonical ensemble, pair production and occupation number fluctuations gases. Nyquist noise, Brownian motion, the Einstein theory of diffusion, Stochastic processes, Poisson and Gaussian distributions, Shot noise, Applications of classical and quantum gases, Bose condensation.	MAIN	Student will be able to: - outline the basic aspects of statistical physics and transport theory in the classical limit; and - solve basic problems in kinetic theory, thermodynamics and fluid dynamics.
PHYI	6824	Statistical Physics	Transport theory: Boltzmann's transport equations in the collisional and collisionless regimes. Derivation of Maxwell-Boltzmann distribution, Boltzmann's H-theorem. Incorporation of transport properties. Applications of transport theory, e.g. collision rate per unit volume in a gas, average mean-free path, collision frequency, effusion, diffusion (complete solution), heat conduction, viscosity. Derivation of the moment equation, as well as the hydrodynamical conservation properties of a fluid. Concepts like the pressure tensor which contains hydrostatic pressure and viscosity will be derived in great detail. Transport theory will be used to calculate expressions for the coefficient of heat conduction, as well as the diffusion coefficient. Pressure in an ideal gas, equipartition of energy, speed distribution, rms-speed, entropy and occupation number fluctuations. Statistical mechanics: Description of statistical mechanics using the canonical and grand canonical ensembles. Derivation of the partition function, and the derivation of thermodynamic functions using the partition function. Energy and occupation number fluctuations. Description of quantum gases in the grand canonical ensemble, pair production and occupation number fluctuations gases. Nyquist noise, Brownian motion, the Einstein theory of diffusion, Stochastic processes, Poisson and Gaussian distributions, Shot noise, Applications of classical and quantum gases, Bose condensation.	MAIN	Student will be able to: - outline the basic aspects of statistical physics and transport theory in the classical limit; and - solve basic problems in kinetic theory, thermodynamics and fluid dynamics.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYI	6834	Material Science I	This course deals with mechanical properties of materials, with an emphasis on metals. The following topics are covered: Crystal defects Diffusion Mechanical tests Hardening mechanisms Steels Nonferrous alloys Corrosion and wear Failure	MAIN	After the completion of this module, learners should be able to explain, identify, discuss and apply the following: - Crystal Imperfections: Line defects, point defects, surface defects, volume defects, general. - Mechanical testing and properties: tensile testing, bend testing, hardness testing, impact testing, fracture toughness testing, fatigue testing, creep testing. - Strain hardening and annealing - Principles of solidification strengthening and processing - Solid solution strengthening and phase equilibrium - Dispersion strengthening by solidification - Dispersion strengthening by phase transformation and heat treatment - Ferrous alloys - Nonferrous alloys - Corrosion
PHYI	6844	Material Science I	This course deals with mechanical properties of materials, with an emphasis on metals. The following topics are covered: - Crystal defects - Diffusion - Mechanical tests - Hardening mechanisms - Steels - Nonferrous alloys - Corrosion and wear - Failure	MAIN	Student will be able to: Examine, discuss and apply: - Crystal Imperfections: Line defects, point defects, surface defects, volume defects, general. - Mechanical testing and properties: tensile testing, bend testing, hardness testing, impact testing, fracture toughness testing, fatigue testing, creep testing. - Strain hardening and annealing - Principles of solidification strengthening and processing - Solid solution strengthening and phase equilibrium - Dispersion strengthening by solidification - Dispersion strengthening by phase transformation and heat treatment - Ferrous alloys - Nonferrous alloys - Corrosion
PHYI	6854	Material Science II	The module `Materials Science I considered crystal defects, diffusion, mechanical tests, hardening mechanisms, steels and non-ferrous alloys, as well as corrosion, wear and failure. This module considers further applied aspects of materials science, chosen from a range of possible topics e.g. ceramics, polymers, glasses, amorphous metals, nanocrystalline materials, composite materials, magnetic materials, optical materials (e.g. for filters, lasers, phosphors etc), quasicrystals, materials for sensor applications, materials for the nuclear industry, nanomaterials, advanced semiconductor materials. Only selected topics will be discussed as time allows and, because new materials are constantly being developed, additional applied topics in materials science not listed above can be included.	MAIN	Student will be able to: -describe and do calculations on several applied topics in materials science, at a level demonstrating a sound understanding of crystal structure and the effects of atomic bonding and crystal defects, as well as the influence of microstructure on macroscopic quantities such as mechanical, optical, magnetic and electrical properties. -predict macroscopic properties of materials based on their microstructure and explain how possible changes to the microstructure may affect these macroscopic properties.
PHYI	6864	Material Science II	The module `Materials Science I considered crystal defects, diffusion, mechanical tests, hardening mechanisms, steels and non-ferrous alloys, as well as corrosion, wear and failure. This module considers further applied aspects of materials science, chosen from a range of possible topics e.g. ceramics, polymers, glasses, amorphous metals, nanocrystalline materials, composite materials, magnetic materials, optical materials (e.g. for filters, lasers, phosphors etc), quasicrystals, materials for sensor applications, materials for the nuclear industry, nanomaterials, advanced semiconductor materials. Only selected topics will be discussed as time allows and, because new materials are constantly being developed, additional applied topics in materials science not listed above can be included.	MAIN	Student will be able to: - describe and do calculations on several applied topics in materials science, at a level demonstrating a sound understanding of crystal structure and the effects of atomic bonding and crystal defects, as well as the influence of microstructure on macroscopic quantities such as mechanical, optical, magnetic and electrical properties. - predict macroscopic properties of materials based on their microstructure and explain how possible changes to the microstructure may affect these macroscopic properties.
PHYI	6874	Semi-Conductors	Studying the theory of semiconductors and describe devices.	MAIN	Student will be able to: -Describe the basic phenomena and theory concerning the basic physical properties of semiconductors; -Explore the use of these properties in the design of semiconductor devices ; and -Solve problems about semiconductor devices as outlined in the assignment.
PHYI	6884	Semi-Conductors	Studying the theory of semiconductors and describe devices.	MAIN	Student will be able to: - Describe the basic phenomena and theory concerning the basic physical properties of semiconductors; - Explore the use of these properties in the design of semiconductor devices; and - Solve problems about semiconductor devices as outlined in the assignment.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYR	6814	Research Techniques	The study, for various surface sensitive techniques, the basic principles of theory, operation, instrumentation and additional apparatus and experimental procedures necessary to operate these spectrometers.	MAIN	Student will be able to: Answer all concept questions at the end of each chapter in the study guide. Name the international accepted acronyms associated with each technique. Describe how to establish a vacuum. Your description must also cover: type of material, metal- and rubber seals, and instruments like pumps, pressure gauges and the calculation of the rate of surface contamination under certain pressure conditions. Explain the basic operation of the techniques. Draw a schematic diagram of the spectrometer of each technique to explain the operation. Describe the operation of various primary radiation sources, energy analysers and sputtering sources used with the techniques. Describe the various energy notations used in the AES and XPS techniques. Interpret a typical trend of ion yield as a result of sputtering under various conditions: like 'crystal structure of the target, primary energy, primary species, angle of incidence, scattering angle and target species. Compare the advantages and disadvantages of the techniques, referring to fields of application, sensitivity and elemental analysis. Discuss the influence of various surface defects on the energy spectrum of each technique. For each technique: plot the approximate behaviour of peaks (energy position and shape) in different chemical environments. Do a qualitative as well as a quantitative analysis of the energy spectra. Describe the analytical information that is available from the output of the spectrometer in each technique. Discuss how to accomplish composition depth profiling (constructively and destructively) in the different techniques. Predict the electron diffraction pattern for simple cubic structures as well as the effect of over structures on these patterns.
PHYR	6824	Research Techniques	The study, for various surface sensitive techniques, the basic principles of theory, operation, instrumentation and additional apparatus and experimental procedures necessary to operate these spectrometers.	MAIN	Student will be able to: Answer all concept questions at the end of each chapter in the study guide. Name the international accepted acronyms associated with each technique. Describe how to establish a vacuum. Your description must also cover: type of material, metal- and rubber seals, and instruments like pumps, pressure gauges and the calculation of the rate of surface contamination under certain pressure conditions. Explain the basic operation of the techniques. Draw a schematic diagram of the spectrometer of each technique to explain the operation. Describe the operation of various primary radiation sources, energy analysers and sputtering sources used with the techniques. Describe the various energy notations used in the AES and XPS techniques. Interpret a typical trend of ion yield as a result of sputtering under various conditions: like 'crystal structure of the target, primary energy, primary species, angle of incidence, scattering angle and target species. Compare the advantages and disadvantages of the techniques, referring to fields of application, sensitivity and elemental analysis. Discuss the influence of various surface defects on the energy spectrum of each technique. For each technique: plot the approximate behaviour of peaks (energy position and shape) in different chemical environments. Do a qualitative as well as a quantitative analysis of the energy spectra. Describe the analytical information that is available from the output of the spectrometer in each technique. Discuss how to accomplish composition depth profiling (constructively and destructively) in the different techniques. Predict the electron diffraction pattern for simple cubic structures as well as the effect of over structures on these patterns.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYS	6808	Practicals	A Practicle course in Solid State Physics where the student master the principles, characterization and operation of the surface techniques AES, XPS, ISS and EDS	MAIN	Student will be able to: -formulate a research question - frame the research question in the form of a hypothesis - test the hypothesis applicable to experimental investigations using AES, XPS, ISS, EDS -describe the principle of operation of the following instruments: thickness monitor, ionization vacuum gauge, thermocouple gauge, pirani vacuum gauge, turbomolecular pump, ion pump, oil rotation pump -reach UHV conditions in the chamber -position the sample on the focal spot of the analyser - do a wide energy scan of the surface, investigating the influence of: scan rate, amplification, time constants, modulation energies, position of the sample, multiplier voltage -operate the ion gun to remove contaminants and accomplish a depth profile - do data analyses - extract concentrations and energy parameters governing a typical multicomponent segregation system - draw conclusions about the hypothesis - present the results in a written scientific report -present the results in an oral scientific report.
PHYS	6814	Quantum Mechanics	Wave-particle duality; Schrödinger equation in three dimensions; Heisenberg uncertainty principle; Square wells and barriers; The harmonic oscillator; Observables and operators; Orbital angular momentum and spin; The hydrogen atom.	MAIN	After an introductory courses in modern physics this course equips the student with an understanding of wave mechanics and a working knowledge of the formal structure of quantum mechanics. The student is skilled in operator techniques and in the practical application of quantum mechanical principles in microscopic systems like atoms and nuclei.
PHYS	6824	Quantum Mechanics	Wave-particle duality; Schrödinger equation in three dimensions; Heisenberg uncertainty principle; Square wells and barriers; The harmonic oscillator; Observables and operators; Orbital angular momentum and spin; The hydrogen atom.	MAIN	After an introductory courses in modern physics this course equips the student with an understanding of wave mechanics and a working knowledge of the formal structure of quantum mechanics. The student is skilled in operator techniques and in the practical application of quantum mechanical principles in microscopic systems like atoms and nuclei.
PHYS	6834	Solid State Physics I	Band structure, Bloch theorem, Density of states, Nearly free and Tight binding models, Effective mass, Excitons, Landau levels, Quantized Hall effect. Following on this one (or, time permitting, two) relevant topics in solid state physics such as (but not limited to): Optical/dielectric properties, Nanostructures, Group theory, Superconductivity.	MAIN	Student will be able to: - explain the origin of energy bands; - solve the Schrodinger equation for an electron in multiple connected square potential wells - show how energy level splitting occurs due to the linear combination of atomic orbitals - discuss the Kronig-Penney model - interpret band diagrams - explain various techniques used for band calculations - distinguish between metals and insulators based on band structure - comment on the effect of disorder and surface states on the energy bands - state, prove, and apply Bloch's theorem; -state Blochs theorem (in both common forms) and prove that these forms are equivalent - prove Blochs theorem (either form) - prove the various symmetries of the Bloch states and that the energy gradient normal to a zone boundary is zero - calculate the density of electron states using appropriate boundary conditions for the Bloch states - criticize the way Drude's model explains the origin of resistivity in metals and give a better description - explain the basic properties of solids in terms of the band theory - distinguish between the electron as a free particle and electrons and holes as quasiparticles in a band structure, and hence explain the idea of effective mass and the Umklapp process - describe and perform calculations pertaining to excitons -derive properties of solids arising from quantum confinement in lower dimensional systems; - discuss electrons trapped in a 2-D quantum well - derive the density of states for lower dimensional (2-D, 1-D) systems - discuss Bloch oscillations, including the difficulties of measuring them and how it can be done - describe quantitatively the formation of Landau levels, and describe the de Haas-van Alphen, Shubnikov-de Haas and (integer) quantum Hall effects - describe and do calculations pertaining to at least one of the myriad of further topics in solid state physics at a level based on a sound understanding of quantum and statistical physics as well as electromagnetism, for example Optical/dielectric properties of solids, Nanostructures, Group theory, Superconductivity etc.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYS	6844	Solid State Physics I	Band structure, Bloch theorem, Density of states, Nearly free and Tight binding models, Effective mass, Excitons, Landau levels, Quantized Hall effect. Following on this one (or, time permitting, two) relevant topics in solid state physics such as (but not limited to): Optical/dielectric properties, Nanostructures, Group theory, Superconductivity.	MAIN	Student will be able to: - explain the origin of energy bands; -solve the Schrodinger equation for an electron in multiple connected square potential wells -show how energy level splitting occurs due to the linear combination of atomic orbitals -discuss the Kronig-Penney model -interpret band diagrams -explain various techniques used for band calculations -distinguish between metals and insulators based on band structure -comment on the effect of disorder and surface states on the energy bands -state, prove, and apply Bloch's theorem; -state Blochs theorem (in both common forms) and prove that these forms are equivalent -prove Blochs theorem (either form) -prove the various symmetries of the Bloch states and that the energy gradient normal to a zone boundary is zero -calculate the density of electron states using appropriate boundary conditions for the Bloch states -criticize the way Drude's model explains the origin of resistivity in metals and give a better description - explain the basic properties of solids in terms of the band theory -Distinguish between the electron as a free particle and electrons and holes as quasiparticles in a band structure, and hence explain the idea of effective mass and the Umklapp process -Describe and perform calculations pertaining to excitons -derive properties of solids arising from quantum confinement in lower dimensional systems; -Discuss electrons trapped in a 2-D quantum well -Derive the density of states for lower dimensional (2-D, 1-D) systems -Discuss Bloch oscillations, including the difficulties of measuring them and how it can be done -Describe quantitatively the formation of Landau levels, and describe the de Haas-van Alphen, Shubnikov-de Haas and (integer) quantum Hall effects -describe and do calculations pertaining to at least one of the myriad of further topics in solid state physics at a level based on a sound understanding of quantum and statistical physics as well as electromagnetism, for example Optical/dielectric properties of solids, Nanostructures, Group theory, Superconductivity etc.
PHYS	6854	Computational methods of Physics	This module addresses the fundamental mathematical methods which are essential for solving a wide variety of physics problems. This module will be especially useful for understanding and solving problems in quantum mechanics, classical mechanics and electromagnetism. Examples will be taken from quantum mechanics, heat flow, waves and coupled systems. It will focus on the theory of differential equations, and especially its relation to linear algebra. At least six of the following topics are addressed: differential equations, linear algebra, Sturm-Liouville theory, separation of variables, Fourier series, integral transforms, special functions, calculus of variations, partial differential equations and group theory.	MAIN	Student will be able to: -solve a wide variety of ordinary and partial differential equations from physics and engineering (e.g. heat equation, wave equation, electric circuits, Schrodinger equation).
PHYS	6864	Computational methods of Physics	This module addresses the fundamental mathematical methods which are essential for solving a wide variety of physics problems. This module will be especially useful for understanding and solving problems in quantum mechanics, classical mechanics and electromagnetism. Examples will be taken from quantum mechanics, heat flow, waves and coupled systems. It will focus on the theory of differential equations, and especially its relation to linear algebra. At least six of the following topics are addressed: differential equations, linear algebra, Sturm-Liouville theory, separation of variables, Fourier series, integral transforms, special functions, calculus of variations, partial differential equations and group theory.	MAIN	Student will be able to: - solve a wide variety of ordinary and partial differential equations from physics and engineering (e.g. heat equation, wave equation, electric circuits, Schrodinger equation).
PHYS	6874	Solid State Physics II	The module `Solid State Physics I lists applied topics [Optical/dielectric properties, Nanostructures, Group theory, Superconductivity] from which one is studied during that module. This module considers further aspects from these applied topics. Additional applied topics in solid state physics not listed above can be included where these are relevant to the research direction of the Physics department.	MAIN	Student will be able to: -describe and do calculations on several applied topics in solid state physics, at a level demonstrating a sound understanding of quantum mechanics, statistical physics and electromagnetism.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PHYS	6884	Solid State Physics II	Brief contents: The module `Solid State Physics I lists applied topics [Optical/dielectric properties, Nanostructures, Group theory, Superconductivity] from which one is studied during that module. This module considers further aspects from these applied topics. Additional applied topics in solid state physics not listed above can be included where these are relevant to the research direction of the Physics department.	MAIN	Student will be able to: - describe and do calculations on several applied topics in solid state physics, at a level demonstrating a sound understanding of quantum mechanics, statistical physics and electromagnetism.
PHYS	8900	Physics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Physics, including: Research project in specialized field of Physics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHYS	9100	Physics Thesis	This module contains fundamental knowledge, theories, principles and practices of Physics, General including Research project in specialized field of Physics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Plant Science

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BLGY	1643	The interdependence of plants and life on earth	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences , including: the important role plants played during the development of life on earth. Included will be the following: -the transition from single celled water living algae to terrestrial plants with roots, stems and leaves; -the subsequent adaptation of photosynthesis with the resultant enrichment of the atmosphere with oxygen; -the influence of plants on the climate and development of habitats on land; -the diversification and domestication of plants as one of the major driving forces in the diversification of animals and humans; -the adaptations of plants to different ecological niches that allowed the colonization of the whole planet; and -the important role of plants in daily life would be emphasized in terms of the carbon footprint, human nutrition and restoration of disturbed areas. The module will include two direct applications of plants in terms of plant breeding and plant pathology.	MAIN	Student will be able to: - Analyse and discuss the results of the transition from single celled water living algae to terrestrial plants with roots, stems and leaves; -Investigate and critically discuss the subsequent adaptation of photosynthesis with the resultant enrichment of the atmosphere with oxygen; -Give a clear explanation of the influence of plants on the climate and development of habitats on land; -Critically discuss the diversification and domestication of plants as one of the major driving forces in the diversification of animals and humans; -Explain the adaptations of plants to different ecological niches that allowed the colonization of the whole planet; and -Discuss the important role of plants in daily life that would be emphasized in terms of the carbon footprint, human nutrition and restoration of disturbed areas.
BTNY	2612	Field excursion 1	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany) that will be explored during an eco-physiological field excursion, including biotic and abiotic stress and its influence on plant growth types, an introduction to various physiological survey methods, data processing and analysis. Recognition and interpretation of morphological and physiological stress indicators in plants to ensure the sustainable rehabilitation of disturbed areas are also included.	MAIN	Student will be able to: -Explore and explain the influence of stress factors on plants and discuss its relationship to other disciplines; -List, describe and apply the methods used to determine plant health and use apparatus to collect and analyse data; - Identify, analyse and address complex problems to provide solutions; - Make decisions in an ethical manner; - Develop and communicate his / her own opinions and ideas in the form of a report on the conducted experiments; and -Take full responsibility for his / her own work and decision making.
BTNY	2616	Plant adaptations for survival on land	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Different plant species grow in different habitats. Environmental factors (abiotic and biotic) play a role in the distribution of plants. Plants are very well adapted to survive in the different environments in which they are growing. In this module the focus will fall on the DNA structure, DNA replication, the cause of mutations and the evolutionary aspects that lead to speciation. Further, the anatomy, morphology and ecological adaptations of vegetative (roots, stems and leaves) and reproductive organs (flowers, inflorescence, fruit and seeds) to different environments will be discussed. The last section of the module deals with the environmental factors present on land and how these factors and the different landscapes influence the form and function of plant organs and the distribution of plants. The distribution of Africa's flora (plant biogeography) will be discussed with the emphasis on southern Africa's flora and landscape ecology.	MAIN	Student will be able to: - discuss DNA mutations and their influence on speciation, different plant organs and tissues that contribute to plant adaptation, environmental factors that influence plant types and vegetation and explain how it relates to other disciplines; - apply methods used for DNA analysis; - identify, analyse and address complex problems to provide solutions; - make decisions in an ethical manner; - develop and communicate his / her own opinions and ideas;and - take full responsibility for his / her own work and decision making.
BTNY	2622	Field excursion 1	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany) that will be explored during an eco-physiological field excursion, including biotic and abiotic stress and its influence on plant growth types, an introduction to various physiological survey methods, data processing and analysis. Recognition and interpretation of morphological and physiological stress indicators in plants to ensure the sustainable rehabilitation of disturbed areas are also included.	MAIN	Student will be able to: -Explore and explain the influence of stress factors on plants and discuss its relationship to other disciplines; -List, describe and apply the methods used to determine plant health and use apparatus to collect and analyse data; -Identify, analyse and address complex problems to provide solutions; -Make decisions in an ethical manner; - Develop and communicate his / her own opinions and ideas in the form of a report on the conducted experiments; and -Take full responsibility for his / her own work and decision making.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BTNY	2626	Introductory plant development and biotechnology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Understanding the factors which affect plant growth and development will enable us to manipulate plants to promote optimum production for the benefit of mankind. These factors are related to the soil, water, nutrients, atmosphere and solar environments. This knowledge is important and of practical value in the plant-related industries such as agriculture, horticulture, nurseries, forestry, nature reservation, seed and fertilizer companies, etc., as well as teaching and research professions.	MAIN	The student will be able to: - explain plant-water relations, nutrition and transport, seed dormancy, growth and development of plants, plant defence, secondary plant metabolites and explain how it relates to other disciplines; - apply methods used for hydroponic plant cultivation and manipulation of seed dormancy; - identify, analyse and address complex problems to provide solutions; - make decisions in an ethical manner; - develop and communicate his / her own opinions and ideas; - take full responsibility for his / her own work and decision making.
BTNY	3712	Field excursion 2	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Students will attend a field excursion to Hogsback in the Eastern Cape. During the excursion students will apply practical techniques in ecological and taxonomic research. Various vegetation survey techniques will be used to analyze vegetation structure and composition in grassland, fynbos and forest. Students will also learn to recognize the most common flowering plant families of the area and understand their relationship with more primitive plant groups like the Bryophytes, Pteridophytes and Gymnosperms. Students will gain experience in collecting herbarium specimens and management of collection data. Plant adaptations for survival in the forest, the characteristics of invasive alien plants and their impact on the indigenous vegetation will be studied in the field.	MAIN	Student will be able to: -discuss information of key South African plant families, important invasive alien plants and morphological adaptations of plants to different habitats and understand how it relates to other disciplines; -use the correct survey technique to analyse the different vegetation types and correctly collect and manage herbarium specimens and data; -identify, analyse and address complex problems to provide solutions; -make decisions in an ethical manner and act accordingly; -develop and communicate his / her own opinions and ideas in the form of posters and oral presentations; and - take full responsibility for his / her own work and decision making.
BTNY	3714	Diversity and systematics of higher plants	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Southern Africa has 21 137 indigenous plant species, of which 80% are endemic to the region. This incredible diversity is comparable to that of the tropical rainforests. In terms of botanical diversity, southern Africa is one of the richest regions in the world. Understanding this diversity is the key to conservation and sustainable utilization of our indigenous plants. This module deals with processes through which the diversity of flowering plants originated and evolved, with specific focus on the South African flowering plants. Evidence from the fossil record will be evaluated and used to interpret the origin of flowering plants. The complex reproduction strategies of flowering plants are investigated. Students will also gain experience in taxonomic applications and principles such as herbarium management, plant identification, description and nomenclature. Sources of systematic evidence such as morphology, anatomy, palynology, cytology and secondary metabolites will also be investigated. Phylogenetic terms and various molecular techniques used to construct phylogenies will be discussed.	MAIN	The student will be able to: - explain the principles of phylogenetic classification, nomenclature, reproductive strategies and evolutionary history of flowering plants and also explain how it relates to other disciplines; - apply techniques used for herbarium curation and plant identification; - apply the gained information and different techniques to identify, analyse and address complex problems to provide solutions; - make decisions in an ethical manner and act accordingly; - develop and communicate his / her own opinions and ideas; and - take full responsibility for his / her own work and decision making.
BTNY	3724	Carbon metabolism in plants	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). To live \`green\` and \`organic\`, it is important to understand the role of carbon in the primary metabolic pathways of cellular respiration and photosynthesis. The influence of environmental factors on the success of carbon sequestration and the effect on cellular respiration and photosynthesis plays an important role in nature, eg. food production and conservation. It is also important to understand how human activity contribute to our \`carbon foot print\`, and how it can be reduced.	MAIN	Student will be able to: - explain plant respiratory metabolism and photosynthesis, environmental factors that could limit carbon incorporation and the complex interaction between plant physiology, ecosystems and humans and explain how it relates to other disciplines; - explain techniques used for determining respiratory and photosynthetic rates as well as their suitability to solve a particular problem; - apply the gained knowledge and different techniques to identify, analyse and address complex problems to provide solutions; - make decisions in an ethical manner and act accordingly; - develop and communicate his / her own opinions and ideas; and - take full responsibility for his / her own work and decision making.
BTNY	3734	Vegetation science and environmental management	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Vegetation science deals with the structure and composition of plant communities. The vegetation is classified into ecologically (past to present) recognizable units. Quantitative analyses, classification and ecological interpretation techniques, bio-monitoring techniques of terrestrial and wetland ecosystems, as well as rehabilitation methods will be discussed. During the practical, identification of species and plant survey techniques will be explained and the different environmental factors, influencing vegetation, will be pointed out.	MAIN	The student will be able to: - explain ecological interactions and factors controlling life in terrestrial ecosystems and explain how it relates to other disciplines; - explain techniques used to analyse terrestrial ecosystems as well as their suitability to interpret and describe the relevant terrestrial data; - apply the gained knowledge and relevant ecosystem management techniques such as bio-monitoring and rehabilitation to identify, analyse and address complex problems to provide solutions; - make decisions in an ethical manner and act accordingly; - develop and communicate his / her own opinions and ideas; and - take full responsibility for his / her own work and decision making.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BTNY	3744	Plant defence and biotechnology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). The module deals with the defence mechanisms of plants against biotic (pathogens and insects) and abiotic (drought, heat, cold, ozone) stress factors on physiological and biochemical levels. The interaction of herbicides and plant physiology also form part of the module. Plants produce a high diversity of natural products or secondary metabolites which are used in pharmaceutical, agrochemical, flavour and aromatic industries. The accumulation of secondary metabolites in plants is also part of the defence response and plays a prominent function in the protection against predators and microbial pathogens. Plant secondary metabolites are described with the emphasis on their roles in plants, especially in the context of ecological interactions.	MAIN	The student will be able to: - explain natural plant defence mechanisms that result in resistance and explain how it relates to other disciplines; - explain techniques used for the manipulation of plant resistance as well as their suitability to solve a particular problem; - apply the gained knowledge and different techniques to identify, analyse and address complex problems to provide solutions; - make decisions in an ethical manner and act accordingly; - develop and communicate his / her own opinions and ideas; and - take full responsibility for his / her own work and decision making.
BTNY	3754	Plant molecular biotechnology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). The module focuses on the genetic analysis and transformation of plants which includes the cloning of plant genes, analysis of their roles in planta and the manipulation of plants through DNA transfer. Published research papers are used for all discussions where many different molecular techniques are described. The discussions focus on how these techniques are integrated in order to understand the roles of particular genes in plants. The cloning and analysis of the Rpg1 plant disease resistance gene is used as an example.	MAIN	The students will be able to: - explain the molecular disease resistance response of plants and explain how it relates to other disciplines; - apply techniques used for the manipulation of the defence response through genetic engineering as well as their suitability to solve a particular problem; - apply the gained knowledge and different techniques to identify, analyse and address complex problems to provide solutions; - make decisions in an ethical manner and act accordingly; - develop and communicate his / her own opinions and ideas; and - take full responsibility for his / her own work and decision making.
BTNY	3764	Ecophysiology: soil-plant-water interactions	This module contains fundamental knowledge about the influence of environmental factors, such as soil health and water availability, on plant health. Biomass production of crops is often directly proportional to the amounts of radiation intercepted, water transpired and nutrients taken up. The module content discuss how the rate of mineralization of from organic matter and the processes of nutrient loss are closely related to the availability of soil water. Soil conditions and -health, which indirectly affects nutrient supply, therefore has a large influence on the quantity of radiation intercepted and hence, biomass production and yield will be affected. Interacting effects of the carbon dioxide levels on photosynthesis and respiration metabolism, also pertaining to yield physiology, is also included.	MAIN	Student will be able to: -Analyse and discuss the interactions between soil conditions and plant metabolism; -Examine the interconnected physiology of photosynthesis, respiration, nutrient uptake and yield; -Describe the physiological consequences of under-nutrified plants will affect plant growth and yield; -Conduct an experimental trial to test nutrient uptake and test environmental factors that influence plant health. -Make use of photosynthesis measurements in order to interpret the general health of plants
PLTB	2613	Theoretical principles of Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module deals with the theoretical science of plant breeding with the emphasis on genetic principles and concepts. This includes Mendelian and quantitative inheritance, mechanisms and implications of self- and cross-pollination, the study of phenotypic variation and the sources of genetic variability. The plant breeding techniques used to manipulate fertility-regulating systems as well as biotechnology methods as tools will be studied.	MAIN	Student will be able: -explain the basic theoretical concepts and techniques of plant breeding and their application.
PLTB	2623	Applied principles of Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module deals with the practical aspects of Plant Breeding. The emphasis is on conventional breeding but the student is exposed to laboratory and biotechnological techniques that serve as tools to improve breeding programmes.	MAIN	Student will able to: -discuss, explain and explore the basic concepts and techniques of plant breeding and their application.
PLTB	3714	Principles of quantitative genetics in Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module concerns the principles of selection for qualitative and quantitative traits in plants. This includes the different methods that can be used to genetically improve self-pollinating, cross-pollinating and vegetatively propagated crops. The selection procedures are compared using mathematical formulae to determine response to selection. The influence of different environments on the phenotypical expression of traits as well as the genetic basis of inbreeding and heterosis are studied.	MAIN	Students will be able to: -Explain selection principles and will be able to decide on the best selection procedure for a specific breeding aim.
PLTB	3724	Breeding for abiotic stress tolerance	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module covers important environmental factors and conditions that contribute to abiotic stress and how it reduces the plant`s performance in production. Breeding objectives and procedures for different abiotic stresses like drought, heat, cold and salinity will be addressed. Students will become familiar with key terms, concepts and principles of stress tolerance breeding.	MAIN	Student will be able to: - Apply the principles that were dealt with and will be able to select the most appropriate breeding approach for crop improvement for stress tolerance.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PLTB	3744	Advanced Breeding Techniques	Advanced Breeding Techniques This module will equip the student with knowledge on breeding techniques such as mutation breeding, tissue and anther culture, recombinant DNA-technology and plant transformation. Furthermore, legislative, labeling and ethical issues of genetically modified organisms (GMO's) are addressed.	MAIN	Student will be able to: -Discuss breeding techniques such as mutation breeding, tissue and anther culture, recombinant DNA-technology and plant transformation. -Examine legislative, labelling and ethical issues of genetically modified organisms (GMOs) are addressed.
PLTB	4806	Literature review	Students complete a literature study on a given topic under the guidance of a supervisor.	MAIN	Student will be able to: -perform literature searches, organize relevant information and compile the information according to a specified format; -integrate knowledge obtained from literature; -discuss how his / her topic fits within the larger body of Plant Breeding l literature; -communicate his / her results in the form of a PowerPoint presentation; and -self-evaluate his / her own development within Plant Breeding.
PLTB	4808	Research Project Plant Breeding	Students complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: -identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -integrate knowledge obtained from both literature and experimental results; -outline how his / her research fit within the larger picture of Plant Breeding research; -report on how the principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialization; -communicate his / her results in the form of a PowerPoint presentation; -assist in the preparation of the results for publication; and -self-evaluate his / her own development within Plant Breeding.
PLTB	4814	Advanced quantitative genetics in Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module consists of analysis of variance of data of different breeding techniques in early and late generations of self-pollinating plants, and in cross-pollinating and vegetatively propagated plants and calculation of variance components and heritability. The module also covers stability and genotype x environment interaction and techniques used to analyse it.	MAIN	Students will be able to: - Calculate variance components and heritability from different breeding systems; and - Analyse and interpret genotype x environment interaction and stability of genotypes.
PLTB	4824	Quality and stress tolerance breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). In this module an in depth study will be done on the application of plant breeding techniques for the improvement of crop quality, high and low temperature and moisture stress tolerance and insect and diseases resistance.	MAIN	Student will be able to: - Initiate a breeding programme; and - Formulate strategies for quality, stress tolerance and resistance breeding.
PLTB	4834	Marker-assisted Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). In this module students will be acquainted with different techniques used for marker-assisted plant breeding. Older as well as the newest DNA marker technologies and protein based methods will be studied. Students will learn to apply these techniques in DNA fingerprinting, for construction of linkage maps, for selection and use of mapping populations, in application of different strategies to target specific genes or genomic regions in plants and in functional genomics and gene discovery.	MAIN	Students will be able to: -Explain the different techniques used for marker-assisted breeding and be able to apply these technologies in breeding programmes.
PLTB	4854	Statistics in Plant Sciences	In this module statistics relevant to Plant Sciences will be covered in both theoretical classes as well as with computer analysis. Students will learn principles related to statistical analyses and will learn how to design experiments, input data and interpret output of statistical analyses they did on different software packages.	MAIN	Students will be able: - apply principles of statistical concepts; - design experiments, input and analyse data; and - interpret the data generated from statistical software.
PPLG	2624	Principles of plant pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Pathology. The introductory module addresses the diagnosis of plant diseases, their development in time and space, interactions at cellular and molecular level and management.	MAIN	Student will be able to: - Discuss the impact, causes and diagnosis of plant diseases and the reasons why plant pathology is considered an important field of study; and - Discuss and illustrate, based on the basic concepts of infection and colonization of plant tissue, of how plant diseases arise and develop and how to approach disease problems.

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PPLG	3714	Mycological plant pathology	This module addresses the taxonomy and general characteristics of fungi, with specific reference to plant pathogens. Emphasis is placed on their reproductive biology, dispersal and survival, biological control, types of diseases caused by fungal pathogens and their impact on agriculture and human and animal health.	MAIN	Student will be able to: - Discuss and apply the taxonomy and general characteristics of fungi and how to integrate this knowledge with the plant pathogenic abilities of mycelial fungi; - Describe the types of plant diseases that are caused by the main groups of fungi; - Illustrate the use and application of fungi to the benefit of humans; - Discuss and apply the additional effects of fungal plant pathogens to the health and well being of humans and animals.
PPLG	3724	Plant disease management	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). On completion of this module the student will be acquainted with concepts and strategies that underlie the management of plant diseases within the context of a sustainable and integrated pest management (IPM) system.	MAIN	Student will be able to: -Examine and discuss ecological and economic concepts that underlie the management of plant diseases within the context of a sustainable and integrated pest management system.
PPLG	3734	Bacterial and viral diseases of plants	This module addresses the morphology and classification of bacteria and viruses, symptomology, survival and transmission of these pathogens. Methods of managing diseases caused by these pathogens are dealt with.	MAIN	Student will be able to: -Discuss the morphology and physiology of bacteria and viruses; -Apply the basic principles of the taxonomy and classification. of plant bacteria and viruses; -Discuss the basic physiological processes that occur during infection of plants by bacteria and viruses; -Apply the basic principles of managing plant diseases caused by bacteria and viruses; -Examine the host ranges, distribution, epidemiology and management options for several examples of bacterial and viral diseases.
PPLG	3744	Ecology of plant pathogens	This module addresses the ecological principles relevant to disease causing organisms in plants. Emphasis is placed on interactions of plants and their pathogens with their biotic and abiotic environment and how this applies to ecological plant health management.	MAIN	Student will be able to: - Discuss and apply the ecological aspects on plant pathogens and their hosts; - Discuss and apply ecological methods used to study plant pathogens; and - Discuss and apply the role the environment plays on the pathogenic behaviour of plant pathogens.
PPLG	4806	Literature review Plant Pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology) The student compiles a review of a specific subject and delivers presentations of selected articles in plant pathology journals. On completion of this module the student is acquainted with literature searches, organizing information, the compilation of information according to a specific format, as well as in written and verbal communication skills.	MAIN	Student will be able to: -Examine principles in an area at the forefront of a selected field in Plant Pathology; -Examine the theories, research methodologies, methods and techniques relevant to the selected field; -Critically review information gathering, evaluation and management processes in specialised contexts; and -Present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	4808	Plant Pathology Research Repor	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The student completes a research project under the guidance of a supervisor and becomes skilled in problem identification, hypothesis formulation, planning, conducting and analysis of experiments as well as the interpretation and communication of results.	MAIN	Student will be able to: -Use a range of specialised skills to identify, analyse and address complex and/or abstract problems in the field of Plant Pathology; -Critically review data gathering, evaluation and management processes in specialised contexts; and -Present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	4824	Plant-pathogen interactions	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The module provides a basis for understanding the physical, biochemical and physiological effects that plant pathogens have on their hosts, particularly the methods they use to attack plants and how plants in turn defend themselves.	MAIN	Student will be able to: - Describe the physical and physiological interactions between plant pathogens and hosts; and - Discuss and apply the role that the environment plays in plant/pathogen interactions.
PPLG	4834	Epidemiology and control of plant diseases	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The course addresses temporal and spatial aspects of plant disease development. Emphasis is on measurement of host, pathogen, and environmental parameters, modelling their interactions in order to understand pathosystem behaviour, quantification of yield loss relationships and identification of effective disease management strategies.	MAIN	Student will be able to: -measure and explain the temporal and spatial aspects of plant disease development; -examine the role of environmental and host factors on disease development and how this can be integrated with disease control; and -manage the application of quantitative epidemiology

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PPLG	4844	Molecular plant pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). On completion of the module, students will have a basic overview and understanding of molecular plant pathology approaches and techniques, their application and how the use of the various molecular biology approaches can aid in various types of studies of plant pathogens. The course provides a basis on the genetics of different pathogen groups, general and some more specialized but contemporary techniques used for molecular plant pathology, and how the various fields of molecular biology aid in understanding various aspects of plant pathology, such as pathogen detection or identification, genetic analysis of plant pathogens, marker-assisted breeding, population genetics and host x pathogen interactions. After completion of the practical module the student will have some experience in certain basic aspects of molecular plant pathology research, which is complementary to the theory.	MAIN	Student will be able to: -Examine concepts of the genetics of different pathogen groups; -Examine and apply principles of some of the most widely used molecular techniques used for plant pathology, and variations of these techniques; -Use molecular plant pathology approaches and examine how it aids general plant pathology studies and which of the approaches are appropriate for what type of studies and questions; and -Select and apply these approaches and techniques in practical situations by understanding the principles, methodology, advantages and disadvantages of each.
BIOL	1624	Plant biology	This module contains fundamental knowledge, theories, principles and practices of Biology, including: Development and reproduction of flowering plants, plant multiplication, plant taxonomic principles, biodiversity, ecology, economic importance of plants.	QWA	Student will be able to: -discuss and explain the basic principles regarding the biology of plants, their development and reproduction (plant manipulation). -discuss and explain the basic principles regarding plant identification and classification (taxonomy). -discuss and explain biodiversity (conservation biology). -discuss and explain the interactions between plants, environment and man (ecology). -discuss, explain and analyse the economic importance of plants (toxic, medicinal, industrial and food plants, plant pathology, plant molecular biology, plant biotechnology and plant breeding).
BIOL	2644	The physical environment: natural resources, ecology and sustainability	This module contains fundamental knowledge, theories, principles and practices of Biology, including an introduction to the discipline of systems ecology, including ecosystem modeling and compartment models. Biogeochemical cycles, primary production and flow of energy and matter through ecosystems. Food chains and food pyramids. Importance of water and the various aquatic habitats. Lotic and lentic waters, flow of sediment and variability in water levels. Basic principles of soil science, water flow and chemistry in soils. Basic climatology, importance of rainfall and importance of depressions and anticyclones in determining the climate. Carbon cycle and global warming. Role of biodiversity in ecosystems, competition for resources, predation and parasitism. Stress and disturbance, K and r strategists, basic population biology. Dispersal and reproduction of organisms. Human dependence on ecosystems, use of natural resources and the principle of sustainability. The link between ecology and economy and ecosystem degradation.	QWA	At the end of the module, the student is expected to be able to: 1.Outline the main principles, methods and processes underlying the field of ecology and sustainability 2.Apply key concepts, principles and theories within the ecological discipline 3.Show awareness of different schools of thought and processes generating knowledge in the discipline of ecology. 4.Take a systems approach in solving problems of natural resource management, using the appropriate procedures for assessing the sustainability of a certain process. 5.Grasp complex systems and understand how components of one system have an impact on other systems, thereby understanding the impact of ecosystem processes on the human economy. 6.Describe the responsibility of a resource manager 7.Demonstrate an ethical approach towards professional practice in resource management. 8.Function in a multidisciplinary group where each student deals with a specific aspect of natural resource management. 9.Access various sources of literature and communicate an overall essay on a specific resource by using academic writing skills.
BOTA	2654	Introduction to plant anatomy and morphology	This module contains fundamental knowledge, theories, principles and practices of Biology, including anatomy, structure and organisation of the cell wall, ergastic substances, structure and development of the ovule and embryo sac, structure, organisation and characteristics of tissues (parenchyma, collenchyma, sclerenchyma, epidermis, periderm, phloem, xylem) and secretory structures.	QWA	At the end of the module, the student is expected to be able to: 1.A basic knowledge and understanding of the internal and external organisation of the plant structure 2.Knowledge and understanding of various tissue (simple and complex) and secretory structures 3.A basic understanding of the cell wall and ergastic substances 4.Knowledge of external morphology of the various plant organs , their modification and ecological adaptations 5.Knowledge of the structure of inflorescences and flowers, pollination , fertilization, 6.The ability to construct the floral diagrams and work out floral formulae 7.Basic knowledge of structure of the ovule, embryo sac development, fertilization, simple and complex plant tissues 8.Basic understanding of the fertilization and embryo sac development 9.Basic knowledge of the secretory structures and structures of the plant organs 10.Practical experience on the use of light microspore and scanning electron microscope
BOTA	2684	Plant physiology and biotechnology	This module contains fundamental knowledge, theories, principles and practices of Biology, including physiological processes in plants, such as water balance (absorption, transpiration, transport), carbon partitioning, nutrient uptake, mineral nutrition, growth regulators, plant movement, photomorphogenesis, biological clock, photoperiodism and adaptation to extreme environments. Plant biotechnology course will look at alternative cultivation techniques of plants: plant nutrient cycles, organic and hydroponic cultivation of plants. The course will also focus on secondary products in plants, i.e. their economic and medicinal value.	QWA	At the end of the module, the student is able to: 1.Describe the functioning of key plant physiological systems; 2.Explain the fundamentals of plant water relations, mineral nutrition, integration of carbon and nutrients in growth and development; 3.Describe and assess the effect of environmental conditions (e.g. light, temperature, day length) and internal factors (e.g. growth regulators, biological clock) on the growth and development of plants; 4.Discuss alternative plant cultivation methods; 5.Describe plant growth regulators and tissue culture; and 6.Portray a basic knowledge of secondary products and their economic and medicinal value.

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BOTA	3724	Plant metabolism and the environment	Plant respiration: cytosolic and mitochondria reactions, measurement of plant respirations, fermentation, regulation of plant glycolysis with special reference to key enzymes, the physiological role of the alternative oxidative pentose phosphate pathway (OPP Pathway), Photosynthesis: the chloroplast and associated pigments, photochemical and non-photochemical reaction of photosynthesis, photophosphoryylation (cyclic and non-cyclic), C3-reduction cycle, photorespiration, C4- and CAM-photosynthesis. The methodology in determining photosynthetic rate through fluorescent techniques Nitrogen metabolism: Fixation, assimilation, transamination, conversion in developmental processes and the respiratory nitrogen cycle.	QWA	Successful students will be able to: 1.Outline the respiratory metabolism in plants and the manipulations thereof for food production; 2.Apply specific techniques to determine or manipulate respiration rates in plants; 3.Explain light dependent and light independent reactions of photosynthesis, cyclic and non-cyclic photophosphorylation, role of the Q-cycle in energy production, photorespiration, C4 and CSM plants; 4.Apply fluorescent techniques to determine photosynthesis and primary productions in plants; 5.Apply fluorescent techniques to determine photosynthesis and primary productions in plants; 6.Explain nitrogen metabolism; and 7.Predict the various effects of different environmental factors on plant metabolism and the resultant effects on food production
BOTA	3734	Introduction to plant systematics	This module describes the plant kingdom and the position of angiosperms within it. Plant fossils and evolutionary history of all plant groups will be discussed, as well as the evolution of flowers, pollination, breeding systems, reproductive isolation and hybridization. Students will learn about the taxonomic system and main subdivisions within the angiosperms. They will learn to apply evolutionary theory, speciation and cladistics as method for deriving phylogenetic trees, using the appropriate rules of nomenclature. Students will learn to assess taxonomic evidence and various types of characters used in plant identification. They will be able to use molecular data in deriving phylogenetic trees. Finally, students will gain an overview of basic biogeography and the concept of biodiversity hotspots.	QWA	1.Demonstrate an integrated knowledge of plant evolution, diversity and taxonomic principles; 2.Apply this knowledge in plant identification and classification; 3.Utilize and understand various methods of plant identification to derive the evolutionary history of a group of plants; 4.Manage different information sources to solve problems in plant systematics 5.Evaluate and reflect on scientific methods that are available to them; 6.Use multiple characters in the identification of a familiar or unfamiliar plant using a dichotomous or polyclave identification key; 7.Derive a phylogenetic tree by means of a character state matrix; 8.Maintain professional standards, taking full responsibility for the choices made; 9.Direct his/ her own learning by correcting mistakes and taking new information into account; 10.Manage data analysis of plant characters in a systematic manner; and 11.Effectively communicate the results of plant systematics analysis.
BOTA	3744	Ethnobotany and Plant Defence	Basotho ethnology, ethnogeography and ethnobotany, basic traditional medicines preparations. Defence mechanism of plants against biotic and abiotic stress factors on physiological-biochemical level. Constitutive and induced defence, structural and biochemical defence, hypersensitivity, systemic and acquired resistance, signal mechanism and manipulation of resistance. Biotechnological application of plants: e g. Propagations techniques, chemical reactions to produce desired products of industrial and pharmaceutical importance. Principles, applications and economic potential of Basotho medicinal plants, algal biotechnology. Design of bioreactors, candidate species for plant and algal biotechnology, practical experience in micropropagation techniques and field trials.	QWA	At the end of the module, the student will be able to: 1.Outline the Basotho ethnology, ethnogeography and ethnobotany; 2.Describe Basotho historical background and every phase of their tradition and Cultural Revolution in terms of Basotho herbalism (curative and ameliorative) and diseases management using medicinal plants; 3.Explain the process of synthesis of different secondary compounds in plants and the role they play in plant defence and in return the medicinal potentials of these compounds; 4.Collect medicinal plants in a sustainable way and application of possible conservation mechanisms for endangered plants through field cultivation and micropropagation; 5.Collect and reserve botanical data by means of graphs, tables, etc.; 6.Use different statistical packages (GraphPad Prism 6) to analyse data; 7.Critical interpretation of data; and 8.Use and care for scientific equipment safely and ethically.
BOTA	3754	Vegetation ecology	Ecosystems and vegetation processes. Primary productivity and Biomass production. Plants and soils, water holding capacity of soils, available water capacity. Soil classification. Plant population ecology. Dispersal, recruitment and clonal growth. Plant functional types and life histories, theories of competition and other plant interactions. Responses to stresses and disturbances. The Braun-Blanquet method of vegetation sampling, plot size, cover-abundance scale. Classification and ordination. Direct and indirect gradient analysis. Development of various multivariate techniques. Vegetation dynamics, in terms of gap dynamics, fire and grazing. Spatial pattern in vegetation. Vegetation mapping. Vegetation and biogeography of plants. Species diversity and ecosystem processes. Global and South African distribution of biomes.	QWA	At the end of the module, the student will be able to: 1.Integrate knowledge of plant population ecology and plant community ecology; 2.Apply that knowledge in conservation management; 3.Evaluate complementary approaches in vegetation studies; 4.Make management decisions based on multiple criteria, for example in drawing vegetation borders; 5.Choose from several methods of vegetation sampling, and assess their suitability to gather different types of information in the field to solve complex problems; 6.Conduct vegetation sampling and analysis in different contexts, recognizing that different contexts require different strategies for problem solving; 7.Address any problem-solving complications that may arise in a self-directed manner; 8.Analyse data and communicate the most important findings and conclusions derived from a vegetation study; 9.Maintain professional and ethical standards, taking full responsibility for his/ her work; 10.Use laws and principles of science in their approach to ecosystems; 11.Show insight into the human uses of ecosystems and how this interacts with vegetation processes; and 12.Derive scientific evidence for changes or explanations that underlie complex systems such as vegetation, using appropriate statistical techniques.

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BOTA	6808	Botany Research Project	The student will conduct a research project depending on the speciality of the supervisor. The research project will either be in plant sciences or zoology field or any other field related to life sciences as deemed necessary by the supervisor. The student will be expected to submit a research proposal and after its approval research will be conducted and then presented orally and finally a written research report (mini-dissertation, which may be in article format)	QWA	Student will be able to: -Critically assess the primary literature on his/her topic -Communicate intelligently with experts and laypeople on the topic, using both oral and written communication skills -Combine the appropriate evolutionary principles and analysis techniques to address his/her scientific questions central - Design and implement an independent study -Assess the success of his/her research through the use of appropriate statistical software and other relevant technologies.
BOTA	6814	Restoration ecology	Principles of green economics: valuation of natural resources and ecosystem services. Restoration planning, indicator species and restoration targets. Restoration targets as based on species, on ecosystem processes or on ecosystem services. Soil enhancement techniques and bio-engineering. Formation of erosion gullies. Hydrology and water balance in river catchments. Revegetation, ecological assembly and population viability analysis. Spatial scale and landscape context. Island biogeography in landscape management. Monitoring and ecological management, fire, herbivory, aftercare of restoration work.	QWA	1.Successful students will be able to: 2.Apply ecological knowledge, theories and research methodologies in the practice of ecological restoration 3.Draft a restoration plan to solve environmental problems on the basis of multiple sources of knowledge and integrate information from various spatial scales, while appreciating the complexities and uncertainties at each level 4.Understand the responsibilities of a restoration practitioner towards various stakeholders and, by means of critical reflection, the complexities of accountability based on a various types of ethical standards that emerge from sociological-ecological systems 5.Make decisions based on such critical 6.Effectively communicate decisions in a restoration plan towards stakeholders 7.Manage his or her learning needs in an ongoing process of critical analysis and reflection 8.Take full responsibility for the work done.
BOTA	6824	Plant ecophysiology	Plant ecophysiology is the study of how plants function in diverse environments and their physiological responses to environmental and climate change. The processes occurring in plants during instantaneous stress response, acclimation and adaptation to a stress are investigated. The course will focus on how plant growth is affected by nutrient availability and deficiency, aluminium in the soil, ecohydrology. Influence of light stress, water deficit and air pollution on plants (i.e. how physiological activities are affected by availability of light, water, nutrients and atmospheric CO2 and the consequences of growth). How respiration in roots is affected by flooding, salinity and water stress. Climate change and plant ecophysiology.	QWA	Successful students will be able to: 1.Outline concepts and principles of plant ecophysiology; 2.Link plant function and landscape carbon, water, climate change and water scarcity; 3.Identify relationships between plant structure and function; 4.Distinguish the different plant strategies for capturing light and the processes governing carbon capture by leaves and canopies; 5.Explain the processes governing movement of carbon through phloem; 6.Provide examples of plant adaptations to different environments and disturbances; 7.Apply practical skill in plant physiological techniques in addressing hypotheses about plant function and survival; 8.Apply knowledge of plant physiology and ecophysiology to media discussions about global climate change, water scarcity, carbon and water trade-offs and forest mortality; and 9.Conduct project investigating the effects of environmental stress on plants.
BOTA	6844	Plant biotechnology	This module aims to introduce students to principles, techniques and applications of plant biotechnology. The students will learn about the techniques in plant tissue culture, an introduction on recombinant DNA technology, the application of genomics and proteomics technologies in studying genes and traits of interest for transgenic plants, the different ways in which transgenic plants are produced and analysed. The regulation and biosafety of plant biotechnology as well as why transgenic plants are controversial will be briefly discussed.	QWA	Successful students will be able to: -Outline concepts and principles of plant ecophysiology; -Link plant function and landscape carbon, water, climate change and water scarcity; -Identify relationships between plant structure and function; -Distinguish the different plant strategies for capturing light and the processes governing carbon capture by leaves and canopies; -Explain the processes governing movement of carbon through phloem; -Provide examples of plant adaptations to different environments and disturbances; -Apply practical skill in plant physiological techniques in addressing hypotheses about plant function and survival; -Apply knowledge of plant physiology and ecophysiology to media discussions about global climate change, water scarcity, carbon and water trade-offs and forest mortality; and -Conduct project investigating the effects of environmental stress on plants.
BOTA	6864	Phytomedicine	Principles of Basotho ethnography, indigenous knowledge of medicinal plants, collection and identification of plants, using the herbarium, resources utilisation and implications (Underutilization and over exploitation), methods preparation of herbal remedies and scientific validation of implicated plants in terms of validation of folkloric claims.	QWA	Successful students will be able to 1.Apply ethnobotanical knowledge, principles, theories and research methodologies in medicinal plants usage; 2.Describe principles of ethnobotany as a multidisciplinary character: botanically, plants and plant usage, ecological patterns, plant dispersal, resources utilisation and conservation; 3.Collect and prepare medicinal plants; 4.Describe possible consequences of indiscriminate resources utilization; 5.Describe and apply major preliminary scientific evaluation methods to validate the folkloric use of implicated plants; 6.Make decisions based on the critical reflection; and 7.Effectively communicate decisions in a conservation plans towards stakeholders if plants are endemic or endangered.

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BOTA	8900	Botany Dissertation	Research project in specialized field of Botany as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
BOTA	9100	Botany Thesis (PhD)	This module contains fundamental knowledge, theories, principles and practices of Botany, General including Research project in specialized field of Botany, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
BTNY	6806	Literature review	Students complete a literature study on a given topic under the guidance of a supervisor.	MAIN	Student will be able to: -perform literature searches, organize relevant information and compile the information according to a specified format; -integrate knowledge obtained from literature; -discuss how his / her topic fits within the larger body of Botanical literature; -communicate his / her results in the form of a Powerpoint presentation; and -self-evaluate his / her own development within Botany.
BTNY	6808	Research Project Botany	Students complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: -identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -integrate knowledge obtained from both literature and experimental results; -outline how his / her research fit within the larger picture of Botanical research; -report on how the principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialization; -communicate his / her results in the form of a Powerpoint presentation; -assist in the preparation of the results for publication; and -self-evaluate his / her own development within Botany.
BTNY	6814	Advanced Plant Ecology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). This module deals with the nature of quantitative plant ecology and vegetation science, the description of natural vegetation, the characteristics of vegetation and environmental data, basic statistical analysis of the vegetation and environmental data, ordenation and classification methods including the method of the Zürich-Montpellier school of vegetation classification. The latest on the mapping of southern Africa's vegetation will also be discussed.	MAIN	Student will be able to: - Provide detailed descriptions of different concepts and vegetation assessment techniques; - Integrate the obtained knowledge from different sources; - Explain how each technique contributed to understanding the responses of plant species to environmental factors; - Apply gained knowledge to identify, analyse, address and solve problems within ecological niches; - Critically evaluate gathered information and published research articles; and - Self-evaluate his / her own development within Plant ecology.
BTNY	6816	Literature review Botany	Students complete a literature study on a given topic under the guidance of a supervisor.	MAIN	Student will be able to: -perform literature searches, organize relevant information and compile the information according to a specified format; -integrate knowledge obtained from literature; -discuss how his / her topic fits within the larger body of Botanical literature; -communicate his / her results in the form of a PowerPoint presentation; and -self-evaluate his / her own development within Botany.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BTNY	6818	Botany Research Project	Students complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: -Identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -Integrate knowledge obtained from both literature and experimental results; -Outline how his / her research fit within the larger picture of Botanical research; -Report on how the principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialization; -Communicate his / her results in the form of a PowerPoint presentation; -Assist in the preparation of the results for publication; and -Self-evaluate his / her own development within Botany.
BTNY	6824	Plant Physiology (Metabolism and Growth)	Plant Physiology I (Metabolism and Growth) The module is designed to equipped the student on different aspects of plant physiology related to metabolism and growth op plants: - Mitochondrial electron transport in plants: - cyanide sensitive electron transport, alternative oxidase pathway, rotenone non-sensitive complex, exogenous NADH oxidase pathway and oxidative phosphorylation. - Secondary metabolism related to lipid mobilization in plants. - Hydroponics as an alternative plant cultivation and research technique: - systems, importance of different nutrient media, sterilization, pH, conductivity, pest control, etc. Hydroponics versus organic versus conventional cultivation practices. - Importance of elements in plant metabolism.	MAIN	Student will be able to: - give detailed descriptions of mitochondrial respiration, lipid metabolism, nutrient cycles and hydroponics; -integrate knowledge from different sources; -discuss how the information contributed to our understanding of plant metabolism and how hydroponics could be used to further study plant metabolism; -apply information to identify, analyse, address and solve problems within industries such as agriculture ; - evaluate gathered information and published research articles; and - self-evaluate his / her own development within Plant physiology.
BTNY	6826	Literature review Botany	Students complete a literature study on a given topic under the guidance of a supervisor.	MAIN	Student will be able to: -Perform literature searches, organize relevant information and compile the information according to a specified format; -Integrate knowledge obtained from literature; -Discuss how his / her topic fits within the larger body of Botanical literature; -Communicate his / her results in the form of a PowerPoint presentation; and -Self-evaluate his / her own development within Botany.
BTNY	6828	Research Report Botany	Students complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: -Identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -Integrate knowledge obtained from both literature and experimental results; -Outline how his / her research fit within the larger picture of Botanical research; -Report on how the principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialization; -Communicate his / her results in the form of a PowerPoint presentation; -Assist in the preparation of the results for publication; and -Self-evaluate his / her own development within Botany.
BTNY	6834	Plant Molecular Systematics	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). This module offers the study of phylogenetic systematics where the aim is to reconstruct the evolutionary history of a plant group. Concepts of phylogenetics will be discussed. DNA extraction, PCR techniques, sequencing and gel electrophoresis will be applied. Phylogenetic methods such as Parsimony and Bayesian Inference will be discussed and applied with computer based programs using datasets to construct a phylogeny / cladogram. The measures of character fitness (CI, RI, HI) and testing support (Bootstrap, Posterior probabilities) of clades in phylograms / cladograms will be discussed and applied for the different phylogenetic methods.	MAIN	The student will be able to: - give detailed descriptions of different concepts and techniques used in molecular phylogeny and how it can be used to construct and interpret phylogenies / cladograms; - integrate the obtained knowledge from different sources; - explain, explore and discuss how each technique contributed to understanding the genetic relationships between plant taxa; - apply the knowledge to identify, analyse, address and solve problems within molecular systematics; - critically evaluate gathered information and published research articles; and - self-evaluate his / her own development within Plant molecular systematics. .
BTNY	6844	Plant Physiology II (Plant Defence and Applications)	Plant Physiology II (Plant Defence and Applications) The plant's defence mechanisms in relation to biotic stress factors such as injury, insects and pathogens. Resistance and susceptibility are explained in terms of defence mechanisms. Constitu¬tive versus induced defence mechanisms, eliciting and signal transduction mechanisms, secondary defence reactions, plant activators, manipulation of resistance, relation to new alternative, but very exciting, uses of plants.	MAIN	Student will be able to: - give detailed descriptions of different concepts and techniques used in biochemical plant defences and how they can be used to understand and improve the defence response; - integrate the principles obtained from different sources; -discuss how each technique contributed to understanding of the biochemical defence responses of plants against disease causing organisms; -apply information to identify, analyse, address and solve problems within an agricultural context; -critically evaluate gathered information and published research articles; and -self-evaluate his / her own development within Biochemical plant defence.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BTNY	6854	Advanced plant taxonomy	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Botany). Plant systematics (which includes taxonomy) is the basis for information on biodiversity and almost all fields of biology rely on taxonomy. This module deals with the four main components of taxonomy, namely: description, identification, classification and nomenclature. The principles and application of each of these components is investigated in terms of evolutionary research, ethnobotany, bio-prospecting and conservation planning. Students will gain practical experience in herbarium management and use of online resources for taxonomic research. The classification of flowering plants will be investigated and brought into context with South African flowering plant diversity.	MAIN	Student will be able to: -apply basic taxonomic principles in the description and nomenclature of plant species and be familiar with the management and use of the herbarium; -integrate the obtained knowledge from different sources; -evaluate and discuss the role of taxonomy in evolutionary research, ethnobotany, bio-prospecting and conservation planning; -apply principles to identify, analyse, address and solve problems within sustainable use and conservation of biodiversity; - critically evaluate gathered information and published research articles; and - self-evaluate his / her own development within Plant taxonomy.
BTNY	6864	Ecosystem management and restoration	Global warming and human overpopulation is a potential threat to existing ecosystems on the planet. Existing ecosystems should thus be managed and utilised in a sustainable manner. In cases where this much needed ecosystems are damaged or destroyed, intervention by man is required to ensure future food security and biodiversity. During this module, the causes and implications of disturbed terrestrial environments will be discussed in detail, and knowledge gained on the practical restoration of different types of disturbed environments.	MAIN	Student will be able to: -outline disturbances of terrestrial ecosystems and its influence on local communities, the challenges of rectifying these disturbances as well as the legislation applicable to ecosystem restoration; - integrate the obtained knowledge from different sources; - evaluate and discuss the challenges of ecosystem restoration and apply models to determine ecosystem health; -apply principles to identify, analyse, address and solve problems within local communities; -critically evaluate gathered information and published research articles;and - self-evaluate his / her own development within Conservation ecology.
BTNY	6874	Advanced plant molecular biotechnology	The response of plants following either a biotic or abiotic stimulus is very complex and specific. Using Rpg1 as an example, the genetic improvement of resistance of crops against fungal diseases are discussed using published research articles. Students prepare and present these articles during weekly discussion sessions. Students will also present a short report in the form of an oral presentation on selected topics within the plant defence response.	MAIN	Student will be able to: -give detailed descriptions of different molecular techniques and aspects relating to plant defences against fungal pathogens; -integrate the obtained knowledge from different sources; -outline how each technique contributed to both unravelling and improving the plant defence response; apply principles to identify, analyse, address and solve problems within the agricultural sector; -critically evaluate gathered information and published research articles; and -self-evaluate his / her own development within Plant molecular biotechnology.
BTNY	6884	Plant analytical biochemistry	An introduction to plant secondary metabolites (natural products) including an overview of plant secondary metabolism, the classes, functions and biosynthesis of terpenoids, phenolic compounds and alkaloids. Finally, an introduction to biologically active plant secondary metabolites will be given.	MAIN	Student will be able to: -give detailed descriptions of plant secondary metabolites and their ecological functions, biosynthesis, biological activity and economic significance; -integrate the obtained knowledge from different sources; -outline the endogenous role of plant secondary products and their possible application within induced plant defence; - apply principles to identify, analyse, address and solve problems within the agricultural sector; -critically evaluate gathered information and published research articles; and -self-evaluate his / her own development within Plant analytical biochemistry.
BTNY	6894	Methods in Palaeo-ecology	This module presents fundamental knowledge about principles and application of state of the art methods for resolving/reconstructing abiotic and biotic palaeo-environmental conditions. It deals with the effects of global climate changes that caused dramatic shifts in marine and terrestrial environments over time, including vegetation zones and their associated fauna. These changes also influenced the hydrology and ecology of lakes and drainage systems. This module therefore provides a background for the assessment and the role that climatic variability played in the evolutionary history of African mammalian fauna, flora and early hominids.	MAIN	Student will be able to: -Analyse how and why climate varied over time; -Assess how climate change affected ecosystems and human society in the past; -Identify and apply appropriate methods for palaeo-environmental investigations in a variety of (taphonomic) contexts; -Apply principles to identify, analyse, address and solve problems within a palaeo-ecological context; and -Critically evaluate gathered information and published research articles.
BTNY+ 67: 68F6866:6866: 6865: 66:68	8900	Botany Dissertation	Research project in specialized field of Botany as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BTNY	9100	Botany Thesis	This module contains fundamental knowledge, theories, principles and practices of Botany, General including Research project in specialized field of Botany, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ENRH	6806	Literature review Environmental Rehabilitation	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Environmental Rehabilitation) and includes the skills to complete a literature study, under the guidance of a supervisor, on a given topic related to Environmental Rehabilitation, applying the above mentioned fundamental knowledge.	MAIN	The student will be able to: - Perform literature searches, organize relevant information and compile the information according to a specified format; - Integrate information obtained from literature; - Explain how his / her topic fits within the larger body of Botanical literature; - Communicate his / her results in the form of a Powerpoint presentation; and - Self-evaluate his / her own development within Botany.
ENRH	6808	Research project	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Environmental Rehabilitation) and includes the skills to complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student will be able to: - identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; -integrate knowledge obtained from both literature and experimental results; -outline how his / her research fit within the larger picture of Botanical research; -discuss how principles of botany can be applied to identify, analyse, address and solve problems within his / her own field of specialization; -communicate his / her results in the form of a Powerpoint presentation; -assist in the preparation of the results for publication; and -self-evaluate his / her own development within Botany.
ENRH	8900	Environmental Rehabilitation, Dissertation	This module contains fundamental knowledge, theories, principles and practices of Environmental Rehabilitation, General including Research project in specialized field of Environmental Rehabilitation, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Students will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ENRH	9100	Environmental Rehabilitation Thesis	This module contains fundamental knowledge, theories, principles and practices of Environmental Rehabilitation, General including Research project in specialized field of Environmental Rehabilitation, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ENVR	6806	Literature review	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Environmental Rehabilitation) and includes the skills to complete a literature study, under the guidance of a supervisor, on a given topic related to Environmental Rehabilitation, applying the above mentioned fundamental knowledge.	MAIN	Student will be able to: -Perform literature searches, organize relevant information and compile the information according to a specified format; -Integrate knowledge obtained from literature; -Examine and discuss how his / her topic fits within the larger body of Botanical literature; -Communicate his / her results in the form of a PowerPoint presentation; and -Self-evaluate his / her own development within Botany.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ENVR	6808	Research Project	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Environmental Rehabilitation) and includes the skills to complete a research project within his / her field of interest under the guidance of a supervisor. A project hypothesis must be stated and tested so as to come to a logical conclusion.	MAIN	Student be able to: - identify a research problem, formulate a hypothesis and test the hypothesis by planning, conducting and executing experiments to test the hypothesis and finally accept or reject the hypothesis based on a critical evaluation of the obtained results; - integrate information obtained from both literature and experimental results; - explain how his / her research fit within the larger picture of Botanical research; - explain how the information can be applied to identify, analyse, address and solve problems within his / her own field of specialization; - communicate his / her results in the form of a Powerpoint presentation; - assist in the preparation of the results for publication; and - self-evaluate his / her own development within Botany.
LIMG	8900	Limnology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Limnology, including: Research project in specialized field of Limnology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHEC	8900	Plant health ecology dissertation	This module contains fundamental knowledge, theories, principles and practices of Plant health ecology, including: Research project in specialized field of Plant health ecology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PHEC	9100	Plant Health Ecology Thesis	This module contains fundamental knowledge, theories, principles and practices of Plant Health Ecology, including: Research project in specialized field of Plant Health Ecology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PLTB	6806	Literature review	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). In this module the student will do a literature review on a specific topic in plant breeding, with the use of different resources. The student will learn how to present this information in an organised and logical format, which is written as a scientific correct review article, and presented in the form of a seminar.	MAIN	Student will be able to: -Conduct research on a specific topic by using different resources, and -Write a literature review in a scientifically correct manner.
PLTB	6814	Advanced quantitative genetics in Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). This module consists of analysis of variance of data of different breeding techniques in early and late generations of self-pollinating plants, and in cross-pollinating and vegetatively propagated plants and calculation of variance components and heritability. The module also covers stability and genotype x environment interaction and techniques used to analyse it.	MAIN	Students will be able to: - Calculate variance components and heritability from different breeding systems; and - Analyse and interpret genotype x environment interaction and stability of genotypes.
PLTB	6816	Literature review Plant breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). In this module the student will do a literature review on a specific topic in plant breeding, with the use of different resources. The student will learn how to present this information in an organised and logical format, which is written as a scientific correct review article, and presented in the form of a seminar.	MAIN	Student will be able to: -Conduct research on a specific topic by using different resources, and -Write a literature review in a scientifically correct manner.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PLTB	6818	Plant Breeding Research Report	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). The student will carry out a scientific project under supervision of a lecturer and will learn how to plan, and execute research, gather data, analyse and interpret the data, make conclusions from the data and write a scientific report.	MAIN	Student will be able to: - Plan and execute a research project; - Analyse data; and - Interpret data and to compile a scientific report.
PLTB	6824	Quality and stress tolerance breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). In this module an in depth study will be done on the application of plant breeding techniques for the improvement of crop quality, high and low temperature and moisture stress tolerance and insect and diseases resistance.	MAIN	Student will be able to: -Initiate a breeding programme and formulate strategies for quality and stress tolerance and resistance breeding.
PLTB	6828	Plant Breeding Research Report	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). The student will carry out a scientific project under supervision of a lecturer and will learn how to plan, and execute research, gather data, analyse and interpret the data, make conclusions from the data and write a scientific report.	MAIN	Student will be able to: - Plan and execute a research project; - Analyse data; and - Interpret data and to compile a scientific report.
PLTB	6834	Marker-assisted Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding). In this module students will be acquainted with different techniques used for marker-assisted plant breeding. Older as well as the newest DNA marker technologies and protein based methods will be studied. Students will learn to apply these techniques in DNA fingerprinting, for construction of linkage maps, for selection and use of mapping populations, in application of different strategies to target specific genes or genomic regions in plants and in functional genomics and gene discovery.	MAIN	Student will be able to: -Examine and apply the different techniques used for marker-assisted breeding and be able to apply these technologies in breeding programmes.
PLTB	6854	Statistics in Plant Sciences	In this module statistics relevant to Plant Sciences will be covered in both theoretical classes as well as with computer analysis. Students will learn principles related to statistical analyses and will learn how to design experiments, input data and interpret output of statistical analyses they did on different software packages.	MAIN	Student will be able to: - Discuss basic statistical concepts in full; - Outline the design of an experiment; - Correctly input and analyse data in to statistical software; and - Correctly interpret data analysed.
PLTB	6874	Advanced statistics in Plant Sciences	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Breeding) for advanced postgraduate students. In this module statistics relevant to Plant Sciences will be covered in both theoretical classes as well as with computer analysis. Students will learn all principles related to statistical analyses and will learn how to design experiments, input data and interpret output of statistical analyses they did on different software packages.	MAIN	Students will be able to: -Discuss statistical concepts; -Design experiments, input and analyse data; and -Interpret the data generated from statistical software.
PLTB	8900	Dissertation Plant Breeding	This module contains fundamental knowledge, theories, principles and practices of Plant Breeding, including: Research project in specialized field of Plant Breeding as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PLTB	9100	Plant Breeding Thesis	This module contains fundamental knowledge, theories, principles and practices of Plant Breeding, General including Research project in specialized field of Plant Breeding, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PLTI	8900	Interdisciplinary Plant Breeding Dissertation	Students do research on an approved topic for at least four semesters in consultation with the Division Head in preparation of a dissertation that will be submitted as a requirement for obtaining the degree. Extra modules may be required for students who do not have the correct scientific background.	MAIN	Student will be able to: -apply advanced principles within his / her research field or discipline that will allow him / her to engage with current international research; - manage information to compile a comprehensive review of current and topical research within his / her research field or discipline; -evaluate and select relevant research tools to engage in research within his / her field or discipline; -use a wide range of specialised skills to identify, conceptualise, design and implement methods of inquiry to address complex issues within his / her research field or discipline; -make autonomous decisions regarding ethical aspects of his / her research; -present and defend his / her own research before a wide range of different audiences; -adjust his own learning strategies so as to sustain and improve his / her professional development;and -operate independently and take full responsibility for his /her research and implementation thereof.
PLTI	9100	Interdisciplinary Thesis Plant Breeding	Students do research on an approved topic for at least four semesters in consultation with the Division Head in preparation of a thesis that will be submitted as a requirement for obtaining the degree. Extra modules may be required for students who do not have the correct scientific background	MAIN	Student will be able to: -apply advanced principles within his / her research field or discipline that will allow him / her to engage with current international research; - manage information to compile a comprehensive review of current and topical research within his / her research field or discipline; -evaluate and select relevant research tools to engage in research within his / her field or discipline; -use a wide range of specialised skills to identify, conceptualise, design and implement methods of enquiry to address complex issues within his / her research field or discipline; -make autonomous decisions regarding ethical aspects of his / her research; -present and defend his / her own research before a wide range of different audiences; -adjust his own learning strategies so as to sustain and improve his / her professional development;and -operate independently and take full responsibility for his /her research and implementation thereof.
PPLG	6806	Literature review	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology) The student compiles a review of a specific subject and delivers presentations of selected articles in plant pathology journals. On completion of this module the student is acquainted with literature searches, organizing information, the compilation of information according to a specific format, as well as in written and verbal communication skills.	MAIN	Student will be able to: - explain information in an area at the forefront of a selected field in Plant Pathology; - identify the theories, research methodologies, methods and techniques relevant to the selected field; - critically review information gathering, evaluation and management processes in specialised contexts; and - present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	6808	Plant Pathology Research Report	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The student completes a research project under the guidance of a supervisor and becomes skilled in problem identification, hypothesis formulation, planning, conducting and analysis of experiments as well as the interpretation and communication of results.	MAIN	The student will be able to: - use a range of specialised skills to identify, analyse and address complex and/or abstract problems in the field of Plant Pathology; - critically review data gathering, evaluation and management processes in specialised contexts; and - present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	6816	Literature review Plant Pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology) The student compiles a review of a specific subject and delivers presentations of selected articles in plant pathology journals. On completion of this module the student is acquainted with literature searches, organizing information, the compilation of information according to a specific format, as well as in written and verbal communication skills.	MAIN	Student will be able to: - explain information in an area at the forefront of a selected field in Plant Pathology; - identify the theories, research methodologies, methods and techniques relevant to the selected field; - critically review information gathering, evaluation and management processes in specialised contexts; and - present and communicate academic, professional or occupational ideas effectively to an audience.
PPLG	6824	Plant-pathogen interactions	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The module provides a broad basis for understanding the physical, biochemical and physiological effects that plant pathogens have on their hosts, particularly the methods they use to attack plants and how plants in turn defend themselves.	MAIN	Student will be able to: - Describe the physical and physiological interactions between plant pathogens and hosts; and - Discuss and apply the role that the environment plays in plant/pathogen interactions.
PPLG	6826	Literature review Plant Pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology) The student compiles a review of a specific subject and delivers presentations of selected articles in plant pathology journals. On completion of this module the student is acquainted with literature searches, organizing information, the compilation of information according to a specific format, as well as in written and verbal communication skills.	MAIN	Student will be able to: - explain information in an area at the forefront of a selected field in Plant Pathology; - identify the theories, research methodologies, methods and techniques relevant to the selected field; - critically review information gathering, evaluation and management processes in specialised contexts; and - present and communicate academic, professional or occupational ideas effectively to an audience.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PPLG	6834	Epidemiology and control of plant diseases	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). The course addresses temporal and spatial aspects of plant disease development. Emphasis is on measurement of host, pathogen, and environmental parameters, modelling their interactions in order to understand pathosystem behaviour, quantification of yield loss relationships and identification of effective disease management strategies.	MAIN	Student will be able to: -measure and explain the temporal and spatial aspects of plant disease development; -examine the role of environmental and host factors on disease development and how this can be integrated with disease control; and -manage the application of quantitative epidemiology.
PPLG	6844	Molecular Plant Pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Sciences (Plant Pathology). On completion of the module, students will have a basic overview and understanding of molecular plant pathology approaches and techniques, their application and how the use of the various molecular biology approaches can aid in various types of studies of plant pathogens. The course provides a basis on the structure and functionality of DNA and RNA genetics of different pathogen groups, general and some more specialized but contemporary techniques used for molecular plant pathology, and how the various fields of molecular biology aid in understanding various aspects of plant pathology, such as pathogen detection or identification, genetic analysis of plant pathogens, molecular marker-assisted breeding, population genetic studies, and host x pathogen interactions. After completion of the practical module the student will have some experience in certain basic aspects of molecular biology plant pathology research, which is complementary to the theory.	MAIN	Student will be able to: -Examine concepts of the genetics of different pathogen groups; -Examine and apply principles of some of the most widely used molecular techniques used for plant pathology, and variations of these techniques; -Use molecular plant pathology approaches and examine how it aids general plant pathology studies and which of the approaches are appropriate for what type of studies and questions; and -Select and apply these approaches and techniques in practical situations by understanding the principles, methodology, advantages and disadvantages of each.
PPLG	8900	Dissertation Plant Pathology	Students do research on an approved topic for at least two semesters in consultation with the Division Head in preparation of a dissertation that will be submitted as the only requirement for obtaining the degree.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PPLG	9100	Thesis Plant Pathology	This module contains fundamental knowledge, theories, principles and practices of Plant Pathology, including: Research project in specialized field of Plant Pathology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Plan independently; and -Conduct in-depth research in a natural or agricultural science discipline.
PPLI	8900	Interdisciplinary Plant Pathology Dissertation	Students do research on an approved topic for at least two semesters in consultation with the Division Head in preparation of a dissertation that will be submitted as the only requirement for obtaining the degree.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PPLI	9100	Interdisciplinary Plant Pathology Thesis	This module contains fundamental knowledge, theories, principles and practices of Plant Pathology, including: Research project in specialized field of Plant Pathology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Plan independently; and -Conduct in-depth research in a natural or agricultural science discipline.

Quantity Surveying and Construction Management

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ABSD	2604	Applied Building Science	Advanced construction problems; integration of different systems; restoration and general construction problems. The complete construction of a single or multi-story building: Foundations and sub-structures for a load bearing and skeleton/framed structures; basic concrete frames; walls; flat and pitched roofs; floors, waterproofing of floors, steps; window ranges, door types; uses of locks, patented fittings and metalwork, service design for single and multi-story structures.	MAIN	Student will be able to: - compile a detailed set of working drawings for a basic building; - orientate buildings in terms of climate; - solve advanced construction problems and convey the solution through drawings and explanations; - implement more complex construction solutions; and - propose and communicate different construction- and material usage and solutions.
ABSD	3704	Applied Building Science	Working drawings of multi-story buildings. Multi-story structures; shoring, sub-structure building and basement constructions, structural steel work, joined structures. Material science: wood, cement, glass, metals, plastic, petro-chemicals and paints, building components.	MAIN	The student will be able to: - compile the specification of a building project as well as do certain working drawings on this level
ABSR	2604	Applied Building Science	Advanced construction problems; integration of different systems; restoration and general construction problems. The complete construction of a single or multi-story building: Foundations and sub-structures for a load bearing and skeleton/framed structures; basic concrete frames; walls; flat and pitched roofs; floors, waterproofing of floors, steps; window ranges, door types; uses of locks, patented fittings and metalwork, service design for single and multi-story structures.	MAIN	Student will be able to: - compile a detailed set of working drawings for a basic building; - orientate buildings in terms of climate; - solve advanced construction problems and convey the solution through drawings and explanations; - to implement more complex construction solutions; and - propose and communicate different construction- and material usage and solutions.
ABSR	3704	Applied Building Science	Working drawings of multi-story buildings. Multi-story structures; shoring, sub-structure building and basement constructions, structural steel work, joined structures. Material science: wood, cement, glass, metals, plastic, petro-chemicals and paints, building components.	MAIN	The student will be able to: - Compile the specification of a building project as well as do certain working drawings on this level.
ARGD	2604	Architecture	The history of architecture in respect of the art of building from antique civilisation till the 21st century. Aspects of architecture theory and philosophy which affect modern man and development. Built-up areas, city planning and design fundamentals.	MAIN	Student will be able to: - Appreciate the built environment; - Have a basic knowledge of style and character in architecture; - Identify and critically appraise different styles of architecture; - Have a good grounding in the basic philosophy of architecture; - Have knowledge and acceptance for good design and construction; - Do basic design documentation for a simple building; and - Understand design fundamentals.
BARD	1522	Architecture	The history of architecture in respect of the art of building from antique civilisation till the 21st century. Aspects of architecture theory and philosophy which affect modern man and development. Built-up areas, city planning and design fundamentals.	MAIN	Student will be able to: -Appreciate the built environment; -Discuss basic style and character in architecture; -Identify and critically appraise different styles of architecture; -Express grounding in the basic philosophy of architecture; -Apply principles and acceptance for good design and construction; and -Discuss design fundamentals.
BARR	1522	Architecture	The history of architecture in respect of the art of building from antique civilisation till the 21st century. Aspects of architecture theory and philosophy which affect modern man and development. Built-up areas, city planning and design fundamentals.	MAIN	Student will be able to: -Appreciate the built environment; -Discuss basic style and character in architecture; -Identify and critically appraise different styles of architecture; -Express grounding in the basic philosophy of architecture; -Apply principles and acceptance for good design and construction; and -Discuss design fundamentals.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BBED	1524	Building Economics 1	The need for buildings. The developer's motivation and needs. The principals of building cost and economics including an introduction to cash flow, cost modelling, cost data, cost planning and cost control. An overview of areas of development/construction to be managed, as well as functional requirements and cost implications of construction methods, materials and of design variables. The basics of the concepts and economical aspects associated with green building and sustainability.	MAIN	Student should be able to: - Interpret the consumer and developer needs in terms of construction and economy; - Apply basic and fundamental principles of building costs, prices, planning and control; -Identify and make recommendations regarding economical alternatives in terms of building methods, materials and design variables ; and - Embrace the concept of green building and sustainability and reflect on the economical importance thereof, in balance with the environmental importance.
BBED	2612	Building Economics	Part one: The extent and development of building economics as discipline, the structure and functioning of the building industry. General concept of building costs and the factors influencing building costs. The concepts of cost planning and cost control in relation to the RIBA plan of works. Concepts and methods of estimating. Part Two: Construction tenders as part of the construction industry. Calculation of building costs and prices including calculation of labour, material and equipment expenses of construction items, components and elements.	MAIN	Student should be able to: - Discuss and explain the basic principles of building cost and building cost factors; - Discuss and explain the principles of building price and understand building prices; - Explain the importance of the integration of cost planning and cost control with RIBS plan of works; and - Do basic elementary estimates.
BBER	1524	Building Economics 1	The need for buildings. The developer's motivation and needs. The principals of building cost and economics including an introduction to cash flow, cost modelling, cost data, cost planning and cost control. An overview of areas of development/construction to be managed, as well as functional requirements and cost implications of construction methods, materials and of design variables. The basics of the concepts and economical aspects associated with green building and sustainability.	MAIN	Student should be able to: - Interpret the consumer and developer needs in terms of construction and economy; - Apply basic and fundamental principles of building costs, prices, planning and control; -Identify and make recommendations regarding economical alternatives in terms of building methods, materials and design variables ; and - Embrace the concept of green building and sustainability and reflect on the economical importance thereof, in balance with the environmental importance.
BBER	2612	Building Economics	Part one: The extent and development of building economics as discipline, the structure and functioning of the building industry. General concept of building costs and the factors influencing building costs. The concepts of cost planning and cost control in relation to the RIBA plan of works. Concepts and methods of estimating. Part Two: Construction tenders as part of the construction industry. Calculation of building costs and prices including calculation of labour, material and equipment expenses of construction items, components and elements.	MAIN	Student should be able to: - Discuss and explain the basic principles of building cost and building cost factors; - Discuss and explain the principles of building price and understand building prices; - Explain the importance of the integration of cost planning and cost control with RIBS plan of works; and - Do basic elementary estimates.
BBER	2622	Building Economics	Part One: The extent and development of building economics as discipline, the structure and functioning of the building industry. General concept of building costs and the factors influencing building costs. The concepts of cost planning and cost control in relation to the RIBS plan of works. Concepts and methods of estimating. Part Two: Construction tenders as part of the construction industry. Calculation of building costs and prices including calculation of labour, material and equipment expenses of construction items, components and elements.	MAIN	Student will be able to: - Calculate building costs and prices; - Price elementary tender documentation; - Understand basic building economic applications; and - Understand the basic principles of building cost management.
BBSD	1514	Building Science I	The understanding of architectural drawings, design and construction related methods will provide a fundamental basis which will give students insight into descriptive quantification related tasks. Materials including concrete, masonry, timber and the correct application of these materials in the construction of a single-storey building. Building regulations.	MAIN	Student will be able to: - Compile a detailed set of working drawings for a single-storey building; -Understand the relationship between design and structure; -Understanding of drawing conventions; -Be able to read and interpret architectural drawings; -Have an understanding of materials and the correct application; and -Propose and communicate different construction, material usage and solutions.
BBSD	2614	Building Sciences II	Multi-story structures; shoring, sub-structure building and basement constructions, structural steel work, joined structures. Material science: concrete, glass, metals, plastic, paints and building components.	MAIN	Student will be able to: - compile a detailed set of working drawings for a double-storey structure; - discuss the relationship between design and structure; - propose and communicate different construction solutions and material usage, such as glass, steel and adobe.
BBSD	3712	Building Science 3	Sanitation. Serviceability of buildings. Sanitary fittings. Water supply. Sanitary drainage. Fire Services. Storm-water run-off. Site services. Local government systems.	MAIN	Student will be able to: - Design a site drainage system; - Compare the alternative methods of dealing with sewerage; - Determine and evaluate the most appropriate method of fire protection in a building; - Evaluate the different methods/ways of water purification; - Design domestic water supply to houses; and - Calculate the sizes of storm-water outlets

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BBSR	1514	Building Science I	The understanding of architectural drawings, design and construction related methods will provide a fundamental basis which will give students insight into descriptive quantification related tasks. Materials including concrete, masonry, timber and the correct application of these materials in the construction of a single-storey building. Building regulations.	MAIN	Student will be able to: - Compile a detailed set of working drawings for a single-storey building; -Understand the relationship between design and structure; -Understanding of drawing conventions; -Be able to read and interpret architectural drawings; -Have an understanding of materials and the correct application; and -Propose and communicate different construction, material usage and solutions.
BBSR	2614	Building Sciences II	Multi-story structures; shoring, sub-structure building and basement constructions, structural steel work, joined structures. Material science: concrete, glass, metals, plastic, paints and building components.	MAIN	Student will be able to: - compile a detailed set of working drawings for a double-storey structure; - knowledge of the relationship between design and stucture; - propose and communicate different construction solutions and material usage, such as glass, steel and adobe.
BCCD	3712	Construction Law	Introduction to the law of contract in SA. Requirements for a valid contract. Breach and unlawfulness. Specific types of contracts, and in particular types of building contracts; structure and forms, sureties, interpretation of building contracts.	MAIN	Student will be able to: - Discuss and apply the basics of the law of contract; - Describe the fundamental theory of building contract law; - Interpret building contracts; - Lead the parties to the closure of a sensible building contract; and - Discuss and apply the principles applicable to different types of contracts.
BCCD	3722	Construction Law	Standard form of building contracts, JBCC, FIDIC, GCC and NEC. Specific clauses in certain standard building contract, construction principles and their application, construction disputes and dispute resolution.	MAIN	Student will be able to: - Lead the parties to the conclusion of a sensible building contract; - Interpret and apply the different types of building contract; and - Conduct and mange the administrative processes created in a building contract.
BCSR	2612	Construction Science	Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance. Frame analyses.	MAIN	Student should be able to: - Explain the function and importance of reinforced concrete in the construction of a building or large construction project; - Identify and quantify the elements of a reinforced concrete construction; and - Explain and analyse the principles of frame work analyses
BCSR	2622	Construction Science 2	Mapping procedures and map series: international, national, regions and local areas. Trigonometry beacons and references. Planimetry and principles; measuring-tape measurements, levelling, plumb levels and contours.	MAIN	Student should be able to: - Perform basic site measurements and survey levels; - Discuss and explain the setting of buildings for construction work; - Calculate areas based on first principles and coordinates; - Calculate joints and polars.
BDQD	1504	Descriptive Quantification I	Descriptive quantification: Introduction to descriptive quantification; style, explanation, reference and arrangement. Dissecting of small and medium building structures in terms of sections, subsections, elements and components, specification and quantification thereof, processing and compiling of lists. Mainly focusing on estimating.	MAIN	Student will be able to: - Discuss the structure of the built environment and be able to execute an elemental estimate with component level items. -Outline the basic principles of construction as well as the purpose of documentation procedures and methods of tender/contract procurement; - Compose and construct projects through dissecting, specification, quantification and composition; - Process items in terms of the element- and component level and item-defining with regard to small and medium constructions; and - Execute all mentioned functions.
BDQR	1504	Descriptive Quantification 1	Descriptive quantification: Introduction to descriptive quantification; style, explanation, reference and arrangement. Dissecting of small and medium building structures in terms of sections, subsections, elements and components, specification and quantification thereof, processing and compiling of lists. Mainly focusing on estimating.	MAIN	Student will be able to: - Discuss the structure of the built environment and be able to execute an elemental estimate with component level items. -Outline the basic principles of construction as well as the purpose of documentation procedures and methods of tender/contract procurement; - Compose and construct projects through dissecting, specification, quantification and composition; - Process items in terms of the element- and component level and item-defining with regard to small and medium constructions; and - Execute all mentioned functions.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BDQR	2604	Descriptive Quantification	Dissecting, specification, quantification and composition of process items in terms of trade item definition with regard to foundation work, lower structures, wall constructions, roof constructions and finishes, finishes, windows, doors. Working up of quantities, abstracting in trades, compiling of draft trade lists of integrated examples	MAIN	Student should be able to: - Provide the underlying reasons why a quantity surveyor should execute his work in a systematic and meticulous manner and cultivate specific behavioural patterns that are characteristic of a professional quantity surveyor and construction manager; - Describe the dissecting, specification and quantification of process items in terms of trade item definition in respect of simple- and complex constructions and be able to basically execute the function.
BPDD	1522	Property Development I	Introduction of project management and aimed at the building and construction industry and the property market in general. Introduction and theory of developments and settlements.	MAIN	Student should be able to: - Outline the basic principles and functions of management and project management; and - Apply the basic theory of property development.
BPDR	1522	Property Development 1	Introduction of project management and aimed at the building and construction industry and the property market in general. Introduction and theory of developments and settlements.	MAIN	Student should be able to: - Outline the basic principles and functions of management and project management; and - Apply the basic theory of property development.
BPDR	2614	Property Development Economics	Synopsis of property, the process of property development, land ownership and administration. Introduction to the theory of settlement, theory and development, government control of the development process; land ownership and administration, regional and community development. Urban morphology. Property values, the value concept, theory of emblements, property production and the economic cycle.	MAIN	Student will be able to: - Discuss and apply the broad principles associated with the property development process; - Apply the theory of settlements and broad location patterns and structures at national and local levels; - Discuss the value of concept as applicable to real estate ; - Use and apply property law, the establishment and types of tenure in real estate; and - Apply the broad principles with regard to property production and investments within the national economy.
BPDR	2624	Property Development	Introduction to the theory of investment. Financial mathematics, techniques for measuring investment return and applications. Capital, income, expenditure and the composition of simple and complex financial feasibility studies.	MAIN	Student will be able to: - Evaluate investments of several alternatives and exercise a viable selection; and - Explain and discuss the important concepts of financial property-mathematics and apply this in comparison with alternatives.
BSCD	2604	Building Science	The complete construction of a single or multi-story building: Foundations and sub-structures for a load bearing and skeleton/framed structures; basic concrete frames; walls; flat and pitched roofs; floors, waterproofing of floors, steps; window ranges, door types; uses of locks, patented fittings and metalwork, service design for single and multi-story structures.	MAIN	Student will be able to: - Compile a detailed set of working drawings for a basic building; - Orientate buildings in terms of climate; - Solve advanced construction problems and convey the solution through drawings and explanations; - Implement more complex construction solutions; and - Propose and communicate different construction- and material usage and solutions.
BSCD	3704	Building Science	Multi-story structures; shoring, sub-structure building and basement constructions, structural steel work, joined structures. Material science: wood, cement, glass, metals, plastic, petro-chemicals and paints, building components..	MAIN	The student will be able to: - Compile the specification of a building project on this level.
BSCR	2604	Building Science	The complete construction of a single or multi-story building: Foundations and sub-structures for a load bearing and skeleton/framed structures; basic concrete frames; walls; flat and pitched roofs; floors, waterproofing of floors, steps; window ranges, door types; uses of locks, patented fittings and metalwork, service design for single and multi-story structures. Die volledige konstruksie van `n enkel-en meerverdieping geboue.	MAIN	Student will be able to: - compile a detailed set of working drawings for a basic building; - orientate buildings in terms of climate; - solve advanced construction problems and convey the solution through drawings and explanations; - implement more complex construction solutions; and - propose and communicate different construction- and material usage and solutions.
BSCR	3704	Building Sciences III	Multi-story structures; shoring, sub-structure building and basement constructions, structural steel work, joined structures. Material science: wood, cement, glass, metals, plastic, petro-chemicals and paints, building components.	MAIN	Student will be able to: - compile the specification of a building project on this level.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CCMD	3704	Building Contracts Law	Foundations of contracts law and commercial law in the construction industry: Building contracts, leases, purchase-deeds, agencies, contracts of service. Parties to the building contract; types of building contracts; structure and forms, sureties, interpretation of building contracts, general conditions of building contracts.	MAIN	The student will be able to: - Describe the basic building contract Law; - Discuss the fundamental theory of building contract Law; - Interpret building contracts; - Lead the parties to the closure of a sensible building contract; - Implement different types of building contracts; and - Deal with the administrative process of a building contract.
CFND	3704	Construction Finance	Construction Finance	MAIN	The student will be able to: - Produce cost reports for labour, material, plant and overhead costs; - Set up his own small works enterprise and introduce the required control programmes to manage the works; - Use concept of cost control programmes to manage the works.
CFNR	3704	Construction Finance	Apply project cost control on site to achieve cost goals Develop systems for small works projects for control purposes and invoicing The concept of cost control and cost planning pertaining to construction sites	MAIN	Student will be able to: -produce cost reports for labour, material, plant and overhead costs; -set up his own small works enterprise and introduce the required control programmes to manage the works; and -apply the concept of cost control programmes to manage the works ot provided.
COED	1504	Building Economics	Three-dimensional concepts of spatial planning, con¬ceptual understanding of structure, and integration of structural techniques in the design process, form construction, management of environmental factors, and graphics. The principals of building cost and prices. The theory of cost planning cost comparisons and com¬petitiveness. Contracts and building economical basis.	MAIN	Student will be able to: - Outline the basic principles of construction and design; - Specify the basic materials for a single story building; - Interpret the consumer requirements in terms of construction and economy; - Recommend the use of different building materials; - Draw basic construction plans with construction details; and - Apply fundamental principles of building costs, prices, planning and control.
COED	2604	Building Economics	The extent and development of building economics as discipline, the structure and functioning of the building industry. General concept of building prices and their composition. Calculation of running expenses. The calculation of labour and material expenses of construction items, components and elements.	MAIN	Student will be able to: - Discuss the basic principles of building economy and the building environment; - Do basic estimates; - Price elementary bills of quantities; and - Assist in the process of building cost management.
COED	3704	Building Economics	The development, methodology and application of historical and current cost estimating methods. The practical application of cost data sources and computerized data. Contract management, payment procedures and certification. The composition of final accounts.	MAIN	The student will be able to: - Implement the different cost estimating methods; and - Utilise available data and price schedules do cost planning, cost-management, cost control certification and payment procedures
CSCD	2604	Construction Science	Mapping procedures and map series: international, national, regions and local areas. Trigonometry beacons and references. Planimetry and principles; measuring-tape measurements, levelling, plumb levels and contours. Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance.	MAIN	Student will be able to: - Do basic site measurements and survey levels; and - Set out buildings for construction work. - Explain the function and importance of reinforced concrete in the construction of a building or large construction project; and - Identify and quantify the elements of a reinforced concrete construction.
CSCD	3704	Construction Science	Part 1 Sanitation: Serviceability of buildings. Sanitary fittings. Water supply. Sanitary drainage. Fire Services: Site services. Local government systems. Part 2: Electrical and mechanical services: Lightning, power supply, circuits, telecommunication, consumption of power. Mechanical services: Natural ventilation, forced ventilation and climate control. Heating systems, transport, refrigiration.	MAIN	The student will be able to: - Develop insight into the importance of building services in the construction of projects; - Identify and quantify the elements of building services and how they fit into the building; - Develop insight into the importance of building services in the construction of projects; and - Identify and quantify the elements of building services and how they fit into the building.
CSCR	2604	Construction Science 2	Mapping procedures and map series: international, national, regions and local areas. Trigonometry beacons and references. Planimetry and principles; measuring-tape measurements, levelling, plumb levels and contours. Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance.	MAIN	Student will be able to: - Perform basic site measurements and survey levels; - Set out buildings for construction work; - Explain the function and importance of reinforced concrete in the construction of a building or large construction project; and - Identify and quantify the elements of a reinforced concrete construction

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CSCR	3704	Construction Science	Part 1 Sanitation: Serviceability of buildings. Sanitary fittings. Water supply. Sanitary drainage. Fire Services: Site services. Local government systems. Part 2: Electrical and mechanical services: Lightning, power supply, circuits, telecommunication, consumption of power. Mechanical services: Natural ventilation, forced ventilation and climate control. Heating systems, transport, refrigiration.	MAIN	The student will be able to: - Develop insight into the importance of building services in the construction of projects; - Identify and quantify the elements of building services and how they fit into the building; - Develop insight into the importance of building services in the construction of projects; and - Identify and quantify the elements of building services and how they fit into the building.
DCPD	3704	Descriptive Construction Project	During the year, on instruction by the Departmental Head, each learner must do an Integrated Construction project. Year-end evaluation is handled and applied in an integrated manner.	MAIN	The student will be able to: - Apply the necessary skills of organising, quantifying, documenting; and - Draw up final accounts.
DCPR	3704	Descriptive Construction Project	During the year, on instruction by the Departmental Head, each learner must do an Integrated Construction project. Year-end evaluation is handled and applied in an integrated manner.	MAIN	The student will be able to: - apply the necessary skills of organising, quantifying, documentation; and - draw up final accounts
DQFD	1504	Descriptive Quantification	Descriptive quantification: Introduction to descriptive quantification; style, explanation, reference and arrangement. Dissecting of small, medium and complex building structures in terms of sections, subsections, elements and components, specification and quantification thereof, processing and compiling of lists.	MAIN	Student will be able to: - Outline the basic principles of construction as well as the purpose of documentation procedures and methods of tender/contract procurement; - Compose and construct projects through dissecting, specification, quantification and composition; - Process items in terms of the element- and component level and item-defining with regard to small-, medium- and complex constructions; and Execute all mentioned functions.
DQFD	2604	Descriptive Quantification	Dissecting, specification, quantification and composition of process items in terms of trade item definition with regard to foundation work, lower structures, wall constructions, roof constructions and finishes, finishes, windows, doors. Working up of quantities, abstracting in trades, compiling of draft trade lists of integrated examples.	MAIN	Student will be able to: - Describe why a quantity surveyor should execute his work in a systematic and meticulous manner and cultivate specific behavioural patterns that are characteristic of a professional quantity surveyor/construction manager; and - Outline and apply the dissecting, specification and quantification of process items in terms of trade item definition in respect of simple- and complex constructions and be able to basically execute the function.
DQFD	3704	Descriptive Quantification	Dissecting, specification and quantification of process items in terms of trade item definition with regard to: foundation work on sloping sites; concrete floor slabs; complex masonry constructions, such as haunches, fins, arches, domes, special bonding, etc. and structures; long-span roofs, patent roof trusses, steel structures, special patents and non-patent fittings; sanitary fittings and complex pipe systems; etc. Processing of quantities, abstracting in trades, draft lists and integrated examples.	MAIN	The student will be able to: - apply the necessary skills in dissecting, specification and quantification of process items and have considerably broadened their understanding and approach towards the quantity surveyor; - exhibit clear behavioural patterns that are characteristic of the professional quantity surveyor; and - use a critical approach to the quality of information required for working drawings.
DQFR	3704	Descriptive Quantification	Dissecting, specification and quantification of process items in terms of trade item definition with regard to: foundation work on sloping sites; concrete floor slabs; complex masonry constructions, such as haunches, fins, arches, domes, special bonding, etc. and structures; long-span roofs, patent roof trusses, steel structures, special patents and non-patent fittings; sanitary fittings and complex pipe systems; etc. Processing of quantities, abstracting in trades, draft lists and integrated examples.	MAIN	The student will be able to: -Use the necessary skills in dissecting, specification and quantification of process items and have considerably broadened their understanding and approach towards the quantity surveyor; and -Apply behavioural patterns that are characteristic of the professional quantity surveyor and demonstrate a critical approach to the quality of information required for working drawings.
DQSD	3704	Descriptive Quantification Project	During the year, on instruction by the Departmental Head, each learner must do an Integrated Quantity Surveying project. Year-end evaluation is handled and applied in an integrated manner	MAIN	The student will be able to: - Use the necessary skills of organising, quantifying, documentation and pricing of bills of quantities for buildings; and - Draw up final accounts.
EGSD	1504	Engineering Science	Part 1 Historical review and perspective of structures: The creation of engineering solutions such as dams, bridges, canals, silos, railway lines, roads and buildings from the earliest historical times till the 21st century, to fulfill the necessities of man in his/her natural environment. Part 2The explanation of basic structural principles as applied in the solving of complex structural problems with respect to historical cases. The use of services in buildings and other structures e.g. electricity, air, conditioners and personal goods and movement with regard to historical cases.	MAIN	Student will be able to: -Recall information and speak with insight to engineers based on his/her developed perspective of historical engineering

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
EGSR	1504	Engineering Science	Part 1 Historical review and perspective of structures: The creation of engineering solutions such as dams, bridges, canals, silos, railway lines, roads and buildings from the earliest historical times till the 21st century, to fulfill the necessities of man in his/her natural environment. Part 2The explanation of basic structural principles as applied in the solving of complex structural problems with respect to historical cases. The use of services in buildings and other structures e.g. electricity, air, conditioners and personal goods and movement with regard to historical cases.	MAIN	Student will be able to: Discuss with insight his/her developed perspective of historical engineering.
PDED	1504	Property development economics	Defining property, fixed property, land, land-ownership, development and the development process. The science of property development economics. The property market, composition, functioning and occupational orientation. Property development management, career opportunities, subject view and curriculum planning, study and learning methods.	MAIN	Student will be able to: - Outline the basic principles and functions of management and project management; - Apply the basic theory of property development; - Explain property as an investment alternative; - Discuss development course and role of property in previous/historical years; and - Describe the role of property for the economy.
PDED	2604	Property Development Economics	Synopsis of property, the process of property development, land ownership and administration. Introduction to the theory of settlement, theory and development, government control of the development process; land ownership and administration, regional and community development. Urban morphology. Property values, the value concept, theory of emblements, property production and the economic cycle.	MAIN	Student will be able to: - discuss the importance of property in the local and national economy; - outline the place and role of local development in the national economy; - discuss property value, return, price, investment, production, financing and functioning; - outline and apply the role of property law in the property industry; and - discuss the influence of time and planning of time on property production and returns.
PDED	3704	Property Development Economics	Introduction to the theory of investment. Financial mathematics, techniques for measuring investment return and applications. Capital, income, expenditure and the composition of simple and complex financial feasibility studies. The concept market value, types of valuations and valuation techniques	MAIN	The student will be able to: - evaluate investments of several alternatives and exercise a viable selection - apply financial property-mathematics as well as be able to compare this with alternatives.
PDER	1504	Property Development Economics	Defining property, fixed property, land, land-ownership, development and the development process. The science of property development economics. The property market, composition, functioning and occupational orientation. Property development management, career opportunities, subject view and curriculum planning, study and learning methods.	MAIN	Student will be able to: - Outline the basic principles and functions of management and project management; - Apply the basic theory of property development; - Explain property as an investment alternative; - Discuss development course and role of property in previous/historical years; and - Describe the role of property for the economy
PDER	3704	Property Development Economics	Introduction to the theory of investment. Financial mathematics, techniques for measuring investment return and applications. Capital, income, expenditure and the composition of simple and complex financial feasibility studies. The concept market value, types of valuations and valuation techniques	MAIN	The student will be able to: - Evaluate investments of several alternatives and exercise a viable selection; and - Have basic knowledge of financial property-mathematics as well as be able to apply this in comparison with alternatives.
PQMD	1504	Production and Operational Management	Introduction to the building and construction industry, structure, functioning, services, interest. Orientation within the real estate industry. Professional consultants, contractor and investor. Professional orientation and inter-professional liaison. Introduction to documentation procurement: types, purpose, compilation and methodology. Introduction to financial service. Introduction to construction management.	MAIN	Student will be able to: - Outline the basic principles of construction as well as the purpose of documentation procedures and methods of tender/contract procurement; - Compose and construct projects through specification, quantification and composition; - Process items in terms of the element- and component level and item-defining with regard to small-, medium- and complex constructions; and - Execute all mentioned functions.
PQMD	2604	Production and Operational Management	Dissecting, specification and quantification and composition of process items in terms of trade item definition. Working up of quantities, abstracting in trades, compiling of draft trade lists of integrated examples	MAIN	Student will be able to: - Provide the underlying reasons why a construction manager should execute his work in a systematic and meticulous manner and cultivate specific behavioural patterns that are characteristic of a professional construction manager; and - Explain the dissecting, specification and quantification of process items in terms of trade item definition in respect of simple- and complex constructions and be able to basically execute the function.
PQMD	3704	Production and Operational Management	Introduction to construction management. Site management and organisation. Manpower application on the building site. Application of material. Span of builders quantities.	MAIN	Student will be able to: - Manage and organise a building project on site in respect of labour; material, safety and security and control; and organise the use of equipment.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PQMR	1504	Production and Operational Management	Introduction to the building and construction industry, structure, functioning, services, interest. Orientation within the real estate industry. Professional consultants, contractor and investor. Professional orientation and inter-professional liaison. Introduction to documentation procurement: types, purpose, compilation and methodology. Introduction to financial service. Introduction to construction management.	MAIN	Student will be able to: - Outline the basic principles of construction as well as the purpose of documentation procedures and methods of tender/contract procurement; - Compose and construct projects through specification, quantification and composition; - Process items in terms of the element- and component level and item-defining with regard to small-, medium- and complex constructions; and - Execute all mentioned functions.
PQMR	2604	Production and Operational Management	Dissecting, specification and quantification and composition of process items in terms of trade item definition. Working up of quantities, abstracting in trades, compiling of draft trade lists of integrated examples	MAIN	Student will be able to: -Explain the underlying reasons why a construction manager should execute his work in a systematic and meticulous manner and cultivate specific behavioural patterns that are characteristic of a professional construction manager; and - Discuss the dissecting, specification and quantification of process items in terms of trade item definition in respect of simple- and complex constructions and be able to basically execute the function.
PQMR	3704	Production and Operational Management	Introduction to construction management. Site management and organisation. Manpower application on the building site. Application of material. Span of builders quantities	MAIN	Student will be able to: - Manage and organise a building project on site in respect of; labour; material; safety and security and control; and organise the use of equipment.
SURV	2622	Land Surveying	Mapping procedures and map series: international, national, regions and local areas. Trigonometry beacons and references. Planimetry and principles; measuring-tape measurements, levelling, plumb levels and contours. Stresses, tensions, shearing forces, bending moments, centres of gravity, moments of inertia and resistance. Frameworks.	MAIN	Student will be able to: - Do basic site measurements and survey levels; - Set out buildings for construction work; - Take levels on site and reduce levels; - Calculate areas base on first principles and coordinates; and - Calculate joints and polars.
Postgraduate					
AINC	7901	Advanced Construction- and Agricultural Engineering	Project procurement and development in civil, mechanical, electrical and agricultural projects. Cost planning and financing. Documentation and advanced cost contracts and project management.	MAIN	The student will be able to: - Interpret the management and procurement of engineering contracts; and - Produce the cost planning, documentation and finance of engineering projects
ANDC	7902	Advanced Property Development	Property development economics, financing, marketing and physical development of projects. Project selection, viability and feasibility studies. Advanced property development calculations, arithmetic and financial mathematics.	MAIN	The student will be able to: - Execute and document financial feasibility of projects and apply an informative decision; - Interpret the property development process and theoretically implement the process through all its faces; and - Distinguish between the different commercial property development possibilities and the difference commercial and non-commercial developments.
APMD	6803	Advanced Project Management	Project management functions and principles. Management of time, time scheduling and programming, time management techniques and time controlling systems. Management of project costs cost report rendering and cost planning and control. The representation of quality norms, quality management, communication and communication techniques in respect of advanced project management.	MAIN	Student will be able to: - interpret and be able to implement project management theory from inspection to completion of the project - interpret and co-ordinate the role of different functions in a project development - interpret and understand the management functions in respect of successful project outcomes - do risk analysis for a project proposal and especially in respect of dimension, time , price, return, resources, relative quality, construction techniques and procurement methods implement project manager practical limits
APMR	6803	Advanced Project Management	Project management functions and principles. Management of time, time scheduling and programming, time management techniques and time controlling systems. Management of project costs cost report rendering and cost planning and control. The representation of quality norms, quality management, communication and communication techniques in respect of advanced project management.	MAIN	Student will be able to: -Interpret and be able to implement project management theory from inspection to completion of the project -Interpret and co-ordinate the role of different functions in a project development -Interpret and understand the management functions in respect of successful project outcomes -Do risk analysis for a project proposal and especially in respect of dimension, time , price, return, resources, relative quality, construction techniques and procurement methods -Implement project manager practical limits

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BCFD	6822	Construction Finance	Cost control systems, general and specific cost control, standard cost and control systems. Preparation of income claims, contract price adjustment clauses, certification and income control statements. Cost statements and project costs, income and cost reconciliation, cost and cash budgets and control. Capital budgeting, earned value management, investment decision-making in construction companies and discounted cash flow modules.	MAIN	Student will be able to: -Discuss the basic function of annual reports, balance sheets, income statements and cash flow statements and how they relate to construction companies. -Discuss a construction project`s finances relate to the financial statements. -Compile valuations of construction work from a Bill of Quantities. -Compile basic statements of comprehensive income, cash flow and balance sheets from bill of quantities` valuations. -Produce an allowable cost budget after award of a construction project. -Produce day-to-day costing and monitoring of the budget -Describe how projects can be assessed within a construction company using simple payback, NPV and IRR calculations. -Discuss and apply the concepts of Earned Value Management and other cost control techniques used in the industry. -Monitor and control the actual cost against the budget during the execution phase of a construction project. -Use capital budgeting and discuss the role it plays in the strategic positioning of a company for future business -Evaluate capital expenditure by using the discounted cash flow model. -Select the best spending option between mutually exclusive projects. -Calculate the net project cash flows on a project or within a company
BCFR	6822	Construction Finance	Cost control systems, general and specific cost control, standard cost and control systems. Preparation of income claims, contract price adjustment clauses, certification and income control statements. Cost statements and project costs, income and cost reconciliation, cost and cash budgets and control. Capital budgeting, earned value management, investment decision-making in construction companies and discounted cash flow modules.	MAIN	Student will be able to: -Discuss the basic function of annual reports, balance sheets, income statements and cash flow statements and how they relate to construction companies. -Discuss a construction project`s finances relate to the financial statements. -Compile valuations of construction work from a Bill of Quantities. -Compile basic statements of comprehensive income, cash flow and balance sheets from bill of quantities` valuations. -Produce an allowable cost budget after award of a construction project. -Produce day-to-day costing and monitoring of the budget -Describe how projects can be assessed within a construction company using simple payback, NPV and IRR calculations. -Discuss and apply the concepts of Earned Value Management and other cost control techniques used in the industry. -Monitor and control the actual cost against the budget during the execution phase of a construction project. -Use capital budgeting and discuss the role it plays in the strategic positioning of a company for future business -Evaluate capital expenditure by using the discounted cash flow model. -Select the best spending option between mutually exclusive projects. -Calculate the net project cash flows on a project or within a company
BIPD	6804	Integrated Project Quantity Surveying and Construction Management	A development proposal (year assignment) consisting of the following aspects: Site identification and analysis, drawings of the proposed project, estimate of the proposed project, health and safety specification/plan, bill of quantities/builders quantities, construction- and development programmes, viability s tudy, cost reports, methods study and contractual documentation.	MAIN	Student will be able to: - use skills in the full spectrum of Quantity Surveying/Construction management -act at a professional level in his/her understanding and approach to the full spectrum of property development
BIPR	6804	Integrated Project Quantity Surveying and Construction Management	A development proposal (year assignment) consisting of the following aspects: Site identification and analysis, drawings of the proposed project, estimate of the proposed project, health and safety specification/plan, bill of quantities/builders quantities, construction- and development programmes, viability study, cost reports, methods study and contractual documentation.	MAIN	Student will be able to: - Master advanced skills in the full spectrum of Quantity Surveying/Construction management -Achieve a definite professional level in his/her understanding and approach to the full spectrum of property development
BOEC	7902	Building Economics for MProp	Building and construction economics, cost design and cost planning of physical developmental projects. Estimating techniques and quantification of elements of structures and projects.	MAIN	The student will be able to: - Implement advanced cost estimates and cost controls; - Execute design economy and cost behaviour of building elements; and - Interpret normative planning.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BPCD	6822	Professional Practice	The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice including professional ethics.	MAIN	Student will be able to: -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; -Outline the practice of a professional firm; -Be attuned to professionalism, personal conduct and the principles of good practise and ethics; -Understand the principles and role of communication in the industry; -Participate in strategic planning an be able to implement strategies; -Understand and be able to demonstrate ethical behaviour; and -Realise the importance and understand risk management with in the professional practise.
BPCR	6822	Professional Practice	The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice including professional ethics.	MAIN	Student will be able to: -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; -Outline the practice of a professional firm; -Be attuned to professionalism, personal conduct and the principles of good practise and ethics; -Understand the principles and role of communication in the industry; -Participate in strategic planning an be able to implement strategies; -Understand and be able to demonstrate ethical behaviour; and -Realise the importance and understand risk management with in the professional practise.
BPDD	6812	Property Development IV	Scope of development economics. Purpose, types methodology and application of viability studies. Planning studies, stages and procedures. Risk identification, calculation and management. Negotiation as an integral part of property development. Development characteristics, procedures, and techniques. The role of external factors on viability studies.	MAIN	Student will be able to: -calculate and document the financial viability of projects and make an informed decision based on the assessment; -discuss the property development process; and -differentiate between the different commercial property prospects and the difference between commercial and non-commercial development possibilities -show an understanding of the economical and political influences on viability studies; -understand the importance of negotiation - explain the importance of risk identification, quantification and management of property development; and -application of ethical and professional principals.
BPDR	6812	Property Development IV	Scope of development economics. Purpose, types methodology and application of viability studies. Planning studies, stages and procedures. Risk identification, calculation and management. Negotiation as an integral part of property development. Development characteristics, procedures, and techniques. The role of external factors on viability studies.	MAIN	Student will be able to: -calculate and document the financial viability of projects and make an informed decision based on the assessment; -discuss the property development process; -differentiate between the different commercial property prospects and the difference between commercial and non-commercial development possibilities; -show an understanding of the economical and political influences on viability studies; -discuss the importance of negotiation; -explain the importance of risk identification, quantification and management of property development; and -application of ethical and professional principals.
BPKR	7914	Professional Practice	Introduction to law of procedure; law of criminal procedure, civil procedure and law of evidence. Mediation and arbitration, alternative procedures for settling disputes. The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice. Communication theory and principles.	MAIN	Student will be able to: -Examine and apply the role of procedural law in the building industry -Advise clients on the procedures in respect of disputes and differences -Discuss and apply the process of mediation -Contribute to the successful administration and management of a firm -Keep record of, collect data and administrate a professional office -Examine the practice of a professional firm -Discuss the principle of joint-ownership -Apply time-planning; and -Handle the schedule from a professionals point of view

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BPMD	6804	Project Management	Project management functions and principles. Management of time, time scheduling and programming, time management techniques and time controlling systems. Management of project costs, cost report rendering and cost planning and control. Auditing of cost results. The representation of quality norms, quality management, communication and communication techniques in respect of project management and project administration. Human resources, procurement, risk, health and safety, claims management, environmental management, stakeholder management, financial management and integration of all project areas form part of the programme.	MAIN	Student will be able to: -Interpret and be able to implement project management theory from inspection to completion of the project -Interpret and co-ordinate the role of different functions in a project development -Interpret and understand the management functions in respect of successful project outcomes -Do analysis for a project proposal and especially in respect of dimension, time, scope, price/cost, return, resources, risk, quality and procurement -Manage the CMBOK and PMBOK areas during project execution -Co-ordinate construction projects and manage a project as project manager
BPMR	6804	Project Management	Project management functions and principles. Management of time, time scheduling and programming, time management techniques and time controlling systems. Management of project costs, cost report rendering and cost planning and control. Auditing of cost results. The representation of quality norms, quality management, communication and communication techniques in respect of project management and project administration. Human resources, procurement, risk, health and safety, claims management, environmental management, stakeholder management, financial management and integration of all project areas form part of the programme.	MAIN	Student will be able to: -Interpret and be able to implement project management theory from inspection to completion of the project -Interpret and co-ordinate the role of different functions in a project development -Interpret and understand the management functions in respect of successful project outcomes -Do analysis for a project proposal and especially in respect of dimension, time, scope, price/cost, return, resources, risk, quality and procurement -Manage the CMBOK and PMBOK areas during project execution -Co-ordinate construction projects and manage a project as project manager
BPPD	6812	Professional Practice IV	Introduction to law of procedure; law of criminal procedure, civil procedure and law of evidence. Mediation and arbitration, alternative procedures for settling disputes.	MAIN	Student will be able to: -Discuss the role of procedural law in the building industry; -Advise clients on the procedures in respect of disputes and differences; -Outline the process of mediation; -Realise the importance of arbitration, mediation, conciliation and adjudication regarding building contracts; and -Develop a working knowledge of law processes and the role of different courts.
BPPR	6812	Professional Practice	Introduction to law of procedure; law of criminal procedure, civil procedure and law of evidence. Mediation and arbitration, alternative procedures for settling disputes.	MAIN	Student will be able to: -Discuss the role of procedural law in the building industry; -Advise clients on the procedures in respect of disputes and differences; -Outline the process of mediation; -Realise the importance of arbitration, mediation, conciliation and adjudication regarding building contracts; and -Develop a working knowledge of law processes and the role of different courts.
BPQD	6822	Professional Practice	The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice including professional ethics.	MAIN	Student will be able to: -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; -Outline the practice of a professional firm; -Be attuned to professionalism, personal conduct and the principles of good practise and ethics; -Understand the principles and role of communication in the industry; -Participate in strategic planning an be able to implement strategies; -Understand and be able to demonstrate ethical behaviour; and -Realise the importance and understand risk management with in the professional practise.
BPQR	6822	Professional Practice	The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice including professional ethics.	MAIN	Student will be able to: -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; -Outline the practice of a professional firm; -Be attuned to professionalism, personal conduct and the principles of good practise and ethics; -Understand the principles and role of communication in the industry; -Participate in strategic planning an be able to implement strategies; -Understand and be able to demonstrate ethical behaviour; and -Realise the importance and understand risk management with in the professional practise.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CCPC	7901	Property Law	Property investment, acquisition and establishment of property rights, ownership, tenure, possession, expropriation, insolvencies and contracts. The law of property valuation, case studies on the role of the property valuers.	MAIN	The student will be able to: - Interpret the various types of property, its rights and limitations; and - Exemplify the factors and laws influencing the valuation of property
CFND	6804	Construction Finance	Cost control systems, general and specific cost control, standard cost and control systems. Preparation of income claims, contract price adjustment clauses, certification and income control statements. Cost statements and project costs, income and cost reconciliation, cost and cash budgets and control.	MAIN	Student will be able to: - implement a suitable cost planning and control system on a construction site; and - handle the financial administration of a project during the construction phase and manage cash flow.
CFNR	6804	Construction Finance	Cost control systems, general and specific cost control, standard cost and control systems. Preparation of income claims, contract price adjustment clauses, certification and income control statements. Cost statements and project costs, income and cost reconciliation, cost and cash budgets and control.	MAIN	Student will be able to: - Implement a suitable cost planning and control system on a construction site; and - Handle the financial administration of a project during the construction phase and manage cash flow
CINC	7901	Construction and Agricultural Engineering	Advanced conceptual development i.r.o. the roles, design, construction methods, management and procurement of civil, structural, mechanical and electrical services i.r.o. building projects and agricultural services.	MAIN	The student will be able to: - Interpret the importance of timely design of engineering services and be able to analyse the necessary steps for the timeous design of services; and - Compare and implement the engineering services necessary for a project
COED	6804	Building Economics	Cost studies of building morphology. Building cost analysis and the cost-spread between building elements and components. Normative planning and implementation of the principles of economical design. Life cycle cost and building cost, the execution of comparing cost studies of design alternatives through life cycle cost analysis. The analysis, planning, management and monetary value of risk.	MAIN	Student will be able to: - Examine the purpose and implement normative planning and be able to use this to create an economical designs; and - Apply and discuss the necessity of life cycle cost analysis (whole life appraisal) and apply this to improve the objectivity in the decision making process.
COER	6804	Building Economics	- Cost studies of building morphology. Building cost analysis and the cost-spread between building elements and components. Normative planning and implementation of the principles of economical design. Life cycle cost and building cost, the execution of comparing cost studies of design alternatives through life cycle cost analysis. The analysis, planning, management and monetary value of risk.	MAIN	Student will be able to: - Examine the purpose and implement normative planning and be able to use this to create an economical designs; and - Apply and discuss the necessity of life cycle cost analysis (whole life appraisal) and apply this to improve the objectivity in the decision making process
COMD	6804	Construction Management	Nature, structure and role of construction, construction industry development. External organisational environment. Construction products. Leadership and management of theories, functions, practices and organisational structures. Staff management. Contemporary and global trends in construction.	MAIN	The student should be able to: -Formulate policies and strategies for a construction project; - Manage organisational culture and change; - Design organisational structures; and - Develop business objectives and strategies for a construction firm.
COMR	6804	Construction Management	Nature, structure and role of construction, construction industry development. External organisational environment. Construction products. Leadership and management of theories, functions, practices and organisational structures. Staff management. Contemporary and global trends in construction.	MAIN	The student should be able to: -Formulate policies and strategies for a construction project; - Manage organisational culture and change; - Design organisational structures; and - Develop business objectives and strategies for a construction firm.
CPOD	6804	Production and Operational Management IV	Production and operational management in construction. Construction management as a profession. Performance objectives of operations. Operation strategies. Planning and control in construction firms. Project procurement and bid strategies. Construction productivity and quality management. Planning and managing labour. Plant, equipment and transport management. New trends in construction industry. Tutorial and practicals.	MAIN	Student will be able to: -Manage a construction firm in respect of production and operations -Apply the forms of business in the building and construction industry strategically -Handle the purchase and administration of labour, material and equipment -To be able to act as a Construction Manger in the building industry
CPOR	6804	Production and Operational Management	Production and operational management in construction. Construction management as a profession. Performance objectives of operations. Operation strategies. Planning and control in construction firms. Project procurement and bid strategies. Construction productivity and quality management. Planning and managing labour. Plant, equipment and transport management. New trends in construction industry. Tutorial and practicals.	MAIN	Student will be able to: -Manage a construction firm in respect of production and operations -Apply the forms of business in the building and construction industry strategically -Handle the purchase and administration of labour, material and equipment -To be able to act as a Construction Manger in the building industry

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CRPD	6808	Construction Management Research Report	To introduce students to the research process with a view to equipping them with the knowledge and skills to identify and investigate built environment problems through systematic approaches and document both the process and outcomes under the guidance of a study leader.	MAIN	Student will be able to: -select a research topic -define the research problem -formulate a hypothesis / research question -develop a research proposal -appraise the literature and use the Harvard referencing method and write a literature review -design and justify an appropriate research methodology to address the problem -conduct an empirical study -analysis and interpret empirical data -draw up conclusions and make recommendations -compile a research project report (treatise) -produce a summary paper of the study (article) Independently implementing research and investigate problems with the aim of solving them; -Compose a research report, make findings known and suggest recommendation; -Administer and manage a data base; and -Use different facilities in a professional manner for effective communication purposes.
CRPR	6808	Construction Management Research Report	To introduce students to the research process with a view to equipping them with the knowledge and skills to identify and investigate built environment problems through systematic approaches and document both the process and outcomes under the guidance of a study leader.	MAIN	Student will be able to: -select a research topic -define the research problem -formulate a hypothesis / research question -develop a research proposal -appraise the literature and use the Harvard referencing method and write a literature review -design and justify an appropriate research methodology to address the problem -conduct an empirical study -analysis and interpret empirical data -draw up conclusions and make recommendations -compile a research project report (treatise) -produce a summary paper of the study (article) Independently implementing research and investigate problems with the aim of solving them; -Compose a research report, make findings known and suggest recommendation; -Administer and manage a data base; and -Use different facilities in a professional manner for effective communication purposes.
CSCD	6803	Construction Science	General principles of construction and design procedures, applied material science and drawings of heavy engineering construction and procedures. Civil: Road, bridges, railway lines, dams, harbour walls, tunnel and shaft construction, sewage and water plants, construction works at mines. Mechanical: Pipe ‘plants, shaft work and supporting structures, installation for handling materials.	MAIN	Student will be able to: -Compile the necessary contract documents for engineering projects and evaluate engineering contract costs in all the engineering disciplines; -Analyse large engineering projects in terms of elements in order to compose a cost estimate for large projects; and -Manage the administrative processes of an engineering project.
CSCR	6803	Construction Science	General principles of construction and design procedures, applied material science and drawings of heavy engineering construction and procedures. Civil: Road, bridges, railway lines, dams, harbour walls, tunnel and shaft construction, sewage and water plants, construction works at mines. Mechanical: Pipe plants, shaft work and supporting structures, installation for handling materials	MAIN	Student will be able to: -Compile the necessary contract documents for engineering projects and evaluate engineering contract costs in all the engineering disciplines; -Analyse large engineering projects in terms of elements in order to compose a cost estimate for large projects; and -Manage the administrative processes of an engineering project.
CTID	6822	Construction Technology and Innovation	Advanced materials and systems Computers in building construction and management	MAIN	The student should be able to: - Develop innovative and cutting edge building materials and systems - Examine the increasing role of information technology in construction and managing buildings
CTIR	6822	Construction Technology and Innovation	Advanced materials and systems Computers in building construction and management	MAIN	The student should be able to: - Develop innovative and cutting edge building materials and systems - Examine the increasing role of information technology in construction and managing buildings

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
DPRP	7902	Dispute Resolution	Clauses that handle breach of contract and are aimed at dispute resolution as object. Different dispute-settlement methods, courts, arbitration, mediation, peace-making, communication and management of disputes.	MAIN	The student will be able to: - Executing as arbitrator, mediator and dispute administrator and revolutionists; - Implementing and interpreting clauses that address disputes; and - Advising institutions locked in contract disputes.
DQFD	6804	Descriptive Quantification	Dissect, specify and quantify complex items in terms of trade item definition regarding alterations, piling, ground anchoring, special foundation constructions, false ground floor constructions of wood and concrete, complex basement constructions, underpinning and shoring, compound long-span structures of in situ concrete.	MAIN	Student will be able to: - Independently implement research and investigate problems with the aim of solving them; - Compose a research report, make findings known and suggest recommendation; - Administer and manage a data base; and - Use different facilities in a professional manner for effective communication purposes.
DQFR	8900	Quantity Surveying Dissertation	This module contains fundamental knowledge, theories, principles and practices of Quantity Surveying, including: Research project in specialized field of Quantity Surveying as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	1. Incorporate, through research, a systematic understanding of in-depth knowledge and a critical awareness of current problems and new insights, informed by and at the forefront of Quantity Surveying research and its related area of professional practice. 2. Integrate originality in the application and command of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret new knowledge in the discipline. 3. Develop a conceptual understanding that enables the student to critically evaluate current research and advanced scholarship in the field of Quantity Surveying, to evaluate methodologies and develop critiques of them and, where appropriate, to propose new hypotheses. 4. Demonstrate an advanced scholarship in the field of Quantity Surveying . 5. Develop an ability to use a wide range of specialised skills in identifying, conceptualising, designing and implementing methods of enquiry to address complex and challenging problems within the area of Quantity Surveying . 6. Utilise the resources of academic and professional discourses to communicate and defend substantial ideas that are the products of research.
DQFR	9100	Quantity Surveying Thesis	This module contains fundamental knowledge, theories, principles and practices of Quantity Surveying, including: Research project in specialized field of Quantity Surveying as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ENDC	7902	Property Development	Advanced property development economics. The theory of property development, property development as science, property value, property valuation as element of property development and selection the property development process. The theory of property valuation, property law and property economics.	MAIN	The student will be able to: - Interpret and organise the theory of property development; - Exemplify and compare the property valuation theory and practice; and - Classifying the property valuation process and the influence of property economics.
ENDR	7900	Research Essay : Property Development	An integrate research study, including an article of the student choice focusing on the area of specialisation (project management or valuation)	MAIN	The student will be able to: - Generate independent research and investigate problems with the aim to solve them; - Implement the correct way of reference; - Implement the correct way of drawing up a bibliography; - Generate statistical data to be able to draw tables and diagrams; - Explain what research is and the identification of a research topic; - Examine the planning of the research, qualitative and quantitative methodologies; - Generate and the compilation of questionnaires; - Classify and Implement sampling methods; - Justify and evaluate a research problem and to plan, to address and to execute it; and - Produce a research report, make findings and suggest recommendations.
ENWV	7904	Property Valuation and Management	Understand highest and best use, expropriation and the expropriation process, servitudes and their function and role, municipal property rates act and the role of the valuer, commercial valuations, lease agreements, income and expenditure, capitalization rate, DCF and the function thereof, residual value, farm valuations, methodology and factors influencing value of farmland and specialized properties.	MAIN	The student will be able to: - Interpret and be able to conduct commercial valuation; - Interpret and be able to conduct farm valuation; - Summarise and apply laws and regulations in property valuation; and - Interpret and implement all factors having an influence on property valuations.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
INDR	7902	Introduction to Research	Principles and theories, Understanding research, nature and purpose of research, types of research, research process, Formulating the research problem, identifying a topic, formulating the problem statement, research questions, hypotheses, objectives, Reviewing the literature, using Harvard referencing, developing a conceptual framework, Research design/plan, different research paradigms and associated methodologies, data collection and analysis methods including ethical considerations and Writing the proposal and presenting it.	MAIN	The student will be able to: - Demonstrate ability to select a relevant research topic and identify a research problem; - Formulate clear research question(s), hypothesis, objectives and relevance of the study; - Design and write critical literature reviews; - Design an appropriate research plan/design and methodology; - Design a conceptual or theoretical framework to underpin the study; and - Design a research proposal as the basis for undertaking the mini-dissertation.
INPD	6803	Integrated Project	An integrated project should be done during the year by the learner on the instruction of the Departmental Head. End of the year evaluation is handled on a integrated manner.	MAIN	Student will be able to: -Apply skills from the full spectrum of Quantity Surveying/Construction Management; and -Use a professional approach to the full spectrum of Quantity Surveying/Construction Management
INPR	6803	Integrated Project	An integrated project should be done during the year by the learner on the instruction of the Departmental Head. End of the year evaluation is handled on a integrated manner.	MAIN	Student will be able to: -Implement advanced skills in the full spectrum of Quantity Surveying/Construction Management -Manage a professional approach to the full spectrum of Quantity Surveying/Construction Management
IPMP	7904	Integrated Project	Urban and spatial planning evaluation including site identification and analysis, Concept proposal and development including drawings, Cost estimation and cost planning, Compilation and evaluation of contract documentation, Development programmes including critical path analysis, Feasibility and viability study including life cycle cost analysis, Environmental and sustainability report, Implementation of all project management areas in accordance with PM Bok and CM Bok for strategic goal achievement and a Power Point presentation	MAIN	- Mastered advanced skills in the full spectrum of project management - Achieved a definite professional level in his or her understanding and approach to the full spectrum of project management
LSFP	7902	Life Cycle Cost , Facility Evaluation and Management	The theory of life cycle costing. Calculation in respect of life cycle costing, evaluation and analysis of cost- and price determinants. The management of the effect of operating cost and financing cost on the life cycle of a property project. Facility evaluation, planning, management and control in respect of all property facilities. The influence of maintenance, labour, material and resources.	MAIN	The student will be able to: - Interpreting and execute maintenance inspection reports and comparing maintenance programs for different buildings; and - Be able to implement life-cycle cost analyses as a tool for effective design and maintenance planning.
MCID	6808	Management of Information and Communication Systems	Field of research, role and place of research, types of research, research methodology, sources and reports. Information, data and data communication. Theory and principles of communication.	MAIN	Student will be able to: - implement research and investigate problems with the aim of solving them; - compose a research report, make findings known and suggest recommendation; - administer and manage a data base; and - use different facilities in a professional manner for effective communication purposes.
PDED	6802	Property Development Economics	Scope of development economics. Purpose, types methodology and application of viability studies. Planning studies, stages and procedures with regard to project planning. Scope, organisation functions and techniques of project management. Development characteristics, procedures, techniques and risks. Development economic perspective.	MAIN	Student will be able to: -Calculate and document the financial viability of projects and make an informed decision based on the assessment; -Discuss the property development process -Differentiate between the different commercial property prospects and the difference between commercial and non-commercial development possibilities.
PFMD	6804	Property Facilities Management	Financial previews and budgets. Leases, lessee composition, valuations and market evaluation. Re-developments, capital application and trusts, risks, valuations and trusts, risks, valuations and evaluation.	MAIN	Student will be able to: -interpret facilities management in respect of scope, function , techniques and procedures; -develop and control financial budgets; -interpret lease contracts, tenants and rental mix, valuations and market valuation; and -interpret redevelopments and capital utilisation.
PFMR	6804	Property Facilities Management	Financial previews and budgets. Leases, lessee composition, valuations and market evaluation. Re-developments, capital application and trusts, risks, valuations and trusts, risks, valuations and evaluation.	MAIN	Student will be able to: -interpret facilities management in respect of scope, function , techniques and procedures; -develop and control financial budgets; -interpret lease contracts, tenants and rental mix, valuations and market valuation; and -interpret redevelopments and capital utilisation.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PPRD	6802	Professional Practice	Introduction to law of procedure; law of criminal procedure, civil procedure and law of evidence. Mediation and arbitration, alternative procedures for settling disputes. The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice.	MAIN	Student will be able to: -Discuss the role of procedural law in the building industry; -Advise clients on the procedures in respect of disputes and differences; -Outline the process of mediation; -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; - Outline the practice of a professional firm; -Outline the principle of joint-ownership; and - Apply time-planning and handle the schedule from a professional's point of view
PPRR	6802	Professional Practice	Introduction to law of procedure; law of criminal procedure, civil procedure and law of evidence. Mediation and arbitration, alternative procedures for settling disputes. The standard building contract and tender documentation, integration of different documents and relationships, special documents and clauses. The organisation of the practice. Extent of office administration and functions in practice	MAIN	Student will be able to: -Discuss the role of procedural law in the building industry; -Advise clients on the procedures in respect of disputes and differences; -Outline the process of mediation; -Contribute to the successful administration and management of a firm keep record of, collect data and administrate a professional office; - Outline the practice of a professional firm; -Outline the principle of joint-ownership; and - Apply time-planning and handle the schedule from a professional's point of view
PPYC	7901	Professional Practice	Professional service as a business. Law and regulations that affect the profession. Ethics and codes of conduct, communication between professionals, the client and the society. Advanced project procurement methods and procurement management. Alternative procedures and processes in respect of contract documentation. The qualification, compilation and management of documentation. Different contract forms. Construction contract analysis.	MAIN	The student will be able to: - Execute professionally and interpret the role of professional practice in society; - Exemplify practice forms; - Design a proposal to clients on the most acceptable method of procurement; - Co-ordinate a complete contract procurement process and procedure; - Analyse and interpret advanced construction contracts; - Exemplify the role of professional acts and constitutions; and - Implementing with inter-professional and institutional communication and participate in respect of professional interaction
PQMD	6804	Production and Operational Management	Organisation of the construction industry, employer organisation, restrictive and stimulating practices organisation of the construction enterprise. Project selection and market evaluation. Purchase and control of material and equipment. Personnel management and administration within a contractors enterprise.	MAIN	Student will be able to: -manage a construction firm in respect of production and operations -apply the forms of business in the building and construction industry -handle the purchase and administration of labour, material and equipment
PQMR	8900	Construction Management Dissertation	This module contains fundamental knowledge, theories, principles and practices of Construction Management, including: Research project in specialized field of Construction Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PQMR	9100	Construction Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Construction Management, including: Research project in specialized field of Construction Management as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: Identify the problem; Formulate a hypothesis; Do independent planning and then conduct the experiments; Analyse and interpret the results; Discuss the results comprehensively; Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
PROP	8900	Property Sciences Dissetation	This module contains fundamental knowledge, theories, principles and practices of Property Sciences, including: Research project in specialized field of Property Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PROP	9100	Property development Thesis	Land and Property development This module contains fundamental knowledge, theories, principles and practices of including: Research project in specialized field of Property development as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
PVPD	6804	Property Valuation Practice	Types of evaluation and how they can be applied in practice. Method of compiling each type valuation, law toward registration, methods of properties. The theory of valuations, valuation practices and techniques	MAIN	Student will be able to: -value property by using different methods; -interpret and understand the legal aspects of determining property value; -interpret and understand the theory of valuation; and -interpret and be able to use the information sources in respect of valuation in valuation practice.
PVPR	6804	Property Valuation Practice	Types of evaluation and how they can be applied in practice. Method of compiling each type valuation, law toward registration, methods of properties. The theory of valuations, valuation practices and techniques.	MAIN	Student will be able to: -value property by using different methods; -interpret and discuss the legal aspects of determining property value; -interpret and understand the theory of valuation; and -interpret and be able to use the information sources in respect of valuation in valuation practice.
QBED	6812	Building Economics	The economic design and planning of structures and the influence of the site of effective cost planning. Planning according to norms and evaluation of design effectiveness within set parameters. Calculation of professional fees (all consultants, with specific reference to the QS).	MAIN	Student will be able to: - Examine the purpose and implement normative planning and be able to use this to create an economical designs; - Make proposals on building shape, plan and building size; -Utilise available data and price schedules to analyse; and -Analyse and calculate professional fees of all consultants.
QBED	6822	Building Economics	Life cycle cost and building cost, the execution of comparing cost studies of design alternatives through life cycle cost analysis. The analysis, planning, management and monetary value of buildings. The different application of indices, with specific reference to escalation and inflation calculations.	MAIN	Student will be able to: - Apply and discuss the necessity of life cycle cost analysis (whole life appraisal) and apply this to improve the objectivity in the decision making process; - Use available indices to predict new trends; and - Use indices to calculate escalation and inflation estimates.
QBER	6812	Building Economics	The economic design and planning of structures and the influence of the site of effective cost planning. Planning according to norms and evaluation of design effectiveness within set parameters. Calculation of professional fees (all consultants, with specific reference to the QS).	MAIN	Student will be able to: - Examine the purpose and implement normative planning and be able to use this to create an economical designs; - Make proposals on building shape, plan and building size; -Utilise available data and price schedules to analyse; and -Analyse and calculate professional fees of all consultants.
QBER	6822	Building Economics	Life cycle cost and building cost, the execution of comparing cost studies of design alternatives through life cycle cost analysis. The analysis, planning, management and monetary value of buildings. The different application of indices, with specific reference to escalation and inflation calculations.	MAIN	Student will be able to: - Apply and discuss the necessity of life cycle cost analysis (whole life appraisal) and apply this to improve the objectivity in the decision making process; - Use available indices to predict new trends; and - Use indices to calculate escalation and inflation estimates.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
QDQD	6804	Descriptive Quantification IV	Dissect, specify and quantify complex items in terms of trade item definition regarding alterations, piling, ground anchoring, special foundation constructions, false ground floor constructions concrete, complex basement constructions, underpinning and shoring, compound long-span structures of in situ concrete and masonry. Overview of electrical and mechanical trade.	MAIN	Student will be able to: - Develop critical and innovative thinking as well as skills and competences regarding the above modules and manage a quantity surveying firm; - Manage effective utilisation of resources required by a firm to conduct these activities successfully; and - Examine and apply the Bill of Quantities on all above modules.
QDQR	6804	Descriptive Quantification IV	Dissect, specify and quantify complex items in terms of trade item definition regarding alterations, piling, ground anchoring, special foundation constructions, false ground floor constructions concrete, complex basement constructions, underpinning and shoring, compound long-span structures of in situ concrete and masonry. Overview of electrical and mechanical trade.	MAIN	Student will be able to: - Develop critical and innovative thinking as well as skills and competences regarding the above modules and manage a quantity surveying firm; - Manage effective utilisation of resources required by a firm to conduct these activities successfully; and - Examine and apply the Bill of Quantities on all above modules.
QRPD	6808	Quantity Surveying Research Report	To introduce students to the research process with a view to equipping them with the knowledge and skills to identify and investigate built environment problems through systematic approaches and document both the process and outcomes under the guidance of a study leader.	MAIN	Student will be able to: -select a research topic -define the research problem -formulate a hypothesis / research question -develop a research proposal -appraise the literature and use the Harvard referencing method and write a literature review -design and justify an appropriate research methodology to address the problem -conduct an empirical study -analysis and interpret empirical data -draw up conclusions and make recommendations -compile a research project report (treatise) -produce a summary paper of the study (article) Independently implementing research and investigate problems with the aim of solving them; -Compose a research report, make findings known and suggest recommendation; -Administer and manage a data base; and -Use different facilities in a professional manner for effective communication purposes.
QRPR	6808	Quantity Surveying Research Report	To introduce students to the research process with a view to equipping them with the knowledge and skills to identify and investigate built environment problems through systematic approaches and document both the process and outcomes under the guidance of a study leader.	MAIN	Student will be able to: -select a research topic -define the research problem -formulate a hypothesis / research question -develop a research proposal -appraise the literature and use the Harvard referencing method and write a literature review -design and justify an appropriate research methodology to address the problem -conduct an empirical study -analysis and interpret empirical data -draw up conclusions and make recommendations -compile a research project report (treatise) -produce a summary paper of the study (article) Independently implementing research and investigate problems with the aim of solving them; -Compose a research report, make findings known and suggest recommendation; -Administer and manage a data base; and -Use different facilities in a professional manner for effective communication purposes.
TRBP	7904	Applied Project Management	Introduction to project management; Deal with PMBOK areas: Scope; Time; Cost; Quality; Human resources; Procurement; Risks; Communications; Integration; Stakeholder management, as well as CMBOK areas: Health and Safety management; Claims management; Environmental management; Financial management.	MAIN	The student will be able to: - Summarising and classifying the phases of projects from inceptions to completion; - Interpreting and executing project management function and apply the functions integrated; - Classifying and implementing contract procurement methods; - Exemplify, interpret and implement all the elements of project management; and - Executing as a project manager, within practical limits

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
URDT	6804	Human Settlement Development Management	The theoretical and practical identification, analysis and procurement of suitable land for the development of human settlements. Conseptualising human settlement projects, inclusive of the relevant sub-disciplines. Structuring of various types of housing projects. An introduction to property development management functions and principles, inclusive of programme management; basic project management, costings , budgeting, cash flow and risk management.	MAIN	Student will be able to: - Identify , analyse and procure land suitable for human settlement projects; -Conceptualise various human settlement projects; -Define the roles and functions of the related sub-disciplines; -Programme the development and implementation of a housing project; -Apply basic project management principles; -Do a cost estimate, budget and cash flow for a housing project; -Compile a project proposal; -Do a risk analysis of a project proposal -Manage the implementation of a housing project.

Soil, Crop and Climate Sciences (116)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
AGRI	1534	Chemical Principles in Agricultural	Student will be equipped with simple chemical principles, concepts, processes and calculations that are important in agriculture sciences, especially with respect to soils, plants, animals and food. Practical work: Student will acquire laboratory skills, which will be used to do simple chemical experiments that bear reference to soils, plants, animals and food. Reports of these experiments will be submitted for evaluation.	MAIN	Student will be able to: -Explain, explore, discuss, and display skills, qualities and other attributes in simple chemical principles in agriculture., concepts, processes and calculations that are important in agricultural sciences, especially with respect to soils, plants, animals and food; in simple
AGRI	1554	Physical and mechanised principles in agriculture	Student will be equipped to apply the basic physical concepts with respect to mechanics, hydrodynamics and hydrostatics, electricity, energy and the application of the gas laws in agriculture and agricultural sciences. This knowledge will be used to explain the influence of these processes on the behaviour of animals, plants and the natural resources. The Student will be familiar with the SI-system and unit conversion. Practical work: The Student will gain practical experience by performing laboratory experiments and calculations will be done to illustrate some of the key concepts mentioned above.	MAIN	Student will be able to: - explain and use the SI-system and perform unit conversions; - apply the basic physical concepts with respect to mechanics, hydrostatics and hydrodynamics, energy and heat, the gas laws; electricity and waves in agriculture and agricultural sciences; - describe and discuss the influence of physical processes on the behaviour of animals, plants and the natural resources; and - solve problems using practical experience and doing calculations involving the above-mentioned subjects.
CLIM	2614	Fundamentals of Agrometeorology	The environment as a system, a description of various climatic elements and the interaction between weather/climate and agriculture on different spatial and temporal scales. This includes the study of local and synoptic scale weather systems that affect southern Africa from time to time, as well as planetary scale systems such as the El Niño Southern Oscillation phenomenon that may influence weather patterns worldwide. Agrometeorological applications such as the calculation of evapotranspiration, irrigation scheduling using weather data, the use of remote sensing technology, and the use of shelterbelts to create more favourable plant environments will also be dealt with. Practical work Weekly assignments focus on cloud identification; the use of the psycrometric diagram; synoptic chart analysis; calculating daily evapotranspiration rates; the use of weather data in irrigation scheduling; and remote sensing applications in Agrometeorology.	MAIN	Student will be able to: - Evaluate the environment as a system; - Describe the climatic elements and the factors that influence them; - Use psychometric tables and diagrams; - Identify the main cloud types; - Apply Buys Ballot's law and the geostrophic assumption in synoptic chart analysis; - Calculate daily reference and crop evapotranspiration and use these values to work out an irrigation schedule; - Identify and describe the most common weather systems affecting southern Africa; -Discuss the El Niño Southern Oscillation phenomenon; - Evaluate the roll of remote sensing technology in Agrometeorology; and - Design shelterbelts.
CLIM	2624	Agrometeorology for farming systems	This module focuses on climatological influences on management and planning decision-making in the agricultural environment. Climate data and forecasts will be employed in the determination of potential and production risk of crops and livestock, while climatic indices will be used to assess the impact of, among others, cold and heat stress, fire risk, frost and droughts as well as pests and diseases on agricultural production. Measures that can be applied to mitigate adverse impacts will also be evaluated. Practical work The module is problem-based and Student are expected to identify, analyse and solve real problems in collaboration with other Student by using all available resources.	MAIN	Student will be able to: - Assess the influence of various climatic factors (e.g. extreme temperatures, humidity, wind, fire, drought, meteorologically triggered pests and diseases) on agricultural production of crops and livestock; - Evaluate measures that can be applied to mitigate adverse impacts; and - Discriminate between various irrigation systems and use weather data to perform irrigation scheduling.
CLIM	3714	Climate data analysis for agrometeorological services	This module focuses on the various types and sources of climatological data, the quality control and representativeness of such data, as well as its statistical analysis for the purpose of research or extracting information for agrometeorological advisories or bulletins. Student receive training in the basic principles of statistical analysis and hypothesis testing, as well as in more advanced tools for data analyses such as regression and multi-variate analyses. Practical Work Weekly assignments enable Student to apply a range of statistical procedures to agrometeorological data.	MAIN	Student will be able to: - prepare a climatological data set for statistical analysis; - design hypotheses and statistically test them; - use a range of methods to present data; - test for significance, homogeneity and normality; - perform simple and multiple linear regression; - derive climate indices for agriculture; and - evaluate early warning systems for farmers.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CLIM	3724	Climate Change and Variability	The following aspects are dealt with: The global climate system; natural climate variability; natural and anthropogenic climate forcing; climate feedbacks; proxy data; recently observed changes in the climate; climate prediction and climate change projections; climate change impacts and adaptation strategies. Practical work Weekly assignments focus on the use of 1- and 2-dimensional models to evaluate climate feedbacks and interactions; the use of proxy data in order to describe climates of the past; obtaining the latest climate change projections for a specific area and assessing the potential impacts to agriculture and adaptation strategies; determining a carbon footprint and monitoring those systems responsible for natural variability within the climate system.	MAIN	Student will be able to: - Describe the major causes and characteristics of internal climate variability and externally forced climate change; - Explain the concepts of radiative forcing and climate feedback; - Evaluate recently observed changes in climate relative to changes that have occurred in the past; - Describe the formulation of climate models and evaluate their strengths and weaknesses; - Discuss the basis, methods and limitations of climate prediction; - Assess the impact of agricultural activities on climate by calculating a carbon footprint; and - Review the latest climate change projections and how this will affect the agricultural sector together with adaptation options.
CLIM	4814	Micrometeorology and Specialised Instrumentation	The following aspects are dealt with: Radiation, temperature, humidity, wind, turbulence and profiles of heat, momentum and mass transfer within plant communities over a diurnal and seasonal cycle; the Monin-Obukhov similarity principle; the microclimate of urban areas, forests, greenhouses and crops. Practical work Practical skills will be acquired in the calibration and set-up of instruments used for observation of environmental variables within and above plant communities and soil surfaces.	MAIN	Student will be able to: - Measure and describe the radiation, temperature, humidity, wind, turbulence and profiles of momentum and mass transfer within plant communities over a diurnal and seasonal cycle; - Apply the Monin-Obukhov similarity principle; - Evaluate the influence of the environment on plant processes such as photosynthesis, transpiration, leaf temperature and the leaf energy balance; and - Analyse the microclimate of urban areas, forests, greenhouses and crops using models and meteorological data.
CLIM	4824	Simulating biophysical interactions	The influence of various climatic and growth factors on photosynthesis and crop growth, and how these processes are depicted by crop growth models are dealt with. The necessary background to test crop growth models by means of sensitivity analysis and statistical verification before these models can be applied in agriculture, will be provided. Practical work Student will obtain practical experience with crop growth models and sensitivity analysis.	MAIN	Student will be able to: - Evaluate the influence of various climatic and growth factors on photosynthesis and crop growth; - Test crop growth models by means of sensitivity analysis and statistical verification; and - Apply these models in agricultural research settings.
CLIM	4834	Physical and dynamical meteorology	After completion of this module the Student will be able to describe the atmospheric composition and structure; derive the various forces which are at work in the atmosphere, and apply them in wind calculations; explain the physical processes involved in cloud formation and precipitation; assess the possibility of thunderstorm development with the use of thermodynamic diagrams and certain stability indices and explain various atmospheric phenomena such as hail and lightning as well as pollution dispersal. Calculation of atmospheric forces and wind components using basic numerical modelling; plotting and analysing of thermodynamic diagrams in weather forecasting.	MAIN	Student will be able to: - describe the atmospheric composition and structure; - derive the various forces which are at work in the atmosphere; - apply this information in wind calculations; - explain the physical processes involved in cloud formation and precipitation; - assess the possibility of thunderstorm development with the use of thermodynamic diagrams and certain stability indices; and - explain various atmospheric phenomena such as hail and lightning as well as pollution dispersal patterns.
CLIM	4844	Weather analysis and forecasting	The content will focus on synoptic climatology and the large-scale tropical and extra-tropical weather systems that may affect southern Africa. Various theoretical models are introduced and explained with the aid of numerical models. Skills are developed in the decoding of surface observations and the interpretation of satellite and radar imagery. Different weather forecasting techniques are dealt with. Practical work Various forecasting techniques are used to compile a five-day weather forecast on a weekly basis. Such a forecast is based on theoretical knowledge as well as the analysis and interpretation of synoptic weather charts, meteorological observations, numerical model outputs and remotely sensed imagery.	MAIN	Student will be able to: - Decode surface observations and plot synoptic weather charts; - Explain the development, propagation and weather associated with various large-scale systems; - Interpret remotely sensed imagery and numerical weather prediction model output; and - Integrate all of the above in order to compile a short-term weather forecast.
CROP	2614	Concepts in crop production	During this module Student will gain greater knowledge about the basic agronomic production practices such as soil tillage, fertilisation/plant nutrition, irrigation and pest control. During practicals Student will obtain sufficient practical knowledge, skills and experience to understand the functioning of implements, and be able to evaluate soil tillage operations. They will also gain a basic understanding on the use of fertilisers, irrigation systems and herbicides.	MAIN	Student will be able to: - List and describe the soil tillage implements and practices used in crop production; - Explain the crop nutritional requirements and solve basic fertilization problems; - List and describe the types of irrigation systems used, as well as explain basic irrigation scheduling methods; - State, and describe the pest control methods that can be used; - Describe and assess basic on-farm production decisions, and explain them using appropriate formats and technologies; and - Explain the effects of production decisions on the agricultural and natural environments, be able to solve issues of concern and recommend possible solutions.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CROP	2624	Winter grain, industrial and diverse crops	Cultivation practices concerning the most important winter grain, industrial and diverse crops of South Africa. The Student will also be able to apply the theoretical and practical aspects of soil tillage, seedbed preparation, planting techniques, plant nutrition and pest control, harvesting and grading as it relates to these crops on a higher level. During practical sessions the Student will study the morphology of these crops in detail and skills concerning the practical aspects of crop cultivation will be developed and practised by the student.	MAIN	Student will be able to: - Identify and list the most important morphological characteristics of the crops dealt with in this module - Identify development stages, and explain the importance of crop development. - Analyse and interpret soil, crop and climate interactions. - Explain and assess cultivation practices for crops covered in this module. - Explain, assess, and be able to make recommendations, on both a theoretical and practical level, on the following principles related to these crops: -soil tillage and field preparation -planting techniques -crop nutrition -weed control - Identify and explain how to control of the main pests and diseases of each crop - Describe the grading and uses of the crops - Assess the suitability of a crop for production in any area, given a set of climatic and soil data, as well as being able to estimate/calculate the approximate yield that can be expected under those conditions. - Accurately identify and calculate inputs required for these crops under given circumstances and be able to assess the decisions and actions of others.
CROP	3714	Summer grain, oil and protein-rich crops	Cultivation practices concerning the most important summer grain, oil and protein-rich crops of South Africa. Student will also be able to apply the theoretical and practical aspects of soil tillage, seedbed preparation, planting techniques, plant nutrition and pest control, harvesting and grading as it relates to these crops on a higher level. During practical sessions the Student will study the morphology of these crops in detail and skills concerning the practical aspects of crop cultivation will be developed and practised by the student.	MAIN	Student will be able to: - Identify and list the most important morphological characteristics of the crops dealt with in this module; - Identify crop development stages, and explain the importance of crop development; - Analyse and interpret soil, crop and climate interactions. - Explain and assess cultivation practices for crops covered in this module; - Explain, assess, and be able to make recommendations, on both a theoretical and practical level, on the following principles related to these crops: soil tillage and field preparation; planting techniques; crop nutrition; weed control; - Identify and explain how to control of the main pests and diseases of each crop - Describe the grading and uses of the crops. - Assess the suitability of a crop for production in any area, given a set of climatic and soil data, as well as being able to estimate/calculate the approximate yield that can be expected under those conditions. - Accurately identify and calculate inputs required for these crops under given circumstances and be able to assess the decisions and actions of others.
CROP	3724	Vegetable crops	The cultivation and use of the most important vegetable crops in South Africa. Aspects such as classification, morphology, cultivation and establishment of seedlings, soil and climatic requirements, fertilization, irrigation, crop rotation, pest control, harvesting, handling and storage, as well as the principles involved in the cultivation of vegetables under protection will be dealt with. The production, acclimatization and establishment of seedlings, together with other cultivation techniques will be practiced in both glasshouse and field will be dealt with during practical sessions.	MAIN	Student will be able to: - Explain the cultivation practices used for the vegetable crops covered in this module in detail; - Describe, and demonstrate the application of both theoretical and practical aspects of seedling propagation, seedbed preparation, planting techniques, plant nutrition, irrigation, pest control, harvesting, handling and storage of the vegetable crops covered in this module; - Identify the various growth stages of the vegetable crops; - Use soil and climatic data to assess the suitability of an area for the production of a vegetable crop; - List, and calculate the amounts of inputs required for specific vegetable crops under given circumstances; and - Interpret research data and write a basic research report on a simple trial conducted in the field or in the glasshouse with a vegetable crop.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CROP	4814	Crop physiology	World food security and the place of crop physiology in crop production. Physiology and biochemistry of plants will be dealt with, including membrane, enzyme and energy systems, together with regulatory mechanisms and signalling. The reactions of the primary and secondary metabolic pathways will be dealt with, as well as their regulation under normal and abnormal environmental conditions. Plant physiology and biochemistry will be placed into perspective for agricultural production, with emphasis on the potential of external manipulation to increase yields. Practicals are presented on a weekly basis in order to a) develop skills of Student to apply standard methodology and techniques as well as to obtain data and b) develop the ability to present data in graphic or table format and interpret data in a scientifically correct manner.	MAIN	Student will be able to: - Describe the current state of affairs concerning food security on the planet as well as make recommendations for the future; - Illustrate an understanding of enzymes by being able to explain how they work, the dynamics of endo- and exothermic reactions in terms of energy transfer and the coupling phenomenon; - Explain, summarize and discuss root, shoot and leaf anatomy, cytology of living cells, membrane structure and the endomembrane concept; - Discuss the physiological role of macro and micro plant nutrients; - Explain the terms regulation' and manipulation of metabolism as ways and means to influence crops externally with the aim of improving yields in light of predicted food shortages. - Explain primary and secondary metabolic pathways and how they inter relate as well as its association with gene expression under normal and stress conditions; - Summarize the effect of abiotic stress on normal physiological processes including means to induce systemic acquired resistance and the involvement of membranes, ABA and free radicals; - Explain the mechanisms of action involved in both normal and stress physiology by applying the broad knowledge of physiology and biochemistry, together with the acquired research skills.
CROP	4824	Role of nutrition in crop development	Advanced knowledge and insight of selected plant nutrients on their supply, uptake and physiological functions in crop manipulation. Aspects of plant analysis, crop requirements, interpretation of plant and soil analysis, nutrient application and organic fertilization as part of the holistic approach to crop nutrition will also be studied. On completion of this module Student should have acquired sound knowledge of root growth and nutrient uptake, nutrient use by crops, and plant response to fertilization. Tutorials will be used to teach Student to interpret soil and plant analyses reports, and how to compile crop nutrition programs from these analysis reports.	MAIN	Student will be able to: - List and explain the classification and function of nutrient elements. - List, explain and discuss all concepts of macro- (N, P, K, Ca, Mg and S) and micro-elements (B, Cu, Fe, Mo and Zn) in crop nutrition. - Discuss the effect of soil pH and its effect on crop nutrition and growth. - Describe and explain crop reaction to fertilization. - Describe and assess fertilizer applications. - Assess and interpret fertilization under given soil conditions (saline soils, acetic soils and certain soil moisture regimes). - Illustrate how to set up hydroponic nutrient solutions. - Describe the role of plant nutrition in crop development
CROP	4834	Water dynamics in crop production	Equip Student to integrate, theoretically and with basic crop modelling, the causes and processes that govern water movement through the soil-plant-atmosphere continuum for agricultural crops. Water flow and exchange processes that take place as crops grow and the responses to a decline in water supply are studied, which are both essential for exploring soil and crop management strategies that enhance efficient water use in both irrigated and rain-fed production systems. Practical classes will be used to teach Student basic scientific soil and crop water measurements and crop-modelling that allow for yield response to water, i.e. water as a limiting factor in crop production. On completion of this module Student should have acquired sound knowledge of root growth and water uptake, the water balance of the plant, water use by crops, measurements of soil water and plant water status, plant response to water deficit and the need, concerns and problems of irrigation.	MAIN	Student will be able to: - Explain, illustrate, analyse and / or synthesize topics such as the role of water in plant life, properties and energy state of water, water storage and movement in soil, the root as an organ for water uptake, plant water balance, the plant as a link between soil and atmosphere, crop water use, radiation and dry matter production, water use and dry matter production, influence of nutrient supply on water use, yield formation under inadequate water supply, water stress in plants and soil, and crop management to ensure efficient water use in rain-fed and irrigated production systems. - Describe and discuss research findings presented in tables and figures to understand and analyse the above-mentioned topics. - Identify and explain the complexities and uncertainties of applying appropriate scientific soil and crop measurements in order to analyse water as a limiting factor in crop production - Demonstrate the use of a range of specialised computer skills to identify, analyse and address water flow in the soil-plant-atmosphere system and subsequent yield response, drawing systematically on research and basic crop modelling knowledge. - Present and communicate crop water relation problems and issues academically and professionally in order to offer creative water management insights and solutions. - Explain the role of water in crop development.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CROP	4844	Weed control	Student will learn about the laws which govern weed control in South Africa, as well as how the biology of weeds affects control strategies. The concepts of herbicide selectivity, absorption, translocation, mode of action and residual activity will be dealt with at an advanced level. Various classification systems used for herbicides, and the safe use of these products will also be dealt with. Student will also learn about the occurrence, prevention and management of weed resistance to herbicides, as well as the use of genetically engineered herbicide resistant plants and their consequences for weed management. The registration process followed for new herbicides will addressed, and the procedure to be followed to diagnose of herbicide problems. During practicals Student will learn to identify the most common agricultural weeds, how to calibrate sprayers and conduct a research project into an aspect of chemical weed control. Student will be expected to follow standard scientific procedures in both the conduct and reporting of the research project.	MAIN	Student will be able to: - List and discuss the laws governing weeds and agricultural remedies - Describe the biology and ecology of weeds and explain how this affects the competitive ability of weeds, as well as their control. - List the principles of weed control using mechanical, biological and chemical methods, and assess their application. - Describe and analyse the factors affecting the activity, selectivity and residual activity of herbicides in the environment. - Describe and compare the classification, use and mode of action of commonly used herbicides. - Identify the most common weeds in croplands. - Explain the causes, prevention and management of herbicide resistance. - Demonstrate the ability to integrate the knowledge obtained to design weed management programmes to deal with practical weed control problems.
SCCS	1624	Introduction to soil, crop and climate sciences	This module will build on a number of fundamental and applied sciences to introduce the complex and integrated nature of soil, crop and climate production ecosystems.	MAIN	Student will be able to: -Define terminology and concepts of soil, crop and climate sciences. Knowledge of the main areas of the disciplines and practices, including an understanding of and an ability to apply the key terms, concepts and facts; -integrate their new knowledge of soil, crop and climate sciences and explain how the knowledge of each field relates to the other fields; -identify, evaluate and solve problems in unfamiliar contexts, gathering evidence and applying solutions based on evidence and procedure appropriate to the soil, crop and climate sciences; -evaluate different sources of information; select information during practical demonstrations and investigations, and apply well-developed processes of analysis, synthesis and evaluation during practical work demonstrations; and -present and communicate complex information reliably and coherently using appropriate academic formats and technologies.
SCCS	4814	Research methodology	During this module the value of research will be highlighted while Student will gain experience in planning and conducting experiments, data collection and processing, and interpretation of experimental data. Student will learn how to analyse data statistically, and the use of regression, correlation and co-variance analysis will also be dealt with. Student will analyse various data sets during tutorials in order to understand the difference between various experimental designs	MAIN	Student will be able to: - Explain the value and role of research; - Illustrate the scientific process and describe how a basic experiment is planned using these principles; - Describe the ethics of scientific research; - Explain basic statistical terms and assess if data is suitable for standard ANOVA; - Explain the value and limitations of statistical techniques and other research tools in planning and execution of trials, and in the interpretation of results; - Demonstrate the ability to choose an appropriate experimental design for the given circumstances; - Conduct and interpret statistical analyses of experimental data from various experimental designs both manually and using computer software; - Explain the differences between annual and perennial crops in research; - Describe the value and role of combined analysis of several experiments in applied research; and - Explain the use of correlation and regression analyses in research
SCCS	4824	Literature review	Student will learn how to acquire data from various literature sources and to interpret it and reproduce it using a scientific writing style. During the preparation, writing and presentation of a seminar on an approved subject-related topic, Student will develop the necessary evaluation and communication skills required to succeed as a research scientist. Weekly assignments will lead Student through the process of data collection, analysis and presentation as they write up results, discussions and conclusions in the form and style of scientific articles.	MAIN	Student will be able to: -Outline the importance of a comprehensive literature survey; - Conduct a literature study and familiarity with the various databases that can be used; - Evaluate a scientific paper and identify the key points; -Use the writing style and terminology of the discipline; -Ability to assimilate knowledge from a variety of sources, and combine it in a logical manner; -Present information in accordance with the requirements of a scientific journal; -Create a visual presentation using the information obtained from the literature study; and -Present the information in a succinct form in front of an audience.
SOIL	2614	Soil classification, evaluation, and land use planning	Classification of South African soils; the behaviour and function of these soils under natural, agricultural and urban ecosystems; soil survey and application in land-use change.	MAIN	Student will be able to: -outline and apply skills, qualities and other attributes in the following animal breeding areas, oil morphology, horizons, pedons and soilscapes of South Africa -classify soil morphology, horizons, pedons and soilscapes of South Africa; -judge and prediction of the response of South Africa soils under natural, agricultural and urban conditions; and -apply professional ethics of soil evaluation and predicted response to land-use change.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
SOIL	2624	Sustainable soil and water management	Natural resources soil and water; physical aspects such as soil compaction; erosion; soil water; soil water potential; gas content and composition; soil temperature; tillage methods and approaches; irrigation scheduling; salinity management. Practical work consists of a field visit, an essay on the sustainable use of natural resources and tutorials.	MAIN	Student will be able to: -describe principles of soil and water as basis to manage agricultural systems, including an understanding of and an ability to apply the key terms, concepts, facts, principles, rules and theories of soil and water; -outline principles as contested and an ability to evaluate types of knowledge and explanations typical within the area of soil and water management in agriculture; -evaluate, select and apply appropriate methods, procedures and/or techniques in processes of investigation or application within soil and water management; and -make decisions and act appropriately in familiar and new contexts, demonstrating an understanding of the relationships between dry land and irrigation systems, and of how actions, ideas or developments in one system impact on other environment.
SOIL	3714	Soil fertility and fertilization	Soil-plant relationships, soil acidity and liming, functions of all essential plant nutrients in soils, including consequences of insufficient and excessive supply; nature, dynamics and availability of all essential plant nutrients in soils; methods used for evaluation of soil fertility status; plant nutrient management, including precision agriculture. Practical work consists of tutorials on the interpretation of soil analyses and the compiling of liming and fertilization programs.	MAIN	Student will be able to: -Outline the functions of all nutrients essential for plants, including consequences of insufficient and excessive supply; -Integrate principles of environmental conditions and soil properties controlling the nature, dynamics and availability of all essential plant nutrients in soil; -Outline and apply the characteristics and hence behaviour of the various limes and fertilizers used in enhancing crop productivity; -Apply a suit of methods in evaluating the fertility status of cropped soils; -Interpret soil analysis reports, and compiling liming and fertilization programmes for cropping; and -Develop sustainable plant nutrient management practices for agro-ecosystems.
SOIL	3724	Soil contaminants and management	Sources and nature of major contaminants added to soils through agricultural, municipal, industrial, nuclear and other wastes; reactions of inorganic (e.g. heavy metals) and organic (e.g. pesticides) contaminants with soils and soil components; factors affecting the mobility and degradation of contaminants in soils; effects of contaminants on soil, water and atmosphere; management and amelioration of contaminated soils. Practical work consists of tutorials on soil contamination and amelioration of contaminated soils based on case studies.	MAIN	Student will be able to: -apply principles on the source and nature of major contaminants added to soils through agricultural, municipal, industrial, nuclear and other wastes; -integrate principles of environmental conditions and soil properties controlling the behaviour of major contaminants in soil; -outline the effects of contaminants on soil, water and atmosphere; -apply a suit of methods in determining the contamination status of soils; -interpret soil analysis reports, and compiling amelioration programs for contaminated soils; and -develop sustainable waste management practices for natural, agricultural, and urban ecosystems.
SOIL	4814	Soil chemical principles and applications	Soil solution chemistry, colloidal chemistry, adsorption phenomena, ion exchange reactions, precipitation, soil reaction, redox equilibria, and the environmental significance thereof. Practical work consists of laboratory measurements of chemical properties, reactions and processes in soils.	MAIN	Student will be able to: -apply principles at the forefront of soil chemical principles and applications; -outline the theories and techniques in soil chemical analyses. -interrogate multiple sources to integrate the current state of soil chemical knowledge; -identify, analyse and address complex soil chemical problems; -critically gather information and evaluate these to develop creative responses to soil chemical problems; -compile and present academic insights, interpretations to soil chemical problems and issues; and -take responsibility for own work, decision making and use of resources.
SOIL	4824	Soil physical principles and applications	Water flow in saturated and unsaturated soil conditions. Movement and exchange of air, heat and solutes in soils. Theory, measurement, and application of the soil water balance, viz. runoff, drainage, evaporation, and transpiration. Practical work consists of field and laboratory investigations in soils of different physical, hydraulic and mechanic properties.	MAIN	Student will be able to: -examine and apply the theories, research methodologies, methods and techniques relevant to soil physics; and an understanding of how to apply this knowledge in natural and agricultural ecosystems; -understand the complexities and uncertainties of selecting, applying or transferring appropriate standard procedures, processes or techniques to unfamiliar problems in soil physics; -use a range of specialised skills to identify, analyse and address complex and/or abstract problems drawing systematically on the body of knowledge and methods appropriate to soil physics; and -operate effectively within natural and agricultural ecosystems, or manage the system based on an understanding of the roles and relationships between elements within the in natural and agricultural ecosystems.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
SOIL	4834	Soil classification principles and applications	Principles in soil classification; relationships between soil properties, processes and expected behaviour; global soil classification systems. Practical work consists of skills training in the gathering of soil systems (i.e. soil survey, soil profile, soilscape) data and analysis of data from soil systems.	MAIN	Student will be able to: -evaluate soil properties on an advanced level; -apply advanced principles of the nature of South Africa soils; -predict the response of soils under general natural, agricultural and urban conditions; -responsibility asses the functions of the soils of South Africa in different ecosystems; and -show accountability towards impact of development and land-use change on the functions of soils in these ecosystems.
SOIL	4844	Soil biological principles and applications	Activity and role of macro- and micro-organisms in soil. Interaction between plant roots and micro-organisms in soil. Chemical changes of biological residues in soil. Composition of humus and the fractionation thereof. Properties of humus and the effect thereof on the biological, chemical and physical properties of soils. Maintenance and improvement of biological soil quality. Practical work consists of isolation of bacteria, fungi, algae, actinomycete and nematodes from soil. Extraction of humus from soil and its fractionation.	MAIN	Student will be able to: - discuss the activities and role of organisms in soil, their decomposition of organic material, and the effect this has on the biological, chemical and physical properties of soil; - apply the latest methods and techniques in determining soil biological indicators in an agricultural and environmental context; - review and interpret soil biological evaluation techniques, in order to make critical decisions on management practices for different ecosystems; - present and communicate complex soil biological concepts reliably and coherently using appropriate formats and technologies available; - responsibly make decisions on soil biological aspects, while considering the effect on the agricultural and natural environment; creatively respond to soil biological issues in different ecosystems; and - work independently as well as in a group, making use of resources in order to make responsible decisions on soil biological problems facing different ecosystems.
Postgraduate					
CLIM	6814	Micrometeorology and Specialised Instrumentation	The following aspects are dealt with: Radiation, temperature, humidity, wind, turbulence and profiles of heat, momentum and mass transfer within plant communities over a diurnal and seasonal cycle; the Monin-Obukhov similarity principle; the microclimate of urban areas, forests, greenhouses and crops. Practical work Practical skills will be acquired in the calibration and set-up of instruments used for observation of environmental variables within and above plant communities and soil surfaces.	MAIN	Student will be able to: - Measure and describe the radiation, temperature, humidity, wind, turbulence and profiles of momentum and mass transfer within plant communities over a diurnal and seasonal cycle; - Apply the Monin-Obukhov similarity principle; - Evaluate the influence of the environment on plant processes such as photosynthesis, transpiration, leaf temperature and the leaf energy balance; and - Analyse the microclimate of urban areas, forests, greenhouses and crops using models and meteorological data.
CLIM	6824	Simulating biophysical interactions	The influence of various climatic and growth factors on photosynthesis and crop growth, and how these processes are depicted by crop growth models are dealt with. The necessary background to test crop growth models by means of sensitivity analysis and statistical verification before these models can be applied in agriculture, will be provided. Practical work Student will obtain practical experience with crop growth models and sensitivity analysis.	MAIN	Student will be able to: - Evaluate the influence of various climatic and growth factors on photosynthesis and crop growth; - Test crop growth models by means of sensitivity analysis and statistical verification; and - Apply these models in agricultural research settings.
CLIM	6834	Physics and dynamics of the atmosphere	After completion of this module the Student will be able to describe the atmospheric composition and structure; derive the various forces which are at work in the atmosphere, and apply them in wind calculations; explain the physical processes involved in cloud formation and precipitation; assess the possibility of thunderstorm development with the use of thermodynamic diagrams and certain stability indices and explain various atmospheric phenomena such as hail and lightning as well as pollution dispersal patterns. Calculation of atmospheric forces and wind components using basic numerical modelling; plotting and analysing of thermodynamic diagrams in weather forecasting.	MAIN	Student will be able to: - describe the atmospheric composition and structure; - derive the various forces which are at work in the atmosphere, - apply this information in wind calculations; - explain the physical processes involved in cloud formation and precipitation; - assess the possibility of thunderstorm development with the use of thermodynamic diagrams and certain stability indices; and - explain various atmospheric phenomena such as hail, lightning and pollution dispersal patterns.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CLIM	6844	Weather analysis and forecasting	The content will focus on synoptic climatology and the large-scale tropical and extra-tropical weather systems that may affect southern Africa. Various theoretical models are introduced and explained with the aid of numerical models. Skills are developed in the decoding of surface observations and the interpretation of satellite and radar imagery. Different weather forecasting techniques are dealt with. Practical work Various forecasting techniques are used to compile a five-day weather forecast on a weekly basis. Such a forecast is based on theoretical knowledge as well as the analysis and interpretation of synoptic weather charts, meteorological observations, numerical weather prediction model outputs and remotely sensed imagery.	MAIN	Student will be able to: - Decode surface observations and plot synoptic weather charts; - Explain the development, propagation and weather associated with various large-scale systems; - Interpret remotely sensed imagery and numerical weather prediction model output; and - Integrate all of the above in order to compile a short-term weather forecast.
CLIM	6854	Agrometeorological Services for Extension	This module will focus on the various communication channels and methods of technology transfer with specific emphasis on qualitative vs. quantitative research, participatory rural appraisal, farming systems research and extension, grounded theory, action research method, monitoring and evaluation method, communication models, dissemination models, early warning systems, agrometeorological intermediaries, use of models in the community, FARMSCAPES and the Florida Consortium example.	MAIN	Student will be able to: - Explore the various communication channels and methods of technology transfer with specific emphasis on weather bulletins and advisories (for the whole range of temporal and spatial scales) for use by farmers, extension officers and policy makes; and - Conduct a participatory needs assessment survey to determine end-user needs; and - Demonstrate how to develop new products from available forecasts and information obtained from meteorologists or climatologists.
CLIM	6864	Tropical meteorology	The content focuses on the general climatology and conceptual models related to several tropical circulation features across a range of spatial and temporal scales, including thermally-forced circulations, mesoscale convective systems, tropical waves, tropical cyclones, subtropical cyclones, tropical upper-tropospheric troughs, monsoon phenomena, tropical-temperate troughs and large-scale modes of climate variability in the tropics. Practical work Case studies will introduce different types of observations and afford Student the opportunity to evaluate analysis techniques used by tropical forecasters. Online modules and quizzes will also be used to increase the student` understanding of key concepts.	MAIN	Student will be able to: - describe and explain the formation, evolution and characteristics (including extreme or hazardous weather conditions) of synoptic-scale weather systems in tropical regions, and assess the limitations of theories and conceptual models about these weather systems; - describe and explain the formation, evolution and characteristics (including extreme or hazardous weather conditions) of convective and mesoscale phenomena and assess the limitations of theories and conceptual models about these phenomena; - monitor the weather situation in the tropics, and use real-time or historic data along with numerical weather prediction model output to prepare analyses and basic forecasts.
CLIM	8900	Agrometeorology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Agrometeorology, including: Research project in specialized field of Agrometeorology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CLMI	8900	Agrometeorology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Agrometeorology, including: Research project in specialized field of Agrometeorology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CLMI	9100	Agrometeorology Interdisciplinary Thesis	This module contains fundamental knowledge, theories, principles and practices of Agrometeorology , including: Research project in specialized field of Agrometeorology is discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CROI	8900	Agronomy Dissertation	Hierdie module bevat fundamentele kennis, teorieë, beginsels en praktyke van Agronomy, insluitend: Navorsingsprojek in gespesialiseerde veld van Agronomy, soos bespreek deur die studieleier(s), Akademiese Departementshoof en student. Die projek sluit probleem identifisering, hipotese formulering, onafhanklike beplanning en uitvoer van eksperimente, analise en interpretasie van resultate, bespreking van resultate, samevatting van die inligting in die vorm van `n verhandeling, grammatikale en tegniese aspekte van wetenskaplike skryfwerk in. This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Research project in specialized field of Forensic Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CROI	9100	Agronomy Thesis (Interdisciplinary)	This module contains fundamental knowledge, theories, principles and practices of Agronomy, including: Research project in specialized field of Agronomy as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Evaluate agronomic principles; -Plan independently; and -Manage in-depth research of agronomy interdisciplinary field
CROP	6814	Crop Physiology	World food security and the place of crop physiology in crop production. Physiology and biochemistry of plants will be dealt with, including membrane, enzyme and energy systems, together with regulatory mechanisms and signalling. The reactions of the primary and secondary metabolic pathways will be dealt with, as well as their regulation under normal and abnormal environmental conditions. Plant physiology and biochemistry will be placed into perspective for agricultural production, with emphasis on the potential of external manipulation to increase yields. Practicals are presented on a weekly basis in order to a) develop skills of Student to apply standard methodology and techniques as well as to obtain data and b) develop the ability to present data in graphic or table format and interpret data in a scientifically correct manner.	MAIN	Student will be able to: - Describe the current state of affairs concerning food security on the planet as well as make recommendations for the future; - Illustrate an understanding of enzymes by being able to explain how they work, the dynamics of endo- and exothermic reactions in terms of energy transfer and the coupling phenomenon; - Explain, summarize and discuss root, shoot and leaf anatomy, cytology of living cells, membrane structure and the endomembrane concept; - Discuss the physiological role of macro and micro plant nutrients; - Explain the terms regulation and manipulation of metabolism as ways and means to influence crops externally with the aim of improving yields in light of predicted food shortages. - Explain primary and secondary metabolic pathways and how they inter relate as well as its association with gene expression under normal and stress conditions; - Summarize the effect of abiotic stress on normal physiological processes including means to induce systemic acquired resistance and the involvement of membranes, ABA and free radicals; - Explain the mechanisms of action involved in both normal and stress physiology by applying the broad knowledge of physiology and biochemistry, together with the acquired research skills.
CROP	6824	Role of nutrition in crop development	Advanced knowledge and insight of selected plant nutrients on their supply, uptake and physiological functions in crop manipulation. Aspects of plant analysis, crop requirements, interpretation of plant and soil analysis, nutrient application and organic fertilization as part of the holistic approach to crop nutrition will also be studied. On completion of this module Student should have acquired sound knowledge of root growth and nutrient uptake, nutrient use by crops, and plant response to fertilization. Tutorials will be used to teach Student to interpret soil and plant analyses reports, and how to compile crop nutrition programs from these analysis reports.	MAIN	Student will be able to: - List and explain the classification and function of nutrient elements. - List, explain and discuss all concepts of macro- (N, P, K, Ca, Mg and S) and micro-elements (B, Cu, Fe, Mo and Zn) in crop nutrition. - Discuss the effect of soil pH and its effect on crop nutrition and growth. - Describe and explain crop reaction to fertilization. - Describe and assess fertilizer applications. - Assess and interpret fertilization under given soil conditions (saline soils, acetic soils and certain soil moisture regimes). - Illustrate how to set up hydroponic nutrient solutions. - Describe the role of plant nutrition in crop development

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CROP	6834	Water dynamics in crop production	Equip Student to integrate, theoretically and with basic crop modelling, the causes and processes that govern water movement through the soil-plant-atmosphere continuum for agricultural crops. Water flow and exchange processes that take place as crops grow and the responses to a decline in water supply are studied, which are both essential for exploring soil and crop management strategies that enhance efficient water use in both irrigated and rain-fed production systems. Practical classes will be used to teach Student basic scientific soil and crop water measurements and crop-modelling that allow for yield response to water, i.e. water as a limiting factor in crop production. On completion of this module Student should have acquired sound knowledge of root growth and water uptake, the water balance of the plant, water use by crops, measurements of soil water and plant water status, plant response to water deficit and the need, concerns and problems of irrigation.	MAIN	Student will be able to: - Explain, illustrate, analyse and / or synthesize topics such as the role of water in plant life, properties and energy state of water, water storage and movement in soil, the root as an organ for water uptake, plant water balance, the plant as a link between soil and atmosphere, crop water use, radiation and dry matter production, water use and dry matter production, influence of nutrient supply on water use, yield formation under inadequate water supply, water stress in plants and soil, and crop management to ensure efficient water use in rain-fed and irrigated production systems. - Describe and discuss research findings presented in tables and figures to understand and analyse the above-mentioned topics. - Identify and explain the complexities and uncertainties of applying appropriate scientific soil and crop measurements in order to analyse water as a limiting factor in crop production - Demonstrate the use of a range of specialised computer skills to identify, analyse and address water flow in the soil-plant-atmosphere system and subsequent yield response, drawing systematically on research and basic crop modelling knowledge. - Present and communicate crop water relation problems and issues academically and professionally in order to offer creative water management insights and solutions. - Explain the role of water in crop development.
CROP	6844	Weed control	Student will learn about the laws which govern weed control in South Africa, as well as how the biology of weeds affects control strategies. The concepts of herbicide selectivity, absorption, translocation, mode of action and residual activity will be dealt with at an advanced level. Various classification systems used for herbicides, and the safe use of these products will also be dealt with. Student will also learn about the occurrence, prevention and management of weed resistance to herbicides, as well as the use of genetically engineered herbicide resistant plants and their consequences for weed management. The registration process followed for new herbicides will addressed, and the procedure to be followed to diagnose of herbicide problems. During practicals Student will learn to identify the most common agricultural weeds, how to calibrate sprayers and conduct a research project into an aspect of chemical weed control. Student will be expected to follow standard scientific procedures in both the conduct and reporting of the research project.	MAIN	Student will be able to: - List and discuss the laws governing weeds and agricultural remedies - Describe the biology and ecology of weeds and explain how this affects the competitive ability of weeds, as well as their control. - List the principles of weed control using mechanical, biological and chemical methods, and assess their application. - Describe and analyse the factors affecting the activity, selectivity and residual activity of herbicides in the environment. - Describe and compare the classification, use and mode of action of commonly used herbicides. - Identify the most common weeds in croplands. - Explain the causes, prevention and management of herbicide resistance. - Demonstrate the ability to integrate the knowledge obtained to design weed management programmes to deal with practical weed control problems.
CROP	8900	Agronomy Dissertation	Hierdie module bevat fundamentele kennis, teorieë, beginsels en praktyke van Agronomy, insluitend: Navorsingsprojek in gespesialiseerde veld van Agronomy, soos bespreek deur die studieleier(s), Akademiese Departementshoof en student. Die projek sluit probleem identifisering, hipotese formulering, onafhanklike beplanning en uitvoer van eksperimente, analise en interpretasie van resultate, bespreking van resultate, samevatting van die inligting in die vorm van `n verhandeling, grammatikale en tegniese aspekte van wetenskaplike skryfwerk in. This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Research project in specialized field of Forensic Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CROP	9100	Agronomy Thesis	This module contains fundamental knowledge, theories, principles and practices of Agronomy, including: Research project in specialized field of Agronomy as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Evaluate agronomic principles; -Plan independently; and -Manage in-depth research of agronomy.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
IRRI	6808	Research project in irrigation management	A subject specific project will be completed under the guidance of a supervisor. The Student will be introduced to problem identification, hypothesis formulation, planning, conducting and analysis of scientific experiments and/or research, as well as the interpretation and communication of results. Student have to submit a scientific research report in the form of a scientific publication and have to prepare and orally present the results in the form required by scientific conferences. The independence and scientific insight developed in this module provides a background for further postgraduate study.	MAIN	Student will be able to: -Discuss the importance of a comprehensive literature survey; -Conduct a literature study and familiarity with the various databases that can be used; -Evaluate a scientific paper and identify the key points; -Apply the writing style and terminology of the discipline; -Examine information from a variety of sources, and combine it in a logical manner; - Present information in accordance with the requirements of a scientific journal; -Create a visual presentation using the information obtained from the literature study; and -Present the information in a succinct form in front of an audience.
IRRI	6816	Evaluation of soil and water for irrigation suitability	Knowledge on the influence of the climate on the selection of irrigated crops. Management of the soil water balance. The Student must be familiar with the soil-plant-atmosphere continuum under irrigation and the effect of irrigation on the environment.	MAIN	Student will be able to: - examine the importance of irrigation farming in South Africa and the accompanying legislative implications of water rights for irrigation; - examine the components of the soil water balance viz. infiltration-runoff, deep drainage, evaporation and the water holding capacity of soils; - describe the water continuum through the soil-plant-atmosphere system using Ohms law analogy; and - question the climatic factors necessary to identify the optimal crops for a specific irrigation project; and interpret waterlogging, salinization and pollution of soil as a result of irrigation and the management thereof.
IRRI	6826	Evaluation of soil fertility and pest control	Knowledge on the maintenance of soil fertility, integrated pest control and rotation of crops under irrigation. Quantification of water requirements and usage of irrigated crops and the identification of methods for irrigation scheduling.	MAIN	Student will be able to: -Examine soil fertility and fertilization with regard to irrigation farming; -Discuss the principles and advantages of crop succession and the disadvantages of monoculture under irrigation; -Assess the water requirements of crops under irrigation; -Examine the stress effects of too much or too little water on crop production; and -Use weather data for irrigation scheduling; be able to advise on irrigation scheduling methods based on the soil water balance.
IRRI	6846	Irrigation design	The Student will be familiar with making choices, design, installation, evaluation and management of irrigation systems. Analysis and evaluation of electrical motors and electrical usage of irrigation systems.	MAIN	Student will be able to: - Examine and apply the different design norms and principles of the different irrigation systems; - Discuss and apply the design principles and hydraulics of pumps and mainlines; - Question the different methods of subsurface drainage and the importance of their installation; -Optimize the different electricity usage options of the irrigation systems; -Advise on the costs of different irrigation systems and the choice of the most economical system; and - Use different computer design methods; advise on the different methods of fertiliser application and usage through irrigation systems.
IRRI	8900	Irrigation Science Dissertation	(This module contains fundamental knowledge, theories, principles and practices of Irrigation Science including: Research project in specialized field of Irrigation Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
IRRI	9100	Irrigation Science Thesis	This module contains fundamental knowledge, theories, principles and practices of Irrigation Science, including: Research project in specialized field of Irrigation Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
SCCS	6808	Research project in soil, crop and climate sciences	A subject specific (Soil Science, Agronomy or Agricultural Meteorology) project will be completed under the guidance of a supervisor. The Student will be introduced to problem identification, hypothesis formulation, planning, conducting and analysis of scientific experiments and/or research, as well as the interpretation and communication of results. Student have to submit a scientific research report in the form of a scientific publication and have to prepare and orally present the results in the form required by scientific conferences. The independence and scientific insight developed in this module provides a background for further postgraduate study.	MAIN	Student will be able to: - Discuss the importance of a comprehensive literature survey; - Conduct a literature study and familiarity with the various databases that can be used; - Evaluate a scientific paper and identify the key points; - Apply with the writing style and terminology of the discipline; - Source knowledge from a variety of sources, and combine it in a logical manner; - Present information in accordance with the requirements of a scientific journal; - Create a visual presentation using the information obtained from the literature study; and - Present the information in a succinct form in front of an audience.
SCCS	6814	Research Methodology	During this module the value of research will be highlighted while Student will gain experience in planning and conducting experiments, data collection and processing, and interpretation of experimental data. Student will learn how to analyse data statistically, and the use of regression, correlation and co-variance analysis will also be dealt with. Student will analyse various data sets during tutorials in order to understand the difference between various experimental designs	MAIN	Student will be able to: -Discuss the value and role of research; -Outline the scientific process and ability to plan a basic experiment using these principles; -Discuss and apply the ethics of scientific research; -Identify the value and limitations of statistical techniques and other research tools in planning, and execution of trials, and in the interpretation of results; -Choose an appropriate experimental design for the given circumstances; -Perform statistical analyses of experimental data from various experimental designs both manually and using computer software; -Outline the differences between annual and perennial crops in research; and -Exhibit an awareness of the value and role of combined analysis of several experiments in applied research.
SCCS	6824	Research Project	Student will acquire data from various literature sources, interpret it and report it using scientific writing style. During the preparation, writing and presentation on an approved subject-related topic, Student will develop the necessary evaluation and communication skills required to succeed as a research scientist. Weekly assignments will lead Student through the process of data collection, analysis and presentation, as well as writing, discussions and conclusions in the form and style of scientific articles	MAIN	Student will be able to: -Discuss the importance of a comprehensive literature survey. -Conduct a literature study and familiarity with the various databases that can be used. -Critically evaluate a scientific paper and identify the key points. -Use the writing style and terminology of the discipline. -Generate information from a variety of sources, and combine it in a logical manner. - Present information in accordance with the requirements of a scientific journal. -Create a visual presentation using the information obtained from the literature study. -Present the information in a succinct form in front of an audience. -Produce a research report
SOII	8900	Soil Science Interdisciplinary Dissertation	Hierdie module bevat fundamentele kennis, teorieë, beginsels en praktyke van Soil Science, insluitend: Navorsingsprojek in gespesialiseerde veld van Soil Science, soos bespreek deur die studieleier(s), Akademiese Departementshoof en student. Die projek sluit probleem identifisering, hipotese formulering, onafhanklike beplanning en uitvoer van eksperimente, analise en interpretasie van resultate, bespreking van resultate, samevatting van die inligting in die vorm van `n verhandeling, grammatikale en tegniese aspekte van wetenskaplike skryfwerk in. This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Research project in specialized field of Forensic Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing..

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
SOIl	9100	Soil Science Interdisciplinary Thesis	This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Soil Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
SOIL	6814	Soil chemical principles and applications	Soil solution chemistry, colloidal chemistry, adsorption phenomena, ion exchange reactions, precipitation, soil reaction, redox equilibria, and the environmental significance thereof. Practical work consists of laboratory measurements of chemical properties, reactions and processes in soils.	MAIN	Student will be able to: -apply principles at the forefront of soil chemical principles and applications; -outline the theories and techniques in soil chemical analyses. -interrogate multiple sources to integrate the current state of soil chemical knowledge; -identify, analyse and address complex soil chemical problems; -critically gather information and evaluate these to develop creative responses to soil chemical problems; -compile and present academic insights, interpretations to soil chemical problems and issues; and -take responsibility for own work, decision making and use of resources.
SOIL	6824	Soil physical principles and applications	Water flow in saturated and unsaturated soil conditions. Movement and exchange of air, heat and solutes in soils. Theory, measurement, and application of the soil water balance, viz. runoff, drainage, evaporation, and transpiration. Practical work consists of field and laboratory investigations in soils of different physical, hydraulic and mechanic properties.	MAIN	Student will be able to: -Examine the theories, research methodologies, methods and techniques relevant to soil physics; and an understanding of how to apply this knowledge in natural and agricultural ecosystems; -Discuss the complexities and uncertainties of selecting, applying or transferring appropriate standard procedures, processes or techniques to unfamiliar problems in soil physics; -Use a range of specialised skills to identify, analyse and address complex and/or abstract problems drawing systematically on the body of knowledge and methods appropriate to soil physics; and -Operate effectively within natural and agricultural ecosystems, or manage the system based on an understanding of the roles and relationships between elements within the in natural and agricultural ecosystems.
SOIL	6834	Soil classification principles and applications	Principles in soil classification; relationships between soil properties, processes and expected behaviour; global soil classification systems. Practical work consists of skills training in the gathering of soil systems (i.e. soil survey, soil profile, soilscape) data and analysis of data from soil systems.	MAIN	Student will be able to: -evaluate soil properties on an advanced level; -apply advanced principles of the nature of South Africa soils; -predict the response of soils under general natural, agricultural and urban conditions; -responsibility asses the functions of the soils of South Africa in different ecosystems; and -show accountability towards impact of development and land-use change on the functions of soils in these ecosystems.
SOIL	6844	Soil biological principles and applications	Activity and role of macro- and micro-organisms in soil. Interaction between plant roots and micro-organisms in soil. Chemical changes of biological residues in soil. Composition of humus and the fractionation thereof. Properties of humus and the effect thereof on the biological, chemical and physical properties of soils. Maintenance and improvement of biological soil quality. Practical work consists of isolation of bacteria, fungi, algae, actinomycete and nematodes from soil. Extraction of humus from soil and its fractionation.	MAIN	Student will be able to: - discuss the activities and role of organisms in soil, their decomposition of organic material, and the effect this has on the biological, chemical and physical properties of soil; - apply the latest methods and techniques in determining soil biological indicators in an agricultural and environmental context; - review and interpret soil biological evaluation techniques, in order to make critical decisions on management practices for different ecosystems; - present and communicate complex soil biological concepts reliably and coherently using appropriate formats and technologies available; - responsibly make decisions on soil biological aspects, while considering the effect on the agricultural and natural environment; creatively respond to soil biological issues in different ecosystems; - work independently as well as in a group, making use of resources in order to make responsible decisions on soil biological problems facing different ecosystems.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
SOIL	7904	Land Evaluation	Soil and climate plays an important role in the environment. The quality, pollution and classification of soil and climate. Climatic regions and indices (including ENSO). Impact of urban activities on the quality of the soil and atmosphere. Urban agriculture. Evaluation of the environment (soil and climate). Data bases (maps, reports and memoirs).	MAIN	Student will be able to: - assess the soils, soil distribution patterns and climate of a location; - match the soil, terrain and climate assessment with requirements of different types of property development; and - evaluate the suitability of the physical environment soil, terrain and climate, of assessable locations using reports, and distant locations, using web available data only.
SOIL	8900	Soil Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Soil Science, including: Research project in specialized field of Soil Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing..
SOIL	9100	Soil Science Thesis	This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Soil Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Mathematical Statistics a Actuarial Sciences (117)

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ACSF	1613	Actuarial Financial Management	The aim of this module is to introduce the following topics to students wishing to study actuarial science: The key principles of finance; Company ownership; Taxation; Financial instruments; Use of derivatives; Issue of shares; Introduction to accounts; The main accounts; Group accounts and insurance company accounts; Interpretation of accounts; Limitations of accounts; Financial institutions; Capital Asset Pricing Model (CAPM)	MAIN	Students will be able to: - Apply fundamental concepts and principles; - Recognise that scientific knowledge and understanding are changeable; - Access, evaluate and synthesise scientific information; - Demonstrate key scientific reasoning skills; - Communicate scientific understanding in writing, orally and using visual, symbolic and/or other forms of representation; - Solve scientific problems; - Apply scientific knowledge and ways of thinking to societal issues, taking into account ethical and cultural considerations; and - Manage and organise their learning activities responsibly.
ACSF	1623	Actuarial Financial Reporting	The aim of this module is to introduce the following topics to students wishing to study actuarial science: Generating accounts; Depreciation and reserves; Weighted average cost of capital; Capital structure and dividend policy; Capital project appraisal	MAIN	Students will be able to: - construct basic accounts of different types and describe the role and principal features of the accounts of a company; - discuss the factors to be considered by a company when deciding on its capital structure and dividend policy; - define what is meant by a company's cost of capital and discuss how its cost of capital interacts with the nature of the investment projects it undertakes; and - show how financial techniques can be used in the assessment of capital investment projects.
ACSF	2716	Introductory Financial Mathematics	The aim of the Introductory Financial Mathematics subject is to provide grounding in financial mathematics and its applications, including: introductory interest calculations; discounting and accumulating; annuities; loans; and cash flow schemes and funds.	MAIN	Students will be able to: - apply the concepts behind basic financial problems, cash flow models and interest rates; and - investigate and solve problems relating to discounting and accumulating, annuities, loans and cash flow schemes (including funds), presenting the underlying assumptions and interpreting the results of the investigation.
ACSF	2726	Financial Mathematics	The aim of the advanced Financial Mathematics subject is to provide grounding in: the theory of investment instruments; the mathematics of basic fixed-interest security valuation; interest rate sensitivity analysis; forward contract valuation; and the term structure of interest rates.	MAIN	Students will be able to: - apply the concepts behind basic and complex financial problems, cash flow models and interest rates; - investigate and solve problems relating to discounting and accumulating, annuities, loans and cash flow schemes, interpreting the results of the investigation; - appraise projects, value investments, and solve complicated simple-rate and compound-rate problems; and - discuss and apply the term structure of interest rates and interest rate models in the context of investment valuation.
ACSF	2746	Advanced Financial Mathematics	The aim of the advanced Financial Mathematics subject is to provide grounding in: the theory of investment instruments; the mathematics of basic fixed-interest security valuation; interest rate sensitivity analysis; forward contract valuation; the term structure of interest rates; and stochastic interest rate models.	MAIN	Students will be able to: - apply the concepts behind basic and complex financial problems, cash flow models and interest rates; - investigate and solve problems relating to discounting and accumulating, annuities, loans and cash flow schemes, interpreting the results of the investigation; - be confident in appraising projects, valuing investments, and the solving of complicated simple-rate and compound-rate problems; - discuss and apply the term structure of interest rates and interest rate models in the context of investment valuation; and - utilise basic stochastic interest rate models in investment valuation.
ACSF	3706	Actuarial Financial Economics	The aim of this module is to give successful candidates the skills needed to: Value a variety of investments using a variety of financial economic models, including, mean-variance portfolio theory, single and multifactor models, pricing models (including those for options evaluation), and credit risk models. Describe the assumptions and workings of financial markets, and investigate these by utilising investment theory related to: investment risk, the Efficient Market Hypothesis, stochastic financial models, Brownian motion, and term structure of interest rates.	MAIN	Students will be able to: - present the advantages and disadvantages of different measures of investment risk; - describe and discuss the assumptions of mean-variance portfolio theory and solve investment valuation problems based in this theory; - implement single and multifactor models of asset returns, and assess the properties of such models; - evaluate and compare pricing models, discussing the principal results and assumptions and limitations of such models; - compare the various forms of the Efficient Markets Hypothesis and discuss the evidence for and against the hypothesis; - appraise stochastic models of the behaviour of security prices; - apply the main concepts of Brownian motion (or Wiener Processes); - analyse the properties of option prices, valuation methods and hedging techniques; - outline and utilise the models of the term structure of interest rates;and - describe and apply simple models for credit risk.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ACSG	1614	Introduction to Actuarial Science	Introduction to Actuarial Science	MAIN	
ACSL	3706	Actuarial Models	Principles of actuarial modelling; Introductory stochastic processes; Markov chains and processes; Survival models, lifetime distributions, and maximum likelihood estimators; Binomial model of mortality; Estimation of transition intensities	MAIN	Students will be able to: - discuss and apply several concepts of survival models, estimation procedures of lifetime distributions and Markov models; - use the Binomial model for mortality confidently; - recognise and evaluate simple assurance and annuity contracts and net premiums; - describe the principles of actuarial modelling; - derive maximum likelihood estimators for the transition intensities in models of transfers between states with piecewise constant transition intensities; and - estimate transition intensities depending on age, exactly or using census approximation.
ACSS	3716	Actuarial Statistical Methods	Decision Theory; Bayesian Statistics; Loss distributions; Credibility Theory and Empirical Bayes Credibility Theory Models; Future loss estimation in the context of general insurance for the purpose of: setting premiums, calculating the probability of ruin, making reinsurance arrangements, and calculating reserves; Monte Carlo simulation	MAIN	Students will be able to: - summarise the concepts of decision theory and apply them; - calculate probabilities and moments of loss distributions both with and without limits and risk-sharing arrangements; - construct risk models involving frequency and severity distributions and derive the moment generating function and the moments for the risk models both with and without simple reinsurance arrangements; - discuss the theoretical aspects of ruin for a risk model both with and without simple reinsurance arrangements and calculate probabilities of ruin; - explain the fundamental concepts of Bayesian statistics and use these concepts to calculate Bayesian estimators by deriving the posterior distributions of different models; - estimate future claims using Empirical Bayes Credibility Models 1 and 2; and - describe and apply techniques for analysing a delay (or run-off) triangle and projecting the ultimate position.
ACXL	1711	Actuarial Models Summary	Principles of actuarial modelling, Introductory stochastic processes, Markov chains and processes, Survival models, lifetime distributions, and maximum likelihood estimators, Binomial model of mortality, Estimation of transition intensities.	MAIN	Student will be able to: -discuss and apply several concepts of survival models, estimation procedures of lifetime distributions and Markov models, -use of the Binomial model for mortality confidently, -recognise and evaluate simple assurance and annuity contracts and net premiums, -describe the principles of actuarial modelling, -derive maximum likelihood estimators for the transition intensities in models of transfers between states with piecewise constant transition intensities, and -estimate transition intensities depending on age, exactly or using census approximation.
ACXL	1811	Actuarial Contingencies Summary	The aim of the module is to provide a grounding in the mathematical techniques which can be used to model and evaluate cash-flows dependent on death, survival, or other uncertain risks. Topics include: Life assurance, life annuity contracts, and pension funds, Life tables and commutation functions, Calculation and evaluation of premiums and reserves, With-profit policies, variable-benefit contracts, and two-life annuities, Contingent and reversionary benefits, Profit testing, Competing risks, Multiple decrement tables, Mortality selection.	MAIN	Student will be able to: -recall and compare life assurance contracts and life annuity contracts, -construct, apply and evaluate the life tables, -evaluate assurances and annuities, -calculate net premiums and reserves, and evaluate the results, -calculate variable benefits and with-profit policies, and gross premiums and reserves for fixed- and variable-benefit contracts, -solve and analyse various problems related to simple annuities and assurances involving two lives, -formulate and interpret contingent and reversionary benefits, -construct a profit testing spreadsheet, -solve for reserves, profit and premiums using a profit testing calculation, -recognise and analyse competing risks, -construct and apply multiple decrement tables, -explain the working of pension funds by formulating commutation functions, and -interpret mortality selection and solve standardisation questions.
EBCS	1514	Business Calculations	Business calculations are an introductory module, which enables the students to understand the basic calculation practices used.	MAIN	Student will be able to: - Perform basic mathematical calculations confidently; - Apply mathematical concepts and calculations in the context of economic and management sciences; and - Apply statistical concepts and calculations in the context of economic and management sciences.
EBCS	1524	Business Calculations	Business calculations are an introductory module, which focusses on the organising and describing data, measurement of central tendency and dispersion, basic probability and probability distributions, confidence intervals, hypothesis testing, Chi-squared tests as well as regression - and correlation analysis.	MAIN	Student will be able to: - Apply mathematical concepts and calculations in the context of economic and management sciences; and - Apply statistical concepts and calculations in the context of economic and management sciences.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ECPM	1514	Calculations for Public Managers	Calculations for Public Managers are an introductory module to the field of Public Administration and Management, which enables the students to understand the basic calculation practices used.	MAIN	Student will be able to: - Perform basic mathematical calculations confidently; - Use the Excel computer programme with confidence; - Analyze data by making use of descriptive statistics to make comparisons and draw conclusions; and - Draw conclusions from a set of facts.
EFBC	1514	Business Calculations	In this module the following topics are addressed:Introduction to Statistics ,Organizing and describing data, Measure of central tendency and dispersion, Basic Probability, Discrete Probability distributions,The Normal distributions, Straight lines Exponential lines and Logarithm line and Financial Mathematics	MAIN	Students will be able to: -perform the basic mathematical operations, -calculate the different types of interest and annuities, -calculate and interpret index numbers, -interpret time series graphically and analyse the data to predict future values, -understand what statistics are, -collect data by means of different techniques and design a questionnaire to collect data, and -solve statistical problems: use mathematical calculations, distinguish between different types of data, collect data, make decisions regarding the methods used to collect data, and be familiar with the different steps in the research process.
EFBC	2514	Business Calculations	Business calculations are an introductory module, which enables the students to understand the basic calculation practices used.	QWA	Student will be able to: - Perform basic mathematical calculations confidently; - Apply mathematical concepts and calculations in the context of economic and management sciences; and - Apply statistical concepts and calculations in the context of economic and management sciences.
EFBC	2524	Business Calculations	Business calculations are an introductory module, which focusses on the organising and describing data, measurement of central tendency and dispersion, basic probability and probability distributions, confidence intervals, hypothesis testing, Chi-squared tests as well as regression - and correlation analysis.	QWA	Student will be able to: - Apply mathematical concepts and calculations in the context of economic and management sciences; and - Apply statistical concepts and calculations in the context of economic and management sciences.
ISCI	1624	Introduction to Investment Science	The aim of this module is two-fold: to introduce many basic concepts used in investment science, namely, the time value of money, the workings of financial markets, interest rate risk, risk and return, and security valuation assumptions and procedures; and to introduce the research process for students	MAIN	Student will be able to: - Outline the fundamental concepts and principles; - Recognise that scientific knowledge and understanding are changeable; - Access, evaluate and synthesise scientific information; - Generate scientific information; - Demonstrate key scientific reasoning skills; - Communicate scientific understanding in writing, orally and using visual, symbolic and/or other forms of representation; - Solve scientific problems; - Demonstrate effective Information and Communication Technology (ICT) skills; - Apply scientific knowledge and ways of thinking to societal issues, taking into account ethical and cultural considerations; and - Manage and organise their learning activities responsibly.
ISCI	3714	Investment Science	This module expands on the contents of ATW2 by covering the following topics: Professional code and ethics, and standards of practice; investment valuation practices; complex investment valuation models; portfolio management procedures; introduction to alternative investments; and valuation of alternative investments and inclusion in an investment portfolio.	MAIN	Student will be able to: - explain fundamental concepts and principles of investment science; - Recognise that scientific knowledge and understanding are changeable; - Access, evaluate and synthesise scientific information; - Generate scientific information; - Demonstrate key scientific reasoning skills; - Communicate scientific understanding in writing, orally and using visual, symbolic and/or other forms of representation; - Solve scientific problems; - Demonstrate effective Information and Communication Technology (ICT) skills; - Apply scientific principles and ways of thinking to societal issues, taking into account ethical and cultural considerations; and - Manage and organise their learning activities responsibly.
STSA	1624	Introduction to Statistics II	Introduction to Statistics II	MAIN	

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
STSA	2616	Multiple Regression Analysis and Time Series Analysis	Simple linear regression and correlation; Matrix notation and matrix calculations; Multiple regression, multiple coefficient of determination, nested models, and stepwise regression; PRESS and Mallows' Cp-statistic; Model building with quantitative and qualitative independent variables.	MAIN	Students will be able to: - apply the basic principles of linear regression; -formulate and solve multiple linear regression problems with matrix algebra; -use and interpret computer printouts from statistical analysis packages; -select models by means of stepwise regression, the Cp-statistic and the PRESS statistic; and -build first-order and second-order models with different numbers of quantitative independent variables, build models with different numbers of qualitative independent variables, and build models with both quantitative and qualitative independent variables.
STSA	2626	Multiple Regression: Variance and time series analysis	Tests for influential observations and outliers; Multicollinearity, data transformations, and residual analysis; Time series analysis and forecasting; Autoregression models; Two-factor factorial experi¬ments and more complex factorial designs	MAIN	Students will be able to: -identify and recognise potential problems that might be encountered when constructing a model; -test for influential observations and outliers; -use residuals to detect departures from the model assumptions; -fit time series models to time series data and forecast with time series autoregressive models; -compare mutual treatment averages using multiple comparison procedures; and -analyse data collected from designed experiments and understand the relationship of the analysis of variance to regression analysis.
STSA	3716	Statistical Inference (Applied)	Introduction to probability, probability distributions and probability densities. Mathematical expectation and special probability distributions.	MAIN	Students will be able to: -utilise, manipulate, and compare discrete random variables, probability distributions, continuous random variables, probability density functions, multivariate-, marginal- and conditional distributions; -determine expected values and moments of a random variable; -understand the concepts of moment-generating functions, product moments, moments of linear combinations of random variables, and conditional expectations, and derive and manipulate these functions; and -understand and apply the most prominently occurring probability distributions in statistical theory.
STSA	3726	Applied Regression and Time Series Analysis	Applied Regression and Time Series Analysis	MAIN	
STSA	3732	Applied Statistics I	The aim of this module is to give successful candidates the skills needed to: Be proficient in the use of statistical programming packages such as SAS and R; Program, apply, and evaluate basic statistical methods within a data analysis procedure.	MAIN	Students will be able to: -utilise statistical software packages, such as SAS and R, in order to input, transform, summarise, and visually present univariate and multivariate data; -understand, program, and apply descriptive statistics and basic statistical analysis models (analysis of variance, regression, and hypothesis testing, for example) within the selected statistical software packages; -analyse and interpret the results of the statistical output; and -evaluate the validity of the statistical methods applied, based on the analyses.
STSA	3742	Applied Statistics II	The aim of this module is to give successful candidates the skills needed to: Be proficient in the use of statistical programming packages such as SAS and R; Program, apply, and evaluate both basic and more advanced statistical methods within a data analysis procedure; Create detailed data analysis reports.	MAIN	Students will be able to: -show proficiency in utilising statistical software packages, such as SAS and R; -understand, program, and apply basic and advanced statistical analysis models within the selected statistical software packages; -analyse and interpret the results of the statistical output; -evaluate the validity of the statistical methods applied, based on the analyses; and -create statistical reports on the analysis of a given data set, and the application and evaluation of a statistical method, in a manner simple enough to be understood by the lay person, but technical enough to interest a field expert.
STSL	1514	Introductory Statistics I	This module contains fundamental knowledge, theories, principles and practices of introductory statistics, including: -The organising, graphical presentation and description of data - elementary principles of probability - Discrete probability distributions	MAIN	Student will be able to: - organise data, graphically present data and apply statistical techniques to interpret and analyse the data -perform elementary probability calculations - perform and interpret probability calculations based on various discrete distributions
STSL	1524	Introductory Statistics II	This module contains fundamental knowledge, theories, principles and practices of introductory statistics, including: - Sampling distributions - Confidence intervals and hypothesis testing - Correlation and regression ‘ Contingency tables	MAIN	Student will be able to: -Calculate probabilities for different distributions, determine confidence intervals, and perform hypothesis tests -Determine the relationship between variables, interpret the relationship, and present it graphically -Perform and interpret chi-square tests on contingency tables -Solve statistical problems: follow the steps of the research process, make decisions regarding the statistical methods to be applied, analyse data and make logical conclusions from the results. .

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
STSM	1614	Introductory Statistics	Descriptive statistics; Introduction to probability and probability distributions; Hypotheses testing.	MAIN	Students will be able to: -Recognise and apply the basic principles of statistics; -Create confidence intervals and test hypotheses; and -Solve statistical problems, deciding on the methods to be applied, analysing data, and concluding logically from the results.
STSM	1624	Introductory Probability Theory	Stochastic variables; Distribution theory; Joint-, marginal- and conditional distributions; Expected values.	MAIN	Students will be able to: -Utilise continuous random variables; -Formulate conditional distributions and functions of random variables with joint distributions; -Determine the expected value, variance, covariance and correlation of random variables; and -Solve probability problems by formulating the problems analytically, quantifying available information, manipulating probability models and interpreting results.
STSM	2616	Sample distribution theory and inference	Limit theorems; Chi-Square-, t- and F- distributions; Sampling theory; Estimation of parameters; Properties of good estimates; Basic interval estimation	MAIN	Students will be able to: -Use the central limit theorem; -Construct distributions from the Normal distribution; -Estimate parameters from various other distributions; and -Find basic confidence intervals.
STSM	2626	Inference I	Inference I	MAIN	
STSM	3714	Inference	Theory of hypothesis testing; Derivation of tests and the properties of tests; Approximate tests; Tests for categorical data; Contingency tables; Theory of confidence intervals and the properties of good confidence intervals; Pivotal quantities and the derivation of confidence intervals; Approximate confidence intervals.	MAIN	Students will be able to: -Recognise and recall properties of the standard distributions in statistics; -Perform classical hypothesis testing under a variety of circumstances; -Derive tests and confidence intervals for the parameters of most standard distributions; and -Apply statistical tests and confidence intervals in practice and interpret the results.
STSM	3724	Multivariate Analysis	General principles of matrix theory; Matrix differentiation: Multivariate normal distribution; Wishart distribution; Estimation of parameters; Mean vectors; Hypotheses testing about mean vectors; Multivariate correlation and regression theory.	MAIN	Students will be able to: -Use matrix theory in statistics, -Derive and apply multivariate tests, -Analyse multivariable data and interpret the results, and, -Apply and test multiple regression and correlation.
STSM	3734	Causal inference: ANOVA, regression, and the potential outcomes approach	This module introduces methods for causal inference, including analysis of variance (ANOVA) for designed experiments, regression for observational studies, and the potential outcomes approach that attempts to bridge the divide between the former two methods. 1. ANOVA and design of experiments 2. Simple and multiple regression, including regression diagnostics 3. Basic Bayesian linear regression, multiple imputation, propensity score matching and potential outcomes for causal inference.	MAIN	Students should be able to: -Apply, analyse and interpret one-way and two-way ANOVA for designed experiments and causal inference. -Apply, analyse and interpret simple and multiple linear regression for causal inference and exploratory studies. -Formulate algorithms for implementing Bayesian linear regression, propensity score matching, and sequential Normal regression multiple imputation, and explain how these methods are used for the potential outcomes approach to causal inference. -Discuss the similarities and differences, defend the strengths, and criticise the weaknesses of the ANOVA, regression, and potential outcomes approaches for causal inference.
STSM	3744	Time Series Analysis and GLMs	-Ordinary Least Squares (OLS) regression -Variable and Model Selection using Information Criterion -Generalised Linear Models (GLM) regression -Spectral Analysis of a time series -Analysis of mean and variance to determine stationarity -Time series decomposition -Removal of non-stationarity through transformation -Autocorrelation analyses (multiple types) -Identification and fitting of -Autoregressive and Moving Average time series models -Order of Integration analysis of a time series -Box-Jenkins analysis -Diagnostic analyses	MAIN	Student will be able to: Perform each of the following types of statistical analysis in a thorough and well-reasoned manner: - OLS regression, - variable and model selection using information criteria, - GLM regression, - spectral analysis of a time series, - stationarity and integration order analysis (and removal of stationarity), - time series decomposition, - autocorrelation analyses, - identification and fitting of AR and MA models, - Box-Jenkins analysis, and - diagnostic analyses; +list and test the assumptions underlying each analysis, as well as theoretically justify each action performed; and +report results in both scientific language and layman's terms.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ACSD	7900	Dissertation	Topic is chosen in consultation with the supervisor and department.	MAIN	Students will be able to: - write a dissertation on a topic of interest to the actuarial community; - outline and implement the structure of a dissertation; and - show acquisition of a broad-based understanding of the scope and nature of statistical research by attending research seminars and workshops.
ACSG	6800	Actuarial Asset and Liability Management	The aim of this module is to examine the following actuarial science topics in detail: The actuarial control cycle; Actuarial advice for clients; Cashflow recognition and appropriate investment; Financial risks and credit ratings; Actuarial regulatory environment; Capital investing; Financial planning	MAIN	Students will be able to: - outline how the Actuarial Control Cycle can be applied in a variety of practical commercial situations; - describe the functions of the clients and potential clients that actuaries can and may advise and the types of advice that actuaries might give their clients; - analyse the cashflows of simple financial products, schemes, contracts and transactions, and discuss the need to invest appropriately to provide for benefits on future financial events; - examine credit risk, liquidity risk, and the use of credit ratings; - assess the implications of the regulatory environment in which the business is written for provisioning and capital; - describe how actuarial techniques can be used in the assessment of capital investment projects; and - explain how the results of the monitoring process in the Actuarial Control Cycle are used to update the financial planning in a subsequent period.
ACSG	6890	Introduction to Actuarial Asset and Liability Management	The aim of this module is to introduce the following actuarial science topics: the actuarial control cycle; actuarial advice for clients; cashflow recognition and appropriate investment; financial risks and credit ratings; actuarial regulatory environment; capital investing; and financial planning	MAIN	Student will be able to: -explain how the Actuarial Control Cycle is applied in practice, -describe the advising role of actuaries, - analyse the cashflows of various financial products, and discuss the need to invest appropriately to provide for benefits on future financial events, -outline the concepts of credit risk, liquidity risk, and credit ratings, -assess the implications of the regulatory environment in which the business is written for provisioning and capital, and -describe how actuarial techniques can be used in the assessment of capital investment projects.
ACSG	7900	Actuarial Asset and Liability Management	The aim of this module is to examine the following actuarial science topics in detail: The actuarial control cycle; Actuarial advice for clients; Cashflow recognition and appropriate investment; Financial risks and credit ratings; Actuarial regulatory environment; Capital investing; Financial planning	MAIN	Students will be able to: - apply the Actuarial Control Cycle in a variety of practical commercial situations; - describe the functions of the clients and potential clients that actuaries can and may advise and the types of advice that actuaries might give their clients; - analyse the cashflows of simple financial products, schemes, contracts and transactions, and discuss the need to invest appropriately to provide for benefits on future financial events; - examine credit risk, liquidity risk, and the use of credit ratings; - assess the implications of the regulatory environment in which the business is written for provisioning and capital; - capital investment projects; - explain how the results of the monitoring process in the Actuarial Control Cycle are used to update the financial planning in a subsequent period; and - given a practical situation, select appropriate asset/liability management procedures, implement them (theoretically), and evaluate the possible results.
ACSG	8900	Actuarial Science	This module contains fundamental knowledge, theories, principles and practices of Actuarial Science, including: Research project in specialized field of Actuarial Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments;; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ACSH	7910	Specialist Health Insurance	This module provides an in-depth review of the principal terms in health and care and health economics. The module covers the operating environments in which health and care insurance products and services are traded in South Africa, the role of the state, the techniques used in pricing health care insurance products and management of risks in the health insurance environment	MAIN	Student will be able to: -Explain and discuss the principal terms in health and care and health economics. -Describe the main types of health and care contracts. -Outline and appraise the principles by which health and care insurance contracts are designed and the interests of the various stakeholders in the process. -Compare how health and care insurance products and services are traded in the context of different operating environments, including the role of the State. -Apply the techniques used in pricing health care insurance products and modelling. -Analyse and discuss the management of risk by health care insurers. -Explain the assumptions, purposes and practices in pricing and valuation. -Interpret the principles of investment underpinning health and care insurance. -Establish refocused business plans according to the principles describing how a health insurance operation uses experience.
ACSH	7920	Specialist Health Insurance	This module provides an in-depth review of the principal terms in health and care and health economics. The module covers the operating environments in which health and care insurance products and services are traded in South Africa, the role of the state, the techniques used in pricing health care insurance products and management of risks in the health insurance environment	MAIN	Student will be able to: -Discuss the principal terms in health and care and health economics. -Describe the main types of health and care contracts. -Outline and appraise the principles by which health and care insurance contracts are designed and the interests of the various stakeholders in the process. -Compare how health and care insurance products and services are traded in the context of different operating environments, including the role of the State. -Apply the techniques used in pricing health care insurance products and modelling. -Analyse and discuss the management of risk by health care insurers. -Explain the assumptions, purposes and practices in pricing and valuation. -Interpret the principles of investment underpinning health and care insurance. -Establish refocused business plans according to the principles describing how a health insurance operation uses experience.
ACSI	7910	Specialist Investments	This module covers actuarial techniques that may be used to develop an appropriate investment strategy, including taxation, the commercial and economic environment, and the application of methods for the valuation of individual investments. The use of the main types of derivative contracts, how they are traded, and their payoffs, are considered in detail. Analysis of the performance of an investment portfolio and discussion of the limitations of such portfolio measurements are also covered.	MAIN	Student will be able to: - State what is meant by a risk-free rate of return, and describe or select assets that may be assumed to be risk-free in practical work. -Describe the typical ways in which investment returns are taxed and the effect of the taxation basis on investor behaviour. - Analyse the influences of the commercial and economic environment. -Discuss the principles of fundamental share analysis. -Apply appropriate methods for the valuation of individual investments in different situations. -Develop plans through which an institution can monitor and control its exposure to risk. -Outline the principles underlying the legislative and regulatory framework for investment management and the securities industry. -Summarise the theory of finance and the characteristics of specialist financial instruments. -Describe the main types of derivative contract and how they are traded, and formulate their payoffs. -Use actuarial techniques to develop an appropriate investment strategy. -Analyse the performance of an investment and discuss the limitations of performance measurement techniques. -Explain the principal techniques in portfolio management including risk control techniques.
ACSI	7920	Specialist Investments	This module covers actuarial techniques that may be used to develop an appropriate investment strategy, including taxation, the commercial and economic environment, and the application of methods for the valuation of individual investments. The use of the main types of derivative contracts, how they are traded, and their payoffs, are considered in detail. Analysis of the performance of an investment portfolio and discussion of the limitations of such portfolio measurements are also covered.	MAIN	Student will be able to: - State what is meant by a risk-free rate of return, and describe or select assets that may be assumed to be risk-free in practical work. -Describe the typical ways in which investment returns are taxed and the effect of the taxation basis on investor behaviour. -Analyse the influences of the commercial and economic environment. -Discuss the principles of fundamental share analysis. -Apply appropriate methods for the valuation of individual investments in different situations. -Develop plans through which an institution can monitor and control its exposure to risk. -Outline the principles underlying the legislative and regulatory framework for investment management and the securities industry. -Summarise the theory of finance and the characteristics of specialist financial instruments. -Describe the main types of derivative contract and how they are traded, and formulate their payoffs. -Use actuarial techniques to develop an appropriate investment strategy. -Analyse the performance of an investment and discuss the limitations of performance measurement techniques. -Explain the principal techniques in portfolio management including risk control techniques.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ACSL	6815	Actuarial Contingencies	The aim of the module is to provide a grounding in the mathematical techniques which can be used to model and evaluate cash-flows dependent on death, survival, or other uncertain risks. Topics include: Life assurance, life annuity contracts, and pension funds; Life tables and commutation functions; Calculation and evaluation of premiums and reserves; With-profit policies, variable-benefit contracts, and two-life annuities; Contingent and reversionary benefits; Profit testing; Competing risks; Multiple decrement tables; Mortality selection	MAIN	Students will be able to: - recall and compare life assurance contracts and life annuity contracts; - construct, apply and evaluate the life tables; - evaluate assurances and annuities; - calculate net premiums and reserves, and evaluate the results; - calculate variable benefits and with-profit policies, and gross premiums and reserves for fixed- and variable-benefit contracts; - solve and analyse various problems related to simple annuities and assurances involving two lives; - formulate and interpret contingent and reversionary benefits; - construct a profit testing spreadsheet; - solve for reserves, profit and premiums using a profit testing calculation; - recognise and analyse competing risks; - construct and apply multiple decrement tables; - explain the working of pension funds by formulating commutation functions; and - interpret mortality selection and solve standardisation questions.
ACSL	7910	Specialist Life Insurance	The main types of life insurance, long term care insurance, critical illness and income protection products are studied in detail within this module. The module provides for the understanding of the general business environment, including the impact on levels of risks to the insurer, and how these could be managed. The principles of setting assumptions for pricing and valuing life insurance contracts and setting and investing supervisory reserves are covered, together with the monitoring and assessment of relevant experience within the business environment.	MAIN	Student will be able to: -Define the principal terms used in life insurance. -Describe the main types of life insurance, long term care insurance, critical illness and income protection products. -Explain the methods of distributing profits to with profits policyholders. -Employ the technique of asset shares; construct asset shares using recursive formulae; and explain the main uses of asset shares. -Examine risk management in life insurance. -Use actuarial models, including multi-state models, stochastic models and Monte Carlo simulation, for decision making purposes in life insurance. -Evaluate the cost of guarantees and options. -Determine discontinuance and alteration terms for without profits contracts, and calculate the benefits on the early termination or alteration of a contract. -Design and price life insurance products according to the applicable principles. -Determine supervisory reserves for a life insurance company. -Describe the principles of investment and apply them to a life insurance company. -Prepare monitoring and assessment plans for actual experience of a life insurance company.
ACSL	7920	Specialist Life Insurance	The main types of life insurance, long term care insurance, critical illness and income protection products are studied in detail within this module. The module provides for the understanding of the general business environment, including the impact on levels of risks to the insurer, and how these could be managed. The principles of setting assumptions for pricing and valuing life insurance contracts and setting and investing supervisory reserves are covered, together with the monitoring and assessment of relevant experience within the business environment	MAIN	Student will be able to: -Define the principal terms used in life insurance. -Describe the main types of life insurance, long term care insurance, critical illness and income protection products. - Explain the methods of distributing profits to with profits policyholders. -Employ the technique of asset shares; construct asset shares using recursive formulae; and explain the main uses of asset shares. -Examine risk management in life insurance. -Use actuarial models, including multi-state models, stochastic models and Monte Carlo simulation, for decision making purposes in life insurance. -Evaluate the cost of guarantees and options. -Determine discontinuance and alteration terms for without profits contracts, and calculate the benefits on the early termination or alteration of a contract. -Design and price life insurance products according to the applicable principles. -Determine supervisory reserves for a life insurance company. -Describe the principles of investment and apply them to a life insurance company. -Prepare monitoring and assessment plans for actual experience of a life insurance company.
ACSR	6808	Actuarial Modelling and Literature Study	Topic is chosen in consultation with the supervisor and department.	MAIN	Students will be able to: - write and present a short research essay on a topic of interest to the statistical community; - outline and implement the structure of a dissertation; and - show acquisition of a broad-based understanding of the scope and nature of statistical research by attending research seminars and workshops.
ACSR	7900	Short Dissertation	Topic is chosen in consultation with the supervisor and department.	MAIN	Students will be able to: - write a short dissertation on a topic of interest to the actuarial community; - outline and implement the structure of a dissertation; and - show acquisition of a broad-based understanding of the scope and nature of statistical research by attending research seminars and workshops.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ACST	8900	Actuarial Science	This module contains fundamental knowledge, theories, principles and practices of Actuarial Science, including: Research project in specialized field of Actuarial Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments;; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ACST	9100	Actuarial Sciences Thesis	This module contains fundamental knowledge, theories, principles and practices of Actuarial Sciences, General including Research project in specialized field of Actuarial Sciences, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Students will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format);and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
RSAN	8900	Risk Analysis Dissertation	This module contains fundamental knowledge, theories, principles and practices of Risk Analysis , including: Research project in specialized field of Risk Analysis as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
RSAN	9100	Risk Analysis Thesis	This module contains fundamental knowledge, theories, principles and practices of Risk Analysis, General including Research project in specialized field of Risk Analysis, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
STSA	6815	Multivariate Methods	This module aims to provide students with a grounding in several multivariate analysis methods, with a focus on the interpretation of analysis results. Methods include: Summarising multivariate data Testing for univariate and multivariate Normality Mean and covariance testing, including profile analysis and growth curve analysis Discriminant analysis and classification Cluster analysis Canonical correlation analysis, principal component analysis and factor analysis Multidimensional scaling, correspondence analysis and multiple correspondence analysis	MAIN	Student will be able to: -summarise multivariate data, -test for univariate and multivariate Normality in data, -perform a variety of mean and covariance tests on multivariate data, and interpret the results, -analyse discriminant functions, -apply linear, quadratic, or k-nearest neighbour classification, -cluster multivariate data according to a hierarchical classification method or the k-means criterion, -perform canonical correlation analysis and interpret the results, -perform principal component analysis and interpret the results, selecting appropriate components in the process, -perform factor analysis and interpret the results, selecting appropriate factors, and possibly rotating the results in the process, -apply and interpret multidimensional scaling, correspondence analysis and multiple correspondence analysis, and -comprehend the assumptions and procedures behind any of the above multivariate analysis methods.
STSA	6825	Data Mining	This module encompasses the basic data mining techniques incorporated into SAS Enterprise Miner, accessing and assaying prepared data, Decision trees, Regressions, Neural Networks, Model Assessment, Model Implementation	MAIN	Students will be able to: -write an extended research dissertation on a topic of interest to the statistical community, -outline and implement the structure of a dissertation, and -acquire a broad-based understanding of the scope and nature of statistical research by attending research seminars and workshops.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
STSA	7910	Multivariate Methods	This module aims to provide students with a grounding in several multivariate analysis methods, with a focus on the interpretation of analysis results. Comparison of methods is also important in the module. Methods include: 1. Summarising multivariate data 2. Testing for univariate and multivariate Normality 3. Mean and covariance testing, including profile analysis and growth curve analysis 4. Discriminant analysis and classification 5. Cluster analysis 6. Canonical correlation analysis, principal component analysis and factor analysis 7. Multidimension scaling, correspondence analysis and multiple correspondence analysis	MAIN	Student will be able to: -summarise multivariate data, -test for univariate and multivariate Normality in data, -perform a variety of mean and covariance tests on multivariate data, and interpret the results, -analyse discriminant functions , -apply linear, quadratic, or k-nearest neighbour classification, -cluster multivariate data according to a hierarchical classification method or the k-means criterion, -perform canonical correlation analysis and interpret the results, -perform principal component analysis and interpret the results, selecting appropriate components in the process, -perform factor analysis and interpret the results, selecting appropriate factors, and possibly rotating the results in the process, -apply and interpret multidimensional scaling, correspondence analysis and multiple correspondence analysis, -comprehend the assumptions and procedures behind any of the above multivariate analysis -compare any set of the above multivariate analysis methods.
STSA	8900	Statistics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Statistics , including: Research project in specialized field of Statistics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
STSA	9100	Statistics Thesis	This module contains fundamental knowledge, theories, principles and practices of Statistics, General including Research project in specialized field of Statistics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
STSB	6810	Bayes Analysis	In this course the Bayesian paradigm is studied: Bayesian analysis in simple and multiple regression; Derivation of probability-matching and reference priors; Derivation of posterior distributions and predictive densities in regression analysis; Monte Carlo simulations and Gibbs sampling; Credibility theory used in Actuarial Science; Derivation of the posterior distributions in the case of the Bühlman-Straub model, Jewell's hierarchical model, Cross-classification models, De Vylders IBNR model and Hachemeister's regression model	MAIN	Students will be able to: -apply the Bayesian regression theory it to real problems; -derive prior, posterior and predictive densities in the case of the linear model; -use the Bayesian approach to formulate the credibility premiums for standard models; and -construct the posteriors and predictive densities for complicated numerical problems using Markov Chain Monte Carlo procedures.
STSB	7910	Bayes Analysis	In this course the Bayesian paradigm is studied: Bayesian analysis in simple and multiple regression; Derivation of probability-matching and reference priors; Derivation of posterior distributions and predictive densities in regression analysis; Monte Carlo simulations and Gibbs sampling; Credibility theory used in Actuarial Science; Derivation of the posterior distributions in the case of the Bühlman-Straub model, Jewell's hierarchical model, Cross-classification models, De Vylders IBNR model and Hachemeister's regression model; Capability analysis	MAIN	Students will be able to: -apply Bayesian regression theory and apply it to real problems, -derive prior, posterior and predictive densities in the case of the linear model, -use the Bayesian approach to formulate the credibility premiums for standard models, and -construct the posteriors and predictive densities for complicated numerical problems using Markov Chain Monte Carlo procedures.
STSC	6825	Categorical Data Analysis	Categorical data Statistical inference for a single proportion 2x2 tables Stratified 2x2 tables Stratified 2xr and sx2 tables Stratified sxr tables	MAIN	Student will be able to: - apply and discuss tests of association in contingency tables, - examine and apply principles of tests of association in stratified contingency tables, - define risk measures in 2x2 tables, - calculate point and interval estimation for risk measure, - distinguish between binary, nominal and ordinal categorical data, - select the appropriate test of association for ordinal versus nominal categorical data, - reflect on the merits of alternative model formulations for relevant data sets, - apply concepts of categorical data analysis in practice, - analyse relevant data sets by using the SAS software package (SAS Proc Freq), - interpret analysis results based on relevant computer output from SAS Proc Freq, - discuss analysis results, and - draw appropriate conclusions from categorical data analyses

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
STSD	7900	Mini Dissertation	Topic is chosen in consultation with the supervisor and department.	MAIN	Students must be able to -write a dissertation on a topic of interest to the statistical community, -outline and implement the structure of a dissertation, and -rule on the scope and nature of statistical research by attending research seminars and workshops.
STSE	6815	Modelling Extremal Events	Modelling Extremal Events -Introduction on Extremes -Tools for analysing data containing Extremes -Tail estimation under Pareto type models -Tail estimation for all maximal domains of attraction -Bayesian prediction on high quantiles	MAIN	Student will be able to -explain and discuss the notion of Extremes, -apply tools for analysing data containing extremes, -model such data and perform goodness of fit tests, -estimate the Extreme Value Index (EVI), -estimate tail probabilities and high quantiles, -predict high quantiles using a Bayesian approach, and -perform analyses and simulations through MATLAB.
STSE	6825	Modelling Extremal Events	Modelling Extremal Events -Introduction on Extremes -Tools for analysing data containing Extremes -Tail estimation under Pareto type models -Tail estimation for all maximal domains of attraction -Bayesian prediction on high quantiles	MAIN	Student will be able to -explain and discuss the notion of Extremes, -apply tools for analysing data containing extremes, -model such data and perform goodness of fit tests, -estimate the Extreme Value Index (EVI), -estimate tail probabilities and high quantiles, -predict high quantiles using a Bayesian approach, and -perform analyses and simulations through MATLAB.
STSE	7910	Modelling Extreme Events	Introduction on Extremes Tools for analysing data containing Extremes Tail estimation under Pareto type models Tail estimation for all maximal domains of attraction Bayesian prediction on high quintiles	MAIN	Student will be able to: -examine and discuss the notion of Extremes -apply tools for analysing data containing extremes -model such data and perform goodness of fit tests -estimate the Extreme Value Index (EVI) -estimate tail probabilities and high quantiles -predict high quantiles using a Bayesian approach -perform analyses and simulations through Matlab, and -given a project, select appropriate extreme value analysis procedures, defend these choices, program the processes and evaluate the simulations.
STSE	7920	Modelling Extreme Events	Introduction on Extremes Tools for analysing data containing Extremes Tail estimation under Pareto type models Tail estimation for all maximal domains of attraction Bayesian prediction on high quintiles	MAIN	Student will be able to: -examine and discuss the notion of Extremes -apply tools for analysing data containing extremes -model such data and perform goodness of fit tests -estimate the Extreme Value Index (EVI) -estimate tail probabilities and high quantiles -predict high quantiles using a Bayesian approach -perform analyses and simulations through Matlab, and -given a project, select appropriate extreme value analysis procedures, defend these choices, program the processes and evaluate the simulations.
STSF	6815	Financial Times Series	Financial Times Series Autocorrelation: The nature and detection of autocorrelation, estimation in the presence of autocorrelation. Remedial measures in regression problems. Dynamic Models: Autoregressive and Distributed-Lag Models The role and reasons for lags in Economics. Estimation of Distributed-Lag Models: Ad hoc estimation, the Koyck and the Almon approach. Causality Stationarity, Unit Roots and Cointegration: Stationary Stochastic Processes, White Noise, Linear Time Series, Unit Root tests and Random walks. Tests based on the correlogram. Cointegration and the Engle-Granger test. Forecasting with ARIMA and VAR models: Approaches to Forecasting. AR, MA, ARMA and ARIMA models and the Box-Jenkins Methodology. Conditional Heteroscedastic Models: Financial Time Series and Their Characteristics. ARCH and GARCH Models, Integrated and Exponential Garch Models, Garch-M and Stochastic Volatility Models.	MAIN	Student will be able to: -discuss different types of stochastic processes and compare the corresponding assumptions defining these processes, -analyse the homogeneous and non-homogeneous Poisson processes, distributions for inter-arrival and waiting times, and apply the theory to the train depot example, -define and analyse renewal processes, alternating renewal, processes, renewal-type processes with quality functions, -prove the main theorems of renewal theory and apply them to obtaining reliability characteristics of repairable systems, -outline and utilise Markov chains with discrete and continuous time, -implement the Markov chain approach to redundant repairable systems with exponential distributions of lifetimes of components, -consider the birth and death processes and justify the transition probabilities for this case, -justify Kolmogorovs forward equations and apply these equations to the two-state Markov chain, -define and analyse standard Brownian motion and Brownian motion with drift, and -point out and compare different stochastic orders (ordinary stochastic order with failure rate ordering and with likelihood ratio ordering).

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
STSF	6825	Risk Analysis	Risk Analysis An introduction to risk analysis An overview of financial risks An in-depth look into the statistical tools needed to apply risk analysis in the banking, investment and insurance industries, including: Frequency functions Loss distributions Alpha-stable distributions Extreme value theory Value-at-Risk Robust statistics Dependence modelling	MAIN	Student will be able to: - discuss the historical development of risk analysis and the effect of globalisation on risk exposures, - compare the various types of risks encountered in the financial world, - criticise or defend the Basel Capital Accord and its implementation, - reconstruct and apply the statistical techniques often utilised in risk analysis: frequency functions, loss distributions, alpha-stable distributions, and extreme value theory, - evaluate the Value-at-Risk measure, and - examine various risk analysis complications and how to solve them: robust statistics and modelling of dependence.
STSF	6845	Econometrics	Principles of Bayesian Analysis with Selected Applications; Basic ideas and principles of Bayesian analysis, point estimation, some large sample properties; The Univariate Normal Linear Regression Model; Simple and multiple regression, posterior and predictive density functions with diffuse and proper priors; Special Problems in Regression Analysis; Autocorrelation errors, unequal variances and regression with data from more than one source. Analysis of Single Equation Nonlinear Models: The Box-Cox family of transformations, Constant Elasticity of Substitution and Generalised Production Functions; Time Series Models: Some Selected Examples; First and second order normal autoregressive processes; Distributed Lag Models and the application to consumption functions.	MAIN	Student will be able to: -Examine and discuss principles of Econometrics.
STSF	7910	Financial Time Series	Autocorrelation: The nature and detection of autocorrelation, estimation in the presence of autocorrelation. Remedial measures in regression problems. Dynamic Models: Autoregressive and Distributed-Lag Models -The role and reasons for lags in Economics. Estimation of Distributed-Lag -Models: Ad hoc estimation, the Koyck and the Almon approach. Causality -Stationarity, Unit Roots and Cointegration: -Stationary Stochastic Processes, White Noise, Linear Time Series, Unit Root tests and Random walks. Tests based on the correlogram. -Cointegration and the Engle-Granger test. -Forecasting with ARIMA and VAR models: Approaches to Forecasting. AR, MA, ARMA and ARIMA models and the Box-Jenkins Methodology. -Conditional Heteroscedastic Models: Financial Time Series and Their Characteristics. ARCH and GARCH Models, Integrated and Exponential Garch Models, Garch-M and Stochastic Volatility Models.	MAIN	Student will be able to: - examine the concepts, terminology, definitions and models commonly encountered in time series, - identify and test for specific models and recognise possible complications, - investigate causality and create distributed lag models using explanatory variables, - create models for general time series, estimate parameters, analyse the models and perform forecasting, - design models of volatility by using ARIMA and GARCH methodology, and - distinguish between the models available in time series analysis for a particular context, select appropriate models, apply these choices, analyse the selected model outputs, and evaluate the procedures applied as a set of related systems.
STSF	7920	Risk Analysis	An introduction to risk analysis An overview of financial risks An in-depth look into the statistical tools needed to apply risk analysis in the banking, investment and insurance industries, including: Frequency functions Loss distributions Alpha-stable distributions Extreme value theory Value-at-Risk Robust statistics Dependence modelling	MAIN	Student will be able to: -discuss the historical development of risk analysis and the effect of globalisation on risk exposures, -compare the various types of risks encountered in the financial world, -criticise or defend the Basel Capital Accord and its implementation, -reconstruct and apply the statistical techniques often utilised in risk analysis: frequency functions, loss distributions, alpha-stable distributions, and extreme value theory, -evaluate the Value-at-Risk measure, -examine various risk analysis complications and how to solve them: robust statistics and modelling of dependence, and -given a practical example, identify and analyse the risks involved, and defend measures to manage these risks.
STSF	7940	Econometrics	Principles of Bayesian Analysis with Selected Applications: Basic ideas an of principles Of Bayesian analysis, point estimation, some large sample properties. The Univariate Normal Linear Regression Model: Simple and multiple regression, posterior and predictive density functions with diffuse and proper priors. -Special Problems in Regression Analysis: Autocorrelation errors, unequal variances and regression with data from more than one source. -Analysis of Single Equation Nonlinear Models: The Box-Cox family of transformations, Constant Elasticity of Substitution and Generalised Production Functions. Time Series Models: Some Selected Examples. First and second order normal autoregressive processes, Distributed Lag Models and the application to consumption functions.	MAIN	Student will be able to: - examine the basic concepts and principles of Bayesian analysis, - identify the correct models for some of the important regression and time series problems commonly encountered in Econometrics, - formulate the likelihood function and Bayesian formulation for these problems, - analyse, create and interpret Bayesian posterior density functions and perform estimation of parameters, - create and analyse nonlinear Bayesian production functions, and - given a practical example, defend the appropriate Bayesian analysis procedures, perform the applicable derivations and calculations, and analyse the results.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
STSM	6815	Regression Analysis	Review of simple regression, multiple regression and matrix algebra, analysis of variance and quadratic development. Theoretical aspects of multiple regression and model building. Variable selection, polynomial regression, influential observations, outliers and residual analysis.	MAIN	Students will be able to: -display knowledge of the application of matrix algebra and theoretical aspects of multiple regression; -understand and apply least squares theory ‘ the most commonly used statistical procedure for estimating the parameters of a regression model; -formulate multiple regression problems, solve them using matrix algebra, and evaluate the results; and -analyse output from computer packages and printouts and the ability to analyse and interpret the results.
STSM	6825	Generalised Linear Models	Generalising the linear model; Estimation; Inference; Binary data and logistic regression; Poisson regression and log-linear models; Data with constant coefficient of variation	MAIN	Students will be able to: -discuss and explain the theory of generalised linear models; -formulate models with the appropriate choice of error distribution, link function and variance function for particular data sets; -reflect on the merits of alternative model formulations for relevant data sets; -compare generalised linear models, linear models and contingency table methods; -demonstrate knowledge of maximum likelihood (ML) estimation for generalised linear models; -perform hypothesis testing and interval estimation in generalised models; -apply and analyse goodness of fit statistics for generalised linear models; -evaluate relevant data sets by fitting generalised linear models using the SAS software package (SAS Proc Genmod); -interpret results of analyses and evaluations based on relevant computer output from SAS Proc Genmod; and -draw appropriate conclusions from analyses of relevant data sets using generalised linear models.
STSM	6845	Mixed Linear Models	Normal Mixed Models: Basics, definition, estimation, significance tests and confidence intervals. Multi-centre trials: Introduction, implications of different analysis models, practical application and interpretation, meta-analysis. Repeated measures data: Introduction, covariance pattern models, random coefficients models	MAIN	Students will be able to: -Ddemonstrate knowledge of the theory of linear mixed models, -Ddemonstrates knowledge of maximum likelihood (ML) and residual ML estimation for normal mixed models, -Perform and interpret hypothesis testing and interval estimation in normal mixed models, -Formulate appropriate linear mixed models, -choose appropriate fixed effects, random effects and covariance patterns for given data sets, -Reflect on the merits of alternative model formulations for relevant data sets, -Aapply mixed model theory in practice, - analyse relevant data sets by fitting linear mixed models using the SAS software package (SAS Proc Mixed), -interpret analysis results based on relevant computer output from SAS Proc Mixed, -Ddiscuss analysis results, and -Draw appropriate conclusions from mixed model analyses.
STSM	7920	Generalised Linear Models	Generalising the linear model Estimation Inference Binary data and logistic regression Poisson regression and log-linear models Data with constant coefficient of variation	MAIN	Student will be able to: -examine the theory of generalised linear models, -formulate models with the appropriate choice of error distribution, link function and variance function for particular data sets, -reflect on the merits of alternative model formulations for relevant data sets, -compare generalised linear models, linear models and contingency table methods, -examine and discuss maximum likelihood (ML) estimation for generalised linear models, -perform hypothesis testing and interval estimation in generalised models, -apply and analyse goodness of fit statistics for generalised linear models, -evaluate relevant data sets by fitting generalised linear models using the SAS software package (SAS Proc Genmod), and -interpret results of analyses and evaluations based on relevant.
STSM	7940	Mixed Linear Models	Normal Mixed Models: Basics, definition, estimation, significance tests and confidence intervals Multi-centre trials: Introduction, implications of different analysis models, practical application and interpretation, meta-analysis Repeated measures data: Introduction, covariance pattern models, random coefficients models	MAIN	Student will be able to: - Examine the theory of linear mixed models, - Outline maximum likelihood (ML) and residual ML estimation for normal mixed models, - Perform and interpret hypothesis testing and interval estimation in normal mixed models, - Formulate appropriate linear mixed models, - Choose appropriate fixed effects, random effects and covariance patterns for given data sets, - Reflect on the merits of alternative model formulations for relevant data sets, - Apply mixed model theory in practice, - Analyse relevant data sets by fitting linear mixed models using the SAS software package (SAS Proc Mixed), - Interpret analysis results based on relevant computer output from SAS Proc Mixed, - Discuss analysis results, - Draw appropriate conclusions from mixed model analyses, and - Display an in-depth knowledge of the module content and apply and analyse the appropriate linear mixed model procedures efficiently.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
STSM	8900	Mathematical Statistics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Mathematical Statistics , including: Research project in specialized field of Mathematical Statistics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
STSM	9100	Mathematical Statistics Thesis	This module contains fundamental knowledge, theories, principles and practices of Mathematical Statistics, General including Research project in specialized field of Mathematical Statistics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
STSP	6815	Stochastic Processes	This course deals with the theory and applications of stochastic processes. The main topics that are covered are: Preliminaries and necessary facts from probability theory; Poisson processes; Generalisations of Poisson processes; Renewal processes; Discrete and continuous Markov chains; Brownian motion and other processes with independent increments; Martingales; Stochastic ordering. The main applications and examples are from reliability and electrical engineering, demography and actuarial science.	MAIN	Student will be able to: -Examine fundamental concepts and principles. -Recognise that scientific knowledge and understanding are changeable. - Access, evaluate and synthesise scientific information. -Generate scientific information. Prove scientific reasoning skills. -Communicate scientific understanding in writing, orally and using visual, symbolic and/or other forms of representation. -Solve scientific problems. -manage and organise their learning activities responsibly.
STSP	6825	Statistical Programming	Statistical Programming Importing and exporting of data. Data preparation and cleaning using Microsoft Excel and VBA. SAS IML (Integrated Matrix Language). MATLAB Statistics Toolbox. R (Open Source) Statistical programming.	MAIN	Student will be able to: -Manipulate data efficiently and effectively and prepare data for statistical analysis, -Describe the different forms of missing data and the methods used to deal with the problem of missing values, -Program a variety of univariate and multivariate hypothesis tests as well as test the assumptions that underpin these tests, -Implement and apply a variety of statistical models to real data sets, -Report results in both formal terms and layman's terms, and -Use multiple statistical programming platforms, including R, MATLAB, and VBA. -Implement basic Bayesian models.
STSP	7910	Stochastic Processes	This course deals with the theory and applications of stochastic processes. The main topics that are covered are: Preliminaries and necessary facts from probability theory; Poisson processes; Generalisations of Poisson processes; Renewal processes; Discrete and continuous Markov chains; Brownian motion and other processes with independent increments; Martingales; Stochastic ordering. The main applications and examples are from reliability and electrical engineering, demography and actuarial science.	MAIN	Students will be able to: -Discuss different types of stochastic processes and compare the corresponding assumptions defining these processes, -Analyse the homogeneous and non-homogeneous Poisson processes, distributions for inter-arrival and waiting times, and apply the theory to the train depot example, -Define and analyse renewal processes, alternating renewal, processes, renewal-type processes with quality functions, -Prove the main theorems of renewal theory and apply them to obtaining reliability characteristics of repairable systems, -Outline and utilise Markov chains with discrete and continuous time, -Implement the Markov chain approach to redundant repairable systems with exponential distributions of lifetimes of components, -Consider the birth and death processes and justify the transition probabilities for this case, -Justify Kolmogorov's forward equations and apply these equations to the two-state Markov chain, -Define and analyse standard Brownian motion and Brownian motion with drift, and -Point out and compare different stochastic orders (ordinary stochastic order with failure rate ordering and with likelihood ratio ordering).

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
STSP	7920	Statistical Programming	Importing and exporting of data: Data preparation and cleaning using Microsoft Excel and VBA, SAS IML (Integrated Matrix Language). MATLAB Statistics Toolbox, R (Open Source) statistical programming.	MAIN	Students will be able to: -discuss different types of stochastic processes and compare the corresponding assumptions defining these processes, -analyse the homogeneous and non-homogeneous Poisson processes, distributions for inter-arrival and waiting times, and apply the theory to the train depot example, -define and analyse renewal processes, alternating renewal, processes, renewal-type processes with quality functions, -prove the main theorems of renewal theory and apply them to obtaining reliability characteristics of repairable systems, -outline and utilise Markov chains with discrete and continuous time, -implement the Markov chain approach to redundant repairable systems with exponential distributions of lifetimes of components, -consider the birth and death processes and justify the transition probabilities for this case, -justify Kolmogorovs forward equations and apply these equations to the two-state Markov chain, -define and analyse standard Brownian motion and Brownian motion with drift, and point out and compare different stochastic orders (ordinary stochastic order with failure rate ordering and with likelihood ratio ordering).
STSR	6808	Statistical Modelling en Literature Study	Statistical Modelling and Literature Study Topic is chosen in consultation with the supervisor and department.	MAIN	Students should be able to: - write a short research essay on a topic of interest to the statistical community, - outline and implement the structure of a dissertation, and - acquire a broad-based understanding of the scope and nature of statistical research by attending research seminars and workshops.
STSR	6825	Reliability and Survival Analysis	Reliability and Survival Analysishis course deals with applications of stochastic processes to reliability and survival analysis. It is a continuation of the Stochastic Processes module and focuses on more specific stochastic models. The main topics that are covered are: Failure rates for lifetime distributions. The shape of the failure rate. Demographic and reliability applications. The mean remaining lifetime basics. Exponential representation for univariate and bivariate absolutely continuous distribution functions. Mixture failure rate. Limiting behaviour of mixture failure rates. Advanced renewal processes theory. The main applications and examples are from reliability and electrical engineering, demography and actuarial science.	MAIN	Student will be able to: -Outline the basic and advanced properties of the failure rate in a general setting and analyse it for the main lifetime distributions, -Outline the basic and advanced properties of the mean remaining lifetime in a general setting and analyse it for the main lifetime distributions, -Analyse the shape of the failure rate and compare the shapes for different distributions, -Formulate assumptions and justify fundamental theorems describing the mixture failure rate for discrete and continuous cases, -Outline asymptotic properties of mixture failure rates and show that they depend only on the initial behaviour of a mixing distribution, -Apply the developed theory of asymptotic mixture failure rates to engineering and demographic settings, -Point out and compare different approaches to modelling heterogeneity, -Formulate assumptions and describe different classes of renewal-type processes, -Analyse geometric processes and verify their main properties, and -Compare asymptotic behaviour of renewal and geometric processes.
STSR	7900	Mini-dissertation	Topic is chosen in consultation with the supervisor and department.	MAIN	Student will be able to: - write a short research essay on a topic of interest to the statistical community, - outline and implement the structure of a mini-dissertation, and - acquire a broad-based understanding of the scope and nature of statistical research by attending research seminars and workshops.
STSR	7920	Reliability and Survival Analysis	This course deals with applications of stochastic processes to reliability and survival analysis. It is a continuation of the Stochastic Processes module and focuses on more specific stochastic models. The main topics that are covered are: 1.Failure rates for lifetime distributions. 2.The shape of the failure rate. 3.Demographic and reliability applications. 4.The mean remaining lifetime basics. 5.Exponential representation for univariate and bivariate absolutely continuous distribution functions. 6.Mixture failure rate. 7.Limiting behaviour of mixture failure rates. 8.Advanced renewal processes theory. The main applications and examples are from reliability and electrical engineering, demography and actuarial science.	MAIN	Student will be able to: -Examine an apply advanced properties of the failure rate in a general setting and analyse it for the main lifetime distributions, -Examine and apply advanced properties of the mean remaining lifetime in a general setting and analyse it for the main lifetime distributions, -Analyse the shape of the failure rate and compare the shapes for different distributions, -Formulate assumptions and justify fundamental theorems describing the mixture failure rate for discrete and continuous cases, -Outline asymptotic properties of mixture failure rate and show that they depend only on the initial behaviour of a mixing distribution, -Apply the developed theory of asymptotic mixture failure rates to engineering and demographic settings, -Identify and compare different approaches to modelling heterogeneity, -Formulate assumptions and describe different classes of renewal-type processes, -Analyse geometric processes and verify their main properties, and -Compare asymptotic behaviour of renewal and geometric processes.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
STSS	6810	Stochastic Simulation	Stochastic Simulation Introduction to stochastic simulation Inverse theorem for continuous and discrete cases Simulating from discrete distributions Simulating from continuous distributions Goodness of fit criteria Acceptance-rejection method Other Monte Carlo methods especially in the Bayesian field	MAIN	Student will be able to: -Generate data from any continuous or discrete distributions, -Inspect the goodness of fit of the simulations, -Analyse the simulated data on compare inferences with the true values, -Apply different Monte Carlo simulation methods, -Perform simulations through MATLAB programming, and -Recognise good simulations
STSS	6815	Stochastic Simulation	Stochastic Simulation Introduction to stochastic simulation Inverse theorem for continuous and discrete cases Simulating from discrete distributions Simulating from continuous distributions Goodness of fit criteria Acceptance-rejection method Other Monte Carlo methods especially in the Bayesian field	MAIN	Student will be able to: -Generate data from any continuous or discrete distributions, -Inspect the goodness of fit of the simulations, -Analyse the simulated data on compare inferences with the true values, -Apply different Monte Carlo simulation methods, -Perform simulations through MATLAB programming, and -Recognise good simulations
STSS	6825	Sampling Techniques	This course deals with the theory and applications of sampling. The main topics that are covered are: 1.Probability sampling techniques: simple random, stratified, systematic, cluster and complex. 2.Sample size and designing a sample. 3.Estimation of means, totals, proportions and their variances. 4.Weighting of survey data. 5.Dealing with non-response. 6.Statistical inference for survey data.	MAIN	Students should be able to: -Know the theory and usage of probability sampling techniques and be able to apply it to real problems. -Prove the main theorems of sampling. -Derive formulae for estimators, the variance of the estimators and apply them to survey data. -Determine the sample size of a survey. -Design and draw a sample. -Calculate weights and apply it to real problems. -Describe unit and item non-response techniques and deal with it in survey data. -Analyse survey data and apply statistical inferential techniques.
STSS	7910	Stochastic Simulation	Introduction to stochastic simulation Inverse theorem for continuous and discrete cases Simulating from discrete distributions Simulating from continuous distributions Goodness of fit criteria Acceptance-rejection method Other Monte Carlo methods especially in the Bayesian field	MAIN	Student will be able to: -generate data from any continuous or discrete distributions; -examine the goodness of fit of the simulations; -analyse the simulated data on compare inferences with the true values; -apply different Monte Carlo simulation methods; -perform simulations through Matlab programming; -recognise good simulations; and -given a project, select appropriate simulation procedures, defend these choices, program the processes and evaluate the simulations.
STSS	7920	Sampling Techniques	This course deals with the theory and applications of sampling. The main topics that are covered are: -Probability sampling techniques: simple random, stratified, systematic, cluster and complex. -Sample size and designing a sample. -Estimation of means, totals, proportions and their variances. -Weighting of survey data. -Dealing with non-response. -Statistical inference for survey data.	MAIN	Student will be able to: -Examine and discuss the theory and usage of probability sampling techniques and be able to apply it to real problems; -Prove the main theorems of sampling; -Derive formulae for estimators, the variance of the estimators and apply them to survey data; -Evaluate and compare estimates from different sampling techniques; -Derive the sample size of a survey; -Design and draw a sample; -Calculate weights and apply it to real problems; -Describe unit and item non-response techniques and deal with it in survey data; -Analyse survey data; and -Discuss and analyse statistical inferential techniques for survey data.
STST	9100	Statistics Thesis	This module contains fundamental knowledge, theories, principles and practices of Statistics, General including Research project in specialized field of Statistics, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
STSX	6825	Capita Selecta	As per selected module	MAIN	As per selected module
STSX	7910	Capita Selecta	As per selected module	MAIN	As per selected module
STSX	7920	Capita Selecta	As per selected module	MAIN	As per selected module

Urban and Regional Planning (118)

Postgraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
URTP	7912	Transportation planning for planners	Understanding of the application of transport impact studies, the role of trip generation and land use on traffic patterns. Focus on transport policy, automobile travel, pedestrians, public transport and transport applications.	MAIN	Student will be able to: -Interpret and apply the nature, extent and necessity of transport planning; -Assess impacts, risks and benefits of transport development and policy proposals; -Examine the relationship between regional, national and global transportation trends and development; and -Apply the role of trip generation and land use on traffic patterns.
UMRD	8900	Urban and Regional Planning Dissertation	This module contains fundamental knowledge, theories, principles and practices of Urban and Regional Planning , including: Research project in specialized field of Urban and Regional Planning as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
URBP	6805	Basic Practice in Urban and Regional Planning	Site analysis, site planning, layout planning and township establishment, zoning, floor area, coverage, height, building restriction area, title deeds and general plans, informal settlement upgrading, infrastructure planning process.	MAIN	Student will be able to: -Conduct a thorough site analysis; -Prepare a site layout plan/site development plan for various land uses, including basic infrastructure planning; -Prepare an effective township layout plan; and -Prepare an informal settlement-upgrading plan.
URBP	6806	Basic Practice in Urban and Regional Planning	Site analysis, site planning, layout planning and township establishment, zoning, floor area, coverage, height, building restriction area, title deeds and general plans, informal settlement upgrading, infrastructure planning process.	MAIN	Student will be able to: -Conduct a thorough site analysis; -Prepare a site layout plan/site development plan for various land uses, including basic infrastructure planning; -Prepare an effective township layout plan; and -Prepare an informal settlement-upgrading plan.
URCS	6812	Capita Selecta in Planning	Further research in any Spatial Planning (Hons) subject already taken, or complementary work.	MAIN	Student will be able to: -Design, conduct and write up a research project in urban and regional Planning.
URCS	6814	Capita Selecta in Planning	Further research in any Spatial Planning (Hons) subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.
URCS	7912	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.
URCS	7913	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.
URCS	7914	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	At the end of the module, the student is expected to be able to design, conduct and write up a research project in urban and regional Planning.
URCS	7916	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.
URCS	7922	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.
URCS	7924	Capita Selecta in Planning	Further research in any M.U.R.P. subject already taken, or complementary work.	MAIN	Student will be able to: Design, conduct and write up a research project in urban and regional Planning.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
URDP	7912	Research proposal	Research proposal	MAIN	Student will be able to: -Ability to conceptualise a research topic, formulate appropriate research questions and prepare a research proposal
URDP	7922	Dissertation Proposal in Urban and Regional Planning	After completion of the module: Research methodologies. Research proposal.	MAIN	Student will be able to: -Prepare research proposals -Plan a research project
UREP	6813	Research in Environmental Planning	Environmental awareness, Sustainable development, Planning with the environment, Sustainable Planning, Environmental impact assessment, disaster risk management, environmental management plans.	MAIN	Student will be able to: -Apply the concepts of sustainable development in planning; -Evaluate development from an environmental management perspective; and -Conduct research into environmental aspects of planning.
UREP	6814	Research in Environmental Planning	Environmental awareness, Sustainable development, Planning with the environment, Sustainable Planning, Environmental impact assessment, disaster risk management, environmental management plans.	MAIN	Student will be able to: -Apply the concepts of sustainable development in planning -Evaluate development from an environmental management perspective -Conduct research into environmental aspects of planning
UREP	6823	Research in Environmental Planning	Environmental awareness, Sustainable development, Planning with the environment, Sustainable Planning, Environmental impact assessment, disaster risk management, environmental management plans.	MAIN	Student will be able to: -Apply the concepts of sustainable development in planning; -Evaluate development from an environmental management perspective; and -Conduct research into environmental aspects of planning.
URFP	7912	Futurology for Planning	A theoretical approach as to what the future is and how planners must handle the uncertainty, the quantitative and the qualitative aspects of spatial ordering in a world of different future scenario's and the application on South Africa.	MAIN	Student will be able to: -Examine and discuss the main factors that influence future planning; and -Make projections and built future scenarios
URFP	7922	Futurology for Planning	A theoretical approach as to what the future is and how planners must handle the uncertainty, the quantitative and the qualitative aspects of spatial ordering in a world of different future scenarios and the application on South Africa.	MAIN	Student will be able to: -Examine and discuss the main factors that influence future planning; and -Make projections and built future scenarios.
URGI	7904	Geographic Information Systems for Planners	Basic theory, methods and techniques regarding the use of GIS in planning, preparation of plans, spatial analysis.	MAIN	Student will be able to: -Use GIS methods and techniques to prepare plans and undertake spatial analysis
URHA	6804	Human Settlement Management and Administration	An introduction to the practical management and administration of human settlements within the South African legislative and policy framework, building capacity and developing skills primarily for the South African human settlement sector but also aimed at needs of the developing world	MAIN	Student will be able to: -Manage the implementation of human settlement projects implemented in terms of government policies within the different spheres of Government; -Execute the administration of the housing delivery process; -Administer the housing procurement and allocation policy in an equitable, efficient, transparent and accountable manner; -Interpret and manage innovate initiatives in settlement planning and design which seek to respond to the current development imperatives in South Africa. -Establish the links between the regulatory framework and planning issues within the context of intergovernmental relations. -Critically evaluate the administration of housing in South Africa within the current legislative and co-operative governance context.
URHS	6813	Housing for Planners	Role of housing, planning for housing, legal framework.	MAIN	Student will be able to: -Discuss and explain the role of housing in human settlements; -Determine housing demand; and -Prepare a housing plan.
URHS	6814	Human Settlements Planning	Application of Urban and Regional Planning to Human Settlements planning and delivery	MAIN	Student will be able to: -Examine various theories of human settlements; -Identify various policies of human settlements; -Appreciate various theories and policies using relevant case studies of human settlements; - Analyse and apply different types of housing policies for human settlements; and -Evaluate and synthesis human settlements' policies with an appreciation of a Southern African perspective and experiences

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
URHS	7913	Housing for Planners	Role of housing, planning for housing, legal framework.	MAIN	Student will be able to: -Discuss and explain the role of housing in human settlements -Determine housing demand -Prepare a housing plan
URHS	7923	Housing for Planners	Role of housing, planning for housing, legal framework.	MAIN	At the end of the module students must be able to: 1.discuss and explain the role of housing in human settlements 2.determine housing demand 3.prepare a housing plan
URHS	8900	Dissertation in Housing	Dissertation	MAIN	Student will be able to: -Manage supervised planning and execution of a research project in the discipline.
URHS	9100	Urban and Regional Planning Thesis	Urban and Regional Planning This module contains fundamental knowledge, theories, principles and practices including: Research project in specialized field of Urban and Regional Planning as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
URHT	6804	Human Settlements Theory	An introduction to the major national and international human settlement theories; policies; discourses and approaches, dealing with, in amongst others: Aspects of enablement; sustainability; collaborative approaches; social justice; gender equality; disabled housing; housing for the aged; informal settlement upgrading; rental housing; consumer education; ownership; and housing finance.	MAIN	Student will be able to: -Identify trends in housing/ human settlement policies in relation to national and international theories. -Contribute towards the formulation of a housing policy. -Contextualise a human settlement development within existing theories and policies. -Describe and apply enablement policies; -Apply sustainability principles to human settlements. -Implement collaborative approaches in the delivery of human settlements. -Apply social justice and gender equality to human settlement policies and projects. -Apply the unique requirements of housing for the aged and disabled in a human settlement policy. -Implement sound theories and policies in the upgrading of informal settlements. -Contribute towards the structuring and implementation of a rental housing policy. -Facilitate, structure and manage a housing consumer education programme. -Apply the principles of home ownership in a housing project. -Be familiar with housing development finance and end user finance options.
URID	7912	Integrated Development Planning	The principles of the integrated Planning (IDP) process, strategic planning processes, development paradigms and implications for planning.	MAIN	Student will be able to: -Critically evaluate strategic planning processes in South Africa and internationally; -Examine the of application of strategic planning methods and techniques ; and -Draw up, evaluate and review Integrated Development Plans.
URID	7922	Integrated Development Planning	The principles of the integrated Planning (IDP) process, strategic planning processes, development paradigms and implications for planning	MAIN	Student will be able to: -Critically evaluate strategic planning processes in South Africa and internationally; -Examine the of application of strategic planning methods and techniques ; and -Draw up, evaluate and review Integrated Development Plans.
URLM	6813	Land Use Management	What is land use management, planning legislation, zoning schemes, development applications, land development.	MAIN	Student will be able to: -Explain concepts and important issues related to spatial planning and land use management legislation; -Describe and discuss basic terms and concepts related to land development processes and application systems; -Prepare a land development application; and -Evaluate a land development application.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
URLM	6814	Land Use Management	What is land use management, planning legislation, zoning schemes, development applications, land development.	MAIN	Student will be able to: -Explain concepts and important issues related to spatial planning and land use management legislation -Describe and discuss basic terms and concepts related to land development processes and application systems -Pprepare a land development application -Eevaluate a land development application
URLM	6824	Land Use Management	What is land use management, planning legislation, zoning schemes, development applications, land development.	MAIN	Student will be able to: -Explain concepts and important issues related to spatial planning and land use management legislation -Describe and discuss basic terms and concepts related to land development processes and application systems -Pprepare a land development applicatinso -Eevaluate a land development application
URLM	7912	Planning Management	Planning law and related legislation, the spatial planning system, development applications	MAIN	Student will be able to: -Discuss the spatial planning system in South Africa including spatial plans and land use management; -Examine and apply policies, plans, and statutory control measures applicable to land use and its management in order to provide sustainable development; and - evaluate development applications.
URLM	7922	Planning Management	Planning law and related legislation, the spatial planning system, development applications	MAIN	Student will be able to: - Discuss the spatial planning system in South Africa including spatial plans and land use management; - Examine and apply policies, plans, and statutory control measures applicable to land use and its management in order to provide sustainable development; and - Evaluate development applications.
URMD	6808	Urban and Regional Planning Research Report	To introduce students to the research process with a view to equipping them with the knowledge and skills to identify and investigate Urban and Regional planning environment problems through systematic approaches and document both the process and outcomes under the guidance of a study leader.	MAIN	Student will be able to: -Select a research topic; -Define the research problem; -Formulate a hypothesis / research question; -Develop a research proposal; -Appraise the literature and use the Harvard referencing method and write a literature review; -Design and justify an appropriate research methodology to address the problem; -Conduct an empirical study; -Analysis and interpret empirical data; -Draw up conclusions and make recommendations; -Compile a research project report (treatise); and -Produce a summary paper of the study (article). Independently implementing research and investigate problems with the aim of solving them; -Compose a research report, make findings known and suggest recommendation; -Administer and manage a data base; and -Use different facilities in a professional manner for effective communication purposes.
URMD	7900	Extended Research Essay	Extended Research Essay	MAIN	Student will be able to: -Conduct independent research and present results in a well written, logical, manner, with a sound argument
URMD	8900	Dissertation	A dissertation in the field of Urban and Regional Planning.	MAIN	Student will be able to: -Conduct independent research and present results in a well written, logical, manner; and -Compile a sound argument.
URPD	9100	Philosophiae Doctor	Thesis or publishable, interrelated articles or mini thesis	MAIN	Student will be able to: -Research on an approved topic for at least four semesters in consultation with the Division Head in preparation for a thesis that will be submitted as the only requirement for obtaining the degree.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
URPP	7914	Professional Practice in Urban and Regional Planning	Project management, planning office management (budgeting, personnel management, leadership), tender processes, stakeholder management.	MAIN	The student will be able to: - Run a professional planning office; - Prepare a tender; - Work with multiple stakeholders; and - Manage a planning project
URPP	7924	Professional Practice in Urban and Regional Planning	Project management, planning office management (budgeting, personnel management, leadership), tender processes, stakeholder management.	MAIN	The student will be able to: - Run a professional planning office; - Prepare a tender; - Work with multiple stakeholders; and - Manage a planning project
URPT	6804	Research in Theory of Planning	Values, ethics for planners, planning processes and techniques, strategie planning, systems thinking development of planning thought, public participation / actor collaboration and the right to the city.	MAIN	Student will be able to: - Appreciation of the role of values and ethics in planning - The ability to critically evaluate planning processes from an ethical and normative perspective - Knowledge of, and the ability to apply various planning processes - Appreciation of the role of community participation in planning
URPT	7904	Research in Theory of Planning	Values, ethics for planners, planning processes and techniques, strategie planning, systems thinking development of planning thought, public participation / actor collaboration and the right to the city.	MAIN	Student will be able to: - Rule on the role of values and ethics in planning; - Critically evaluate planning processes from an ethical and normative perspective; - Apply various planning processes; and - Appreciation of the role of community participation in planning
URRA	7912	Planning for Rural Areas	Professional rendering of service as business law and regulations that affect the profession. Ethics and code of conduct, communication between professional, the client and the society.	MAIN	Student will be able to: -Apply rural development theories to rural areas; -Develop a rural development strategy; and -Critically evaluate rural development policy.
URRA	7922	Planning for Rural Areas	Professional rendering of service as business law and regulations that affect the profession. Ethics and code of conduct, communication between professional, the client and the society.	MAIN	Student will be able to: -Apply rural development theories to rural areas; -Develop a rural development strategy; and -Critically evaluate rural development policy.
URRE	6813	Research in Economics for Planners	Research with a urban and regional planning focus in topics such as economic theory, economics, contemporary economic realities, entrepreneurship, informal economy, subsistence economy, globalisation, developmental economics, rethinking economic development, local economic development and sustainable livelihoods.	MAIN	Student will be able to: -Discuss and apply the basic knowledge of economics; -Explain and analyse the impact of globalisation on communities; -Explain the dynamics of the informal economy, indigenous knowledge and entrepreneurship and apply these concepts in local economic development planning; -Prepare Local Economic Development plan/programme or project; and -Conduct a research project on economic aspects of planning.
URRE	6814	Research in Economics for Planners	Research with a urban and regional planning focus in topics such as economic theory, economics, contemporary economic realities, entrepreneurship, informal economy, subsistence economy, globalisation, developmental economics, rethinking economic development, local economic development and sustainable livelihoods.	MAIN	At the end of the module students will be able to -Discuss and apply the basic knowledge of economics -Explain and analyse the impact of globalisation on communities -Explain the dynamics of the informal economy, indigenous knowledge and entrepreneurship and apply these concepts in local economic development planning -Pprepare Local Economic Development plan/programme or project -Cconduct a research project on economic aspects of planning
URRE	6823	Research in Economics for Planners	Research with a urban and regional planning focus in topics such as economic theory, economics, contemporary economic realities, entrepreneurship, informal economy, subsistence economy, globalisation, developmental economics, rethinking economic development, local economic development and sustainable livelihoods.	MAIN	Student will be able to: - Discuss and apply the basic knowledge of economics; - Explain and analyse the impact of globalisation on communities; - Explain the dynamics of the informal economy, indigenous knowledge and entrepreneurship and apply these concepts in local economic development planning; - Prepare Local Economic Development plan/programme or project; and - Conduct a research project on economic aspects of planning.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
URRE	6824	Research in Economics for Planners	Research with a urban and regional planning focus in topics such as economic theory, economics, contemporary economic realities, entrepreneurship, informal economy, subsistence economy, globalisation, developmental economics, rethinking economic development, local economic development and sustainable livelihoods.	MAIN	At the end of the module students will be able to -Discuss and apply the basic knowledge of economics -Explain and analyse the impact of globalisation on communities -Explain the dynamics of the informal economy, indigenous knowledge and entrepreneurship and apply these concepts in local economic development planning -Pprepare Local Economic Development plan/programme or project -Conduct a research project on economic aspects of planning
URRM	7914	Research Methodologies for Planners	Research Methodologies for Planners	MAIN	At the end of the module students will have the ability to: -Outline various research methods; -Use basic statistics in research; -Prepare a research proposal; and -Conduct independent research
URRM	7924	Research Methodologies for Planners	Research Methodologies for Planners	MAIN	At the end of the module students will have the ability to: -Outline various research methods; -Use basic statistics in research; -Prepare a research proposal; and -Conduct independent research
URRP	7902	Introductory Studies in Regional Planning	Introductory Studies in Regional Planning	MAIN	Student must be able to: Examine and discuss regional development initiatives and have the ability to apply this knowledge in a variety of settings.
URRP	7906	Applied Regional Planning Project	Regional Planning processes and IDP, legal framework, applied regional development project.	MAIN	Student will be able to: -Prepare a spatial development framework; and -Conduct a regional development research project in a team
URRR	6805	Research Essay in Human Settlements	This module contains fundamental knowledge, theories, principles and practices of Human Settlements, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination.	MAIN	Student will be able to: -Conduct independent research and present results in a well written, logical, manner, with a sound argument.
URRT	6803	Research in Regional Planning Theory	Research with a regional planning focus in topics such as regional context, classical regional planning theories, planning policy and legislation timeline, rural realities and rural development, small towns, rural-urban linkage, city regions, mega-city regions, polycentric regions, regional blocks. Regionalism. New regionalism, globalisation, industrial spaces, competitiveness and innovation, innovative spaces, regional planning process, development plans, systems thinking in regional planning, regional scenario planning, regional project management, rural resilience and rural self sufficiency.	MAIN	Student will be able to: -Outline the development of regional planning and development theories; -Critically evaluate the implications of globalisation, competitiveness and resource depletion on development in regions; and -Prepare a spatial development framework.
URRT	6805	Research in Regional Planning Theory	Research with a regional planning focus in topics such as regional context, classical regional planning theories, planning policy and legislation timeline, rural realities and rural development, small towns, rural-urban linkage, city regions, mega-city regions, polycentric regions, regional blocks. Regionalism. New regionalism, globalisation, industrial spaces, competitiveness and innovation, innovative spaces, regional planning process, development plans, systems thinking in regional planning, regional scenario planning, regional project management, rural resilience and rural self sufficiency.	MAIN	Student will be able to: -Outline the development of regional planning and development theories; -Critically evaluate the implications of globalisation, competitiveness and resource depletion on development in regions; and -Prepare a spatial development framework
URSC	6813	Research in Socio-Cultural Aspects in Planning	Research with urban and regional planning focus in topics such as cultures and traditions, social factors influencing planning, e.g. migration, demography, culture of poverty, indigenous knowledge, gender, housing as a verb, social context, contemporary society, impact of HIV/AIDS and disease.	MAIN	Student will be able to: -Examine and show appreciation of different cultures and traditions; -Explain of theories of community and social development, demographic change, disease, poverty and gender; -Describe the factors influencing population change; and -Prepare a research project on socio-cultural aspects in planning.
URSC	6814	Research in Socio-Cultural Aspects in Planning	Research with urban and regional planning focus in topics such as cultures and traditions, social factors influencing planning, e.g. migration, demography, culture of poverty, indigenous knowledge, gender, housing as a verb, social context, contemporary society, impact of HIV/AIDS and disease.	MAIN	Student will be able to: -Appreciation of different cultures and traditions -Explain of theories of community and social development, demographic change, disease, poverty and gender -Describe the factors influencing population change -Pprepare a research project on socio-cultural aspects in planning

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
URSC	6823	Research in Socio-Cultural Aspects in Planning	Research with urban and regional planning focus in topics such as cultures and traditions, social factors influencing planning, e.g. migration, demography, culture of poverty, indigenous knowledge, gender, housing as a verb, social context, contemporary society, impact of HIV/AIDS and disease.	MAIN	Student will be able to: -Appreciation of different cultures and traditions; -Explain of theories of community and social development, demographic change, disease, poverty and gender; -Describe the factors influencing population change; and -prepare a research project on socio-cultural aspects in planning.
URSC	6824	Research in Socio-Cultural Aspects in Planning	Research with urban and regional planning focus in topics such as cultures and traditions, social factors influencing planning, e.g. migration, demography, culture of poverty, indigenous knowledge, gender, housing as a verb, social context, contemporary society, impact of HIV/AIDS and disease.	MAIN	At the end of the module students will be able to -Appreciation of different cultures and traditions -Explain of theories of community and social development, demographic change, disease, poverty and gender -Describe the factors influencing population change -Pprepare a research project on socio-cultural aspects in planning
URTD	7912	Planning for Tourism	Introduction to the definitions, components and impacts of tourism. New forms of tourism (sustainable, alternative, soft, green and eco-tourism). General tourism development and policy. General tourism planning concepts and instruments. National, regional and local tourism planning on national, regional and local level	MAIN	Student will be able to: -interpret the character, extent and necessity of planning for tourism; as well as tourism in global context and new tourism forms; -assess the impacts, risks and benefits of tourism development proposals; -outline the interpersonal and personal needs in terms of investment, sociological, social, cultural values and other requirements of all those associated with the creation of the tourism environment; and -examine the relationship between regional, national and global tourism development and to evaluate how philosophical and theoretical values influence it.
URTD	7922	Planning for Tourism	Introduction to the definitions, components and impacts of tourism. New forms of tourism (sustainable, alternative, soft, green and eco-tourism). General tourism development and policy. General tourism planning concepts and instruments. National, regional and local tourism planning on national, regional and local level.	MAIN	Student will be able to: -interpret the character, extent and necessity of planning for tourism; as well as tourism in global context and new tourism forms; -assess the impacts, risks and benefits of tourism development proposals; -outline the interpersonal and personal needs in terms of investment, sociological, social, cultural values and other requirements of all those associated with the creation of the tourism environment; and -examine the relationship between regional, national and global tourism development and to evaluate how philosophical and theoretical values influence it
URTP	7922	Transportation planning for planners	Understanding of the application of transport impact studies, the role of trip generation and land use on traffic patterns. Focus on transport policy, automobile travel, pedestrians, public transport and transport applications	MAIN	Student will be able to: -Interpret and apply the nature, extent and necessity of transport planning; -Assess impacts, risks and benefits of transport development and policy proposals; -Examine the relationship between regional, national and global transportation trends and development; and -Apply the role of trip generation and land use on traffic patterns.
URUP	7906	Urban Research Project	Spatial planning processes and legal framework, spatial analysis, planning techniques, public participation, applied urban development project.	MAIN	Student will be able to: -undertake an urban development and research project in a group
URUT	6803	Research in Urban Development Theory	Research with an urban planning focus in topics such as the urban context, the ideal city, urban functionality, urban form, urban transportation, urban economy, urban sustainability and self-sufficiency, urban resilience, safe and healthy cities, Western urban realities, African urban realities, urban management and governance and Right to the City.	MAIN	Student will be able to: -Examine and discuss historical and current urban development processes in western and African cities; -Show appreciation of the issues and challenges facing urban areas; -Critically evaluate the policy and action programmes implemented to address the challenges of modern urban areas; and -Prepare an urban development framework.
URUT	6804	Research in Urban Development Theory	Research with an urban planning focus in topics such as the urban context, the ideal city, urban functionality, urban form, urban transportation, urban economy, urban sustainability and self-sufficiency, urban resilience, safe and healthy cities, Western urban realities, African urban realities, urban management and governance and Right to the City.	MAIN	At the end of the module, the student is expected to be able to have: -Knowledge and understanding of historical and current urban development processes in western and African cities -Appreciation of the issues and challenges facing urban areas -Ability to critically evaluate the policy and action programmes implemented to address the challenges of modern urban areas -Ability to prepare an urban development framework

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
URUT	7912	Geography for Planners	Urban Geography: Physiographic stand factors, functional user occupations, the Central Business District, urban service areas, problems of urban pollution and climatic factors. Mapping and surveying techniques important to planners. Case studies.	MAIN	Student will be able to: - Examine the functions of urban areas; - Discuss urban morphology; - Examine the economic role of the different parts of a city and its impact on the functioning of cities effectively; and - Assess the impact of policies on the structure and to determine the operation of the city.
URUT	7922	Geography for Planners	Urban Geography: Physiographic stand factors, functional user occupations, the Central Business District, urban service areas, problems of urban pollution and climatic factors. Mapping and surveying techniques important to planners. Case studies.	MAIN	Student will be able to: - Outline principles of the functions of urban areas; - Examine urban morphology; - Discuss the economic role of the different parts of a city and its impact on the functioning of cities effectively; and - Assess the impact of policies on the structure and to determine the operation of the city.

Zoology and Entomology(119)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BLGY4:5F744:64:6F744:64:7F744:64:9F744:64:104:11F744:64:124:134:14F744:64:154:16F744:64:184:19F744:64:204:21F744:6	1663	Introduction to Zoology and Entomology	This module contains fundamental knowledge, theories, principles and practices of Zoology and Entomology, including the paradigm of Zoological sciences followed by an overview of taxonomy, systematics and evolution. The second part will be a functional approach to the organ systems of invertebrate as well as vertebrate animals and will include the following systems: Body cover, body support systems, movement and locomotion, feeding, digestion and absorption, gas exchange, homeostasis, osmoregulation and excretion, reproduction, nervous control and coordination. The third section will deal with principles of ecology: ecosystems and interaction in communities.	MAIN	Student will be able to -Explain and describe the basic classification of vertebrates and invertebrates -Display a basic knowledge of vertebrate and invertebrate (including the Class: Insecta) organ systems; and -Describe the principles of biogeography as it applies to the animal kingdom, the basic driving forces of evolution, and the ecological influences on animal behaviour.
ENTO	2614	Introduction to Morphology, Anatomy and Bio-ecology of Insects	This module contains fundamental knowledge, theories, principles and practices of Entomology, which includes an introduction to entomology; morphology of the body wall, head, thorax and abdomen; types of mouth parts; internal anatomy of organ systems; growth and metamorphosis; insect orders with examples and life cycles; identification of the most important pests of agricultural and veterinary importance; the damage and diseases caused by them and integrated pest management practices.	MAIN	Student will be able to: - Discuss the basic morphology, anatomy and functioning of the insect body; - Identify the most important pest insects and discuss their impact in relation to the agricultural environment; and - Explore different control mechanisms to reduce the negative impact of insect pests.
ENTO	2616	Functional Morphology and Evolutionary Biology of Insects	This module contains fundamental knowledge on the characteristics of arthropods, in particular those of hexapods (insect-like organisms). Morphology of the head, thorax and abdomen, locomotory organs, mouth parts and reproductive organs form the basis of the module. In addition segmentation, growth and metamorphosis; anatomy of internal organs; characteristics to differentiate between insect orders; insect systematics and insect biology according to evolutionary form and function, processes and patterns, and time, space and scale are also dealt with. In separate practical sessions microscope and key identification of all developmental stages of insects up to family level; morphological and anatomical dissections of adult insects; elementary comparative morphology; basic classification of invertebrates and arthropods also receive attention.	MAIN	Student will be able to: - Apply basic morphology, anatomy and functioning of the insect body in a comparative sense within the Invertebrata; - Identify insects to order level and discuss their role in the environment; and - Use evolutionary biology of insects to explore their development in time.
ENTO	2626	Ecophysiology of Insects	Module contains fundamental knowledge on respiration, feeding and feeding habits, digestion, physiology of body wall, blood system, reproduction, metamorphosis, excretion and water regulation, thermoregulation, exo- and endocrine glands and pheromones, nervous system, light-, mechanical- and chemical reception, chemical defence, and bioluminescence of insects under variable environmental conditions. Laboratory trials concerning feeding and digestion, blood circulation and haemocytes, alimentary canal symbionts, growth and metamorphosis are conducted. Scientific writing and basic statistical analysis is also treated.	MAIN	Student will be able to: - Outline the structure and physiological functioning of the organ systems and sensory structures of insects; - Explain how insects interact with food sources and other organisms in their environments; - Explain the different mechanisms involved in chemical communication in insects, and their functional and physiological importance; and - Write scientific papers and reports at an acceptable standard.
ENTO	3714	Advanced Insect Ecology	This module contains advanced knowledge on the main components of and basic processes in ecosystems; influences of environmental forces; insect-plant relationships; prey-predator interactions; parasite-host interactions; population dynamics; mutualism; pollination ecology; energy flow; characteristics of populations and communities; the niche concept. Practical determination of ecosystem functioning; habitat differentiation; biotic and abiotic components of a habitat; importance of environmental factors; species richness; life strategies; host relationships; guild structure and interaction; niche structure; population composition; morphological form and function; quantitative and qualitative analysis is also dealt with.	MAIN	Student will be able to: - Apply basic and advanced ecological analysis of the different functional groups of insects in practice; - Interpret insect behaviour in an applied sense; and - Recommend management practices based on ecological principles.
ENTO	3724	Applied Insect Pest Management	This module contains fundamental knowledge on the following aspects of insect pest management. Identifying and defining pests; use of economical threshold values; pest prediction- and monitoring techniques; ecological principles; pest control and the environment; chemical control; integrated pest management; pesticide application. Practical field applications of pest management; case studies; calibration of pesticide application equipment; pesticide application techniques and principles.	MAIN	Student will be able to: - Evaluate and assess pest injury levels using predictive models and bio-monitoring; - Execute handling and application of pesticides in a safe and responsible manner; and - Compile pest management activity calendars.
ENTO	3734	Advanced Medical, Veterinary and Forensic Entomology	This module contains intermediate knowledge, theories, principles and practices of Entomology, including the identification of medical and veterinary important insects; identification of the diseases they transmit; insects as vectors of diseases of man and animals; biology and life cycles; ecological preferences and host specificity; identification of forensic important insects and their role in forensic medicine.	MAIN	Student will be able to: - Identify insects of medical, veterinary and forensic importance; - List the diseases spread by insects; - Discuss the role of insects in the decomposition process of carcasses; - Describe the role of insects in disease transmission; and - Review and explore the control measures against insect vectors.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ENTO	3744	Applied Insect Biochemistry and Pharmacology	This module contains integrated knowledge, theories, principles and practices of Entomology, including: Metabolism of carbohydrates, lipids, amino acids and proteins by insects to provide adequate energy for flight and general insect activities. Biochemistry of flight muscles, growth and development, the nervous system, pharmacological detoxification and defensive excretions as well as application in chemical control also receive attention.	MAIN	Student will be able to: -Evaluate metabolic pathways and adaptations necessary for insect energy production between different insect orders, families and even species; -Interrelate different biochemical processes such as nerve stimulation, hormonal excretions and haemolymph carrier proteins to obtain successful insect energy production for different activity levels; -Justify pharmacological action for insect control on biochemical knowledge of the mode of action of pharmacological substances and insect detoxification and defensive excretions; and -Validate information gathered to develop methodology for insect enzyme extractions and pharmacological inhibition.
ENTO	3754	Agricultural Entomology	Identification of the most important South African pests of agricultural crops; biology, ecology and life cycles of pest species; the physical damage indices on agricultural crops; insects as vectors of diseases of agricultural crops; ecological preferences and host specificity are dealt with in this module.	MAIN	Student will be able to: - Identify insects of importance on agricultural crops in South Africa; and - Identify and evaluate damage and disease symptoms caused by insect vectors.
ZLGY	2616	Animals of medical and veterinary importance	Identification, morphology, life cycles, pathology and treatment of parasites and vectors of medical and veterinary importance in Africa. Identification, nature and extent of veterinary and medically important poisonous and venomous invertebrates and vertebrates in South Africa. Nature and action of different toxins as well as emergency treatment. The morphology and general biology of selected invertebrates form part of the practical component.	MAIN	Student will be able to: -Identify various parasites of medical and veterinary importance affecting man in Africa based on morphology, life cycles, vectors and pathology, as well as have basic knowledge on the treatment of each of these parasites; and -Outline principles of the important poisonous and venomous animals found in South Africa, in order to identify the various animals, comprehending the nature and action of the different toxins, as well as emergency treatment in each case.
ZLGY	2626	Vertebrate Life and Evolution	This module incorporates a detailed approach to the evolution and diversity of vertebrate fauna with emphasis on the endemic fauna of the southern African subregion. The foundations of vertebrate phylogenetic systematics; the unifying characteristics of major groups with a focus on evolutionary, functional and physiological adaptations; ecology; utilisation and emerging conservation issues are explored. The practical component focuses on comparative anatomy and morphology of representative vertebrate groups, to reinforce lecture themes.	MAIN	Student will be able to: -Differentiate between major groups of extant and extinct vertebrates through a demonstrated understanding of their origin, diversity and distinctive traits; -Demonstrate comprehensive insight into the major events in vertebrate evolution; -Identify and classify various indigenous vertebrates; and -Illustrate the principles that underline sustaining vertebrate biodiversity in southern Africa. Extensive laboratory work will provide the Student with practical knowledge on vertebrate form and function as to evaluate the relationships between morphological features and functional significance in a comparative context.
ZLGY	3714	Marine and Freshwater Ecology	The South African coast is unique largely as a result of ocean currents dividing our coastline into three distinct regions, each hosting a unique intertidal fauna. The composition of the Marine ecosystems is studied with reference to sandy beaches, rocky shores, kelp beds and estuaries. Basic limnological techniques will be demonstrated specifically for Freshwater Ecology. These include mapping of small impoundments, determining pH, conductivity, dissolved oxygen, etc., as well as techniques for collection, identification and quantification of aquatic organisms such as plankton, benthos, epibionts and fishes. The practical component of this module includes a field excursion during the autumn recess as well as shorter excursion in the Mangaung area.	MAIN	Student will be able to: - Identify, analyse and address complex problems of the main functions and interactions of intertidal and freshwater ecology by applying evidence based solutions and theory driven arguments; - Determine physical and chemical parameters of water in order to manage and interpret results in ecosystem processes; and - Collect and identify aquatic organisms in order to quantify results when performing water quality studies.
ZLGY	3724	Life Strategies in Arid Environment	This module focusses on life strategies that enable animals to survive under arid conditions. Behavioural, morphological and physiological adaptations are discussed in detail using specific examples. Special reference is also made to thermoregulation, respiration, water balance, bioenergetics and reproduction in arid environments.	MAIN	Student will be able to: -Integrate the knowledge of the main themes discussed and be able to apply these in the discipline using specific examples of morphological, physiological and behavioural adaptations -Identify, explain and communicate why animals are able to successfully survive in arid environments)Independently perform practical experiments and write scientific reports; and -Communicate findings of given tasks by means of presenting seminars.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ZLGY	3734	Conservation Ecology	The influence of human activities on ecosystems and biodiversity is critically reviewed. We start by exploring the origin of the universe, our solar system and planet Earth the only place that we know of, teeming with life. How did life originate and what are the specifications for life? How did life evolve, and how does evolution work. Here we will detour to the life and times of Charles Darwin and his contribution to our understanding of evolution and the mechanism that resulted in the enormous biodiversity we know today which only represents 1% of all the life that previously existed on Earth. What happened to the other 99%? They became extinct due to natural processes of evolution but also in 5 mass extinction events caused by global catastrophes. And today in the 21st centuries it is happening again but this time its humans causing the mass extinction event. What are the reasons and can we survive it? Where do humans come from and how did we become so successful that our ecological footprint is now threatening the survival of our planet. In 2011 we surpassed the 7 billion mark, is this sustainable? In the final section we conclude on a positive note; how to care for our planet for our own survival.	MAIN	Student will be able to: -Critically reflect on how life evolved and how evolution works -Understand and explain where humans came from and why humans are so successful that they are now threatening the survival of our planet -Explore and discuss the local and global impact of the invasive expansion of human populations into all natural ecosystems; and -Explain how human activities are changing environments expelling species from their natural habitats and translocating alien species.
ZLGY	3744	Animal Behaviour	This module contains integrated knowledge, theories, principles and practices of Animal Behaviour. Themes covered include: the history of ethology, concepts, ecology of behaviour, evolution of behaviour, social spacing, group advantage and play behaviour.	MAIN	Student will be able to: -Use the theory of natural selection and understand the levels of natural selection -Interpret the major aspects of behaviour using current ideas -Develop hypotheses about behaviour and design experiments or sampling programmes to test them -Use basic statistical methods in behavioural studies; and -Write concise and accurate reports of practical work.
BIOL	1504	Lower life and molecular biology	This module contains fundamental knowledge, theories, principles and practices of Biology, including conditions on early earth, chemical evolution, appearance of cells, origin of metabolism, self-replicating systems, origin of pro and eukaryotic cells, origin of membranes and organelles, cell division, energy harvesting pathways: photosynthesis. The Flow of genetic information: mitosis and meiosis, DNA replication and patterns of inheritance and the application are included. The following are also covered: bacteria and viruses, protists, single celled algae and fungi.	QWA	Student will be able to: -Explain the current theories w.r.t. the origins of life and how it unfolds in nature -Explain the structures of living cells and how complex molecules in cells interact with each other to make the flow of energy, material and information possible in the cell -Explain the transfer of genetic information and how it influences the patterns of inheritance between generations of organisms -Understand the fundamental principles regarding the biology of the different levels of organization in living organisms from viruses to eukaryotic micro-organisms
BIOL	1514	Lower life and molecular biology	This module contains fundamental knowledge, theories, principles and practices of Biology, including conditions on early earth, chemical evolution, appearance of cells, origin of metabolism, self-replicating systems, origin of pro and eukaryotic cells, origin of membranes and organelles, cell division, energy harvesting pathways: photosynthesis. The Flow of genetic information: mitosis and meiosis, DNA replication and patterns of inheritance and the application are included. The following are also covered: bacteria and viruses, protists, single celled algae and fungi.	QWA	Student will be able to: -Explain the current theories w.r.t. the origins of life and how it unfolds in nature -Explain the structures of living cells and how complex molecules in cells interact with each other to make the flow of energy, material and information possible in the cell -Explain the transfer of genetic information and how it influences the patterns of inheritance between generations of organisms -Understand the fundamental principles regarding the biology of the different levels of organization in living organisms from viruses to eukaryotic micro-organisms
BIOL	1644	Animal Biology	This module contains fundamental knowledge, theories, principles and practices of Biology, including higher levels of the kingdom Animalia, a thorough briefing on Invertebrata and an introduction to Vertebrata. Topics covered include an introduction to invertebrate classification and bio-ecology, insect morphology, anatomy and metamorphosis, basic entomology and its application, including insect plant relationships, medical, veterinary and forensic entomology, insect physiology and pest control. Finally, students will learn about mammalian zoogeography, evolution and etho-ecology.	QWA	Student will be able to: -Explain and describe the basic classification of the invertebrates, including insects. -Display a basic knowledge of entomology: class Insecta. -Describe the principles of biogeography as it applies to the animal kingdom, the basic driving forces of evolution, and the ecological influences on animal behaviour.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BIOL	2614	Evolution, genetics and diversity	This module contains fundamental knowledge, theories, principles and practices of Biology, including Students will be introduced to the principles of evolutionary theory, including the following key concepts: species concepts, scientific names, binomial and sub-specific ranks, Darwin's theory of evolution, Mendelian genetics, the modern synthesis, variability in populations: population genetics and Hardy-Weinberg equilibrium, natural selection and genetic drift, molecular genetics, the genetic code, distribution ranges, dispersal, biogeography and reproductive isolation. Students will receive a practical introduction to methods such as Polymerase Chain Reaction, gene sequencing, deriving phylogenetic trees, phenetics and phylogenetics.	QWA	Student will be able to: -Demonstrate knowledge on genetic variability and its consequences for population genetics and speciation as well. -Apply this knowledge in analyzing gene frequencies in populations to predict the changes in population genetics over generations. -Apply the principles of distributions and chance to solve problems of population genetics in an unfamiliar context. -Evaluate and use different types of population data and conform to ethical standards while engaging in population genetic questions. -Understand the connection between genetic variability on a molecular level and a population level and make connections between both levels. -Select appropriate methods and analyses in dealing with genetic or molecular data -Communicate the findings of genetic and molecular analyses in an appropriate manner. -Recognize the criteria of assessment and accurately assess his/her own learning needs and those of others.
BIOL	3714	Human ecological footprint	The influence of human activities on ecosystems is critically reviewed, which includes man's ecological footprint, biodiversity, speciation, extinction and Africa's natural history. Several conservation issues are analysed, including an evaluation of the state of our natural resources, translocation and introduction of organisms, threats to biodiversity with a focus on southern African species, an introduction to conservational areas in southern Africa, environmental management, climate change and an exploration of alternative, sustainable sources of energy. After successfully completing this module, the student will be able to critically evaluate human impact on the environment and will be able to provide practical solutions for environmental problems.	QWA	Student will be able to: -Outline the principles of ecology and conservation; -Apply and evaluate the key terms, concepts, facts, principles, rules and theories associated with conservation ecology; -Indicate how conservation ecology relates to other fields or disciplines; -Evaluate types of explanations and information typical of conservation ecology; -Outline the range of inquiry in this field and their suitability to specific investigations; -Apply a range of methods to resolve problems in the discipline; -Identify, analyse, critically reflect on and address complex ecological problems, applying theory-driven ecological arguments; -Develop appropriate processes of information gathering for a given assignment/topic, and independently evaluate and manage this information; -Create and communicate his/ her ideas and opinions in well-formulated arguments, using appropriate academic discourse; and -Take responsibility for his/her decisions and actions, whether it is individually or as part of a group, including the responsibility for the use of resources where appropriate and limited accountability for the decisions and actions of others in varied contexts.
BIOL	3724	Macroevolution and speciation	This module describes the history of life, focusing on the phenomena of natural selection and adaptation, as originally postulated by Darwin. A broad perspective will be taken, encompassing evidence from plate tectonics, fossil records, evolutionary genomics, homologies, embryology and modern-day biodiversity. Important concepts such as inheritance of characteristics, stochastic mutations, and the various processes that drive speciation will be addressed. Students will gain an invaluable, scientific perspective on the abundance and origins of life on Earth.	QWA	Student will be able to: -Competently conduct phylogenetic analyses using morphological and molecular data -Understand and employ an array of scientific approaches to phylogenetic reconstruction -Apply these techniques in evolutionary comparisons -Explain the coalescent model of gene-genealogies within species -Accurately estimate population size and migration rates from DNA sequence data
UNIR	2624	Insect ecophysiology	This module contains fundamental knowledge, theories, principles and practices of Biology, including insect physiology within an ecological framework. Upon completion of this module, students will have acquired skills in lab based insect experiments, and understand the composition of the diverse variation in form and structure of the insect body, as well as how insects are able to survive under diverse conditions. Topics include respiration, feeding habits, digestion, physiology of body wall, blood system, reproduction, metamorphosis, excretion and water regulation, thermoregulation, exo- and endocrine glands and pheromones, nervous system and light, mechanical and chemical reception of insects under variable environmental conditions.	QWA	Student will be able to: -Answer familiar and unfamiliar questions about insect ecology -Argue various viewpoints related to insect ecological theories -Provide South African examples of insect ecological theory -Formulate independent opinions around various debates of insect ecological theories -Conduct relevant statistical analysis used within ecological studies -Design an experiment based on a Student-initiated hypothesis and write a scientific article based on calculated results.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
UNIR	3724	Applied entomology	This module will teach students to apply their knowledge of entomology to manage pest species or to use insects beneficially. The theoretical aspect will be divided into four main modules: chemical control of pests, biological control of pests, additional methods of controlling pests, and beneficial uses of insects. The practical side of the course will look at the major pests of fruit, vegetable, wood and livestock practices. Students will identify major pests, calculate thresholds, and recommend treatment plans. Topics will include: basic entomological practices in the agricultural environment, insects as pests, intergraded pest management, thresholds, insecticides, insecticide toxicity and environmental fate, host plant resistance, transgenic crops, storage and transport pest management, vectors and vector control, biological control, nematology, forest, tree, and garden pest management, bee keeping, decomposers, biomonitoring, insect conservation and trade markets, urban and public health entomology, the role of insects in aesthetics, art, culture and leisure practices	QWA	Student will be able to: -Apply knowledge of entomology to control insect pests through chemical control, and alternative methods; -Demonstrate the beneficial use of insects; -Monitor the level of infestation of a pest insect; -Calculate thresholds and crop damage predictions; -Create a treatment plan when presented with novel pest scenarios; and -Obtain information from various sources based on a specific pest species and report on this species through professional PowerPoint presentations
UNIR	3734	Medical, veterinary and forensic entomology	This is a practical and theoretical course significantly expanding on students' basic knowledge of entomology. Topics covered in this course include the identification of medically and veterinary important insects, identification of the diseases they transmit, insects as vectors of diseases of man and animals, insect biology and life cycles, ecological preferences and host specificity, identification of forensically important insects, and the role of insects in forensic medicine.	QWA	1.Identify insects of medical and veterinary importance 2.Demonstrate and apply knowledge of economically important diseases transmitted by insect vectors. 3.Identify insects of forensic importance 4.Relate the role of insects in the decomposition process of carcasses and their importance in solving criminal cases.
UNIR	3744	Insect biochemistry and pharmacology	This course is an advanced investigation of insect physiology and morphology as well as biochemical processes relevant to insect survival and biological control. Topics covered in this course include: the biochemistry of flight muscles; metabolism of carbohydrates, lipids, amino acids, proteins and nucleic acids; biochemistry of growth and development; insect nervous systems; pharmacology; detoxification and defensive excretions and application in chemical control.	QWA	Upon successful completion of the module Student will be able to: 1.Appropriately interpret scientific notation and apply their knowledge to solve scientific problems involving scientific notation 2.Read, recall, discuss, clarify and organise information of the physiological and biochemical processes of insects 3.Present relevant topics in different graphical or diagrammatic formats and relate concepts of general insect physiology and specific biochemistry aspects. 4.Criticize and argue about data, ideas and concepts of insect physiology, biochemistry and pharmacology. 5.Set up and conduct laboratory experiments on biochemical and pharmacological aspects of a.insect metabolism and key enzyme inhibition b.pesticide identification and c.pesticide development.
ZOOL	2614	Basic entomology	This module consists of both theoretical and practical units, giving students a broad introduction to the study of insects. Topics covered include insect physiology, evolution, and taxonomy. Students will be given practical tools to start in the field of entomology, within a sound scientific, hypothesis-based framework. Upon completion of this module, students will have acquired skills in insect taxonomy that will enable them to identify insects to order and family level. Students will also understand the composition of the diverse variation in form and structure of the insect body. Students will learn how insects are able to survive under diverse conditions. Students will also have insight into where insects fit into the animal kingdom and be able to describe the unique entomological fauna of southern Africa.	QWA	Student will be able to: -Demonstrate a proficiency in academic and scientific literacy that enables them to read, recall, recognize, draw, describe, discuss, clarify, criticize, and write about the variety of different forms and functions of the insect body. -Construct diagrams and notations that illustrate scientific thinking about entomological concepts and investigations. -Design, plan and conduct scientific investigations to compare and record observations of the local insect fauna. -Present the results of their own scientific studies verbally and in writing. -Demonstrate confidence in using scientific knowledge to debate investigations, practices, issues and popular articles in terms of their scientific validity and credibility -Use critical thinking and problem solving skills to propose and recommend scientific solutions to every day, real life problems. -Investigate and appreciate the unique diversity of biomes in southern Africa and the importance of conservation and sustainable living -Demonstrate through discussion and critical reflection the knowledge developed about the variation in physiological systems in insects.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ZOOL	2634	Invertebate biodiversity	This module contains fundamental knowledge, theories, principles and practices of Biology, including an overview of upper classification through all invertebrate phyla. This will include the general taxonomy, anatomy, morphology, physiology, ecology, evolution and benefits to humans. In practical sessions the students will be introduced to all phyla and taught how to identify invertebrates from phylum to order level. Phyla included in course are: Porifera, Placozoa, Cnidaria, Ctenophora, Mesozoa, Plathelminthes, Nemertea, Rotifera, Acanthocephala, Gnathostomulida, Micrognathozoa, Nematoda, Nematomorpha, Priapulida, Kinorhyncha, Loricifera, Annelida, Mollusca, Arthropoda, Tardigrada, Onychophora, Gastrotricha, Chatognatha, Cycliophora, Phoronida, Brachiopoda, Bryozoa, Entoprocta, Echionodermata, Hemichordata, Xenoturbellida, Chordata (the non vertebrate specimens).	QWA	Student will be able to: -Understand the upper taxonomic relationships and evolutionary trends within the invertebrate phyla. -Describe the ecology and benefits of each invertebrate taxon. -Identify specimens from phylum to order level for all invertebrates. -Illustrate scientific drawings correctly for publication. -Use and create dichotomous keys as aid for taxonomic identification purposes.
ZOOL	2664	African vertebrates	This module contains fundamental knowledge, theories, principles and practices of Zoology, including several aspects and principles of the study of African vertebrates, including the principles of vertebrate systematics, physiology, morphology, anatomy, ecology and ethology, as well as key terms, concepts, facts, principles, rules and theories associated with vertebrates. Students will undergo both theoretical and practical training, acquiring a grasp of laboratory and field-based research techniques. After successful completion of this course a student will be able to identify African vertebrates and be well informed on the basic concepts of vertebrate ecology in the southern African sub-region.	QWA	Student will be able to: -Demonstrate a detailed knowledge of the principles of vertebrate systematics, physiology, morphology, anatomy, ecology and ethology. -Apply the key terms, concepts, facts, principles, rules and theories associated with vertebrate studies. -Systematically identify most African vertebrates. -Evaluate and solve ecological questions posed concerning African vertebrates, with special emphasis on endemic species occurring in the southern African sub-region. -Understand and communicate complex systematic, physiological, morphological, anatomical and ecological information in a reliable, coherent manner, using the appropriate academic decorum and professional formats and technologies such as written essays and PowerPoint presentations. -Access library and online resources, select information appropriate to the topics of given assignments and projects and synthesise relevant information. -Work effectively in a group and take responsibility for his/her decisions and actions, whether it is individually or as part of the group, including the responsibility for the use of resources where appropriate.
ZOOL	2684	Introduction to Parasitology	This module introduces students to the practical and theoretical aspects of studying parasites. Topics include taxonomic classification of parasites, host spectrum, geographical distribution, morphology, life cycles, epidemiology, parthenogenesis, control measures and public significance and vectors of medical and veterinary importance.	QWA	Student will be able to: -Discuss how important parasites can be classified according to kingdom and phylum; -Describe how parasitic infections affect the communities in poor countries and that the knowledge of their life cycle is important for effective prevention and control; -Outline the central facts and the experimental basis of modern parasitology; -Solve problems in the context of this understanding; -Describe the relationship of parasitic infections to symptoms, relapse and the accompanying pathology; -Arrange factors that determine endemicity of the parasite infection; -State the distribution and epidemiology of the parasites; -Explain the methods of parasite control; -Recall the basic terms in parasitology and appropriately describe basic life cycles; -Identify different types of parasites namely, hemoparasites, gastro-intestinal parasites and ectoparasites; -Describe major diseases caused by parasites and their epidemiology; -Collect, identify, and conduct laboratory diagnosis of parasite infections in hosts and vectors; -Identify medically and veterinary important parasites and vectors; and -Conduct appropriate diagnostic techniques.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ZOOL	3714	Introduction to Animal Behaviour	This course introduces students to the scientific study of animal behaviour through an evolutionary lens, including aspects of human behavioural ecology. Tinbergens four questions will be applied to the study of animal behaviour, i.e., the functional, phylogenetic, mechanistic and developmental aspects of behaviour. This course will also introduce principles of optimal foraging theory, predator-prey interactions, social behaviour, decision-making theory, learning, communication, cognition, and the physiological control of behaviour. Successful students will be prepared for the advanced course in Behavioural Ecology (ZOO614) and will be able to apply their knowledge of behavioural ecology to biodiversity conservation, wildlife management, animal husbandry, and the more theoretical field of biological psychology.	QWA	Student will be able to: -Use scientifically robust techniques to assess and describe behaviour, based on the principles of Tinbergen's four questions; -Communicate scientific results competently through written and oral argument; -Apply evolutionary principles to the naturally observed behaviours of animals (including humans); -Apply principles of behavioural ecology to the management of animal welfare and conservation, when presented with novel problems; -Distinguish between proximate and ultimate causes of given behavioural patterns; -Critically assess and formulate arguments on the origins and expression of animal behaviour; -Discuss the evolutionary ties between all animals as evident from behavioural ecology; and -Design and assess critical scientific studies in behavioural ecology.
ZOOL	3724	Ecotoxicology	This course is aimed at undergraduate students who have completed basic chemistry and biology courses. It provides a general introduction to the field of ecotoxicology and covers topics such as environmental contamination, major classes of contaminants and acute/chronic effects of contaminants on individuals, populations, communities and ecosystems. Through an accompanying practical program, emphasis is also given on the assessment of the toxicity of potential environmental contaminants in the laboratory.	QWA	Student will be able to: - design and conduct research projects in ecotoxicology - analyzing, interpreting and communicating their findings in report and article forms
ZOOL	3734	Insect ecophysiology	This module contains fundamental knowledge, theories, principles and practices of Entomology, including class discussions based around insect ecology and various ecological concepts from the interaction between insects and their abiotic environment, insects and other individuals within the same species as well as between specimens of different species. Students will investigate symbiotic relationships, as well as their evolutionary development. The course is designed around the creation of hypotheses and experimental design to test these ecological theories. Students are expected to find South African examples for various ecological concepts, and be able to design experiments around South African conditions. Furthermore, students are taught to argue various statements, as well as formulate their own opinions around various ecological topics. Students are also expected to find additional literature in the form of articles to justify their arguments. Students will be taught various ecological statistical analyses and calculations used during environmental evaluation and related ecological studies.	QWA	Student will be able to: -Answer familiar and unfamiliar questions about insect ecology -Argue various viewpoints related to insect ecological theories -Provide South African examples of insect ecological theory -Formulate independent opinions around various debates of insect ecological theories -Conduct relevant statistical analysis used within ecological studies -Design an experiment based on a Student-initiated hypothesis and write a scientific article based on calculated results.
ZOOL	3744	Molecular parasitology	This module introduces students to parasite genomics whereby the identity and functions of important genes and proteins of selected parasites will be studied. Practical techniques of parasite diagnostics, such as PCR and LAMP, will be demonstrated and practiced. These techniques are used for diagnosis of parasite infections targeting specifically expressed genes or unique sequences on non-specific genes. Further techniques will also be practiced, such as ELISA, in which recombinant proteins are used as antigens in serological assays. Students will understand the basic functions of the immune system and different types of the immune system (innate and adaptive). This study will include in-depth coverage of molecules used by immune system to combat parasite infections. Lastly, the course details antigenic variation, a common strategy used by parasites to evade immune systems.	QWA	Student will be able to: -Correctly explain the molecular biology of selected parasites of medical and veterinary importance; -Factually recall and describe specific parasitological genes and proteins that play important roles in the survival of the parasite (i.e., virulence); -Apply modern molecular techniques used to diagnose parasites targeting particular genes; -Describe immunology, the host immune system and how it combats parasite infections; and -Describe the methods by which parasites evade the host immune system.
ZOOL	3754	Freshwater and marine ecology	This course gives students an in-depth knowledge of marine and freshwater ecosystems, with a particular emphasis on African aquatic systems. In freshwater ecology basic limnological techniques are demonstrated. These include mapping of small dams, determining pH, conductivity, dissolved oxygen, etc., as well as techniques for collection, identification and quantification of aquatic organisms. Students will learn about the costs and benefits of living in freshwater, and how to preserve our planet's dwindling water supplies. The techniques practiced in this course will enable them to monitor the health of freshwater ecosystems using rigorous national standards of assessment. The South African coast is unique largely as a result of ocean currents, which result in dividing our coastline into three distinct regions, each hosting a unique intertidal fauna. The composition of these ecosystems will be studied with special reference to sandy beaches, rocky shores, kelp beds and estuaries. The practical component of the marine ecology sub-module is a marine field excursion during the autumn recess.	QWA	Student will be able to: -Use scientifically robust techniques to assess the health of lotic freshwater systems according to South African standards (the SASS and DBI scoring systems); -Communicate scientific results competently in written presentations; -Distinguish between zones of different coastal areas as well as lentic systems; -Identify invertebrates and vertebrates typical of South African freshwater and marine environments; -Discuss and describe aquatic ecosystem dynamics, including the river continuum concept and abiotic factors impacting the living environment; -.Appraise anthropogenic impacts on the aquatic environment; -Recognize the specific and vital reliance of mankind on healthy aquatic ecosystems. -Outline global and local relationships between the aquatic environment and geographic factors; and -Evaluate the unique aspects of South Africa's living waters.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
Postgraduate					
ENTO	6808	Research Report Entomology	A year project that involves protocol planning, field work, data analysis, writing up of results and oral presentation of results on a topic determined by a selected field within the discipline.	MAIN	Student will be able to: - Present and discuss a selected topic in front of an audience; and - Demonstrate independent research skills and processes from beginning to end by submitting a research project written in article format.
ENTO	6814	Research techniques, scientific methodology and scientific communication	This module consists of techniques applicable in Entomology, accessing scientific literature, organising and evaluating scientific information, broad techniques in systematic analysis, compilation of information according to scientific standards and format, and written and oral communication skills.	MAIN	Student will be able to: - Examine and apply the methodologies and techniques in accessing scientific literature; - Present and communicate academic ideas effectively to various audiences; - Use various computer programmes to prepare presentations; - Apply systematic analysis; and - Prepare and submit reports and standard operating procedures for research projects.
ENTO	6822	Quantitative Ecology	This module explores the application of intermediate quantitative methods to ecological questions in Entomology.	MAIN	Student will be able to: - Determine the appropriate statistical method to use when confronted with most questions and data types; - Be familiar with the assumptions underlying these methods; - Have an understanding of software used to apply the methods; and - Offer a basic interpretation of results provided.
ENTO	6832	Biodiversity, Evolution & Biogeography	This module investigates biodiversity, taxonomy, systematics, biogeography and evolution as fundamental components of the biological sciences. A sound knowledge of these topics is developed during this course and this is achieved by discussing the principals of the mentioned components, as well as by debating various cutting-edge issues.	MAIN	Student will be able to: - Present and discuss relevant topics regarding the existence of organisms in time and space; and - Interpret and debate issues regarding the origin of species diversity.
ENTO	6842	The Environment	The main assignment for this module is to present a seminar and then to write an appropriate article and executive summary for the South Africa Journal of Science in which a topical issue concerning the global and/or South African environment is critically discussed.	MAIN	Student will be able to: - Argue issues relating to environmental management in front of an audience; and - Recommend practices and strategies that will realistically contribute towards environmental conservation.
ENTO	6854	Insect-Plant Interactions	Based on ecological and evolutionary principles the role and impact (positive and negative) of insects associated with plants in natural and synthetic (agricultural) environments are discussed and demonstrated with relevant case studies. This is approached in an above ground and below ground context.	MAIN	Student will be able to: - Provide advice relating to insects affecting plant health in forestry, horticultural, agricultural and natural environment settings; and - Consider strategies to facilitate the interpretation of insect activity on plants in general.
ENTO	6864	Medical and Veterinary Entomology	This module contains high-order knowledge, theories, principles and practices of Entomology, in terms of the bio-ecology, vector potential, disease transmission and parasite-host relationships of insects of medical and veterinary importance.	MAIN	Student will be able to: - Integrate the following aspects of the vector, host and pathogen / parasite in terms of (i) characteristics, (ii) life cycle & transmission routes, (iii) the range of vectors and hosts infected, (iv) bio-ecology, (v) susceptibility of the vector and hosts, (vi) disease / symptoms, (vii) overwinter mechanism / survival of the pathogen / parasite, (viii) ecological / economic consequences, (ix) vector and disease control measures, (x) landscape epidemiology, (xi) distribution patterns; and - Evaluate critically the evolutionary aspects driving the host / vector / disease interaction and association.
ENTO	6874	Forensic Entomology	This module contains high-order knowledge, theories, principles and practices of Entomology, dealing with insects in criminal investigations, especially violent crime such as homicide, suicide and the neglect of children and elderly people.	MAIN	Student will be able to: - Integrate, with the aim to apply such knowledge in case studies, for various crime scene scenarios in terms of: (i) Decomposition of the body (ii) Insect activity on the body (iii) seasonal variation and (iv) geographical variation; - Apply the relevant post-mortem interval calculations; - Identify the mature and immature stages of flies and beetles of forensic importance (this will include the use of keys and the use of techniques for the preparation of biological material); and - Identify the other sectors of forensic entomology: i.e. (i) criminal misuse of insects; (ii) Urban Entomology and (iii) Stored Product Entomology.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ENTO	6884	Advanced Pest Management	A broad and in-depth approach to all facets of modern insect pest management on plants and animals. New management techniques; cultural and environmental aspects of a holistic integrated pest management program; alternatives to chemical control as well as the environmental impact of pest control are covered in this module	MAIN	Student will be able to: - Research, present and discuss relevant topics regarding insect pest management; and - Evaluate and apply different insect management strategies forming part of an integrated pest management system.
ENTO	6894	Capita selecta in Entomology	This is a Capita selecta module where students can choose from the following three topics i.e. Arachnology, Dipterology & Nematology. Taxonomy, phylogeny and identification of families; biodiversity (including species richness and Afrotropical endemics); role in agroecosystems and medically and veterinary important species are themes covered in this module.	MAIN	Student will be able to: - Identify families in the selected groups; and - Show how families of the selected groups can be used in agricultural, medical and veterinary fields.
ENTO	8900	Entomology Dissertation	This is a research based dissertation and contains fundamental knowledge, theories, principles and practices of Entomology. A Research project in a specialised field of Entomology is chosen and discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem and formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing; and - Provide specialist knowledge in a particular field of Entomology.
ENTO	9100	Entomology Thesis	This is a research based thesis and contains fundamental knowledge, theories, principles and practices of Entomology. A Research project in a specialised field of Entomology is chosen and discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified thesis structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: - Show high-level expertise and critical knowledge in an area at the forefront of the field, discipline or practice; and - Conceptualise new research initiatives and create new knowledge or practices.
ZLGY	6808	Zoology Research Report	A year project that involves protocol planning, field work, data analysis, writing up of results and oral presentation of results on a topic determined by a selected field within the discipline.	MAIN	Student will be able to: -Independently design and carry out experimental and correlational research that yields valid results; and -Present and discuss their research findings in front of an audience.
ZLGY	6814	Research Techniques, Scientific Methodology and Scientific Communication	The module consists of techniques applicable in Zoology, accessing scientific literature, organising and evaluating scientific information, broad techniques in systematic analysis, compilation of information according to scientific standards and format, and written and oral communication skills.	MAIN	Student will be able to: -Demonstrate methodologies and techniques used in accessing scientific literature -Present and communicate academic ideas effectively to various audiences -Master skills such as various computer programmes to prepare presentations -Show a broad comprehension of systematic analysis; and -Prepare and submit reports and standard operating procedures for research projects.
ZLGY	6822	Quantitative Ecology	This module explores the application of intermediate quantitative methods to ecological questions in Zoology.	MAIN	Student will be able to: -Predict the appropriate statistical method to use when confronted with most questions and data types -Recognise the assumptions underlying these methods -Describe software used to apply the methods; and -Offer a basic interpretation of results provided.
ZLGY	6832	Biodiversity, Evolution & Biogeography	This module investigates biodiversity, taxonomy, systematics, biogeography and evolution as fundamental components of the biological sciences. A sound knowledge of these topics is developed during this course and this is achieved by discussing the principals of the mentioned components, as well as by debating various cutting-edge issues.	MAIN	Student will be able to: -Research, present and discuss relevant topics regarding the existence if organisms in time and space; and -Interpret and debate issues regarding the origin of species diversity.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ZLGY	6834	Wetland Ecology	Wetlands in southern Africa, chemical and physical conditions in wetlands, biotic community of wetlands, wetlands as biological filters, threats to wetlands, production and productivity, as well as wetlands in arid environments are topics covered during this module. This course includes class work, presentations by students, practical work, seminars and an open book examination.	MAIN	Student will be able to: -Determine the conservation status of wetlands based on chemical, physical and biological information -Collect and analyse the data referred to above and be able to provide a professional opinion on management of wetlands with the aim of environmental conservation -Relate the experience gained during the module to analyse unfamiliar wetlands; and -Identify alien species and present practical measures for their control.
ZLGY	6842	The Environment	The main assignment for this module is to present a seminar and then to write an appropriate article and executive summary on a topical issue concerning the global and/ or South African environment.	MAIN	Student will be able to: -Argue issues relating to environmental management in front of an audience; and -Recommend practices and strategies that will realistically contribute towards environmental conservation.
ZLGY	6854	Veterinary Ectoparasitology	This module concentrates on the occurrence, biology and control of selected ectoparasites associated with domesticated animals. Specific attention is given to the role of these ectoparasites in the transmission of pathogens to animal hosts and humans.	MAIN	Student will be able to; - Discuss where tick species fit into the taxonomic system and be able to allocate a tick specie to one of the three families in the suborder Ixodida; - Identify the different life strategies of different tick species and its evolutionary importance for tick survival; - Have knowledge of tick host interactions within a habitat, the sensory basis of tick feeding as well as tick adaptations to ensure an adequate water balance for survival during on and off host periods; - Discuss different tick transmitted diseases and their economic impact on cattle production; - Compare the two major tick families, Argasidae (soft ticks) and Ixodidae (hard ticks), with regards to differences and similarities in morphological, biological and ecological features to ensure successful survival in a hostile environment; - Make recommendations on tick control and the management strategies on the development of tick resistance against chemical tick control; and - Identify other ecto- parasites of veterinary importance such as fleas (Ctenocephalides felis) and sheep scab (Psoroptes ovis) and their interaction with their hosts and the environment.
ZLGY	6864	Animal Behaviour	This module focuses on advanced principles of animal behaviour with the emphasis on reproductive behaviour and sexual selection. Aspects of social learning and cultural transmission on this topic are also addressed.	MAIN	Student will be able to: - Conceptualise and recognise the evolutionary advantages as well as the influences of social learning and cultural transmission of certain mating behaviours on the fitness of animals in a process of natural selection.
ZLGY	6874	Aquatic Parasitology	This module concentrates on water borne parasites, which spend at least part of their life cycle in water. Aspects that are covered include: Taxonomy, ecology, pathology, parasite / host associations, epizootology and control of parasites	MAIN	Student will be able to: - Outline and apply the theories and research methodologies in the broad field of parasitology; - Identify the various parasites encountered on/in fish based on their morphology, life cycle, ecology and pathology caused to the host; - Use a range of methods and laboratory techniques to identify and process various fish parasites from different taxonomic groups; and - Address various ethical issues when determining the specific methods for treating hosts for parasites.
ZLGY	6884	African Ornithology	This module focuses on the scientific study of wild birds of Africa with emphasis on principles of identification, monitoring, conservation status and anthropogenic influence on this group of animals. The use of birds as biological indicators of ecosystem health is also explained and debated.	MAIN	Student will be able to: -Identify various bird taxa to species level; and -Use birds as biological indicators in Basic Assessment Reports.
ZLGY	6894	Capita selecta in Zoology	This is a Capita selecta module where students can choose from the following four topics i.e. Conservation Ecology, Palaeontology, Nematology and Herpetology.	MAIN	Student will be able to: -Discuss various theories, research methodologies and techniques relevant to these four fields; -Use a range of skills to identify, analyse and address problems in these fields; and -Apply strategies in a self-critical manner.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ZLGY	8900	Zoology Dissertation	This module is a research based dissertation. A research project in a specialised field of Zoology is chosen and discussed with study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ZLGY	9100	Zoology Thesis	This module contains fundamental knowledge, theories, principles and practices of Zoology. A Research project in a specialised zoological field is chosen and discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified thesis structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified thesis structure; and -Write two manuscript, adhering to the grammatical and technical aspects of scientific writing.
ZOOL	8900	Zoology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Zoology, including: Research project in specialized field of Zoology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem - Formulate a hypothesis - Do independent planning and then conduct the experiments - Analyse and interpret the results - Discuss the results comprehensively - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
BIOL	6808	Research essay	The student will conduct a research project depending on the speciality of the supervisor. The research project will either be in plant sciences or zoology field or any other field related to life sciences as deemed necessary by the supervisor. The student will be expected to submit a research proposal and after its approval research will be conducted and then presented orally and finally a written research report (mini-dissertation, which may be in article format). The student will be introduced to research whereby he/she will be given a mini project that will be conducted for a period of 8 months	QWA	Student will be able to: -Critically assess the primary literature on his/her topic -Communicate intelligently with experts and laypeople on the topic, using both oral and written communication skills -Combine the appropriate evolutionary principles and analysis techniques to address his/her scientific questions central - Design and implement an independent study - Assess the success of his/her research through the use of appropriate statistical software and other relevant technologies.
BIOL	6814	Scientific methodology and communication	Description of five principles of science. Description of hypothesis. Description of theory with discussions on world`s popular theories. Definition of research, its significance and discussions on practical products of research available in our daily life. A breakdown on how to write a research proposal including literature review, justification, objectives, materials and methods, milestones/time frames, budget, data analysis and references. What is plagiarism, why do people plagiarize and how to avoid plagiarism. Step by step protocols of searching and downloading articles, genes, amino acids, alignment of sequences on online databases with practical at the library. Different laboratory techniques depending on students research specialty such as microscopy and molecular techniques. Field research techniques, application for permits, animal ethics, sample collection (animal and plant).	QWA	Student will be able to: -Describe the principles of science. -Apply basic methodologies which have to be followed when conducting research, how to write a research proposal and research report (dissertation/ thesis) as well as publication articles. -Avoid plagiarism and understand its implications on ones scientific career. -Search for scientific articles, resources and programs on internet databases. -Distinguish the value of different basic laboratory techniques and field based research techniques for both animal and plant research. -Understand the value of communicating scientifically with different audiences, including a hands-on knowledge of “science communication.”

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BIOL	6824	Current events in science	Each student will choose a topic relevant to events from the previous year on a global scale. Regular topic fall into the main categories of: natural disasters, accidents due to human error, exploitation of natural resources; disease outbreaks; new ground braking findings within biology and relative fields; conservation practices & malpractices; and governmental policies. Each student must then gather information around the event, history that lead up to the event, the consequences of the event, the management of the event, and future plans for restoration. Furthermore, they have to bring it into perspective and find out how the event affected our country, and how our government and relative associated management would have dealt with a similar event. Each student will also report on interesting media stories, or statements of famous people and their opinions of the event as well as providing their own opinion and solution to the problem or how they would have dealt with the problem differently. The student would have a better understanding of the impact of humanity on the environment as well as being able to debate various relative environmental issues taking inconsideration the view points of all parties involved.	QWA	Student will be able to: - Obtain information on a specific event, and evaluate how these events have affected the environment -Create an opinion on a relative topic under discussion and debate an given argument taking in consideration all view points -Present an report on a relative topic -Write a scientific article base on a relative topic, that look at all the perspectives so that the Student can learn from this event to be able to identify potential problems that might affect the environment and plan to prevent a similar disaster
BIOL	6834	Advanced biostatistics	Exploratory data analysis. Multiple regression and Multi-factor ANOVA. Principal Components Analysis, Factor analysis. Cluster analysis. Correspondence Analysis, Canonical Correspondence Analysis, Multidimensional Scaling. PerMANOVA. Discriminant analysis. Presentation of data and interpretation of results. Relevance for community ecology.	QWA	Student will be able to: -Demonstrate knowledge and engagement in the analysis of multivariate datasets -Apply this knowledge to various biological questions -Evaluate the processes of knowledge production in complex biological and ecological questions. -Select the right method applicable to any question involving multivariate data -Understand the complexities and limitations of each of these methods when solving biological or ecological problems -Obtain and manage relevant data for multivariate analysis and operate within a statistical framework to analyze such data in a creative manner. -Demonstrate accountability and ethical standards in guiding his or her own learning process in a self-critical manner.
BIOL	6844	Advanced biostatistics	Exploratory data analysis. Multiple regression and Multi-factor ANOVA. Principal Components Analysis, Factor analysis. Cluster analysis. Correspondence Analysis, Canonical Correspondence Analysis, Multidimensional Scaling. PerMANOVA. Discriminant analysis. Presentation of data and interpretation of results. Relevance for community ecology.	QWA	Student will be able to: -Use the analysis of multivariate datasets; -Apply this knowledge to various biological questions; - Evaluate the processes of knowledge production in complex biological and ecological questions; -Select the right method applicable to any question involving multivariate data; -Discuss the complexities and limitations of each of these methods when solving biological or ecological problems; -Obtain and manage relevant data for multivariate analysis and operate within a statistical framework to analyze such data in a creative manner; and -Demonstrate accountability and ethical standards in guiding his or her own learning process in a self-critical manner.
LFSC	8900	Life Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Life Science, including: Research project in specialized field of Life Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	QWA	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
LFSC	9100	Life Sciences Thesis	This module contains fundamental knowledge, theories, principles and practices of Life Sciences, including: Research project in specialized field of Life Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
UNIR	6808	Entomology Research Project	The student will conduct a research project depending on the speciality of the supervisor. The research project will be in Entomology field or any other field related to life sciences as deemed necessary by the supervisor. The student will be expected to submit a research proposal and after its approval research will be conducted and then presented orally and finally a written research report (mini-dissertation, which may be in article format)	QWA	Student will be able to: -Critically assess the primary literature on his/her topic - Communicate intelligently with experts and laypeople on the topic, using both oral and written communication skills -Combine the appropriate evolutionary principles and analysis techniques to address his/her scientific questions central - Design and implement an independent study -Assess the success of his/her research through the use of appropriate statistical software and other relevant technologies.
UNIR	6814	Science reading course	The students will choose a main entomological field and plan a short course around this topic (number of lectures is dependent on number of students, but no more than 5). They will have to gather topics and background information from textbooks and relative literature, and logically arrange a course layout. Furthermore, the student has to create classes and teaching aids on this topic and present these lectures. Each student also has to design a project for an additional practical class as well as evaluation criteria. Each student will then also have to create a test of 100 marks, with complete memo. The remainder of the students within the class will have to take this short course and be evaluated according to the lecturing student criteria. (In the case of only one student, the lecturer will provide at least two additional short courses, that the student will be evaluated on in test format)	QWA	Student will be able to: -Obtain knowledge of a specialized entomological topic and being tested on it; -Gather information around a given topic and arranging it in a logical order, through a course layout, study aids, between 3-5 classes, as well as tests and memos; -Learn the skills in preparation for a presentation, making use of various educational aids, as well as skills to present a class, and answering questions around a given topic; -Prepare for a practical class with an assignment; and -Prepare methods for evaluating assignments and tests
UNIR	8900	Entomology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Entomology, including: Research project in specialized field of Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	QWA	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
UNIR	9100	Entomology Thesis	This module contains fundamental knowledge, theories, principles and practices of Entomology, including: Research project in specialized field of Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	QWA	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
ZOOL	6808	Zoology Research Report	The student will conduct a research project depending on the speciality of the supervisor. The research project will either be zoology field or any other field related to zoology as deemed necessary by the supervisor. The student will be expected to submit a research proposal and after its approval research will be conducted and then presented orally and finally a written research report (mini-dissertation, which may be in article format)	QWA	Student will be able to: -Critically assess the primary literature on his/her topic - Communicate intelligently with experts and laypeople on the topic, using both oral and written communication skills -Combine the appropriate evolutionary principles and analysis techniques to address his/her scientific questions central - Design and implement an independent study -Assess the success of his/her research through the use of appropriate statistical software and other relevant technologies.
ZOOL	6814	Applied behavioural ecology	Description of five principles of science. Description of hypothesis. Description of theory with discussions on world's popular theories. Definition of research, its significance and discussions on practical products of research available in our daily life. A breakdown on how to write a research proposal including literature review, justification, objectives, materials and methods, milestones/time frames, budget, data analysis and references. What is plagiarism, why do people plagiarize and how to avoid plagiarism. Step by step protocols of searching and downloading articles, genes, amino acids, alignment of sequences on online databases with practical at the library. Different laboratory techniques depending on students research specialty such as microscopy and molecular techniques. Field research techniques, application for permits, animal ethics, sample collection (animal and plant).	QWA	Student will be able to: -Describe the principles of science; -Apply basic methodologies which have to be followed when conducting research, how to write a research proposal and research report (dissertation/ thesis) as well as publication articles; -Avoid plagiarism and understand its implications on one's scientific career; -Search for scientific articles, resources and programs on internet databases; and -Distinguish the value of different basic laboratory techniques and field based research techniques for both animal and plant research.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
ZOOL	6824	Veterinary parasitology	Students will learn about the different habitats of vectors, their adaptations to habitats, feeding behaviour and host preferences. They will acquire advanced knowledge on the life cycle stages of endoparasites in and outside the host. Factors conducive to propagation of parasites including temperature, vegetation, soil, rainfall will also be covered in this module.	QWA	Student will be able to: -Describe the ecology of the ectoparasites and endoparasites in high detail -Apply control methods for ectoparasites and endoparasites
ZOOL	6844	Biosystematics	Biosistematiek Curriculum review. This module forms an integral part of the BSc curriculum offered at the University of the Free State's Qwaqwa campus, in particular the new BSc majoring in Life Sciences Each student will choose an invertebrate taxonomic group whose taxonomy they will re-evaluate according to recent academic literature. They are required to write a scientific review of this taxonomic group with basic descriptions of classification within this taxon, general information available on the biology, ecology, physiology, biochemistry and conservation status of the chosen taxon. Additionally each student have to create a dichotomous key for the species within a given area (South Africa, Free State, or Qwaqwa region) that have been described, as well as design a poster around the taxonomy of the chosen group. This course will give students interested in other taxa not dealt with in detail within the department the opportunity to study them for academic credits. Additionally students must make a reference collection of the chosen taxon for the region. It will be recommended for students to take a taxon relative to their main honours research project.	QWA	Student will be able to: -Write a scientific review that illustrates the Student's knowledge on the taxonomic relationship and classification of a chosen taxon, as well as the Student's ability to review and find literature around a specific taxon -Designing a taxon specific catching method for capturing the chosen taxon -Identify a specimen of a chosen taxon -Preserve and display a reference collection -Using morphological characteristics to design a dichotomous key for the identification of specimens in a given area -Illustrate morphological important characteristics around the identification of the chosen taxon
ZOOL	6854	Immunology	The objective of this course is to learn about the structural features of the components of the immune system as well as their functions and to attain a working knowledge of current immunological principles as they relate to the cells and molecules of the immune system, how they interact in defending the body against invading microorganisms, how they develop and acquire the ability to recognize antigens, and finally how they malfunction in autoimmune diseases and how they become inadequate in immune deficiency states. Furthermore, students will extend and solidify their understanding of the presented principles through critical readings from the primary research literature. Reading of research papers will help introduce students to research techniques and also help them appreciate the value of scientific research.	QWA	Student will be able to: -Demonstrate a comprehensive and practical understanding of basic immunological principles involved in research and clinical/applied science. -Differentiate between innate and adaptive immunity. -Explain the mechanisms and differences between primary and secondary responses and their relevance to immunizations. -Identify the role of antigen presenting cells, lymphocytes, and phagocytic cells in immune responses. -Differentiate between humoral and cell mediated immunity. -Discuss current immunology news and issues.
ZOOL	9100	Zoology Thesis	A research-based thesis only This module contains fundamental knowledge, theories, principles and practices of Zoology, including: Research project in specialized field of Zoology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	QWA	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Centre for Disaster Management (123)
Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
DIME	7910	Management of Media Relations	The management of media relations in a crisis entails much more than the dissemination of information. The focus in media liaison should be on the management of public perceptions, support, cooperation, and goodwill. Therefore the aim is to provide learners with a deeper understanding of mass media operations and a functional framework of reference that could assist disaster management media liaison practitioners in using and managing the media more effectively.	MAIN	The student will be able to: - Describe the characteristics and nature of human settlement in southern Africa; - Recognise the cultural and economic value of livestock; - Obtain a theoretical perspective on the relationship between human beings and domestic animals; - Evaluate the problems created by the present tendencies in urban settlement from an anthropological perspective; - Identify the potential health and life threatening hazards contained in informal settlements; and - Design solutions for hazards created by informal settlement in urban areas.
DIMG	7900	Information Management Disaster Management	Geographic information systems (GIS) are an important entry point into fields where location in geographic space is critical. Any decision maker normally using a map will therefore find that information analyzed by a GIS gives more flexibility and a wider range of possibilities to the presentation of the information. The aim of the module is to introduce learners to the various possibilities of spatial information technology to prepare contingency plans for disaster management.	MAIN	Student will be able to: - Examine underlying concepts of spatial and temporal data and be able to implement this knowledge in a real-world situation.
DIMH	7910	Crisis Intervention and Trauma Management	To equip professionals involved with crisis intervention and trauma management with skills to enable them to empower and support victims of traumatic incidents. It also aims to empower employees of disaster management centers to overcome the symptoms of posttraumatic stress and burn-out that result from their long-term exposure to traumatic incidents and the victims of trauma.	MAIN	The student will be able to: - Define a crisis, victim and victim empowerment; - Discuss the basic principles involved trauma intervention; - Compare different action-oriented models of crisis intervention; - Discuss the basic tasks involved with the process of empowering and supporting victims; - Apply the basic principles of crisis intervention to case studies and a person to person interview; - Describe the symptoms of Posttraumatic-Stress-Disorder; - Discuss Acute Stress Disorder; - Describe Burnout in professional and voluntary crisis workers; - Discuss assessment techniques used to determine the impact of traumatic experiences on survivors; - Discuss the psychological consequences, coping strategies and management of principle of Natural disasters, Man-made disasters, Family and sexual violence, Injury, chronic and life threatening illness; - Analyse the case studies involving crisis intervention processes with victims of above-mentioned disasters and to make suggestions regarding the implementation of effective crisis intervention strategies; - Outline and appraise the strengths perspective and resiliency enhancing model as point of departure to empower individuals, families, groups and communities during crisis intervention by means of describing and distinguishing the philosophy, concepts, principles and language of the strengths perspective and resiliency enhancing model; - Outline and appraise the ecological perspective as point departure to explore and describe the reciprocal impact of individuals, families, groups and communities and environmental systems by means of: oElucidating the foundations of the perspective oDistinguishing the levels of the ecological model and the implications thereof for victim empowerment oEvaluating the value of an ecological approach; - Outline and appraise the process of participatory action as point of departure in trauma management; oComprehend the philosophy of participatory action in empowering the individual, family, group and community oFormulate a definition of participatory action o Outline the process of participatory action o Explain the principles of participatory action as a vehicle for planning prevention, intervention and postvention programs so that those concerned will take responsibility and ownership of it; - Outline and appraise the shattered assumption theory as point of departure in trauma management: o Comprehend the philosophy of the shattered assumption theory in the healing process of the individual, family, group and community o Explain the impact of the features of a traumatic event on planning prevention, intervention and postvention programs; - Distinguish reactions a child may experience during loss and trauma; - Apply and discuss the named conceptual frameworks to bereaved and traumatized children in planning services on a prevention, intervention and postvention level in trauma management; - Outline children¿s rights as spelled out by the South African Constitution Act 108 of 1996 Section 2 and the African charter on the Rights and Welfare of the African Child (www.soulcity.org.za/publications/9childrens_rights_booklet.pdf); - Outline the family processes in coping with loss and trauma during childhood and adolescence; - Develop a training programme focusing on learning essential coping strategies for the prevention of victimization and for the promotion of resilience and well-being of community members; and - Debriefing of emergency services/human services personnel to counteract burnout and compassion fatigue.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
DIMI	5810	Introduction to Disaster Management	The subject is about the understanding of basic terminology and concepts in disaster management. Focus will be on the disaster management continuum or cycle, the activities in both the pre and post phase of a disaster will be discussed in detail. International trends in disaster management with more emphasis on disaster risk reduction will also be discussed.	MAIN	The subject has two parts, module 1 and Module 2, which both carry seperate learning outcomes. Module 1 is about, Overview of disaster management and Module 2 about, Practical application of the disaster management cycle. Briefly the general outcome of the subject is that the student should be able to understand the basic principles and practices of disaster management and be able to apply the disaster management cycle to a real life disaster management project.
DIMI	7910	Disaster Risk and Impact Assessment	The main aim of this course is to introduce students to the risks and impacts of disasters. Focus will be on social, economic and environmental effects of disasters, it will teach them the techniques for identifying, evaluating and quantifying the different forms of risks and impact damages to the environment.	MAIN	Student will be able to: - assess the social impacts and facilitate the development of plans to prevent or mitigate such environmental risks and damages as: Drought risks and drought impacts on food security, Health hazards and disease epidemics (cholera, malaria, HIV/AIDS). Human conflicts, refugee crises, human settlements, and their impacts on the environment. Water pollution and related impacts on humans and aquatic lives Common property utilization and the effects on the environment. -Assess the amount of damage that could be inflicted on the environment by any form of disaster, on: Humans lives, Farm and range lands, Water, Forests, Fisheries Real Estate, etc.In performing the tasks, they should make use of the following economic and conventional tools of valuation and assessment. Cost benefit analysis (CBA), Environmental impact assessment (EIA), Discounting and compounding techniques, Risk and uncertainty analysis, Travel Cost, Hedonic and Contingent Valuation Methods. -Analyse the macroeconomic effects of disasters at both national and international levels. -Assess the environmental impacts of disasters and facilitate the development of plans to prevent or mitigate the impacts caused by disasters. -Assess the risk of disasters in a specific community through the application of the necessary participatory risk assessment activities. Construct and interpret probability density functions for empirical and other commonly used distributions; Discuss the relationship between probability density functions and cumulative probability distributions; Construct cumulative distribution functions from probability density functions and to interpret these distributions; Choose between risky alternatives based on efficiency criteria;
DIML	5810	Legal and institutional arrangements for disaster managers	The disaster management fraternity is under the mandate of various statutes, statutes enacted at both national and international levels. This subject entails a discussion of all the various statutes relevant to humanitarian work as well as ethical conducts binding humanitarian workers. Areas of focus will be on national and international Disaster Management Legislations, key factors, principles and ethics consideration for effective planning, controlling, co-ordinating, monitoring and implementing Disaster Management strategies.	MAIN	Student will be able to: -Outline the historical development of Disaster Management in RSA; -Examine legislation relevant to Disaster Management; -Discuss the need for disaster management policy; -Apply the key aspects of policy necessary for the effective application of Disaster Management; -Discuss future developments in the legislative and related field; -Discuss the five principles of ethical power. How can it be made applicable on the individual and the manager; -Integrate and apply these principles during all phases of disaster management i.e. prevention, mitigation, response, recovery and reconstruction; -Examine the Code of Conduct of the International Red Cross and apply those during disaster operations; -Arguments for why certain ethics are not applicable, define them, identify when is it not applicable; and discuss the impact of ethics; and -Discuss the development of ethics.
DIMM	5810	Theoretical Models for disaster risk reduction	This module deals with the morphology of disasters and the application of theoretical models and frameworks for DRR and more specifically disaster risk assessment. The interaction between hazards and economic, social and environmental vulnerability as well as resiliency is the core of this module. These include (i) probability and intensity of hazards, (ii) demarcation of hazards, (iii) the use of vulnerability and resiliency indicators and (iv) the integration thereof in the disaster risk equations.	MAIN	Student will be able to: -Examine the difference between a hazard and vulnerability; -Discuss the principles of the various vulnerability models; -Apply insight into strategies to reduce disaster risks; -Evaluate the difference between experimental and non experimental data; -Outline the different types of statistical variables; -Discuss the data generation process; -Use examples of probability density functions; -Calculate the mean of a normal population; -Estimate the variance of a normal population; -Predict the value of a normal random variable; -Use rational expectations; -Apply the economic factors to be considered in disaster management; -Discuss and apply basic economic terms and terminologies used in disaster risk reduction and disaster assessments; -Discuss the macro-economic impact of disasters; and -Determine the potential direct tangible damages of any disaster in monetary value.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
DIMM	7910	Management of Media Relations	The management of media relations in a crisis entails much more than the dissemination of information. The focus in media liaison should be on the management of public perceptions, support, cooperation, and goodwill. Therefore the aim is to provide learners with a deeper understanding of mass media operations and a functional framework of reference that could assist disaster management media liaison practitioners in using and managing the media more effectively.	MAIN	Student will be able to: Discuss the importance of constructive media relations for the organisation; -Incorporation of media in disaster management activities; -The nature of news as a mass media phenomenon and commercial product; -Factors that influence news reporting; -Perception management; -Knowledge of different communication mediums; -Developing a crisis communication plan. Be able to apply skills related to: -The handling of media inquiries -The writing of media releases -Presenting of media conferences -Dealing with interpersonal interviews by journalists -Doing radio interviews -Doing television interviews

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
DIMN	5820	Management of Natural and Human-Made Disasters	Understanding of the critical factors in average response to disasters. Demonstrate the principles of management of at least four natural and four artificial disasters. Determination of disasters and risk. Resilience Analysis. Determination of the potential impact of disasters. Socio-economic and environmental impact. formulation of dangers and risikoverminderingstrategie¿. Formulation of prevention and mitigation strategies.	MAIN	Student will be able to: - Identify appropriate flood mitigation measures to mitigate the negative consequences of floods; - Determine the costs involved implementing the identified mitigation measures - Calculating the net present value (NPV) and the benefit cost ratio; - Execute a benefit cost analysis to determine the economic feasibility of identified mitigation measures; - Implement a phased remedial programme work; - Formulate a cost-effective mitigation strategy; - Discuss drought as a natural hazard; - Assess the impact of drought; - Apply the methodology for drought planning; - Develop a drought plan; -Evaluate the role and impact of fire on the vegetation, fauna and soil properties; -Examine the impact of accidental and controlled fires; -Discuss fire behaviour; -Evaluate fire as a management tool; -Determine the damage to the environment caused by fire; -Discuss fire management; - Discuss Climatology and the products used in common operations; -Characterise typical weather patterns for winter and summer seasons over South Africa and relate them to the long-term mean rainfall and temperature values of various regions; -Identify different types of Chemical Hazards and its possible effects on the environment and human safety and to evaluate these hazards scientifically by looking at: - structural, material and operational sources of hazards - toxicity and dose-response relationships (LD50) - environmental transport and transformation of chemicals -Evaluate potential chemical hazards with special reference to industrial fires, chemical pollution, explosive materials, nuclear disasters and chemical terrorism. -Evaluate the technical aspects of managing these different types of hazards and to apply this knowledge on different real-life examples; -Discuss the mitigation of chemical hazards by -minimising exposure -inventory control -monitoring of potential hazards -Evaluate the basic objectives of site decontamination, the methods used to do so and the prevention of contamination of Clean Areas; -Apply and adjust basic knowledge of disaster management to Chemical Hazards with special reference to the following: -Incident Command System (ICS) and Hierarchy -Scope of Emergency Planning (health, safety and environment (HSE)) -Assessment of Hazards and Risk (assessment, phases of decision making, techniques) -Authority and Responsibility -Communication and information (handling and processing) -Contents of Emergency Plan (Incident Action Plan including location of data/info, chemical inventory. MDS¿s, haz. Chemicals, etc.) -Personal Protective clothing/equipment (PPC & PCE), (selection and criteria, vendors) -Hazard and Risk Reduction Strategies (minimize number and magnitude of incidents, mitigation of chemical hazards) -Decontamination (plan, incompatible and synergistic chemical contaminants) -Prevention of contamination of clean areas -Discuss the different agents which can be used in biological weapons (from previous course DIM 607); -Differentiate between biological weapons and chemical weapons. -Evaluate different potential targets of biological warfare (i.e. the population directly, or the food and water sources of a population); -Discuss control methods for the different groups of biological weapons once these weapons have been used; and -Develop a strategy for the control, limitation of spread and treatment after exposure to a selected biological weapon.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
DIMP	5820	Public Health in Disaster Managament	Understanding concepts related to Public Health with regard to biological, community health and psycho-social and certain mental health implications of disasters. Biological warfare, Veterinary risks; Epidemiology: Community assessment, infection control and prevention disease. Handling and management of health risks during disasters and/or conflict. Psycho-social aspect of HIV/AIDS and Mental health burnout.	MAIN	Student will be able to: -Define, explain, indicate, outline, discuss and appraise the socio-economic and psycho-social impact of HIV/AIDS as a man-made disaster by means of: - Recognizing that HIV/AIDS can be defined as a pandemic in the category of man-made disasters, implying that different sectors of society and professionals have a contribution to make. -Elucidating the concepts of HIV/AIDS and other relevant concepts in the field of public and mental health. -Describing the epidemiology of HIV/AIDS. -Outlining the susceptibility of society regarding HIV/AIDS. - Describing, discussing and evaluating from a systemic perspective the vulnerability and impact of HIV/AIDS on: Individuals , households (families) , communities, vulnerable groups (e.g. children) rural areas, private sector, government, development -Distinguishing and discussing the importance of the tasks of the different role players in the field in order to comprehend the necessity of a multi-professional approach. -Designing measures in the field of HIV/AIDS for the managing of the pandemic. -Distinguish between stress, post-traumatic stress, post-traumatic stress disorder,
DIMP	7900	Political Strategic Planning	The aim of this module is related to an explanation of the nature of political governance and its application on times of change and fundamental change (with reference to the evolving nature of security thinking and practice). Specific attention will be given to strategic conflict analysis, political risk analysis as well as scenario development as techniques of forecasting. These tools must be applied in the context of conflict and post-conflict situations, with specific reference to Africa. Lastly, we will also explore the steps associated with developing a risk management strategy.	MAIN	The student will be able to: - Collect and systematise information; - Provide standpoints and views; - Provide insight into phenomena / problems; - Reflect on the above; and - Write papers and takes part in class discussions for broader and deeper understanding.
DIMR	5810	Research design and methodology	The module aims at developing the research knowledge and skills of students to doe quantitative and qualitative research. Plan, design and manage practical research. Compile and present a proposal for a project and mini-dissertation	MAIN	Student will be able to: - Define a crisis, victim and victim empowerment; - Discuss the basic principles involved trauma intervention; - Compare different action-oriented models of crisis intervention; - Discuss the basic tasks involved with the process of empowering and supporting victims; - Apply the basic principles of crisis intervention to case studies and a person to person interview; - Describe the symptoms of Post-traumatic-Stress-Disorder; - Discuss Acute Stress Disorder; - Describe Burnout in professional and voluntary crisis workers; - Discuss assessment techniques used to determine the impact of traumatic experiences on survivors;
DIMR	7900	Disaster Management Mini-Dissertation	Mini -dissertation in specialised field of Disaster Management as discussed by study leader(s), Academic Departmental Head and student. The mini-dissertation includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a mini-dissertation, adhering to the grammatical and technical aspects of scientific writing.
DIMS	5820	Strategic Disaster Management	The focus of this module is on management principles and concepts such as strategic planning, strategic management, leadership, resource planning and management including financial management, human resource management, logistics and administration. The project cycle, project development and project planning form an important element of this module. Sector specific plans such as the disaster management plan with its sub-plans such as the disaster risk reduction plan, disaster response plan, preparation plan and contingency plan are covered in this module.	MAIN	Student will be able to: -use strategic management best practice models to formulate disaster management strategies; -discuss the various strategic models that can be used for disaster management projects; -outline what strategy is, within the disaster management context; -evaluate implementable strategies; -incorporate disaster management statutes and other relevant statutes when drawing up strategic documents; -Explore the forces and dynamics of the environments that influences Disaster Management; -discuss strategic disaster management interventions as processes impacting on a dynamic environment; -examine strategic management process and the application thereof to Disaster Management; -discuss key principles and stages in the strategic management process for disaster management; and -evaluate the implementation of strategic disaster management planning in context of local/regional integrated development planning.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
DIMT	5820	Information Technology in Disaster Management	The main aim of this module is to develop knowledge of information and information systems in order to manage information in all phases of the disaster continuum.	MAIN	Student will be able to: -Discuss the theory of information; -Outline computer-based information systems and information technology; -Recognize information systems vulnerabilities and identify possible disasters and risks that pose a threat to information systems; and -Evaluate the importance of information and information systems as an integral part of Disaster Risk Reduction.
DISM	9100	Disaster Management	The content is multidisciplinary with the focus on disaster management. This will include Disaster Risk Reduction (DRR) focusing on mitigation, preparedness, prevention and sustainable development. Issues of post disaster management are also included, which are response, relief, recovery, rehabilitation and reconstruction. Resilience and vulnerability in terms of either community, environment, economic and/or infrastructure will be clearly articulated.	MAIN	The student will be able to portray: A significant level of research competence and scientific writing Methodological and conceptual skills Original and critical thought Clarity in exposing and development of argument, sound judgment and interpretation.
DSMT+ A19:F20	9100	Disaster Management Thesis	This module contains fundamental knowledge, theories, principles and practices of Disaster Management, General including: Research project in specialized field of Disaster Management, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Genetics (124)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BLGY	1623	Introduction to Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: a introduction to the fundamental principles within Genetics. This module covers the basic principles of inheritance and starts with a study of meiosis, since a good understanding of the fundamental genetic mechanisms of reproduction is necessary to understand the principles of heredity. The work of Gregor Mendel, the father of Genetics, will also be studied. Both the chromosomal and molecular foundations of inheritance will be investigated as well as the way in which genes are expressed when protein synthesis is covered. Finally, the fast growing field of Biotechnology, a very practical application of the science of Genetics will receive attention.	MAIN	Student will be able to: -Explain the mechanism and reason for meiosis; -Describe the origins of genetic variation among offspring; -Recount the impact of the environment on the genotype; -Apply the principles of Mendelian genetics; -Determine recessively and dominantly inherited disorders; -Explain how linkage affects inheritance; -Depict human disorders due to chromosomal alterations; -Specify the basic principles of transcription and translation; -Describe the different types of point mutations; and -Outline selected practical applications of DNA technology, including PCR, forensics and cloning.
FORS	2616	Introductory Forensic Science	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences as an applied science that covers an array of disciplines. The aim of the module is to recognise, identify and evaluate physical evidence by applying all the different fields of science.	MAIN	Student will be able to: -Outline the areas of knowledge that are essential to forensic science; -Apply basic forensic science concepts to problem solving; -Explain how the multi-disciplinary aspects, of forensic science, can be used to solve criminal cases; and -Identify, evaluate and interpret different types of forensic evidence in relation to criminal investigations.
FORS	2626	Crime Scene Management	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences , including the interaction between crime scene investigation, the criminal law and the science involved. Various investigating techniques and procedures applied in CSI will be demonstrated and the impact it has in the legal system of South Africa will be addressed.	MAIN	Student will be able to: -describe how to preserve and process a crime scene in the South African context; -discuss the criminal justice system in South Africa; -explain law/science interface in Forensic Sciences; -discuss the ethical and professional responsibilities of a forensic scientist; and -discuss forensic photography.
FORS	3714	Trace and impression evidence	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including insight into the forensic aspects of various types evidence found at a crime scene. Detail is provided about bloodstain pattern analysis, trace evidence examinations, microscopy, questioned documents and impressions.	MAIN	Student will be able to: - Identify and interpret bloodstain patterns; - Describe trace evidence relevant to crime scene analysis, including fiber, hair, paint and glass analysis. - interpret and report results and comment on the evidential value of trace evidence. - Explain and discuss concepts and procedures applied in questioned document analysis.
FORS	3724	Forensic Chemistry	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including the disciplines of drugs of abuse, the chemistry of Gun Shot Residue and statistics for Analytical Chemistry.	MAIN	Student will be able to: - Identify various controlled substances using presumptive and confirmatory methods; - Analyse ammunition and its by-products; - Calculate of bullet trajectories based on evidence found at the crime scene; and - Apply the statistics of Analytical Chemistry.
FORS	3734	Forensic Entomology	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including an introduction to entomology; morphology of body wall, head, thorax and abdomen; mouth parts; appendages, internal anatomy of organ systems; growth and metamorphosis; ecological preferences and life cycles; characteristics used to differentiate between insect orders; identification of forensic important insects and their role in forensic medicine.	MAIN	Student will be able to: - Describe the basic morphology, anatomy and functioning of the insect body; - Identify insects to order level and insects of forensic importance to more detailed levels - Discuss and apply the role of insects in the decomposition process of carcasses.
FORS	3744	Forensic Genetics	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including the detailed study of various marker systems used in forensic genetics. The application of other molecular techniques, such as epigenetic and mRNA analysis, in the field of forensic genetics will also be examined. The interpretation of DNA profiles is demonstrated and the practical application of DNA profiles in the identification and parentage analysis process are explained.	MAIN	Student will be able to: - Describe and differentiate between the various techniques and marker systems used in forensic genetics, - Explain how these profiles can be applied in DNA forensics, - Discuss how STR technology is used for individual and parentage analysis - Discuss and apply the use of epigentics for identification purposes, with a specific focus on identical twins - Discuss and analyse the application of mRNA analysis in the field of forensic genetics

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FORS	3774	Forensic Chemistry	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including the disciplines of drugs of abuse, toxicology, fires and explosions and forensic ballistics.	MAIN	Student will be able to: - Identify various controlled substances using presumptive and confirmatory methods - Explain the role of toxins in human death - Understand the investigation of an arson scene in terms of observation, sampling and packaging - Discuss the analysis and interpretation of samples taken from an arson scene - Analyse ammunition and its by-products - Calculate of bullet trajectories based on evidence found at the crime scene
FORS	3784	Evidence type	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including insight into the forensic aspects of various types of assault and homicide. Legal definitions and associated evidences types are studied. Detail is provided about bloodstain pattern analysis, assault, sexual offenses and trace evidence examinations.	MAIN	Student will be able to: - Identify and interpret bloodstain patterns; - Evaluate the limitations of evidence interpretation, especially with regards to the case context; - Determine the presence of various body fluids, both qualitatively and quantitatively; - Discuss factors which affect the interpretation of body fluids within sexual assault cases; and - Describe trace evidence relevant to assault and homicide, interpret and report results and comment on the evidential value of trace evidence.
GENE	2616	Principles of Genetics: Human Genetics	This module contains fundamental knowledge, theories, principles and practices of Human Genetics, including: an introduction to classical genetics and the human genome as well as transmission genetics which include single-gene inheritance, extensions to Mendel`s laws, sex-linked inheritance and multifactorial traits. This module will further focus on DNA structure and replication, gene actions from DNA to protein, chromosomes and gene mutations. Genetic testing and relevant technologies will also be discussed.	MAIN	Student will be able to: - Discuss the basic scientific background on human and medical genetics; - Discuss chromosomal disorders and mechanisms of aetiology; - Identify and interpret the pattern of inheritance of single and multiple genes and statistically test a hypothesis based on these inheritance patterns; and - Interpret the inheritance of diseases or traits based on family pedigrees and calculate the probabilities of inheriting these traits.
GENE	2626	Molecular Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: an introduction to DNA as the blueprint of life. The central dogma of molecular biology will be studied, which includes the transcription of DNA to RNA, followed by the translation of RNA to proteins; DNA replication and organization into chromosomes; DNA mutations and mechanisms for repairing mutations; the basis of gene regulation and expression in prokaryotes and eukaryotes. The advent of recombinant DNA technology will be discussed by considering various DNA cloning tools and the importance of genome sequencing and analysis. The possibility of improving life through the production of Genetically Modified Organisms (GMOs) will also be studied.	MAIN	Student will be able to: - Explain the basis of DNA as the genetic material, including the structure and function thereof in the cell; - Describe and apply the link between DNA, RNA and proteins as well as the process of protein synthesis; - Describe the different mechanisms controlling the genetic integrity between individuals of different generations; - Discuss the basis of gene regulation and expression in prokaryotes and eukaryotes - Discuss the implications and impact of recombinant DNA technology, including the production of Genetically Modified Organisms (GMOs).
GENE	3714	Genomics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: an introduction to phylogenomics; evolutionary principles; databases; homology, homoplasy, pairwise and multiple alignment; constructing phylogenomic matrices; genome sequencing and annotation; tree building; robustness and rate of heterogeneity in phylogenomics; Bayesian approaches in evolution; incongruence; genome content analysis; tree of life, DNA barcoding and metagenomics.	MAIN	Student will be able to: -conceptualize the methods applied in genome sequencing studies; -navigate and acquire specific sequences from different sequence databases; -apply in silico methods to comparatively analyse and interpret sequence data; -differentiate between discernible prokaryotic and eukaryotic genomic features; and -deduce gene expression data gathered using genome-wide analysis techniques
GENE	3734	Behavioural Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: an introduction to patterns of inheritance and pedigree analysis as applied in genetic counselling, prenatal diagnosis, the potential contribution of genotype and/or environment on behavioural studies, quantitative studies, twin and adoption studies, identifying genes contributing to human behaviour, deeper study of human behaviour, including memory and learning, cognitive disabilities, psychopathology, anxiety disorders and addiction.	MAIN	Student will be able to: - Describe and apply the basic scientific background on human and medical genetics; - Outline chromosomal disorders and mechanisms of ethiology; - Interpret pedigrees; - Describe the effect of different genetic techniques on society; - Evaluate the boundaries of ethical research; - Apply the various research types when studying behaviour; and - Plan an experiment to determine if a certain behavioural trade is inherited or influenced by the environment.
GENE	3744	Population and Conservation Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: the importance of genetic diversity; the effects of genetic drift, selection, mutation, migration and fragmentation on allele frequencies in large and small populations; inbreeding depression; population genetic principles applied in nature conservation and the need for genetic management; and the use of appropriate molecular and statistical measures to describe the preceding processes.	MAIN	Student will be able to: -Describe the influence of various evolutionary and population-genetic processes on populations and species; -Discuss how these factors may change populations; -Use suitable statistical measures to quantify and demonstrate the effects of the above processes; and -Recommend strategies for the conservation of genetic diversity in wild and artificially managed populations.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GENE	3764	Advances in Genetics	This module contains fundamental and applied knowledge, theories, principles and practices of Genetics, including: knowledge of, and practical application of difference research techniques when investigating chromosomal and molecular aspects of evolution, inheritance and gene expression.	MAIN	Student will be able to: -Distinguish between different techniques used in genetic research -Explain how these techniques can prove new data and insights during the study of evolution, inheritance and gene expression -Distinguish and contrast chromosomal and molecular aspects involved in genetics -Discuss and explain the practical application of DNA technology (old and recent).
HMBG	2614	Human Molecular Biology of Dietetics	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: - Composition of the human genome - Gene inheritance of metabolic disorders - The interaction of complex nutritional disorders and pharmacogenetics.	MAIN	Student will be able to: -Examine and discuss the composition of the human genome; -Discuss gene inheritance resulting in syndromes and diseases; -Discuss the genes associated with carbohydrate related disorders; -Discuss the genes associated with amino acid related disorders; and -Apply basic principles on Nutrigenomics
HMBG	3714	Human Molecular Biology of Nutritional Disorders	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: -Composition of the human genome -Gene inheritance of metabolic disorders -The interaction of complex nutritional disorders and pharmacogenetics.	MAIN	Student should be able to: - Describe the composition of the human genome at macro level; - Discuss and apply gene inheritance resulting in syndromes and diseases; - Outline genes associated with carbohydrate related disorders; - Outline genes associated with amino acid related disorders; and - Discuss and apply pharmacogenetics.
HMBG	3724	Human Molecular Biology of Cancer	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: -Molecular basis of cellular development and differentiation -Malignancies of the cell cycle, mutagenesis and DNA repair systems -Oncogenes and tumour suppressor genes, gate keeper and caretaker genes -Gene fusions resulting in lymphoma and leukaemia.	MAIN	Student should be able to: -Describe development and differentiation of cells in the human body; -Discuss malignancies of the cell cycle; -Discuss and apply mutagenesis and DNA repair systems; -Analyse oncogenes and tumour suppressor genes; -Describe gate keeper and caretaker genes; and -Outline gene fusions resulting in lymphoma and leukaemia.
HMBG	3734	Human Molecular Biology of Chromosomes	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: -Molecular basis of chromosomal abnormalities and prenatal screening -Autosomal and sex chromosomal linked aberrations -Population biology, natural selection of genetic disorders, the human genome project and gene therapy.	MAIN	Student should be able to: -Discuss and apply the molecular basis of chromosomal abnormalities; -Outline autosomal and sex chromosomal linked aberrations; -Discuss and apply population biology and natural selection of genetic disorders; and - Describe human genome project and gene therapy.
HMBG	3744	Human Molecular Biology of Immunology and Haemostasis	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: -Molecular basis of the immune system, antigen structure, recognition and function, as well as applications in forensics -The molecular basis of haemostasis, inherited bleeding tendencies, thrombosis and platelet disorders.	MAIN	Student will be able to: - Discuss and apply molecular basis of the immune system; - Describe antigen structure, recognition and function; - Discuss the application of immunogenetics in forensics; - Outline the molecular basis of haemostasis; and - Discuss and apply molecular basis of inherited bleeding tendencies, thrombosis and platelet disorders.
Postgraduate					
FORC	6808	Research Essay: Forensic Chemistry	This module contains fundamental knowledge, theories, principles and practices of Forensic Chemistry, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: - Problem identification -Hypothesis formulation -Planning and conducting of experiments -Analysis and interpretation of results -Discussion of results -Compiling the information according to a specified structure -Technical aspects of scientific writing -Practical presentation skills.
FORC	6814	Advanced forensic techniques	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: insight into techniques and instrumentation used in forensic science. These include infrared, chromatography and microscopy, which can be applied to a variety of evidential types. Theoretical and practical elements of these methodologies are covered.	MAIN	Student will be able to: -Apply and discuss numerous analytical techniques and their applications in forensic science; and -Apply both theoretical and practical applications of techniques used in forensic science.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FORC	8900	Forensic Chemistry Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Chemistry, including: Research project in specialized field of Forensic Chemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORC	9100	Forensic Chemistry Thesis	Forensic Chemistry Thesis	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORE	8900	Forensic Entomology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Entomology , including: Research project in specialized field of Forensic Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORE	9100	Forensic Entomology Thesis	Forensic Entomology Thesis	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; and -Discuss the results comprehensively.
FORG	6808	Research Essay	This module contains fundamental knowledge, theories, principles and practices of Forensic Genetics, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Plan and conduct experiments; -Analyse and interpret results; -Discuss results; -Compile the information according to a specified structure; -Apply technical aspects of scientific writing; and -Apply practical presentation skills.
FORG	6814	Research: Literature Study	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: -Search and access literature on a particular topic, -Organise and integrating the information, -Draw conclusions from the available body of literature, -Compile the information according to a specified format, -Apply technical aspects of scientific writing, -Demonstrate practical presentation skills.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FORG	6816	Research Techniques	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Theory behind techniques such as extraction, quantification, PCR and analysis. Students should be familiar with all laboratory equipment (centrifuges, heating blocks, water baths, pipettes, autoclave, vortexes, PCR machines, pH-meter, magnetic stirrers and the NanoDrop) and save laboratory practices. Students should be able to prepare chemicals and to perform techniques such as DNA extraction, gel electrophoresis and PCR reactions.	MAIN	Student will be able to: - apply formal logic and evaluate the logic of scientific writing; - write and present a paper at a conference; - create and present a poster at a conference; -write a scientific paper; - write and present a press release; - handle a TV/radio interview; - construct a CV and handle a job interview; - use appropriate statistical measures and associated software to analyze data; - apply safe laboratory practise; - set centrifuges, heating blocks, water baths, pipettes and the autoclave according to protocols given to them; - write programs on the different PCR machines in the department; and - extract DNA from different sources, visualize it on an agarose gel and amplify a specific region using appropriate primers and a PCR reaction.
FORG	6824	Research: Literature Study	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: -analyse literature on a particular topic, -organise and integrating the information, -draw conclusions from the available body of literature, -compile the information according to a specified format, -apply the technical aspects of scientific writing, -apply practical presentation skills.
FORG	6834	Forensic DNA typing and quality assurance	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Quality control, quality assurance and accreditation of Forensic Laboratories.	MAIN	The student will be able to: - Compare analytical methods used in DNA forensic analysis; and - Evaluate the management and maintenance of a forensic laboratory based on quality assurance, quality control and accreditation guidelines.
FORG	6844	Forensic DNA typing and quality assurance	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Quality control, quality assurance and accreditation of Forensic Laboratories.	MAIN	Student will be able to: - Discuss and compare analytical methods used in DNA forensic analysis - Evaluate the management and maintenance of a forensic laboratory based on quality assurance, quality control and accreditation guidelines.
FORG	6854	Crime Scene Investigation and the Juctice system	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Crime scene analysis; Presumptive test done at the crime scene including (blood, saliva, semen samples); Chain of custody of evidence samples; Collecting reference samples; Chain of custody in the Forensic laboratories; Compiling a DNA evidence report for court; Presenting DNA evidence in court.	MAIN	Student will be able to: -Perform presumptive tests of various types of forensic evidence samples -Explain the different procedures that take place at a crime scene -Evaluate evidence found at a crime scene -Compile a forensic report that can be presented in the court of law in South Africa -Defend and justify results in a court of law under cross examination.
FORG	6864	Crime scene management and the justice system	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Crime scene analysis; Presumptive test done at the crime scene including (blood, saliva, semen samples); Chain of custody of evidence samples; Collecting reference samples; Chain of custody in the Forensic laboratories; Compiling a DNA evidence report for court; Presenting DNA evidence in court.	MAIN	The student will be able to: - Perform presumptive tests of various types of forensic evidence samples; - Explain the different procedures that take place at a crime scene; - Evaluate evidence found at a crime scene; - Compile a forensic report that can be presented in the court of law in South Africa; and - Defend and justify results in a court of law under cross examination.
FORG	6874	Capita Selecta in Forensic Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Capita Selecta of advanced aspects of Forensic Genetics, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	None provided-Depends on the student's choice.
FORG	8900	Forensic Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Genetics, including: Research project in specialized field of Forensic Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. as discussed by study leader(s), Academic Departmental Head and student.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FORG	9100	Forensic Genetics Thesis	Forensic Genetics Thesis	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified thesis structure (the department recommend that theses be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORI	8900	Forensic Sciences Interdisciplinary Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences , including: Research project in specialized field of Forensic Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORI	9100	Forensic Sciences Interdisciplinary	Forensic Sciences Interdisciplinary	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; and -Discuss the results comprehensively.
FORS	6808	Research Report	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: -Examine and discuss the nature of a crime scene and the `continuity of evidence process. -Evaluate, record, collect, interpret and present forensically-relevant material. -Plan and develop crime scene evaluation and laboratory analysis strategies.
FORS	6814	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: - Search and access literature on a particular topic; - Organise and integrate the information; - Draw conclusions from the available body of literature; - Compile the information according to a specified format; - Apply technical aspects of scientific writing; and - Use practical presentation skills.
FORS	6816	Research Techniques Forensic Science	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Students should be able to prepare chemicals and to perform techniques. Subject specific practical experience includes: packaging and labelling; principle examinations: search and recovery; searching, preliminary testing, recovery, lab notes and case files.	MAIN	Student will be able to: - apply formal logic and evaluate the logic of scientific writing; - write and present a paper at a conference; - create and present a poster at a conference; - write a scientific paper; - write and present a press release; - handle a TV/radio interview; - construct a CV and handle a job interview; - use appropriate statistical measures and associated software to analyse data; - apply safe laboratory practice; - implementing the appropriate packaging and labeling as required by forensic laboratories; and - plan and use appropriate techniques and technology in the searching, preliminary testing and recovery in principle examinations.
FORS	6824	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: - Locate and examine literature on a particular topic, - Organise and intergrate the information, - Draw conclusions from the available body of literature, - Compile the information according to a specified format, - Apply the technical aspects of scientific writing,and - Apply presentation skills.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FORS	6834	Evaluating & Interpreting Forensic Evidence: Forensic Sciences	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences. Topics include the criminal justice system, evidence interpretation and reasoning, laboratory accreditation and management, as well as the investigative process from crime scene to court.	MAIN	Student will be able to: -Determine, using statistical methods, the evidential value of data generated through forensic examinations. -Examine the interface between forensic science and the law and challenges with regard to presentation of evidence in court. -Outline the processes involved in successfully managing a forensic laboratory.
FORS	6854	Crime to Court	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: This module puts into practise the theory and knowledge from previous modules. It takes the form of a `crime scene to court' exercise where time is spent on a mock crime scene, in the laboratory and in the courtroom. Essential factors such as contemporaneous note-taking, interpretation, evaluation and presentation of evidence are emphasised.	MAIN	The student will be able to: - Investigate the crime scene and evidential material; - Interpret, evaluate, record and present forensic-relevant material; and - Plan and develop strategies.
FORS	6874	Capita Selecta in Forensic Sciences	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Capita Selecta of advanced aspects of Forensic Sciences, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	The student will be able to: Outline the fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Capita Selecta of advanced aspects of Forensic Sciences.
FORS	6893	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	The student will be able to: - Search and access literature on a particular topic; - Organise and integrate the information; - Draw conclusions from the available body of literature; - Compile the information according to a specified format; - Apply technical aspects of scientific writing; and - Use practical presentation skills.
FORS	8900	Forensic Sciences Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences , including: Research project in specialized field of Forensic Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORS	9100	Forensic Science Thesis	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Research project in specialized field of Forensic Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; and -Discuss the results comprehensively.
GENB	6814	Advanced Behavioural Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Determination of the inheritance of behaviour; monogenic vs. polygenic inheritance; allelism; Pleiotropy; epistasis; quantitative studies and analysis; experimental design; bioethics; statistical analyses.	MAIN	Student will be able to: - Plan and execute a behavioural genetic study; - Identify and judge factors influencing behaviour; - Identify bioethical considerations to be made when studying behaviour; and - Apply basic statistical analysis to behavioural genetic quantitative data.
GENB	8900	Behavioural Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Research project in specialized field of Human or Behavioural Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GENB	9100	Behavioural Genetics Thesis	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Research project in specialized field of Human or Behavioural Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENC	6814	Advanced Cytotaxonomy	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Chromosome evolution, cytotaxonomy, speciation.	MAIN	The student will be able to: - plan and execute a cytotaxonomic study, analysing and reporting the results; - identify different forms of chromosomal evolution; and - identify hybrids at cellular level.
GENE	6808	Research Report Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	The student will be able to: - Problem identification; - Hypothesis formulation; - Planning and conducting of experiments; - Analysis and interpretation of results; - Discussion of results; - Compiling the information according to a specified structure; - Technical aspects of scientific writing; and - Practical presentation skills.
GENE	6814	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	The student will be able to: - Search and access literature on a particular topic; - Organise and integrate he information; - Draw conclusions from the available body of literature; - Compile information according to a specified format; - Use technical aspects od scientific writing and - Practical presentation skills.
GENE	6816	Research Techniques	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Theory behind techniques such as extraction, quantification, PCR and analysis. Students should be familiar with all laboratory equipment (centrifuges, heating blocks, water baths, pipettes, autoclave, vortexes, PCR machines, pH-meter, magnetic stirrers and the NanoDrop) and save laboratory practices. Students should be able to prepare chemicals and to perform techniques such as DNA extraction, gel electrophoresis and PCR reactions.	MAIN	Student will be able to: -apply formal logic and evaluate the logic of scientific writing -write and present a paper at a conference -create and present a poster at a conference -write a scientific paper -write and present a press release -handle a TV/radio interview -construct a CV and handle a job interview -use appropriate statistical measures and associated software to analyze data -know safe laboratory practise -set centrifuges, heating blocks, water baths, pipettes and the autoclave according to protocols given to them. -write programs on the different PCR machines in the department. -extract DNA from different sources, visualize it on an agarose gel and amplify a specific region using appropriate primers and a PCR reaction.
GENE	6824	Research : Literature Study	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: -analyse literature on a particular topic, -organise and integrating the information, -draw conclusions from the available body of literature, -compile the information according to a specified format, -apply technical aspects of scientific writing, -apply practical presentation skills.
GENE	6834	Capita Selecta: Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Capita Selecta of advanced aspects of Genetics, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	Student will be able to: - Examine and discuss principles of chosen topic.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GENE	6844	Capita Selecta: Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Capita Selecta of advanced aspects of Genetics, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	Student will be able to: - Examine and discuss principles of chosen topic.
GENE	8900	Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Research project in specialized field of Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENE	9100	Genetics Thesis	Genetics Thesis This module contains fundamental knowledge, theories, principles and practices: Research project in specialized field of Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENF	8900	Forensic Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of forensic Genetics, including: Research project in specialized field of Forensic Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENF	9100	Forensics Genetics Thesis	Forensics Genetics Thesis This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Research project in specialized field of Forensic Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENG	6808	Research Essay	This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: - Problem identification; - Hypothesis formulation; - Planning and conducting of experiments; - Analysis and interpretation of results; - Discussion of results; - Compiling the information according to a specified structure; - Technical aspects of scientific writing; and - Practical presentation skills.
GENH	6804	Research: Literature Review	A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	The student will be able to: - Access and search for literature on a particular topic; - Organise and integrating the information; - Draw conclusions from the available body of literature; - Compile the information according to a specified format; - Apply technical aspects of scientific writing; and - Practical presentation skills.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GENH	6806	Research Techniques	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Theory behind techniques such as extraction, quantification, PCR and analysis. Students should be familiar with all laboratory equipment (centrifuges, heating blocks, water baths, pipettes, autoclave, vortexes, PCR machines, pH-meter, magnetic stirrers and the NanoDrop) and save laboratory practices. Students should be able to prepare chemicals and to perform techniques such as DNA extraction, gel electrophoresis and PCR reactions.	MAIN	Student will be able to: - apply formal logic and evaluate the logic of scientific writing; - write and present a paper at a conference; - create and present a poster at a conference; - write a scientific paper; - write and present a press release; - handle a TV/radio interview; - construct a CV and handle a job interview; - use appropriate statistical measures and associated software to analyze data; - know safe laboratory practise; - set centrifuges, heating blocks, water baths, pipettes and the autoclave according to protocols given to them; - write programs on the different PCR machines in the department; and - extract DNA from different sources, visualize it on an agarose gel and amplify a specific region using appropriate primers and a PCR reaction.
GENH	6814	Advanced Human Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: a background on the concepts of human genetic, a study of genetic disorders at molecular and cytogenetic level, diagnostic practices in genetics, strategies and techniques to conduct research and identify susceptibility loci, utilize public databases in research.	MAIN	Student will be able to: - Discuss and apply the molecular and chromosomal basis and mechanisms involved in common and complex human genetic disorders; - Discuss molecular and cytogenetic techniques used in research and diagnostics; and - Design a human genetics research protocol.
GENH	8900	Human Molecular Genetics Disseration	This module contains fundamental knowledge, theories, principles and practices of Human Genetics , including: Research project in specialized field of Human Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENH	9100	Human Molecular Genetics Thesis	This module contains fundamental knowledge, theories, principles including: Research project in specialized field of Human Molecular Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENI	8900	Genetics Interdisciplinary Dissertation	This module contains fundamental knowledge, theories, principles and practices of This module contains fundamental knowledge, theories, principles and practices of Zoology, including: Research project in specialized field of This module contains fundamental knowledge, theories, principles and practices of Zoology, including: Research project in specialized field of Zoology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. as discussed by study leader(s), Academic Departmental Head and student.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENI	9100	Genetics Interdisciplinary Thesis	Genetics Interdisciplinary Thesis This module contains fundamental knowledge, theories, principles and practices: Research project in specialized field of Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GENM	6814	Recombinant DNA technology	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Recombinant DNA technology provides a powerful platform that enables the study of any gene isolated from virtually any organism. Central to this technology is the cloning of nucleic acid fragments (for example, DNA) into cloning vectors, a process simplified by the Polymerase Chain Reaction (PCR) technique. Subsequently, recombinant vectors used to transform competent bacterial cells and the sequence information of the cloned gene can be determined by DNA sequencing. This course aims to introduce basic tools and techniques utilized in recombinant DNA technology.	MAIN	Student will be able to: - apply various laboratory procedures to isolate DNA and RNA from cellular and/or eukaryotic tissues - plan and perform experiments on complementary DNA (cDNA) synthesis - design, implement and evaluate experiments based on the Polymerase Chain Reaction (PCR) technique - create recombinant DNA molecules by cloning DNA fragments into cloning vectors - use laboratory protocols to transform recombinant cloning vectors into bacteria; and - analyse and compare cloned DNA fragments using sequencing and various computer-based sequence analysis programmes.
GENP	6824	Applied Conservation Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: the use of molecular markers and appropriate statistical coefficients to determine levels of diversity, detect historic bottlenecks, measure drift and differentiation, describe population structure, detect hybridization, apply assignment methods, and perform forensic investigations relating to wildlife. These outcomes are reached using appropriate statistical approaches and suitable contemporary software.	MAIN	Student will be able to: - analyse molecular data with various statistical coefficients and appropriate software, - implement molecular data results in such a way that it can contribute to the conservation of biodiversity, and - examine and describe the contribution of genetics to conservation and ecology.
GENS	6814	Advanced Molecular Systematics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Data preparation, sequence alignment, genetic distances and nucleotide substitution models, distance methods, maximum likelihood methods, Bayesian phylogenetic analysis, parsimony methods, selecting models of evolution, testing tree topologies, molecular adaptation, computer programs used in molecular analyses.	MAIN	Student will be able to: - plan a molecular study - obtain and prepare sequencing data for analysis - apply the different tree and network drawing methods and models - interpret the evolutionary history of organisms - incorporate additional data, e.g. chromosome numbers, geographical and ecological features, distribution to infer phylogenies.
GENS	6824	Advanced Molecular Systematics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Data preparation, sequence alignment, genetic distances and nucleotide substitution models, distance methods, maximum likelihood methods, Bayesian phylogenetic analysis, parsimony methods, selecting models of evolution, testing tree topologies, molecular adaptation, computer programs used in molecular analyses.	MAIN	The student will be able to: - plan a molecular study; - obtain and prepare sequencing data for analysis; - apply the different tree and network drawing methods and models; - interpret the evolutionary history of organisms; and - incorporate additional data, e.g. chromosome numbers, geographical and ecological features, distribution to infer phylogenies.

Genetics (124)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
BLGY	1623	Introduction to Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics , including: a introduction to the fundamental principles within Genetics. This module covers the basic principles of inheritance and starts with a study of meiosis, since a good understanding of the fundamental genetic mechanisms of reproduction is necessary to understand the principles of heredity. The work of Gregor Mendel, the father of Genetics, will also be studied. Both the chromosomal and molecular foundations of inheritance will be investigated as well as the way in which genes are expressed when protein synthesis is covered. Finally, the fast growing field of Biotechnology, a very practical application of the science of Genetics will receive attention.	MAIN	Student will be able to: -Explain the mechanism and reason for meiosis; -Describe the origins of genetic variation among offspring; -Recount the impact of the environment on the genotype; -Apply the principles of Mendelian genetics; -Determine recessively and dominantly inherited disorders; -Explain how linkage affects inheritance; -Depict human disorders due to chromosomal alterations; -Specify the basic principles of transcription and translation; -Describe the different types of point mutations; and -Outline selected practical applications of DNA technology, including PCR, forensics and cloning.
FORS	2616	Introductory Forensic Science	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences as an applied science that covers an array of disciplines. The aim of the module is to recognise, identify and evaluate physical evidence by applying all the different fields of science.	MAIN	Student will be able to: -Outline the areas of knowledge that are essential to forensic science; -Apply basic forensic science concepts to problem solving; -Explain how the multi-disciplinary aspects, of forensic science, can be used to solve criminal cases; and -Identify, evaluate and interpret different types of forensic evidence in relation to criminal investigations.
FORS	2626	Crime Scene Management	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences , including the interaction between crime scene investigation, the criminal law and the science involved. Various investigating techniques and procedures applied in CSI will be demonstrated and the impact it has in the legal system of South Africa will be addressed.	MAIN	Student will be able to: -describe how to preserve and process a crime scene in the South African context; -discuss the criminal justice system in South Africa; -explain law/science interface in Forensic Sciences; -discuss the ethical and professional responsibilities of a forensic scientist; and -discuss forensic photography.
FORS	3714	Trace and impression evidence	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including insight into the forensic aspects of various types evidence found at a crime scene. Detail is provided about bloodstain pattern analysis, trace evidence examinations, microscopy, questioned documents and impressions.	MAIN	Student will be able to: - Identify and interpret bloodstain patterns; - Describe trace evidence relevant to crime scene analysis, including fiber, hair, paint and glass analysis. - interpret and report results and comment on the evidential value of trace evidence. - Explain and discuss concepts and procedures applied in questioned document analysis.
FORS	3724	Forensic Chemistry	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including the disciplines of drugs of abuse, the chemistry of Gun Shot Residue and statistics for Analytical Chemistry.	MAIN	Student will be able to: - Identify various controlled substances using presumptive and confirmatory methods; - Analyse ammunition and its by-products; - Calculate of bullet trajectories based on evidence found at the crime scene; and - Apply the statistics of Analytical Chemistry.
FORS	3734	Forensic Entomology	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including an introduction to entomology; morphology of body wall, head, thorax and abdomen; mouth parts; appendages, internal anatomy of organ systems; growth and metamorphosis; ecological preferences and life cycles; characteristics used to differentiate between insect orders; identification of forensic important insects and their role in forensic medicine.	MAIN	Student will be able to: - Describe the basic morphology, anatomy and functioning of the insect body; - Identify insects to order level and insects of forensic importance to more detailed levels - Discuss and apply the role of insects in the decomposition process of carcasses.
FORS	3744	Forensic Genetics	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including the detailed study of various marker systems used in forensic genetics. The application of other molecular techniques, such as epigenetic and mRNA analysis, in the field of forensic genetics will also be examined. The interpretation of DNA profiles is demonstrated and the practical application of DNA profiles in the identification and parentage analysis process are explained.	MAIN	Student will be able to: - Describe and differentiate between the various techniques and marker systems used in forensic genetics, - Explain how these profiles can be applied in DNA forensics, - Discuss how STR technology is used for individual and parentage analysis - Discuss and apply the use of epigentics for identification purposes, with a specific focus on identical twins - Discuss and analyse the application of mRNA analysis in the field of forensic genetics

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FORS	3774	Forensic Chemistry	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including the disciplines of drugs of abuse, toxicology, fires and explosions and forensic ballistics.	MAIN	Student will be able to: - Identify various controlled substances using presumptive and confirmatory methods - Explain the role of toxins in human death - Understand the investigation of an arson scene in terms of observation, sampling and packaging - Discuss the analysis and interpretation of samples taken from an arson scene - Analyse ammunition and its by-products - Calculate of bullet trajectories based on evidence found at the crime scene
FORS	3784	Evidence type	This module contains fundamental knowledge, theories, principles and practices of Forensic Science, including insight into the forensic aspects of various types of assault and homicide. Legal definitions and associated evidences types are studied. Detail is provided about bloodstain pattern analysis, assault, sexual offenses and trace evidence examinations.	MAIN	Student will be able to: - Identify and interpret bloodstain patterns; - Evaluate the limitations of evidence interpretation, especially with regards to the case context; - Determine the presence of various body fluids, both qualitatively and quantitatively; - Discuss factors which affect the interpretation of body fluids within sexual assault cases; and - Describe trace evidence relevant to assault and homicide, interpret and report results and comment on the evidential value of trace evidence.
GENE	2616	Principles of Genetics: Human Genetics	This module contains fundamental knowledge, theories, principles and practices of Human Genetics, including: an introduction to classical genetics and the human genome as well as transmission genetics which include single-gene inheritance, extensions to Mendel`s laws, sex-linked inheritance and multifactorial traits. This module will further focus on DNA structure and replication, gene actions from DNA to protein, chromosomes and gene mutations. Genetic testing and relevant technologies will also be discussed.	MAIN	Student will be able to: - Discuss the basic scientific background on human and medical genetics; - Discuss chromosomal disorders and mechanisms of aetiology; - Identify and interpret the pattern of inheritance of single and multiple genes and statistically test a hypothesis based on these inheritance patterns; and - Interpret the inheritance of diseases or traits based on family pedigrees and calculate the probabilities of inheriting these traits.
GENE	2626	Molecular Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: an introduction to DNA as the blueprint of life. The central dogma of molecular biology will be studied, which includes the transcription of DNA to RNA, followed by the translation of RNA to proteins; DNA replication and organization into chromosomes; DNA mutations and mechanisms for repairing mutations; the basis of gene regulation and expression in prokaryotes and eukaryotes. The advent of recombinant DNA technology will be discussed by considering various DNA cloning tools and the importance of genome sequencing and analysis. The possibility of improving life through the production of Genetically Modified Organisms (GMOs) will also be studied.	MAIN	Student will be able to: - Explain the basis of DNA as the genetic material, including the structure and function thereof in the cell; - Describe and apply the link between DNA, RNA and proteins as well as the process of protein synthesis; - Describe the different mechanisms controlling the genetic integrity between individuals of different generations; - Discuss the basis of gene regulation and expression in prokaryotes and eukaryotes - Discuss the implications and impact of recombinant DNA technology, including the production of Genetically Modified Organisms (GMOs).
GENE	3714	Genomics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: an introduction to phylogenomics; evolutionary principles; databases; homology, homoplasy, pairwise and multiple alignment; constructing phylogenomic matrices; genome sequencing and annotation; tree building; robustness and rate of heterogeneity in phylogenomics; Bayesian approaches in evolution; incongruence; genome content analysis; tree of life, DNA barcoding and metagenomics.	MAIN	Student will be able to: -conceptualize the methods applied in genome sequencing studies; -navigate and acquire specific sequences from different sequence databases; -apply in silico methods to comparatively analyse and interpret sequence data; -differentiate between discernible prokaryotic and eukaryotic genomic features; and -deduce gene expression data gathered using genome-wide analysis techniques
GENE	3734	Behavioural Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: an introduction to patterns of inheritance and pedigree analysis as applied in genetic counselling, prenatal diagnosis, the potential contribution of genotype and/or environment on behavioural studies, quantitative studies, twin and adoption studies, identifying genes contributing to human behaviour, deeper study of human behaviour, including memory and learning, cognitive disabilities, psychopathology, anxiety disorders and addiction.	MAIN	Student will be able to: - Describe and apply the basic scientific background on human and medical genetics; - Outline chromosomal disorders and mechanisms of ethiology; - Interpret pedigrees; - Describe the effect of different genetic techniques on society; - Evaluate the boundaries of ethical research; - Apply the various research types when studying behaviour; and - Plan an experiment to determine if a certain behavioural trade is inherited or influenced by the environment.
GENE	3744	Population and Conservation Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: the importance of genetic diversity; the effects of genetic drift, selection, mutation, migration and fragmentation on allele frequencies in large and small populations; inbreeding depression; population genetic principles applied in nature conservation and the need for genetic management; and the use of appropriate molecular and statistical measures to describe the preceding processes.	MAIN	Student will be able to: -Describe the influence of various evolutionary and population-genetic processes on populations and species; -Discuss how these factors may change populations; -Use suitable statistical measures to quantify and demonstrate the effects of the above processes; and -Recommend strategies for the conservation of genetic diversity in wild and artificially managed populations.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GENE	3764	Advances in Genetics	This module contains fundamental and applied knowledge, theories, principles and practices of Genetics, including: knowledge of, and practical application of difference research techniques when investigating chromosomal and molecular aspects of evolution, inheritance and gene expression.	MAIN	Student will be able to: -Distinguish between different techniques used in genetic research -Explain how these techniques can prove new data and insights during the study of evolution, inheritance and gene expression -Distinguish and contrast chromosomal and molecular aspects involved in genetics -Discuss and explain the practical application of DNA technology (old and recent).
HMBG	2614	Human Molecular Biology of Dietetics	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: - Composition of the human genome - Gene inheritance of metabolic disorders - The interaction of complex nutritional disorders and pharmacogenetics.	MAIN	Student will be able to: -Examine and discuss the composition of the human genome; -Discuss gene inheritance resulting in syndromes and diseases; -Discuss the genes associated with carbohydrate related disorders; -Discuss the genes associated with amino acid related disorders; and -Apply basic principles on Nutrigenomics
HMBG	3714	Human Molecular Biology of Nutritional Disorders	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: -Composition of the human genome -Gene inheritance of metabolic disorders -The interaction of complex nutritional disorders and pharmacogenetics.	MAIN	Student should be able to: - Describe the composition of the human genome at macro level; - Discuss and apply gene inheritance resulting in syndromes and diseases; - Outline genes associated with carbohydrate related disorders; - Outline genes associated with amino acid related disorders; and - Discuss and apply pharmacogenetics.
HMBG	3724	Human Molecular Biology of Cancer	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: -Molecular basis of cellular development and differentiation -Malignancies of the cell cycle, mutagenesis and DNA repair systems -Oncogenes and tumour suppressor genes, gate keeper and caretaker genes -Gene fusions resulting in lymphoma and leukaemia.	MAIN	Student should be able to: -Describe development and differentiation of cells in the human body; -Discuss malignancies of the cell cycle; -Discuss and apply mutagenesis and DNA repair systems; -Analyse oncogenes and tumour suppressor genes; -Describe gate keeper and caretaker genes; and -Outline gene fusions resulting in lymphoma and leukaemia.
HMBG	3734	Human Molecular Biology of Chromosomes	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: -Molecular basis of chromosomal abnormalities and prenatal screening -Autosomal and sex chromosomal linked aberrations -Population biology, natural selection of genetic disorders, the human genome project and gene therapy.	MAIN	Student should be able to: -Discuss and apply the molecular basis of chromosomal abnormalities; -Outline autosomal and sex chromosomal linked aberrations; -Discuss and apply population biology and natural selection of genetic disorders; and - Describe human genome project and gene therapy.
HMBG	3744	Human Molecular Biology of Immunology and Haemostasis	This module contains fundamental knowledge, theories, principles and practices of Human Molecular Biology, including: -Molecular basis of the immune system, antigen structure, recognition and function, as well as applications in forensics -The molecular basis of haemostasis, inherited bleeding tendencies, thrombosis and platelet disorders.	MAIN	Student will be able to: - Discuss and apply molecular basis of the immune system; - Describe antigen structure, recognition and function; - Discuss the application of immunogenetics in forensics; - Outline the molecular basis of haemostasis; and - Discuss and apply molecular basis of inherited bleeding tendencies, thrombosis and platelet disorders.
Postgraduate					
FORC	6808	Research Essay: Forensic Chemistry	This module contains fundamental knowledge, theories, principles and practices of Forensic Chemistry, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: - Problem identification -Hypothesis formulation -Planning and conducting of experiments -Analysis and interpretation of results -Discussion of results -Compiling the information according to a specified structure -Technical aspects of scientific writing -Practical presentation skills.
FORC	6814	Advanced forensic techniques	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: insight into techniques and instrumentation used in forensic science. These include infrared, chromatography and microscopy, which can be applied to a variety of evidential types. Theoretical and practical elements of these methodologies are covered.	MAIN	Student will be able to: -Apply and discuss numerous analytical techniques and their applications in forensic science; and -Apply both theoretical and practical applications of techniques used in forensic science.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FORC	8900	Forensic Chemistry Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Chemistry, including: Research project in specialized field of Forensic Chemistry as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORC	9100	Forensic Chemistry Thesis	Forensic Chemistry Thesis	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORE	8900	Forensic Entomology Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Entomology , including: Research project in specialized field of Forensic Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORE	9100	Forensic Entomology Thesis	Forensic Entomology Thesis	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; and -Discuss the results comprehensively.
FORG	6808	Research Essay	This module contains fundamental knowledge, theories, principles and practices of Forensic Genetics, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Plan and conduct experiments; -Analyse and interpret results; -Discuss results; -Compile the information according to a specified structure; -Apply technical aspects of scientific writing; and -Apply practical presentation skills.
FORG	6814	Research: Literature Study	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: -Search and access literature on a particular topic, -Organise and integrating the information, -Draw conclusions from the available body of literature, -Compile the information according to a specified format, -Apply technical aspects of scientific writing, -Demonstrate practical presentation skills.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FORG	6816	Research Techniques	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Theory behind techniques such as extraction, quantification, PCR and analysis. Students should be familiar with all laboratory equipment (centrifuges, heating blocks, water baths, pipettes, autoclave, vortexes, PCR machines, pH-meter, magnetic stirrers and the NanoDrop) and save laboratory practices. Students should be able to prepare chemicals and to perform techniques such as DNA extraction, gel electrophoresis and PCR reactions.	MAIN	Student will be able to: - apply formal logic and evaluate the logic of scientific writing; - write and present a paper at a conference; - create and present a poster at a conference; -write a scientific paper; - write and present a press release; - handle a TV/radio interview; - construct a CV and handle a job interview; - use appropriate statistical measures and associated software to analyze data; - apply safe laboratory practise; - set centrifuges, heating blocks, water baths, pipettes and the autoclave according to protocols given to them; - write programs on the different PCR machines in the department; and - extract DNA from different sources, visualize it on an agarose gel and amplify a specific region using appropriate primers and a PCR reaction.
FORG	6824	Research: Literature Study	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: -analyse literature on a particular topic, -organise and integrating the information, -draw conclusions from the available body of literature, -compile the information according to a specified format, -apply the technical aspects of scientific writing, -apply practical presentation skills.
FORG	6834	Forensic DNA typing and quality assurance	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Quality control, quality assurance and accreditation of Forensic Laboratories.	MAIN	The student will be able to: - Compare analytical methods used in DNA forensic analysis; and - Evaluate the management and maintenance of a forensic laboratory based on quality assurance, quality control and accreditation guidelines.
FORG	6844	Forensic DNA typing and quality assurance	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Quality control, quality assurance and accreditation of Forensic Laboratories.	MAIN	Student will be able to: - Discuss and compare analytical methods used in DNA forensic analysis - Evaluate the management and maintenance of a forensic laboratory based on quality assurance, quality control and accreditation guidelines.
FORG	6854	Crime Scene Investigation and the Juctice system	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Crime scene analysis; Presumptive test done at the crime scene including (blood, saliva, semen samples); Chain of custody of evidence samples; Collecting reference samples; Chain of custody in the Forensic laboratories; Compiling a DNA evidence report for court; Presenting DNA evidence in court.	MAIN	Student will be able to: -Perform presumptive tests of various types of forensic evidence samples -Explain the different procedures that take place at a crime scene -Evaluate evidence found at a crime scene -Compile a forensic report that can be presented in the court of law in South Africa -Defend and justify results in a court of law under cross examination.
FORG	6864	Crime scene management and the justice system	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Crime scene analysis; Presumptive test done at the crime scene including (blood, saliva, semen samples); Chain of custody of evidence samples; Collecting reference samples; Chain of custody in the Forensic laboratories; Compiling a DNA evidence report for court; Presenting DNA evidence in court.	MAIN	The student will be able to: - Perform presumptive tests of various types of forensic evidence samples; - Explain the different procedures that take place at a crime scene; - Evaluate evidence found at a crime scene; - Compile a forensic report that can be presented in the court of law in South Africa; and - Defend and justify results in a court of law under cross examination.
FORG	6874	Capita Selecta in Forensic Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Capita Selecta of advanced aspects of Forensic Genetics, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	None provided-Depends on the student’s choice.
FORG	8900	Forensic Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Genetics, including: Research project in specialized field of Forensic Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. as discussed by study leader(s), Academic Departmental Head and student.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FORG	9100	Forensic Genetics Thesis	Forensic Genetics Thesis	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified thesis structure (the department recommend that theses be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORI	8900	Forensic Sciences Interdisciplinary Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences , including: Research project in specialized field of Forensic Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORI	9100	Forensic Sciences Interdisciplinary	Forensic Sciences Interdisciplinary	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; and -Discuss the results comprehensively.
FORS	6808	Research Report	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: -Examine and discuss the nature of a crime scene and the `continuity of evidence process. -Evaluate, record, collect, interpret and present forensically-relevant material. -Plan and develop crime scene evaluation and laboratory analysis strategies.
FORS	6814	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: - Search and access literature on a particular topic; - Organise and integrate the information; - Draw conclusions from the available body of literature; - Compile the information according to a specified format; - Apply technical aspects of scientific writing; and - Use practical presentation skills.
FORS	6816	Research Techniques Forensic Science	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Students should be able to prepare chemicals and to perform techniques. Subject specific practical experience includes: packaging and labelling; principle examinations: search and recovery; searching, preliminary testing, recovery, lab notes and case files.	MAIN	Student will be able to: - apply formal logic and evaluate the logic of scientific writing; - write and present a paper at a conference; - create and present a poster at a conference; - write a scientific paper; - write and present a press release; - handle a TV/radio interview; - construct a CV and handle a job interview; - use appropriate statistical measures and associated software to analyse data; - apply safe laboratory practice; - implementing the appropriate packaging and labeling as required by forensic laboratories; and - plan and use appropriate techniques and technology in the searching, preliminary testing and recovery in principle examinations.
FORS	6824	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: - Locate and examine literature on a particular topic, - Organise and intergrate the information, - Draw conclusions from the available body of literature, - Compile the information according to a specified format, - Apply the technical aspects of scientific writing,and - Apply presentation skills.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
FORS	6834	Evaluating & Interpreting Forensic Evidence: Forensic Sciences	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences. Topics include the criminal justice system, evidence interpretation and reasoning, laboratory accreditation and management, as well as the investigative process from crime scene to court.	MAIN	Student will be able to: -Determine, using statistical methods, the evidential value of data generated through forensic examinations. -Examine the interface between forensic science and the law and challenges with regard to presentation of evidence in court. -Outline the processes involved in successfully managing a forensic laboratory.
FORS	6854	Crime to Court	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: This module puts into practise the theory and knowledge from previous modules. It takes the form of a `crime scene to court' exercise where time is spent on a mock crime scene, in the laboratory and in the courtroom. Essential factors such as contemporaneous note-taking, interpretation, evaluation and presentation of evidence are emphasised.	MAIN	The student will be able to: - Investigate the crime scene and evidential material; - Interpret, evaluate, record and present forensic-relevant material; and - Plan and develop strategies.
FORS	6874	Capita Selecta in Forensic Sciences	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Capita Selecta of advanced aspects of Forensic Sciences, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	The student will be able to: Outline the fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Capita Selecta of advanced aspects of Forensic Sciences.
FORS	6893	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	The student will be able to: - Search and access literature on a particular topic; - Organise and integrate the information; - Draw conclusions from the available body of literature; - Compile the information according to a specified format; - Apply technical aspects of scientific writing; and - Use practical presentation skills.
FORS	8900	Forensic Sciences Dissertation	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences , including: Research project in specialized field of Forensic Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
FORS	9100	Forensic Science Thesis	This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Research project in specialized field of Forensic Entomology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; and -Discuss the results comprehensively.
GENB	6814	Advanced Behavioural Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Determination of the inheritance of behaviour; monogenic vs. polygenic inheritance; allelism; Pleiotropy; epistasis; quantitative studies and analysis; experimental design; bioethics; statistical analyses.	MAIN	Student will be able to: - Plan and execute a behavioural genetic study; - Identify and judge factors influencing behaviour; - Identify bioethical considerations to be made when studying behaviour; and - Apply basic statistical analysis to behavioural genetic quantitative data.
GENB	8900	Behavioural Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Research project in specialized field of Human or Behavioural Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GENB	9100	Behavioural Genetics Thesis	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Research project in specialized field of Human or Behavioural Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENC	6814	Advanced Cytotaxonomy	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Chromosome evolution, cytotaxonomy, speciation.	MAIN	The student will be able to: - plan and execute a cytotaxonomic study, analysing and reporting the results; - identify different forms of chromosomal evolution; and - identify hybrids at cellular level.
GENE	6808	Research Report Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	The student will be able to: - Problem identification; - Hypothesis formulation; - Planning and conducting of experiments; - Analysis and interpretation of results; - Discussion of results; - Compiling the information according to a specified structure; - Technical aspects of scientific writing; and - Practical presentation skills.
GENE	6814	Research: Literature Review	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	The student will be able to: - Search and access literature on a particular topic; - Organise and integrate he information; - Draw conclusions from the available body of literature; - Compile information according to a specified format; - Use technical aspects od scientific writing and - Practical presentation skills.
GENE	6816	Research Techniques	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Theory behind techniques such as extraction, quantification, PCR and analysis. Students should be familiar with all laboratory equipment (centrifuges, heating blocks, water baths, pipettes, autoclave, vortexes, PCR machines, pH-meter, magnetic stirrers and the NanoDrop) and save laboratory practices. Students should be able to prepare chemicals and to perform techniques such as DNA extraction, gel electrophoresis and PCR reactions.	MAIN	Student will be able to: -apply formal logic and evaluate the logic of scientific writing -write and present a paper at a conference -create and present a poster at a conference -write a scientific paper -write and present a press release -handle a TV/radio interview -construct a CV and handle a job interview -use appropriate statistical measures and associated software to analyze data -know safe laboratory practise -set centrifuges, heating blocks, water baths, pipettes and the autoclave according to protocols given to them. -write programs on the different PCR machines in the department. -extract DNA from different sources, visualize it on an agarose gel and amplify a specific region using appropriate primers and a PCR reaction.
GENE	6824	Research : Literature Study	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	Student will be able to: -analyse literature on a particular topic, -organise and integrating the information, -draw conclusions from the available body of literature, -compile the information according to a specified format, -apply technical aspects of scientific writing, -apply practical presentation skills.
GENE	6834	Capita Selecta: Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Capita Selecta of advanced aspects of Genetics, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	Student will be able to: - Examine and discuss principles of chosen topic.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GENE	6844	Capita Selecta: Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Capita Selecta of advanced aspects of Genetics, with the purpose of broadening the knowledge of the object presented in this module. Assignments form an important part of this module for both the theory and practical work.	MAIN	Student will be able to: - Examine and discuss principles of chosen topic.
GENE	8900	Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Research project in specialized field of Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENE	9100	Genetics Thesis	Genetics Thesis This module contains fundamental knowledge, theories, principles and practices: Research project in specialized field of Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENF	8900	Forensic Genetics Dissertation	This module contains fundamental knowledge, theories, principles and practices of forensic Genetics, including: Research project in specialized field of Forensic Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENF	9100	Forensics Genetics Thesis	Forensics Genetics Thesis This module contains fundamental knowledge, theories, principles and practices of Forensic Sciences, including: Research project in specialized field of Forensic Sciences as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENG	6808	Research Essay	This course stretches over the whole year and involves a research project under the guidance of a lecturer. The project is selected in consultation with Academic Departmental Head. The results of the project must be submitted in the form of a typed scientific paper for examination. An oral presentation of 15 minutes with 5 minutes for questions on the research project is required.	MAIN	Student will be able to: - Problem identification; - Hypothesis formulation; - Planning and conducting of experiments; - Analysis and interpretation of results; - Discussion of results; - Compiling the information according to a specified structure; - Technical aspects of scientific writing; and - Practical presentation skills.
GENH	6804	Research: Literature Review	A review paper is written and presented orally on a date determined by the Academic Departmental Head. The review includes searching and accessing literature on a particular topic, organizing and integrating the information, drawing conclusions from the available body of literature, compiling the information according to a specified format, technical aspects of scientific writing and practical presentation skills.	MAIN	The student will be able to: - Access and search for literature on a particular topic; - Organise and integrating the information; - Draw conclusions from the available body of literature; - Compile the information according to a specified format; - Apply technical aspects of scientific writing; and - Practical presentation skills.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GENH	6806	Research Techniques	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Logic, Scientific writing, Scientific presentations (conferences - oral and poster; press releases, TV/radio interviews), Job interviews, Statistics. Theory behind techniques such as extraction, quantification, PCR and analysis. Students should be familiar with all laboratory equipment (centrifuges, heating blocks, water baths, pipettes, autoclave, vortexes, PCR machines, pH-meter, magnetic stirrers and the NanoDrop) and save laboratory practices. Students should be able to prepare chemicals and to perform techniques such as DNA extraction, gel electrophoresis and PCR reactions.	MAIN	Student will be able to: - apply formal logic and evaluate the logic of scientific writing; - write and present a paper at a conference; - create and present a poster at a conference; - write a scientific paper; - write and present a press release; - handle a TV/radio interview; - construct a CV and handle a job interview; - use appropriate statistical measures and associated software to analyze data; - know safe laboratory practise; - set centrifuges, heating blocks, water baths, pipettes and the autoclave according to protocols given to them; - write programs on the different PCR machines in the department; and - extract DNA from different sources, visualize it on an agarose gel and amplify a specific region using appropriate primers and a PCR reaction.
GENH	6814	Advanced Human Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: a background on the concepts of human genetic, a study of genetic disorders at molecular and cytogenetic level, diagnostic practices in genetics, strategies and techniques to conduct research and identify susceptibility loci, utilize public databases in research.	MAIN	Student will be able to: - Discuss and apply the molecular and chromosomal basis and mechanisms involved in common and complex human genetic disorders; - Discuss molecular and cytogenetic techniques used in research and diagnostics; and - Design a human genetics research protocol.
GENH	8900	Human Molecular Genetics Disseration	This module contains fundamental knowledge, theories, principles and practices of Human Genetics , including: Research project in specialized field of Human Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENH	9100	Human Molecular Genetics Thesis	This module contains fundamental knowledge, theories, principles including: Research project in specialized field of Human Molecular Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENI	8900	Genetics Interdisciplinary Dissertation	This module contains fundamental knowledge, theories, principles and practices of This module contains fundamental knowledge, theories, principles and practices of Zoology, including: Research project in specialized field of This module contains fundamental knowledge, theories, principles and practices of Zoology, including: Research project in specialized field of Zoology as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. as discussed by study leader(s), Academic Departmental Head and student.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
GENI	9100	Genetics Interdisciplinary Thesis	Genetics Interdisciplinary Thesis This module contains fundamental knowledge, theories, principles and practices: Research project in specialized field of Genetics as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research.	MAIN	Student will be able to: -Identify the problem -Formulate a hypothesis -Do independent planning and then conduct the experiments -Analyse and interpret the results -Discuss the results comprehensively -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format) -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
GENM	6814	Recombinant DNA technology	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Recombinant DNA technology provides a powerful platform that enables the study of any gene isolated from virtually any organism. Central to this technology is the cloning of nucleic acid fragments (for example, DNA) into cloning vectors, a process simplified by the Polymerase Chain Reaction (PCR) technique. Subsequently, recombinant vectors used to transform competent bacterial cells and the sequence information of the cloned gene can be determined by DNA sequencing. This course aims to introduce basic tools and techniques utilized in recombinant DNA technology.	MAIN	Student will be able to: - apply various laboratory procedures to isolate DNA and RNA from cellular and/or eukaryotic tissues - plan and perform experiments on complementary DNA (cDNA) synthesis - design, implement and evaluate experiments based on the Polymerase Chain Reaction (PCR) technique - create recombinant DNA molecules by cloning DNA fragments into cloning vectors - use laboratory protocols to transform recombinant cloning vectors into bacteria; and - analyse and compare cloned DNA fragments using sequencing and various computer-based sequence analysis programmes.
GENP	6824	Applied Conservation Genetics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: the use of molecular markers and appropriate statistical coefficients to determine levels of diversity, detect historic bottlenecks, measure drift and differentiation, describe population structure, detect hybridization, apply assignment methods, and perform forensic investigations relating to wildlife. These outcomes are reached using appropriate statistical approaches and suitable contemporary software.	MAIN	Student will be able to: - analyse molecular data with various statistical coefficients and appropriate software, - implement molecular data results in such a way that it can contribute to the conservation of biodiversity, and - examine and describe the contribution of genetics to conservation and ecology.
GENS	6814	Advanced Molecular Systematics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Data preparation, sequence alignment, genetic distances and nucleotide substitution models, distance methods, maximum likelihood methods, Bayesian phylogenetic analysis, parsimony methods, selecting models of evolution, testing tree topologies, molecular adaptation, computer programs used in molecular analyses.	MAIN	Student will be able to: - plan a molecular study - obtain and prepare sequencing data for analysis - apply the different tree and network drawing methods and models - interpret the evolutionary history of organisms - incorporate additional data, e.g. chromosome numbers, geographical and ecological features, distribution to infer phylogenies.
GENS	6824	Advanced Molecular Systematics	This module contains fundamental knowledge, theories, principles and practices of Genetics, including: Data preparation, sequence alignment, genetic distances and nucleotide substitution models, distance methods, maximum likelihood methods, Bayesian phylogenetic analysis, parsimony methods, selecting models of evolution, testing tree topologies, molecular adaptation, computer programs used in molecular analyses.	MAIN	The student will be able to: - plan a molecular study; - obtain and prepare sequencing data for analysis; - apply the different tree and network drawing methods and models; - interpret the evolutionary history of organisms; and - incorporate additional data, e.g. chromosome numbers, geographical and ecological features, distribution to infer phylogenies.

Consumer Science(125)

Undergraduate

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CNCC4:9A14:84:1144:8+4:6F84:6	1612	Clothing construction I	Pattern alterations. Implementation and evaluation of basic construction techniques. Use of a commercial pattern. Fashion development: The role of the designer, technology and world trends. Fashion cycles: Introduction, acceptance and rejection. Fashion forecast: Designer, manufacturer, merchandise and the media. Fashion research sources.	MAIN	Student will be able to: -Outline fashion development, fashion designers, fashion technology, fashion cycles, fashion forecasting and fashion resources, patterns and pattern alterations; -Select and apply suitable pattern alterations and construction techniques in garment construction; -Accurately and coherently, write notes on the factors that influence fashion cycles; -Apply techniques in basic construction and pattern alterations; and - Take responsibility of the use of material and energy resources in construction of a garment.
CNCC	1622	Clothing construction II	Children's clothing: classification, needs and requirements. Implementation of principles in construction and trimming of children's clothing. Wardrobe planning: implementation of design elements and principles, personality and figure types, personal style and good taste.	MAIN	Student will be able to: -Outline the requirements for children's and baby clothing as well as the principles for the selection; -Define the principles for wardrobe planning; -Integrate figure irregularities, elements and principles of design to plan suitable outfits, taking personality, figure type as well as the occasion into account; -Identify clothing needs of elderly people; - Construct a list of textile fabrics required for specific occasions and its use. -Distinguish between clothing needs and different textile fabrics for the use in sports clothing. -Explore the necessity of clothing for people with sensory disorders. -Use the gathered information to identify gaps in the market.
CNCC	2612	Clothing construction III	Origin and functions of clothing. Interrelationship between clothing and cultural patterns, national habits and customs. Clothing expectations regarding social role, status and mobility. Fashion as a social phenomenon. Special fabrics: Principles and guidelines for the handling of special fabrics. Application of principles for the handling of special fabrics. Application of principles for the handling of special fabrics when planning and constructing of articles (sleepwear, bras and panties).	MAIN	Student will be able to: -Outline the functions of clothing and the inter-relationship of clothing and cultural patterns; -Explain clothing expectations in the depicting of social role, status and social mobility; - Describe the relationship between the environment, clothing and health; - Identify and describe special fabrics; and - Construct shirt and skirt with bags.
CNCC	2622	Clothing construction IV	This module deals with fashion and all the facet regarding it. From the development of fashion, the role that the designers play, up to the apparel industry, marketing and quality control.	MAIN	Student will be able to: - Explain the development of fashion; - Identify the role of fashion designers; - Analyze the world conditions regarding fashion; - Interpret the impact of technology; - Define and compare fashion cycles, deflections and fore casts; - Understand and explain the apparel industry and fashion centers; - Interpret whole sale and retail in marketing of fashion; - Evaluate the effect of globalization on apparel production and sourcing; and - Identify the role of the consumer in sustainable fashion.
CNCC	3712	Clothing construction V	This module will address the relationship of human beings and dress; the influence of culture and society on dress; interdisciplinary sources of dress; physical similarities and difference and prescriptive and proscriptive interpretations.	MAIN	Student will be able to: - Define dress and its relationship to human beings as biological, social, and aesthetic beings; - Differentiate between culture and society's influence on dress; - Define and state examples of ethnocentrism and dress; - Define, compare and contrast world dress, and dress varieties from culture to culture; - Discuss the interdisciplinary sources of dress; - Compare physical similarities and differences including appearance; - Relate between body, dress and the environment; and - Define and explain moralistic essays, satire, and prescriptive interpretations.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CNCC	3722	Clothing construction VI	This module the deal with ethnicity in clothing; nutrition, disease, growth and age as influences on dress; cultural adaption, sex differentiation and human development; abilities of the human body; environment and socio-cultural systems.	MAIN	Student will be able to: - Explain why the concept of race is not objective scientific terminology, but the concept of ethnicity is; - Explain how nutrition, disease, growth and age influence decisions of dress; - Apply the concept of cultural adaption, ethnicity, sex differentiation and human development to a research topic; - Explain how dress extends the abilities of the human body; - Conceptualize how dress intervenes between the body and environment; - Apply the concept of dress as a cultural adaption to the environment for a research topic; - Compare the roles that word dress, national costume and ethnic dress play in commercial socio-cultural systems; and - Describe how dress interacts with the senses to produce and aesthetic response.
CNCD	3732	Community development	Module1: The communication process. Method of presentation. Teaching aids. Evaluation. Module 2: Community development with regard to individuals, families and groups. Program and project planning	MAIN	Student will be able to: -Discuss and apply the communication process; -Apply different presentation methods; -Compile and apply teaching aids; -Assess the quality of different products and articles; -Distinguish the factors that must be taken in account in community development and program planning; -Develop and implement a successful project; and -Evaluate the success of an completed project, and recommend adjustments.
CNCR	3764	Research Methodology Consumer Science	This module is intended for all students who are pursuing studies on an honours level. Students will be exposed to the research process and all its facets in order to equip them to participate in and contribute to research projects in the work environment. It will thus address scientific research, ethical principles and behaviour in research, and the nature, methods and process of conducting quantitative and qualitative research. They will write a report under the supervision of their lecturer and in the end evaluate the finished products for adherence to standards and specifications in their specific field of study.	MAIN	Student will be able to: - Explain some basic concepts of research and other methodologies; - Discuss the explain research terminology; - Identify appropriate reseach topics; - Apply the ethical principles of research, ethnical challenges and approval processes; - Prepare a project proposal; - Describe quantitative, qualitative and mixed methods approaches to research; - Identify the components of a literature review process; - Critically analyse published research; - Organize and conduct research in a more appropriate manner; and - Write an research report.
CNCS	1622	Ergonomics and Apparatus studies	Ergonomics: the work, worker and work place are studied. This module will also focus on productivity and the study of apparatus, which include the selection, use and maintenance of household apparatus.	MAIN	Upon successful completion of the module students will be able to: 1.Outline work, the worker and the work place including detailed knowledge of ergonomics; 2.Evaluate, select and apply appropriate work methods in the work place to ensure a productive and motivating environment; 3.Identify, evaluate and select appropriate apparatus for the home; 4.Evaluate different sources of information for appropriate household apparatus for specified tasks, and to apply well-developed processes of analysis, synthesis and critical evaluation of that information; 5.Decide and act appropriately in the selection of an apparatus; 6.Evaluate performance against given criteria, and accurately identify and address own task-specific learning needs in a given context, and to support the learning needs of others; and 7.Work effectively in a team or group, and to take responsibility for management of the work process including the responsibility for the use of energy and manpower where appropriate.
CNCS	1624	Home planning	Planning and arranging the home for individual families and communities of different socio-economic groups as well as special groups (disabled). Design application and evaluating of social, private and work areas. To be successful in planning a home the determination of needs, identification of problems and problem solving are essential. Selection of suitable soft furnishings.	MAIN	Upon successful completion of the module students will be able to: 1.Discuss the principles of home planning, needs of individuals, families and special groups; 2.Evaluate the design and interior planning of a home in terms of the needs of the family; 3.Design functional social, private and work areas in the home; 4.Identify the needs of families and plan solutions to a problem; and 5.Select suitable furnishings for the needs within the available resources of the family.
CNCS	1634	Interior design	This module contains fundamental knowledge, theories, principles and practices of Interior design, including: - Design: basic principles of design and guidelines; - Design elements: line, form, shape, space, texture and colour; - Design principles: proportion, scale, balance, rhythm, emphasis, harmony and character; - Interior design, design style and designers; - Study of material and furniture; - Classification, origin, manufacture, properties, uses, care and maintenance; and - Aspects such as lighting, ventilation, temperature- and noise control.	MAIN	Students will be able to: 1.Discuss the elements of designs; 2.Apply the elements and principles of design appropriately; 3.Classify, tell the origin, manufacture, properties, uses, care and maintanance of material and furniture; and 4.Evaluate and apply lighting, ventilation, temperature- and noise control.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CNCS	2612	Resource Management	Management and decision-making processes in the family and the use of resources available. Different forms of management and decision-making. Handling of the family's finances with special attention to aspects as the use of credit, personal financial management, protection planning, retirement planning and health planning	MAIN	Students will be able to: -explore and analyse different management and decision-making processes; -explain, explore and discuss the factors that influence decision-making; - identify a family`s needs and develop a plan to address it -identify the resources to fulfill the family`s needs; and -Manage the family`s resources to fulfill these needs.
CNCS	3744	The interior, food or clothing business	The interior, food or clothing business.	MAIN	Students will be able to: -Have knowledge of the factors that will influence the planning and setting of a studio; -Be able to analyse the market and identify the opportunities; -Be able to compile a business plan for a small business; and -Have insight in the importance of professional growth.
CNCS	4809	Research Project	Research project: Introduction, problem statement, aim, literature review, methodology, data collection, analysis, discussion of results, conclusion and summary.	MAIN	Student will be able to: -Deduct an aim from a given problem statement; -Gather literature relevant to the problem; -Integrate the literature in a literature review with proper reference to the literature; -Identify the methodology to collect the data; -Apply the methodology scientifically to collect data; -Interpret the data and discuss it; -Draw conclusions from the data; and -Write a research report.
CNCS	4814	The early history of textiles, clothing, interiors or foods	The early history of textiles, clothing, interiors or foods.	MAIN	Students will be able to: -discuss and explain the development of the history of textiles, clothing, interiors or food.; -describe of the influences of factors such as geography, religion, politics and economics on the history of textiles, clothing, interiors or food; identify and classify items to specific periods on specific features; and display insight in relevant research methodologies for history of textiles, clothing, interiors or food.
CNCS	4824	The recent history of textiles, clothing, interiors or foods	The early history of textiles, clothing, interiors or foods.	MAIN	Student will be able to: -develop and discuss an overview of the development of the history of textiles, clothing, interiors or food; -develop and discuss overview of the influences of factors such as geography, religion, politics and economics on the history of textiles, clothing, interiors or food; - identify and classify items to specific periods on specific features; and develop insight in relevant research methodologies for history of textiles, clothing, interiors or food.
CNFD	1614	Introductory food I	This module will be a introduction for food students to food principles and applications. The student will do food preparation basics; menus and recipes; meal management; food selection; food evaluation and cereals. The theory will be applied during the practical classes.	MAIN	Student will be able to: - Discuss how heat is transferred to foods through conduction, convection and radiation; - Describe how heat affects food; - Discuss the basic principles of various cooking methods; - Measure ingredients and select the correct measuring utensil; - Apply the correct mixing techniques; - Standardized recipes; - Calculate unit cost and recipe costs; - Control food costs; - Describe the different food service organizations; - Do meal management; - Reduce waste and save cost; - Manage time; - Do healthy food selections; - Evaluate food by using sensory and objective evaluation; - Identify a variety of grains; and - Apply various cooking methods to grains and finishes.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CNFD	1624	Introductory food II	This module the follow the introduction of food to the first year student. It will complete their basic knowledge of food principles and applications. The module will include chemistry of food composition; food safety; flours; starches; quick breads and yeast breads. It also include practical classes as an application for the theory.	MAIN	Student will be able to: - Identify categories of nutrients and explain their chemical structure; - Discuss the different components of food and their purposes; - Identify the causes of food-borne illnesses; - Handle food in a safe manner; - Explain and follow a HACCP system; - Take appropriate actions to create and maintain a safe and sanitary working environment; - Recognize and classify sauces; - Use thickening agents properly; - Control the development of gluten; - Discuss the baking process; - Use chemical leavening agents properly; - Prepare a variety of quick breads; and - Select and use yeast properly.
CNFD	2624	Food preparation I	This module contains fundamental knowledge, theories, principles and practices of Consumer Sciences including cereal, grains and pasta, flour and flour mixtures, starches and sauces, quick breads, yeast breads, cakes & cookies, pastries and pies, candy, food preservation, beverages, frozen desert, sweeteners, fats and oils. The practical work includes food preparation with regards to aspects of the theory.	MAIN	Students will be able to: 1.Detail knowledge of cereal, grains and pasta, flour and flour mixtures, starches and sauces, quick breads, yeast breads, cakes & cookies, pastries and pies, candy, food preservation, beverages, frozen desert, sweeteners, fats and oils; 2.Evaluate food products such as cereal, grains and pasta, flour and flour mixtures, starches and sauces according to given criteria; 3.Explain the influence of cooking methods on the properties of grain cereal and pasta products; 4.Identify appropriate food preservation and cooking methods for specific cereal, grain or pasta; and 5.Develop and apply criteria for cereal, grain and pasta purchase.
CNFD	3713	Food preservation	Home and industrial food preservation. Preserving principles, preparing raw material, blanching, freezing, pasteurisation, UHT, heat sterilisation, microwave and infrared radiation, freeze-drying, coating and packaging.	MAIN	Student will be able to: -Distinguish between different methods; -Select suitable methods of preservation for specific products; -Evaluate different methods for suitability for a specific product; -Apply different preservation methods; -Set criteria for different preserved products; and -Evaluate the quality of a product against the set criteria.
CNFD	3732	Food product development	Development of food products. The criteria, principles and approaches. Practical work: Demonstration and or practical application of the steps in food product development.	MAIN	Student will be able to: -Identify development potential in raw products; -Determine the challenges in a product development process; -Gather and Integrate relevant information for product development; -Set criteria for the product; -Plan and implement a product development process; and -Evaluate the success of the product tot he criteria.
CNFD	3744	Meal planning	Meal planning: Nutrition, food preferences, menus and application of economic and gastronomic principles, budgets, time plans, etiquette en table setting. Different forms of entertaining: Formal and informal. International eating habits. SA wines. Practicals: Planning and preparation of meals and receptions.	MAIN	Student will be able to: -Compile a menu according to the four aims of good meal planning; -Analyze and evaluate a given menu according to the four aims for good meal planning, as well as aspects texture, cooking method, temperature, colour and shape; - Understand the basic French menu terminology; - Compile and complete an order form for the purchasing of ingredients; - Plan a menu for a special event considering all aspects including budget, cultural, religious and other requirements; - Compile and apply timetables; - Manage the planning, preparation and serving of a special event. - Set and apply criteria for the evaluation of a set menu; and - Calculate the cost per person and per dish.
CNFD	4808	Consumer Analysis of Foods	Advanced aspects in consumer preferences and analysis of foods.	MAIN	Student will be able to: -Explain advanced aspects in consumer preference and analysis; -Will be familiar with the mental, emotional and physical processes used to select, obtain consume and dispose of food products or food services to satisfy needs and wants and the impact that these processes have on the consumer and society; -Apply the knowledge concerning the aspects of the theory in practice; -Develop scientific thinking through mastering the skills to select, interpret, evaluate, review, compare and organize subject matter; -Compare literature through critical reading; and -Use relevant research methodologies.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CNFS	2613	Food security I	Food security is a complex concept and the interpretation thereof subjective to context specific and specialist perspectives. The construct is multidimensional, therefore an overview of multiple disciplines are necessary.	MAIN	Students will be able to: - Define and classify the pillars of food security. - Analyse the global food security situation. - Interpret available data and report on the south African food security situation. - Identify the role that global and local agriculture sectors plays in food security. - Define the role of modern agricultural practises, aqua-culture, agro-forestry and permaculture in food security. - Evaluate how crop losses and food wastage affects global food security. - Interpret the impact of advances in science and technology in relation to food security. - Critique the emergence of genetically modified organisms in the food system as aid to attaining food security. - Understand and explain the influences of: urbanisation, poverty, education and employment, human development, gender equality' coping strategies in emergencies and crises on food security
CNFS	2623	Food security II	Food security is a complex concept and the interpretation thereof subjective to context specific and specialist perspectives. The construct is multidimensional, therefore an overview of multiple disciplines are necessary.	MAIN	Students should be able to: - Explain the correlation between food security and nutrition, disease and mortality. - Identify and interpret the influence of HIV/AIDS on food security. - Identify the role that non-food inputs such as safe water and sanitation plays in food security. - Evaluate how the usage of non-renewable resources impacts provision and food security. - Define and differentiate between the water-and ecological foot prints. - Analyse and compare the concepts of sustainability and environmentalism. - Discuss the effect of the type of governance on food security policies. - Identify the role that international humanitarian aid plays in relation to a food security/ insecurity status. - Distinguish between the different classification and monitoring systems for measuring food security. - Interpret the macro-and-micro-economic principles of food commodities within a food security context.
CNFS	3714	Food security III	Linking sustainability to the food security concept focusing on permaculture, changing diets, policy agendas, economics, biodiversity, organic production, biotechnology, waste management and the future of sufficient food production from and environmental aspect.	MAIN	Students will be able to: -Define and interpret the term sustainability and what it inherently entails; -Describe agriculture production within the food security concept and how it relates to sustainability; - Investigate and evaluate the potential of modern agriculture production methods on sustainability; -Interpret the possible outcomes/ consequences of adjusted behavior regarding the food value chain and consumption on food security and sustainability; -Predict the ethical implications that human decisions and actions can have on sustainability within food security; and - Evaluate the current human behavioral aspects an how it relates to the food security situation.
CNFS	3724	Food security IV	Students will study the following topics: food security in a household context; asset models for household food security mapping; assessment of vulnerable individuals; governmental policies on household food security; current situational factors within the community; coping strategies; food security and nutrition; affect of HIV/AIDS and intervention programs.	MAIN	Student will be able to: -Define and interpret food security in a household context. -Differentiate between asset models for household food security mapping and interpret the use thereof; -Use available resources to identify and compile an assessment of vulnerable individuals within certain households in the community. -Explain the influence of current governmental policies on household food security. - Predict possible outcomes of current situational factors within the community/household-cultural nexus that impacts food security; -Investigate coping strategies and the management of food insecurity as a product of human behavior; - Establish and explain the correlation between food security and nutrition; - Ascertain and interpret the effect of the high prevalence of HIV/AIDS on food security in the South African context; and - Appraise an compare different intervention programs to promotes food security.
CNOT	2614	Skills	The development of skills in design and sewing and application for special needs	MAIN	Student will be able to: -Apply the basic principles of needlework -Plan, design and make practical resources for patients -Teach skills which patients can use to make products which can provide income -Use handcrafts for recreation -Teach patients to use handcrafts to improve employment opportunities

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CNSB	1614	Consumer behaviour I	The future of South Africans has never been more uncertain and challenging than in the present. For the consumer to remain successful in times of rapid change, it is imperative to maintain a disciplined business and marketing approach. Understanding markets s derived from knowing why consumers adapt certain behavioral patterns; why, when and how they purchase the varied types of products and services they consume.	MAIN	Student will be able to: - Define the concept of consumer behavior; - Classify diversity in the market and how it can be segmented; - Identify what role value and satisfaction play relating to consumer behavior; - Discuss how to do consumer research and collect secondary data; - Explain how to motivate consumers; - Describe how to measure the motives when consumers make purchasing decisions; - Differentiate between possible perceptions consumers have; - Apply knowledge on attitude formation to change a particular attitude; - Analyze the elements of consumer learning and information processing; and - Construct persuasive messages to the consumer through good communication.
CNSB	1624	Consumer behaviour II	To understand the consumer from a local and global perspective, the study requires an understanding of the challenges and changes taking place both here and abroad. The focus is on consumers as members of society, as well as broad cultural groups and cross-cultural consumer research to international marketing. Consumer decision-making process and reactions to innovations are also handled.	MAIN	Student will be able to: -Define the contemporary South African family and life cycle; -Distinguish between the different social classes and how it affects consumer behaviour; -Explain the influence of culture on consumer behaviour; -Analyse the impact of subculture on age, religion and gender and women in South Africa; -Evaluate multinational strategies: global versus local; -Discuss the use of cross-cultural psychographic segmentation as an indicator for consumer behaviour; -Argue the decision-making process and ethical dimensions relating to consumer behaviour; -Differentiate between the levels of consumer decision-making, gifting behaviour and consuming and processing; and -Critique marketing ethics and social responsibility.
CNSB	2614	Cosumer behaviour III	Sustainable consumption encompasses a wide range of consumer behavior, including consumer purchase of econ-friendly products, factors driving sustainable consumption behavior and consumer attitudes towards sustainable consumption. Products and services need to be consumed in such a way as to have a minimal impact on the environment so future generations can meet their needs.	MAIN	Student will be able to: -Define terms and specific vocabulary relevant to the sustainability spectrum; -Explain what sustainable consumption behavior entails; - Interpret sustainable consumption behavior in a South African context; - Analyze post-purchase and post-use behavior of consumers; - Apply green consumption in everyday life: recycle, rethink, reuse and reduce; - Evaluate the available infrastructure/ opportunities to enable sustainable post-consumption behavior; - Assess the factors (external and internal) that influences consumers' post-consumption behavior; - Create a theoretically feasible solution for post-consumer consumption behavior education; and -Discuss what influence major phenomenon's (energy crisis; global warming) has on consumers and how to build around it.
CNSB	2624	Consumer behaviour IV	Man and his housing needs are influenced by the individual and family values, standards and objectives in the different stages of the family life cycle. A variety of housing types are available to select from to fulfil the specific need. The family and its housing is dependent on the environment, therefore we emphasise a sustainable environment.	MAIN	Student will be able to: -Define the different terms relevant to housing; - Identify the factors that influence housing needs and the provision of housing; - Assess an individual or family's physiological, security, safety and social needs in terms of housing; - Differentiate between the different stages of a family life cycle relating to the housing needs of the individual or family; - Distinguish between different housing types; Evaluate a housing arrangement in terms of fulfillment for a special needs group (elderly, disabled, student); -Discuss the psychological influences of safe and secure housing on the individual; - Explain the term sustainable housing; and - Interpret sustainable housing in a South African context.
CNSB	3714	Consumer behaviour V	Personal financial management is the process whereby an individual or a family unit seeks to budget, save, and spend monetary resources over time, taking into account various financial risks and future life events. Circumstances relating to investment-, retirement-, health-, income tax-, career-, estate-, credit and protection planning need to be considered.	MAIN	Students will be able to: - Define personal financial management and what it entails; - Explain the advantage and disadvantage of personal financial management; - Implement principles of personal finances through successfully compiling a household budget; - Assess the efficiency of a budget and suggest recommendations; - Discuss the effect of credit planning on an individual's personal finances; - Identify and interpret the influence of the consumer credit act on the finances of the individual; - Evaluate how career choices will potentially affect lifestyle and consequently personal finances; - Define and differentiate between the different types of taxation the government can charge; - Interpret how taxation will influence different investment strategies and retirement planning. - Distinguish between the different forms of estate planning and the influence thereof on personal finances; - List the financial considerations taken into account when buying a residence; and - Compare the financial implications when starting your own business or buying a franchise or existing business.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CNSB	3724	Consumer behaviour VI	Wealth and a high majority of jobs are created by small businesses started by entrepreneurially minded individuals, many of whom go on to create big businesses. Entrepreneurial ventures also create jobs and conditions for a prosperous society. In today's digital world it is necessary to know how to use online marketing to promote you business, as the virtual word has many benefits.	MAIN	Student will be able to: - Differentiate between small, medium and micro-enterprises in an entrepreneurial sense; - Explain the basic business concepts; - Discuss the business environment in a South African context; - Assess the viability of a business idea; - Identify and interpret the development of business ideas; - Compile a business plan; - List the steps in setting up a business; - Differentiate between search engine marketing and optimisation; - Define the concepts of online advertising, online selling, email marketing, mobile marketing and social media marketing; and - Discuss an implement an e-marketing strategy.
CNSF	2614	Food III	Students will study the principles of diary products and their substitutes; protein rich foods, fruit and vegetables and legumes; soups, salads and gelatines. The work will include the food chemistry as well as the preparation changes of the different food groups.	MAIN	Student will be able to: -Examine and discuss recipe science, food preparation basics, meal management, food safety basics, food chemistry basics, food selection and evaluation of the different food groups and cooking methods; - Evaluate food products for purchase; - Select the appropriate food preparation method for the type of food and to apply the method; - Evaluate the quality of a food product for purchase; - Plan food purchase and preparation within a certain schedule to fit specific requirements; - Prepare food products to a specific standard and within a certain schedule; -Discuss the structure and composition of meats, poultry, fish and shellfish; and - Apply various cooking methods to all the food groups.
CNSF	3714	Food V	Development of food products. The criteria, principles and approaches. Practical work: Demonstration and or practical application of the steps in food product development.	MAIN	Student will be able to: - Examine the process of product development in the food industry; - Examine the way in which the principles of subjects studied until now can be applied in the development of a food product; - Generate new ideas and test concepts; - Discuss the sensory evaluation process (also including elementary data analysis); - Identify development potential in raw products; - Determine the challenges in a product development process; - Gather and Integrate relevant information for product development; - Set criteria for the product; - Plan and implement a product development process; and - Evaluate the success of the product tot he criteria.
CNSF	3724	Food VI	Home and industrial food preservation. Preserving principles, preparing raw material, blanching, freezing, pasteurisation, UHT, heat sterilisation, microwave and infrared radiation, freeze-drying, coating and packaging.	MAIN	Student will be able to: - Distinguish between different methods; - Select suitable methods of preservation for specific products; - Evaluate different methods for suitability for a specific product; -Apply different preservation methods; - Set criteria for different preserved products; - Evaluate the quality of a product against the set criteria; and - Develop new economically an environmentally sustainable food products in an increasingly global context.
CNSI	1612	Interior I	The interior design profession: the services provided by an interior designer; steps involved with the design process; various methods available to communicate design vision to the consumer; forecasting and trends; principles of a professional practice. Case studies and visits to businesses and shadow work - practical.	MAIN	Student will be able to: - Acknowledge the services provided by an interior designer; - Perform the steps involved with the design process; - Build extensive knowledge on the various methods available to communicate their design vision to the consumer; - Build skills on forecasting and trends; and - Apply the principles of professional practice.
CNSI	1622	Interior II	Design and architectural principles, elements and finishes: principles and elements of design; colour schemes; lighting solutions; new products; techniques; sustainable interior uses. Sketch-up designs.	MAIN	Student will be able to: - Apply the principles and elements of design to enhance a space; - Create colour schemes to fit a space; - Describe and pair lighting solutions to spaces; - Apply principles of new products, manufacturing techniques and applications for lining interiors; and - Design a space by making use of sketch-up.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CNSI	2612	Interior III	Socially responsible design, ergonomics and special user groups - space in terms of human factors and environmental factors; speciality segments of interior design; spaces to suit people's needs - applying knowledge of furnishings. Sketch - up: Practical.	MAIN	Student will be able to: - Outline work, the worker and the work place including detailed knowledge of ergonomics; - Evaluate, select and apply appropriate work methods in the work place to ensure a productive and motivating environment; - Identify, evaluate and select appropriate apparatus for the home; - Evaluate different sources of information for appropriate household apparatus for specified tasks, and to apply well-developed processes of analysis, synthesis and critical evaluation of that information; - Decide and act appropriately in the selection of an apparatus; - Evaluate performance against given criteria, and accurately identify and address own task-specific learning needs in a given context, and to support the learning needs of others; and - Work effectively in a team or group, and to take responsibility for management of the work process including the responsibility for the use of energy and manpower where appropriate. - Evaluate a space in terms of human factors and environmental factors. - Differentiate between the specialties segments of interior design. - Create space to suit people's needs by applying knowledge of furnishings.
CNSI	2622	Interior IV	Period design styles.Historical interior styles. Inspiration to contemporary spaces. Sketch-up.	MAIN	Student will be able to: - Investigate and describe historic interior styles; - Apply historic style inspiration to contemporary spaces and - Use Sketch-up to design a contemporary space.
CNSI	3712	Interior V	The properties of textile fibres and fabrics determine their suitability towards a specific product. Textile fibres are classified according to their source of origin or manufacture. The macro- and microstructure, physical and chemical properties and construction and finishing influence the uses and maintenance of different textile fabrics.	MAIN	Student will be able to: - Classify textile fibres in generic groups; - Evaluate a textile for use by the consumer according to properties; - Prescribe the care and maintenance instructions according to the properties of each textile; - Explain the textile fibre performance in terms of the structure and the physical and chemical properties of the textile; - Identify textile fibres by applying burning, microscope, chemical and stain methods; and - Identify and analyse the environmental impact of different textile fibres.
CNSI	3722	Interior VI	The classification and construction of yarns and fabrics. The influence of construction on the fabric properties. Finishing, dyeing and printing of textile fabrics. Care and maintenance of textile fabrics.	MAIN	Student will be able to: -Discuss weaving looms, process of weaving, basic weaves; - Predict performances of fabrics based inn fabrication, yarn structure and fibre; - Relate advances in fabric production to market availability and cost; - Differentiate between warp-and filling-knit fabrics; -Discuss versatility of knit fabrics for apparel, interior and technical products; -Examine and discuss how finishing affects fabric, including cost, quality, performance and appearance; - Identify different fabric construction methods; - Evaluate the application possibilities of a specific type of construction; - Evaluate the effect of specific finishes on the quality and end use of specific textile fabrics; -Evaluate the application possibilities of specific dyeing and printing methods; and - Prescribe textile care for a specific fabric or garment considering the construction and finishes;
CNST	3734	Apparel industry	The apparel industry: International fashion centres. Design, financing, production and distribution in the apparel industry. Wholesale and retail. Fashion promotion. Tailoring: principles and guidelines and the application in construction	MAIN	Students will be able to: -discuss and explain the functioning of the fashion industry; -develop insight in the steps applicable tot he manufacturing of the fashion article; -develop criteria for the selection of stock for a clothing retail outlet; -discuss and apply tailoring techniques and principles; and -Apply the techniques in the manufacture of a tailored garment.
CNST	3744	Pattern design	Psychological aspects of clothing. Flat pattern design: principles and guidelines. Style variations. Practical application in designing a flat pattern and construction of a garment.	MAIN	Students will be able to: -Discuss clothing as a non-verbal communicator; -Explain the role of clothing in the self concept, conformity and individuality; -Outline clothing symbolism; -Describe the depicting of values, attitudes and interests through clothing; -Provide an overview of the theoretical perspectives in the study of clothing; -Explain the principles and guidelines of flat pattern design; -Design a basic block pattern with an individuals measurements; and -Design different styles in the flat pattern method. -Interpret a fashion sketch. -Prescribe construction processes for a specific style.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CNST	3754	Textile design and construction	Weaving, knitting and crocheting. Surface enrichment of fabrics. Elements and principles of art in successful designs of textile items.	MAIN	Student will be able to: -Have knowledge of the principles of design in textile construction; - design a textile product; -apply a variety of design techniques in fabric construction; -set criteria for textile items; -plan and apply construction processes for construction of an item; and -evaluate the success of a textile item towards the intended use of the item.
CNST	4814	Clothing industry	The clothing industry. Construction in mass production, construction of clothing for the handicapped.	MAIN	Student will be able to: -Outline clothing mass production; -Assess information on clothing in mass production; -Integrate information from different sources; -Evaluate available resources for application in a clothing construction unit; -Design and plan a clothing solution to a specific need of a handicapped person; -Design and plan the flow in a clothing construction unit; -Communicate the gathered information in a report; and -Take responsibility of the management of utilization of resources.
CNST	4824	Quality management in the clothing industry	Quality management in the clothing industry. Standards and specifications. Uniforms.	MAIN	Student will be able to: -explain quality management in clothing mass production; - to distinguish between different quality management styles; - gather information on clothing quality and standards; - integrate information from different sources; - design and plan a quality standard solution to a specific need; - to design and plan the quality control inspection points in a clothing construction unit; and - to analyze a need and apply a suitable strategy to develop a garment to fulfill the specific need.
CNST	4834	Social aspects of clothing	The social aspects of clothing. Origin, functions, culture and clothing patterns, clothing and the social role.	MAIN	Students will be able to: -Outline the social aspects of clothing; -Conversant with the social perspective on clothing; -Developed scientific thinking through mastering the skills to select, interpret, evaluate, review, compare and organize the subject matter of the social aspects of clothing; -Integrate the work of different authors when discussing a specific aspect; -Compare views through critical reading and communicate the results in a report; -Use the research methodology for studies in the social aspects of clothing; and -Collect and review literature and compile an organized and logical paper.
CNST	4844	Psychological aspects of clothing	Psychological aspects of clothing: Self-concept, clothing symbolism, conformity, individuality.	MAIN	Student will be able to: -Outline the psychological aspects of clothing; -Conversant with the psychological perspective on clothing; -Develop scientific thinking through mastering the skills to select, inerpret, evaluate, review, compare and organize the subject matter of thepsycological aspects of clothing; -Integrate the work of different authors when discussing a specific aspect; -Compare views through critical reading; -Use the research methodology for studies in the psychological aspects of clothing; and -Collect and review literature and compile an organized and logical paper.
CNST	4854	Natural textile fibres	Natural vegetable fibres, natural protein fibres and manmade fibres from natural origin.	MAIN	Students will be able to: -Describe natural fibres and regenerated fibres from natural origin; -Analyse the properties of a fibre; -Evaluate a specific fibre for a specific end use; -Integrate the theories of different authors in compiling a literature review; -Assess the environmental impact of different fibre production systems; -Critically review information on new fibres and compile textile care prosesses for new textile fibre products; and -Work in a team and take responsibility for the planning of textile evaluation projects
CNST	4864	Finishes for natural textile fibres	Finishes to improve the appearance and function of natural fibres.	MAIN	Student will be able to: -Explain the finishes for natural fibres and regenerated fibres from natural origin; -Analyse the properties of a finished fibres; -Evaluate a specific finish for a specific end use; -Integrate the theories of different authors in compiling a literature review; -Assess the environmental impact of different fibre finishes and application methods; -Review information on new finishes and asses the value in terms of the improvement of the properties compared to the impact; and -Work in a team and take responsibility for the planning of textile finish evaluation projects.

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
Postgraduate					
CNCS	6814	The early history of textiles, clothing, interior or foods	The early history of textiles, clothing, interior or foods.	MAIN	Students will be able to: -discuss and explain the development of the history of textiles, clothing, interiors or food.; -describe of the influences of factors such as geography, religion, politics and economics on the history of textiles, clothing, interiors or food; identify and classify items to specific periods on specific features; and display insight in relevant research methodologies for history of textiles, clothing, interiors or food.
CNCS	8900	Consumer Science Dissertation	This module contains fundamental knowledge, theories, principles and practices of Consumer Science , including: Research project in specialized field of Consumer Science as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing.	MAIN	Student will be able to: - Identify the problem; - Formulate a hypothesis; - Do independent planning and then conduct the experiments; - Analyse and interpret the results; - Discuss the results comprehensively; - Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and - Write a manuscript, adhering to the grammatical and technical aspects of scientific writing.
CNCS	9100	Consumer Sciences Thesis	This module contains fundamental knowledge, theories, principles and practices of Consumer Sciences, General including: Research project in specialized field of Consumer Sciences, General as discussed by study leader(s), Academic Departmental Head and student. The project includes problem identification, hypothesis formulation, independent planning and conducting of experiments, analysis and interpretation of results, discussion of results, compiling the information according to a specified dissertation structure, grammatical and technical aspects of scientific writing. The emphasis is on independent and original research	MAIN	Student should be able to: -Identify the problem; -Formulate a hypothesis; -Do independent planning and then conduct the experiments; -Analyse and interpret the results; -Discuss the results comprehensively; -Compile the information according to a specified dissertation structure (the department recommend that dissertations be written in article format); and -Write a manuscript, adhering to the grammatical and technical aspects of scientific writing
CNST	6834	Social aspects of clothing	The social aspects of clothing. Origin, functions, culture and clothing patterns, clothing and the social role.	MAIN	Students will be able to: -Outline the social aspects of clothing; -Conversant with the social perspective on clothing; -Developed scientific thinking through mastering the skills to select, interpret, evaluate, review, compare and organize the subject matter of the social aspects of clothing; -Integrate the work of different authors when discussing a specific aspect; -Compare views through critical reading and communicate the results in a report; -Use the research methodology for studies in the social aspects of clothing; and -Collect and review literature and compile an organized and logical paper.
CNST	6844	Psychological aspects of clothing	Psychological aspects of clothing: Self-concept, clothing symbolism, conformity, individuality.	MAIN	Student will be able to: -Outline the psychological aspects of clothing; -Conversant with the psychological perspective on clothing; -Develop scientific thinking through mastering the skills to select, inerpret, evaluate, review, compare and organize the subject matter of thepsycological aspects of clothing; -Integrate the work of different authors when discussing a specific aspect; -Compare views through critical reading; -Use the research methodology for studies in the psychological aspects of clothing; and -Collect and review literature and compile an organized and logical paper.
CNST	6854	Natural textile fibres	Natural vegetable fibres, natural protein fibres and manmade fibres from natural origin.	MAIN	Students will be able to: -Describe natural fibres and regenerated fibres from natural origin; -Analyse the properties of a fibre; -Evaluate a specific fibre for a specific end use; -Integrate the theories of different authors in compiling a literature review; -Assess the environmental impact of different fibre production systems; -Critically review information on new fibres and compile textile care prosesses for new textile fibre products; and -Work in a team and take responsibility for the planning of textile evaluation projects

Module code		Course Long Title	Course Description	Campus	Learning Oucomes
CNST	6864	Finishes for natural textile fibres	Finishes to improve the appearance and function of natural fibres.	MAIN	Student will be able to: -Explain the finishes for natural fibres and regenerated fibres from natural origin; -Analyse the properties of a finished fibres; -Evaluate a specific finish for a specific end use; -Integrate the theories of different authors in compiling a literature review; -Assess the environmental impact of different fibre finishes and application methods; -Review information on new finishes and asses the value in terms of the improvement of the properties compared to the impact; and -Work in a team and take responsibility for the planning of textile finish evaluation projects.