FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

QwaQwa

YEARBOOK 2014

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

Content

1. CONTACT DETAILS: OFFICE OF THE DEAN AND ACADEMIC ADMINISTRATION

POSITION	DEAN	ASSISTANT DEAN QWAQWA	FACULTY MANAGER	LEARNING AND TEACHING MANAGER	NATURAL SCIENCES UNDERGRADUATE AND POSTGRADUATE	BUILDING SCIENCES UNDERGRADUATE AND HONOURS	MASTER'S AND DOCTORAL DEGREES
NAME	Prof Neil Heideman	Prof Riaan Luyt	Johan Kruger	Elzmarie Oosthuizen	Mpho Leripa (QwaQwa Campus Faculty Officer)	Epefia Maboa	Rebecca Dipyere Mandy Basson
BUILDING	Room 9, Biology Building	Science Building, Room 1008, QwaQwa Campus	Room 11, Biology Building	Room 10, Biology Building	QwaQwa Science Building, Room 5	Room N143, George du Toit Administration Building	Room 315 / 322A, George du Toit Administration Building
TEL. NUMBER	051 401 2322	058 718 5314	051 401 3199	051 4012934	058 718 5132	051401 2943	051 401 2943 / 2722
E-MAIL	dean@ufs.ac.za	luytas@qwa.ufs.ac.za	krugerjd@ufs.ac.za	oosthuizenem@ufs.ac.za	leripamp@qwa.ufs.ac.za	maboaemb@ufs.ac.za	dipyererd@ufs.ac.za bassonmg@ufs.ac.za
WEB ADDRESS	http://www.ufs.ac.za/natagri						

2. CONTACT DETAILS: PROGRAMME DIRECTORS

Programme	Architecture	Agricultural Sciences	Agricultural Economics Agricultural Management	Biochemistry	Botany, Plant Breeding, Plant Health Ecology, Plant Pathology	Genetics, Behavioural Genetics, Human Molecular Biology, Forensic Sciences	Microbiology, Microbial Biotechnology	Entomology & Zoology	Building Sciences	Faculty Officer of the QwaQwa Campus
Name	Jako Olivier	Prof Japie van Wyk	Dr Antonie Geyer	Dr Frans O'Neill	Dr Botma Visser	Zurika Odendaal	Prof Stephanus Kilian	Prof Jo van As	Mart-Mari Els	Mpho Leripa (QwaQwa Campus Faculty Officer)
Building	Room 26, ARG111, Architecture Building	Room LG 3. G02, Agriculture Building	Room LG 1.129 Agriculture Building	Room 5, Biotechnology Building	Room134, Biology Building	Room 322 ,Steyn Annex	Room 50, Biotechnology Building	Room D 118, Biology Building	Room A6, Quantity Surveying and Construction Management	QwaQwa Science Building, Room 5
Telephone Number	051 401 2332	051 401 2677	051 401 9053	051 401 7553	051 401 3278	051 401 2776	051 401 2780	051 401 2427	051 401 2257	058 718 5132
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Programme	Computer Science, Informatics, Information Technology	Consumer Science	Extended and UPP Natural Sciences	Geography	Geology, Geohydrology	Mathematical Sciences	Mathematical Statistics, Actuarial Science	Physical Science , Chemical Sciences	Urban and Regional Planning	Extended and UPP Agricultural Sciences
Name	Prof Pieter Bilgnaut	Prof Hester Steyn	Rina Meintjes	Eldalize Kruger	Dr Hermann Praekelt	Prof Schalk Schoombie	Michael von Maltitz	Dr Johan Venter	Dr Lize Barcley	Elzmarie Oosthuizen
Building	Room WWG 313, Mathematical Sciences Building	Room LG 9.106, Agriculture Building	Room CEM 2. 202, Chemistry Building	Room GEO 2.3, Geography Building	Room GG 305, Geology Building	Room WWG 110 A, Mathematical Sciences Building	Room W102, Mathematical Statistics Building	Room CEM 2. 101, Chemistry Building	Room 7 ARG4, Architecture Building	Room , Biology Building
Telephone Number	051 401 2605 /3705	051 401 2304	051 401 2783	051 401 2185	051 401 2373	051 401 2329	051 401 2609 / 2933	051 401 3336	051 401 2795	051 401 2934
E-mail	Pieterb@ufs.ac.za	steynhj@ufs.ac.za	meintjr@ufs.ac.za	krugere@ufs.ac.za	praekehe@ufs.ac.za	schoomsw@ufs.ac.za	vmaltitz@ufs.ac.za	venterja@ufs.ac.za	barcleye@ufs.ac.za	oosthuizenem@ufs.ac.za

3. USING THE YEARBOOK

The Yearbook 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 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 (January and July) are only available on appointment.
- 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 regulations.

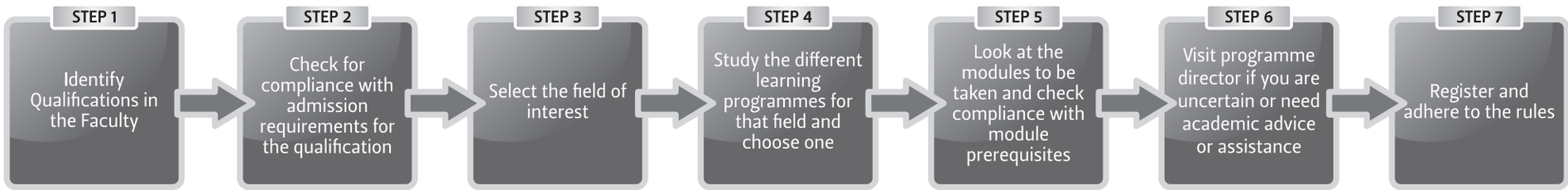
The third section contains module content information:

- 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 Yearbook 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 Institutional Rules of the UFS 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 contents may occur so that the Faculty of Natural and Agricultural Sciences can ensure the relevance of the degrees. Students must therefore consult the new Yearbook every academic year before registration to ensure alignment with updated curricula, as the Faculty updates the Yearbook to keep abreast of the latest scientific developments. 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:



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**
Professor	Prof. B.J. Willemse	***Prof. J.P.C. Greyling**, Prof. G.N. Smit, Prof. H.A. Snyman, Prof. J.B. van Wyk, Prof. F.W.C. Neser	Prof. L.D. van Rensburg	
Professors Extraordinary		Prof. M.M. Scholtz, Prof. T.L. Nedambale, Prof. A.J. van der Zijpp, Prof. A. Maiwashe	***Prof. C.C. du Preez**, Prof. J.C. Pretorius,	
Associate Professor	Prof. B. Grové	Prof H.O. de Waal	Prof. P.A.L. le Roux, Prof. C.W. van Huyssteen	***Prof. H.J.H. Steyn**
Affiliated Professors			Prof. C.J. Stigter, Prof. S. Walker	
Affiliated Associate Professor			Prof. M. Tsubo, Prof. R. van Antwerpen	
Senior Lecturer	Dr A.C. Geyer	Dr. A.M. Jooste	Dr J. Allemann, Dr G.M. Ceronio, Dr G.M. Engelbrecht	
Lecturers	Dr H. Jordaan, ***Mr D.B. Strydom**, Ms N. Matthews, Mr A.O. Ogundeji, Mr F.A. Maré, Mr J.I.F. Henning, Mr P. Mokhatla, Mr H.N. van Niekerk	Dr M.D. Fair, Mr P.J. Malan, Mr F.H. de Witt, Mr O.B. Einkamerer, Dr G.D.J. Scholtz, Mr F. Deacon	Mr J.H. Barnard, Ms L. de Wet, Ms E. Kotzé, Mr A.S. Steyn	Ms I. van der Merwe, Dr J.F. Vermaas
Junior Lecturers		Mr M.B. Raito		Ms J.S. van Zyl, Ms P.Z. Swart, Ms N. Cronje, Ms N. Tinta
Lecturers Units	Dr L. Terblanche, Mr W.A. Lombard, Ms N. Mdungela, Ms N. Venter, Ms J. Hayward		Dr. J.H. van der Waals	
Research Associate				
Junior Researcher		Dr B.B. Janecke		
Agricultural Engineering	Mr J.J. van Staden			

	ARCHITECTURE (051 401 2332)	**QUANTITY SURVEYING AND CONSTRUCTION MANAGEMENT** (051 401 2248)	**URBAN AND REGIONAL PLANNING** (051 401 2486)
Professor	Prof. W.H. Peters		***Prof. V.J. Nel**
Affiliated Professors	Prof. O. Joubert		
Senior Lecturers	Ms M. Bitzer, Ms P.N. Tumubweinee, Ms A. Wagener		Dr M.M. Campbell
Lecturers	Mr G. Bosman, Mr J.L. du Preez, Mr J.W. Ras	Prof. K. Kajimo-Shakanthu, Mr H.J. van Vuuren, Dr B.G. Zulch, Mr P.M. Oosthuizen, Mr M.S. Ramabodu, Mr M Letsie, Ms E. Jacobs, Ms O.R.C. du Preez, Ms M.M. Els	Mr P.J. Potgieter, Ms E. Barclay, Mr Y. Mashalaba
Junior Lecturers	***Mr H.B. Pretorius**, Mr W.R. Bitzer, Mr J.I. Olivier, Mr J.H. Nel, Mr H. Raubenheimer, Mr Z.G. Wessels		

	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	***Prof. A. Roodt**						
Senior Professor						***Prof. J.H. Meyer**	Prof. M.S. Finkelstein
Professor			***Prof. J.J. Spies,** Prof. J.P. Grobler	Prof. G.E. Visser		Prof. A.H.J.J. Cloot, Prof. S.W. Schoombie	***Prof. R. Schall**
Professor Researcher					Prof. W.A. van der Westhuizen		
Professors Extraordinary							
Professors	Prof. J.C. Swarts, Prof. B.C.B. Bezuidenhoudt, Prof. J. Conradie	***Prof. P.J. Blignaut**					
Associate Professors	Prof. W. Purcell, Prof. J.H. van der Westhuizen, Prof. H.G. Visser				Prof. W.P. Colliston, Prof. M. Tredoux, Prof. C.D.K. Gauert	Prof. T.M. Acho	
Affiliated Professors	Prof. D. Ferreira, Prof. H. Frank, Prof. K. Swart, Prof. T. van der Merwe, Prof. S. Otto, Prof. J.M. Botha	Prof. H.J. Messerschmidt	Prof. T.E. Turner		Prof. D.E. Miller		
Affiliated Associate Professors	Prof. C. Edlin, Prof. G. Fouché, Prof. V. Maharaj, Prof G.Steyl		Prof. A. Kotzé				
Senior Lecturers	Dr S.L. Bonnet, Dr K von Eschwege, Dr. J.A. Venter, Dr E.H.G. Langner, Dr E. Erasmus	Dr A. van Biljon, Dr L. de Wet, Dr J.E. Kotze, Dr E. Nel, Dr T. Beelders		***Dr C.H. Barker**	Dr J.O. Claassen, ***Dr F. Roelofse**	Ms J.S. van Niekerk, Dr S. Dorfling	Dr J.M. van Zyl, Dr L van der Merwe, Mr F.F. Koning, Dr D. Chikobvu, Dr A. Verster
Senior Lecturer-researcher					Dr H.E. Praekelt		
Lecturers	Dr L. Twigge, Dr A. Brink, Dr M. Schutte-Smith, Dr E. Müller, Dr R. Shago, Ms A. Wilhelm-Mouton, Ms A-L. Manicum	Ms E.H. Dednam, Mr A.J. Burger, Mr W. Nel, Mr R. Brown	Dr K. Ehlers, Mr M.F. Maleka, Mr J.A. Viljoen, Ms P. Spies, Ms S-R Schneider, Ms L. Heathfield	Ms E. Kruger, Ms T.C. Mehlomakhulu, Ms R.T. Massey		Ms A.F. Kleynhans, Mr C. Venter	Mr A.M. Naudé, Mr M.J. von Maltitz, Mr S. van der Merwe, Ms E. Girmay, Ms W. Oosthuizen, Ms Z. Ludick, Dr M. Sjölander
Affiliated Lecturers			Dr D.L. Dalton, Lt.-Col. A. Lucassen				
Junior Lecturers		Ms M.J.F. Botha, Mr R.C. Fouché, Mr J. Marais, Mr J.P. du Plessis, Mr D. Wium	Ms Z. Odendaal, Ms L. Wessels, Ms H. van der Westhuizen	Ms M. Rabumbulu, Ms A. Pretorius, Mr A.J. van der Walt	Ms H. Pretorius, Mr A.I. Odendaal, Ms J. Magson		
Subject Coordinators	Dr C. Marais, Ms R. Meintjes						

	CHEMISTRY (058 718 5130)	**COMPUTER SCIENCE AND INFORMATICS** (058-718 5216)		**GEOGRAPHY** (058-718 5476)		**MATHEMATICS AND APPLIED MATHEMATICS** (058-718 5204)	
QWAQWA-CAMPUS							
Professor	Prof. A.S. Luyt						
Associate Professor				Prof. W.F. van Zyl		***Prof. J. Schröder**	
Senior Lecturers				***Dr G. Mukwada**			
Lecturers	Ms N.F. Molefe, Mr T.A. Tsotetsi, Ms M.A. Malimabe	Mr V.F.S. Mudavanhu, Mr ***R.M. Alfonsi,** Ms R.D. Wario		Mr A. Adjei, Ms M. Naidoo		Mr S.P. Mbambo	
Junior Lecturers	***Mr R.G. Moji,**	Mr B. Sebastian, Mr F.M. Radebe, Mr T. Lesesa, Mr M.B. Mase, Mr G.J. Dollman		Mr P.S. Mahasa		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 Sciences**		**Plant Pathology**	**Botany**	**Plant Breeding**	
Senior Professor			Prof. H.C. Swart				
Distinguished Professor	Prof. J.L.F. Kock						
Professor	***Prof.J.C.du Preez,** Prof.J.Albertyn, Prof. R.R. Bragg, Prof.S.G.Kilian, Prof. M.S. Smit, Prof. E. van Heerden, Prof. B.C. Viljoen	Prof.G.Osthoff	Prof. P.J. Meintjes, ***Prof. J.J. Terblans,** Prof. O.M. Ntwaeaborwa, Prof. W.D. Roos	Prof. Z.A. Pretorius, Prof. W.J. Swart, Prof. N.W. McLaren		Prof. M.T. Labuschagne	***Prof. J.G. van As,** Prof. S. v.d. M. Louw, Prof. L. Basson
Professors Extraordinary				Prof. P. Crous			Prof. G.L. Prinsloo, Prof. L.J. Fourie
Associate Professors	Prof. C.H. Pohl-Albertyn	Prof. A. Hugo, Prof. C.J. Hugo	Prof. M.J.H. Hoffman		Prof. P.J. du Preez	***Prof. L. Herselman**	Prof. L.L. van As
Affiliated Professors	Prof. M.F. DeFlaun						
Affiliated Associate Professors	Prof . E.J. Lodolo		Prof. K.T. Hillie	Prof. R. Prins	Prof. M. van der Bank	Prof. R. Prins, Prof. J.B.J. van Rensburg	
Senior Lecturers	Dr H.G. O'Neill, Dr F.H. O'Neill, Dr D. Opperman	Dr J. Myburgh, Dr M. de Wit	Dr R.E. Kroon	Dr M. Gryzenhout, Dr G.J. Marais	Dr G.P. Potgieter, Dr B. Visser		Dr C.R. Haddad
Lecturers	Dr O.M. Sebolai, Dr C.W. Swart-Pistor	Dr C. Bothma	Dr. B. van Soelen		Dr M. Cawood, Dr L. Mohase, Dr M. Jackson, Dr L. Joubert	Dr A. van Biljon, 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, Dr S Brink
Junior Lecturers	Ms C.E. Boucher, Mr W.P.D. Schabort				Ms M. Westcott		Mr V.R. Swart, Ms L. Heyns, Mr D Fourie
Research Associate					Dr L. Rossouw		
Senior Researcher			Dr. E Coetsee-Hugo				
Researcher	Ms L. Steyn						

	MICROBIAL, BIOCHEMICAL AND FOOD BIOTECHNOLOGY		PHYSICS (058-718 5303)	PLANT SCIENCES (058-718 5134)			ZOOLOGY AND ENTOMOLOGY (058-718 5327)
	Division of Microbiology and Biochemistry	Division of Food Sciences		Plant Pathology	Botany	Plant Breeding	
QWAQWA-CAMPUS							
Associate Professor			Prof. B.F. Dejene				
Senior Lecturers					***Dr. A.O.T. Ashafa,** Dr E.J.J. Sieben, Dr L.V. Buwa		***Dr A. le Roux,** Dr M.M.O. Thekisoe
Lecturers			Dr J.J. Dolo, Mr R.O. Ocaya, Mr S.V. Motloung, ***Mr K.G. Tshabalala**		Dr R. Ngara		Dr P.M. Leeto, Dr J. van As, Dr E. Bredenhand
Junior Lecturers			Mr L.F. Koao		Mr T.R. Pitso		Ms H.J.M. Matete, Ms M. van As

	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. M.T. Seaman**	***Prof. I.B. Groenewald**	***Dr P.D. Vermeulen**
Professor					Prof. G.J. van Tonder
Associate Professor		Prof. P.W.J. van Wyk			
Affiliated Professors			Prof. A. Turton		
Affiliated Associate Professors					Prof. K. Witthauser, Prof. J.L. Nieber
Affiliated Researchers					Prof. J.F. Botha, Dr J. van der Merwe, Mr S.S. de Lange
Senior Lecturer				Dr J.A. Van Niekerk	
Lecturers	***Dr A.J. Jordaan**		Ms M.F. Avenant		
Junior Lecturers	Dr B. Grové, Dr L. Terblanche, Prof. G. Viljoen, Mr E. du Plessis, Prof. H. Hudson, Prof. W. Purcell, Mr C. Dreyer, Dr D. Sakulski, Dr H. Booysen, Ms A. Weyers, Dr. D. Chikobvu				
	Ms O. Kunguma, Ms A. Ncube, Ms J. Belle, Mr A.O. Ogundeji				
Lecturers/Researchers					Ms L-M. Deysel, Dr F.D. Fourie
Research Associate			Dr N.L. Avenant, Dr N.B. Collins, Mr P. Grundlingh, Dr S. Mitchell, Dr J. Brink, Dr P.C. Zietsman, Dr H. Bezuidenhout, Dr D.F. Toerien		

*** Academic Department Head**

5. QUALIFICATION TYPES

The Higher Education Qualifications Framework (HEQF) contains nine 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 Degree	7	360	Minimum 120 credits at Level 7 Maximum 96 credits at Level 5	Bachelor Honours Degree	8	120	Minimum 120 credits Minimum 120 credits at Level 8
Professional Degree	8	480	Minimum 120 credits at Level 7 Minimum 96 credits at Level 8 Maximum 96 credits at Level 5	Master's Degree	9	180	Minimum 180 credits Minimum 120 credits at Level 9
				Doctoral Degree	10	360	Minimum 360 credits Minimum 360 credits at Level 10

6. CONSTITUTION OF QUALIFICATIONS

The majority of the bachelor's degrees offered in the Faculty of Natural and Agricultural Sciences consist of three years' study. The first year of study provides students with the opportunity to develop a broad scientific foundation and they are required to complete eight modules (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 a supportive discipline. 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 interest, for example, Physics and Chemistry, or Microbiology and Biochemistry, or Genetics and Botany (at NQF Level 7), with at least a total of 60 credits completed for each major. Furthermore, students may also be required to complete modules to ensure that they have the necessary literacy required to function in a demanding academic environment. The diagram below indicates how degrees are composed 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 interest, namely:

- Architecture
- Agricultural Sciences
- Consumer Sciences

The Bachelor of Science (BSc) and the Bachelor of Science Honours degrees make provision for six fields of interest, namely:

- Biological Sciences
- Building Sciences
- Consumer Sciences
- Chemical and Physical Science
- Geosciences
- Information Technology
- Mathematical Sciences

The Bachelor of Sciences in Agriculture (BScAgric) degree makes provision for three fields of interest, namely:

- Animal, Grassland and Wildlife Sciences
- Plant Breeding and Plant Pathology
- Soil, Crop and Climate Sciences

In each field of interest different modules may be combined as majors. The different combinations of majors, minors and supportive modules are referred to as learning programmes. All the learning programmes comply with the minimum credits as indicated under the heading *Types of Qualifications* above. Each learning programme has a unique code which refers to a qualification registered with SAQA. The first two or three digits refer to different degrees as follows:

Advanced Diploma	400xx	Bachelor Agric	501xx	Master's degree by dissertation	473xx	Doctor	493xx
Advanced Diploma Agric	500xx	Bachelor of Science Agriculture	51xxx,	Master's degree by coursework	474xx	Doctor of Philosophy	491xx
Bachelor	401xx	or	52xxx,	Master of Science by dissertation	471xx	Doctor of Science	490xx
Bachelor of Science	41xx	or	53xxx,	Master of Science by coursework	472xx	University Preparation Programmes	
or	42xxx	or	54xxx	Master of Agricultural Sciences by dissertation	571xx	Agriculture	5000x
or	43xxx	Bachelor Honours	453xx	Master of Agricultural Sciences by coursework	572xx	Sciences	4000x
or	44xxx	Bachelor of Science Honours	450xx			Extended programmes	
		Bachelor of Science in Agriculture Honours	550xx			Agriculture	509xx
		Postgraduate Diploma	460xx			Sciences	409xx

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 degree, or a single specialty area in the case of Honours, Master's and Doctoral degrees. Every discipline is identified by a two-digit code as given in the table below.

Table 1: Identification codes of different disciplines

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

Table 2: Identification codes of other specialisation fields

Approved Alternative Combination	00	Economics	55	Irrigation Management	62	Nano Sciences	69
Programme without two majors	01 – 09	Environmental Management	56	Human Settlements	63	Plant Health Ecology	70
Accounting	50	Environmental Rehabilitation	57	Land and Property Development	64	Polymer Sciences	71
Agricultural Engineering	51	Facilities Management	58	Life Sciences	65	Property Sciences	72
Agricultural Management	52	Finance	59	Limnology	66	Psychology	73
Business	53	Geoinformatics	60	Microbiotechnology	67	Risk Analysis	74
Environmental Sciences	54	Human Molecular Biology	61	Mineral Resource Throughput Management	68	Wildlife Management	75

The curricula for the different learning programmes 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.39.

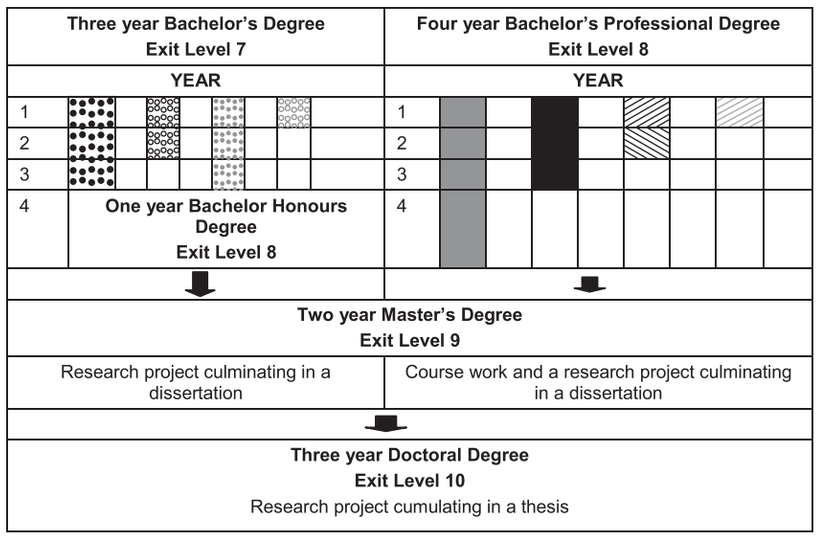
Examples of learning programme codes

Learning programme	First two or three digits represent type of degree (or part of the major)	Subsequent digits represent different disciplines or specialisation fields	Learning programme code
BAgric In Agricultural Economics	401xx	xxx11	40111
BConsumer Science	401xx	xxx23	40123
BSc with Chemistry and Physics	42xxx (where 2 is part of 20, the code for Chemistry)	x2140	42140
BSc Hons Chemistry	450xx	xxx21	45021
MSc Chemistry by dissertation	471xx	xxx21	47121
PhD Chemistry	491xx	xxx21	49121

7. 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.



MODULE CODES

Undergraduate modules may be presented as semester or year modules. The credits awarded to every module give an indication of the teaching and learning time. 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 ABCxyz and this code represents the following:

ABC Indicates the discipline
x A numeral stating the study year, for example first year = 1
y An odd number indicates the first semester and an even number indicates the second semester. The numerals 0 or 9 indicate a year module
z The number multiplied by four indicates the number of credits

For example, AGR354 indicates that it is an Agronomy module (AGR), presented during the third academic year at NQF 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 Honours, Master's and Doctoral modules will start with a 6, 7 and 9 respectively, and often the second and third numbers do not have the same meaning as the codes of undergraduate modules.

8. CORE COMPETENCIES FOR GRADUATES

A Bachelor's or Bachelor of Science Graduate is:

Academically excellent

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.

Adjusted to cultural diversity

This entails that the student:

- Acquires an understanding of the social and cultural diversity in our country.
- Learns to value and respect different cultures.

An active global citizen

This entails that the student:

- Acquires an appreciation of the global perspective on his/her chosen discipline(s).
- Learns to accept social responsibilities.
- Is able to work effectively both as a team leader and a team member.
- Takes cognisance 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

- 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.

Skills

- 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.

Values and attitudes

- 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.

9. FACULTY RULES

NAS1 – General rules

The **General Institutional Rules** of the UFS are set out in General Institutional Rules (First Qualification, as well as Advanced and Postgraduate Qualifications) for each year in the Yearbook of the University, and contains the following relevant information:

GENERAL RULES FOR FIRST QUALIFICATIONS			
A1 – General rules	A2 – Application for admission	A3 – Admission or readmission to the university and an academic qualification	A4 – Submission of documentation to register as a student
A5 – Duration of study and curriculum compilation	A6 – Registration and re-registration as student	A7 – Amendment of a qualification and/or module(s) and/or university campus/centre and/or mode of instruction	A8 – Credit accumulation and transfer
A9 – Assessment rules	A10 – Qualifications with distinction	A11 – Qualification certificates, Deans and Senate Medals	A12 – Statements of results, academic records, study records, certified statements, conduct certificates and certified examination timetables
A13 – Requests on the grounds of exceptional circumstances	A14 – Discipline	A15 –Financial support	A16 – Module and lecture hall timetable and examination timetable
A17 – Residing in campus housing	A18 – Fees payable	A19 – Information Communication and Technology	

GENERAL RULES FOR POSTGRADUATE DIPLOMA			
A20 – General rules	A21 – Application for admission	A22 – Admission or readmission to the university and an academic qualification	A23 – Submission of documentation to register as a student
A24 – Duration of study and curriculum compilation	A25 – Registration and re-registration as student	A26 – Amendment of a qualification and/or module(s) and/or university campus/centre and/or mode of instruction	A27 – Credit accumulation and transfer
A28 – Assessment rules	A29 – Qualification with distinction	A30 – Qualification certificates	A31 – Intellectual property
A32 – Publication of a research essay	A33 – Statements of results, academic records, study records, certified statements, conduct certificates and certified examination timetables	A34 – Requests on the grounds of exceptional circumstances	A35 – Discipline
A36 – Financial support	A37 – Module and timetable and examination timetable	A38 – Residing in campus housing	A39 – Fees payable
A40 – Information communication and technology			

GENERAL RULES FOR BACCALAUREUS HONOURS DEGREES			
A45 – General rules	A46 – Application for admission	A47 – Admission or readmission to the university and a baccalaureus honours degree	A48 – Submission of documentation to register as a student
A49 – Duration of study and curriculum compilation	A50 – Registration and re-registration as student	A51 – Amendment of a qualification and/or module(s) and/or university campus/centre and/or mode of instruction	A52 – Credit accumulation and transfer
A53 – Assessment rules	A54 – Qualifications with distinction	A55 – Qualification certificates, Dean's and Senate Medals	A56 – Intellectual property
A57 – Publication of a research essay	A58 – Statements of results, academic records, study records, certified statements, conduct certificates and certified examination timetables	A59 – Requests for exceptional cases	A60 – Discipline
A61 – Financial support	A62 – Module and timetable and examination timetable	A63 – Residing in campus housing	A64 – Fees payable
A61 – Recognition of modules passed at this or another institution of higher education	A62 – Presentation modes and assessment	A63 – Times and venues where examinations are conducted	A64 – Assessors/moderators
A65 – Information communication and technology			

GENERAL RULES FOR MASTER'S DEGREES			
A70 – General rules	A71 – Application for admission	A72 – Admission or readmission to the university and a baccalaureus honours degree	A73 – Submission of documentation to register as a student
A74 – Mode of presentation	A75 – Requirements in respect of a dissertation or publishable, mutually related article (s) (journal article option) or mini-dissertation, or an extended essay, or dissertation	A76 – Duration of study and curriculum compilation	A77 – Registration and re-registration as student
A78 – Amendment of a research title	A79 – Study and co-supervisor (s)	A80 – Assessors and moderators	A81 - Amendment of a qualification and/or module(s) and/or university campus/centre and/or mode of instruction
A82 – Credit accumulation and transfer	A83 – Assessment rules	A84 – Qualification with distinction	A85 – Qualification certificates, Dean's and Senate Medals
A86 – Intellectual property	A87 – Publication of a dissertation, extended essay, dissertation	A88 – Statements of results, academic records, study records, certified statements, conduct certificates and certified examination timetables	A89 – Requests for exceptional cases
A90 – Discipline	A91 – Financial support	A92 – Module and timetable	A93 – Residing in campus housing
A94 – Fees payable	A95 – Information Communication and Technology		

GENERAL RULES FOR BACCALAUREUS HONOURS DEGREES			
A45 – General rules	A46 – Application for admission	A47 – Admission or readmission to the university and a baccalaureus honours degree	A48 – Submission of documentation to register as a student
A49 – Duration of study and curriculum compilation	A50 – Registration and re-registration as student	A51 – Amendment of a qualification and/or module(s) and/or university campus/centre and/or mode of instruction	A52 – Credit accumulation and transfer
A53 – Assessment rules	A54 – Qualifications with distinction	A55 – Qualification certificates, Dean's and Senate Medals	A56 – Intellectual property
A57 – Publication of a research essay	A58 – Statements of results, academic records, study records, certified statements, conduct certificates and certified examination timetables	A59 – Requests for exceptional cases	A60 – Discipline
A61 – Financial support	A62 – Module and timetable and examination timetable	A63 – Residing in campus housing	A64 – Fees payable
A61 – Recognition of modules passed at this or another institution of higher education	A62 – Presentation modes and assessment	A63 – Times and venues where examinations are conducted	A64 – Assessors/moderators
A65 – Information communication and technology			

GENERAL RULES FOR MASTER'S DEGREES			
A70 – General rules	A71 – Application for admission	A72 – Admission or readmission to the university and a baccalaureus honours degree	A73 – Submission of documentation to register as a student
A74 – Mode of presentation	A75 – Requirements in respect of a dissertation or publishable, mutually related article (s) (journal article option) or mini-dissertation, or an extended essay, or dissertation	A76 – Duration of study and curriculum compilation	A77 – Registration and re-registration as student
A78 – Amendment of a research title	A79 – Study and co-supervisor (s)	A80 – Assessors and moderators	A81 - Amendment of a qualification and/or module(s) and/or university campus/centre and/or mode of instruction
A82 – Credit accumulation and transfer	A83 – Assessment rules	A84 – Qualification with distinction	A85 – Qualification certificates, Dean's and Senate Medals
A86 – Intellectual property	A87 – Publication of a dissertation, extended essay, dissertation	A88 – Statements of results, academic records, study records, certified statements, conduct certificates and certified examination timetables	A89 – Requests for exceptional cases
A90 – Discipline	A91 – Financial support	A92 – Module and timetable	A93 – Residing in campus housing
A94 – Fees payable	A95 – Information Communication and Technology		

GENERAL RULES FOR DOCTOR'S DEGREES			
A100 – General rules	A101 – Application for admission	A102 – Admission or readmission to the University and a doctoral degree	A103 – Submission of documentation to register as a student
A104 – Mode of presentation	A105 – Requirements in respect of a thesis or publishable, mutually related articles, (journal article option) or mini-thesis	A106 – Duration of study and curriculum composition	A107 – Registration and re-registration as a student
A108 – Amendment of a research title	A109 – Promoter and co-promoter(s)	A110 – Assessors and moderators	A111 – Amendment of a qualification and/or discipline and/or module(s) and/or university campus/centre
A112 – Credit accumulation and transfer	A113 – Assessment rules	A114 – Qualification with distinction	A115 – Qualification certificates
A116 – Intellectual property	A117 – Publication of a thesis	A118 – Statements of results, academic records, study records, certified statements, conduct certificates and certified examination timetables	A119 – Requests for exceptional cases
A119 – Requests for exceptional cases	A121 – Financial support	A122 – Module and timetable	A123 – Residing in campus housing
A124 – Fees payable	A125 – Information Communication and Technology		
GENERAL RULES FOR DOCTOR'S DEGREES (NQF Exit Level 10)			
A130 – General rules	A131 – Application for admission	A132 – Admission or readmission to the higher doctorate	A133 – Registration and re-registration as a student
A134 – Mentor	A135 – Assessors	A136 – Requirements that must be met at the submission of scientific publications	A137 – Assessment reports
A138 – Pass requirements	A139 – Plagiarism	A140 – Qualification certificates	A141 – Fees payable
GENERAL RULES: HONORARY DEGREES			
A145 – Honorary suggestions	A146 – Qualification certificates	A150 – Convocation	

The General Institutional Rules of the UFS apply to this faculty *mutatis mutandis* (A1 to A150). 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 Yearbook every academic year before registration to ensure alignment with updated curricula, as the Faculty updates the Yearbook 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 Diplomas, Access and Extended programmes and Bachelor degrees. The following fields of study are covered in each of the categories at the main campus and on the QwaQwa campus where indicated or where indicated on the QwaQwa campus only:

- **Diplomas**: Advanced Diploma in Sustainable Agriculture and Rural Development.
- **Access and Extended Programmes:** University Preparation Programme: Agricultural Sciences for BAgric; University Preparation Programme: Natural and Agricultural Sciences(Mathematics and Chemistry) for BSc, Access: Natural and Agricultural Sciences (Mathematics and Chemistry) for BSc (QwaQwa, Bachelor of Agriculture Extended Programme, Bachelor of Agricultural Sciences Extended Programme, Bachelor of Science Extended Programme (Mathematics and Chemistry) (QwaQwa), Bachelor of Science Extended Programme (Mathematics and Finances).
- **Bachelor Degrees:**
  - **Bachelor of:**
    - Architecture; Agriculture (Agricultural Management, Animal Production Management, Crop Production Management, Irrigation Management, Mixed Farming Management, Wildlife Management); Agricultural Economics, Consumer Sciences(General and Food);
  - **Bachelor of Science in:**
    - Actuarial Sciences, Agricultural Economics,
    - Biological Sciences: Biochemistry and Botany, Biochemistry and Entomology, Biochemistry and Genetics, Biochemistry and Microbiology, Biochemistry and Zoology, Botany and

Entomology, Botany and Genetics, Botany and Microbiology, Botany and Zoology, Entomology and Genetics, Entomology and Microbiology, Entomology and Zoology, Genetics and Microbiology, Genetics and Zoology, Microbiology and Zoology, Behavioural Genetics, Human Molecular Biology, Forensic Sciences, Botany and Plant Breeding, Plant Health Ecology, Botany and Plant Pathology, Environmental Rehabilitation, Botany (QwaQwa), Entomology (QwaQwa) Life Sciences (QwaQwa), Zoology (QwaQwa).

- o Building Sciences: Construction Management(residential) Quantity Surveying(residential) Construction Management (Distance learning), Construction Management (Facilities Management) (Distance learning), Quantity Surveying (Distance learning)
- o Chemical and Physical Sciences: Chemistry and Biochemistry, Chemistry and Botany (QwaQwa), Chemistry and Food Science, Chemistry and Microbiology, Chemistry and Physics (QwaQwa), Physics and Agrometeorology, Physics and Astrophysics, Physics and Engineering Subjects, Chemistry and Entomology (QwaQwa only), Chemistry and Zoology (QwaQwa only).
- o Consumer Science
- o Geosciences: Geoinformatics, Geography and Environmental Sciences, Geography and Statistics, Geography and Agrometeorology, Environmental Geography (QwaQwa only),Geology specialisation, Geochemistry, Environmental Geology, Geology and Chemistry, Geology and Geography, Geology and Physics.
- o Computer and Information Technology Sciences: Information Technology and Chemistry (QwaQwa), Information Technology and Mathematical Statistics, Information Technology and Mathematics, Information Technology and Physics (QwaQwa), Information Technology and Business, Information Technology and Management (QwaQwa only).
- o Mathematics, Mathematical Statistics and Statistical Sciences: Climate Science, Econometrics, Investment Sciences, Psychometrics, Mathematics and Applied Mathematics, Mathematics and Chemistry, Mathematics and Mathematical Statistics, Mathematics and Physics, Mathematics and Finances, Statistics and Accounting, Statistics and Economics, Statistics and Psychology.

- **Bachelor of Science in Agriculture in:**
  - o Agrometeorology, Agronomy, Animal Sciences, Food Sciences, Grassland Sciences, Plant Breeding, Plant Pathology, Soil Sciences.

NAS2.1 – Faculty Undergraduate entrance requirements

In addition to the requirements contained in General Regulation A2(a), a candidate 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 Bachelors and Bachelor of Science degrees require selection: Architecture, Construction Management, Forensic Sciences, Geology, Engineering Sciences and Quantity Surveying.

c) Applications to these programmes, on the prescribed form, must reach the Registrar, Academic Student Services, on or before 31 July for 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 October, but the final selection will only be confirmed after the National Senior Certificate (NSC) 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 Admission Point (AP) or the M Scores (MS) are calculated as indicated in Table 3:

Table 3: Calculating AP and M Scores

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

NCS Performance level	UFS Admission Point (AP)	NCS Performance level	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		

Calculation of the M score with regard to candidates 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

e) The entrance 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 4: Broad Entrance Requirements

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.	(i) NCS with an endorsement that allows entrance to degree studies or an equivalent qualification.
(ii) A minimum MS of 30.	(ii) A minimum AP of 30.
(iii) HG = E or SG = C in an official tuition language.	(iii) A performance level 4 (50%) in an official tuition language.
(iv) Mathematics HG = D or SG = B. Alternatively at least a pass mark of 60% in WTV164 or WTV194 or WTW184. If WKS114 or WTW114 is included in the learning programme at least a level 6 (70%) and at least a level 7 (80%) is respectively required for Mathematics.	(iv) Mathematics on level 5 (60%). Alternatively at least a pass mark in WTV164 or WTV194 or WTW184 is required. If WKS114 or WTW114 is included in the learning programme a level 6 (70%) and a level 7 (80%) is respectively required for Mathematics. Alternatively a pass mark of at least 70% in WTW164/WTV164 or at least 60% in WTW184 or a pass in WTW134 is required
(v) Both Biology and Physical Science will be required. **(This applies strictly as from 2015; in 2014 meritorious cases offering only one of Life Sciences or Physical Science at the appropriate level will still be considered.**)	(v) Both Life Sciences and Physical Science must be offered. **(This applies strictly as from 2015; in 2014 meritorious cases offering only one of Life Sciences or Physical Science at the appropriate level will still be considered.)**
(vi) Biology HG = D or SG = B and Physical Science HG = E or SG = C.	(vi) Life Sciences level 5 (60%) and Physical Science level 4 (50%). Alternatively, at least 60% is required in the modules CHE112, CHE132, CHE122 and CHE142.
(vii) Participation in the NBT tests for Language.	(vii) Participation in the NBT tests for Language.
(viii) Participation in the NBT tests for Mathematics.	(viii) Participation in the NBT tests for Mathematics.

f) If students wish to transfer from other higher education institutions or another programme before they have completed their undergraduate studies must provide evidence of their academic progress, in the form of an academic record. 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

Table 5: Specific entrance requirements

(a) Advanced Diploma in Sustainable Agriculture and Rural Development	(b) University Preparation Programme (Natural Sciences and Mathematics)
• 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 levels.	• Requires a National Senior Certificate 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%).

Table 5: Specific entrance requirements

(c) University Preparation Programme (Agricultural Sciences) • National Senior Certificate 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 6 (70%) OR Mathematics with a minimum achievement level 3 (30%).	**(d) BAgric extended four-year** • Requirement (i) in Table 4 above. • A minimum AP of 25. • Official tuition language with a minimum achievement level 4 (50%). • Mathematics on performance level 2(30%) or Mathematical Literacy at least at level 6 (70%) if the AP score is above 26.
(e) BSc extended four-year (Chemistry and Mathematics) • Requirement (i) in table 4 above. • A minimum AP of 25. • Official tuition language with a minimum achievement level 4 (50%). • Mathematics on performance level 3 (40%). • Life Sciences at performance level 4 (50%) or Physical Science on performance level 3 (40%).	**(f) BSc extended four-year (Mathematics and Finances)** • Requirement (i) in table 4 above. • A minimum AP of 25. • Official tuition language with a minimum achievement level 4 (50%). • Mathematics at performance level 3 (40%).
(g) BSc Agric extended five year • Requirement (i) in table 4 above. • A minimum AP of 25 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 4 (50%) or Physical Science at performance level 3 (40%).	**(h) BAgric** • 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 33 or above.
(i) BSc Actuarial Science (4336) • Requirements (i), (iii-(iv), (vii) & (viii) in table 4 above. • A minimum AP of 34. • Mathematics at performance level 7 (80%).	**(j) BSc in Agricultural Sciences** • Requirements (i)-(iv), (vii) & (viii) in table 4 above. • Either Life Sciences, Agricultural Sciences or Physical Science . (As from 2016 Physical Science with either Life Sciences or Agricultural Sciences will be required). • Performance level 5 (60%) for Life Sciences or Agricultural Sciences and Performance level 4 (50%) for Physical Science.
(k) BSc in Agricultural Economics • Requirements (i)-(iv), (vii) & (viii) in table 4 above.	**(l) B Consumer Sciences** • Requirements (i)-(iii) & (vii) in table 4 above.

Table 5: Specific entrance requirements

(m) BArchitecture (BArchStud)

- A selection process takes place before admission. A maximum number of 55 students are admitted.
- A student registered for a programme at the UFS and wishing to change to the BArchStud-programme, must contact the department on or before 31 May of 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 will be communicated in writing by the department to the applicants, after the closing date for applications on 31 May of the year before the intended registration.
- Applicants have to pass a preliminary selection process.
- Applicants who passed the preliminary selection will be invited to a selection interview at which a portfolio of creative work has to be presented.
- Qualifying applicants must write aptitude and NBT test and submit the results to the department before the selection interview.
- Students will be notified of the outcome not later than the end of November of the year before intended registration.

(n) BSc in Chemical and Physical Science

- Requirements (i)-(iv), (vii) & (viii) in table 4 above.
- Physical Science at performance level 5 (60%) or Physical Science HG = E or SG = C.
- If Biological subjects is the second major Life Sciences at performance level 5(60%) is required.
- Students intending to offer Chemistry as a major must take note that In the second year a maximum of 80 and in the third year a maximum of 60 students will be admitted to the second year owing to laboratory constraints. These students will be admitted based on academic excellence.
- Students intending to register for engineering subjects must take note that limited space is available.

(o) BSc 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 2013.
- 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.

(p) BSc Geography

- Requirements (i)-(iv) and (vii)& (viii) in table 4 above.
- Physical Science at performance level 4(50%) to register for the Geoinformatics 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 all Statistics programmes.

(q) BSc in Geology

- A selection process takes place before admission. In the first year a maximum number of 80 students will be admitted to GLG114 owing to laboratory constraints. In the second and third year a maximum number of 60 students will be admit due to laboratory constraints. These students will be admitted based on academic excellence. Students failing GLG114 or GLG124 and 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 at performance level 5 (60%) [this apply as from 2015 in 2014 students with performance level 4 will be consider on merit] or Physical Science HG = E or SG = C. Alternatively, at least 65% is required in the modules CHE112, CHE132, CHE122 and CHE142, and in WTV164/194.
- An AP of 34 or higher is highly recommended.

(r) BSc Information Technology

- Requirements (i)-(iii) and (vii)& (viii) in table 4 above.
- Mathematics at performance level 4 (50%) in order to register for WTW174.
- Mathematics at performance level 5 (60%) to register for WTW134.
- Mathematics at performance level 6 (70%) to register for WKS114.
- Mathematics at performance level 7 (80%) in order to register WTW114. Alternatively (senior students) a pass mark WTW164/WTV164 or in WTW184.
- If Chemistry or Physics is the second major, Physical Science at performance level 4 (50%) is required.

Table 5: Specific entrance requirements

(s) BSc in Mathematical Sciences	(t) BSc in Quantity Surveying and BSc in Construction Management
• Requirements (i)-(iv), (vii) & (viii) in table 4 above. • Mathematics at performance level 7 (80%). Alternatively (senior students) a mark of at least 70% in WTW164/WTV164 or at least 60% in WTW184 (Main Campus) or 50% in WTW134 is required. • If Agrometeorology,or Chemistry or Physics is the second major Physical Science a performance level of 4 (50%) is required. • If enrolling for Applied Statistics degrees only level 5(60%) for Mathematics is a required	• A selection process takes place before admission. A maximum number of 80 students is admitted owing to laboratory constraints. • Application must be submitted before or on 31 July each year of the year before intended registration. • Requirements (i), (iii)-(iv), , (vii) & (viii) in table 4 above. • A minimum AP of 34. One of the following at performance level 4 (50%): Physical Science, Economics, Business Studies or Accounting, or 70% in WTV164/WTV194 and an average of at least 65% for all modules in the first year of the UPP or BSc Extended programme and at least 70% in both WTV154 and WTV164.

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

a) Students who score below 65% in the language NBT test must register for the language module ALN108 or AFA108.
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 subjects 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, Honours, Master's, and Doctoral degrees.

The following Postgraduate Diploma is presented: Postgraduate Diploma in Disaster Management.

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

- Bachelor Honours is offered in Architecture, Agricultural Management, Consumer Sciences, Spatial Planning.
- Bachelor of Science Honours degree is awarded in the following fields of study: Actuarial Sciences, Agricultural Economics, Agrometeorology, Astrophysics, Behavioural Genetics, Biochemistry, Botany (QwaQwa), Chemistry (QwaQwa), Computer Information Systems, Consumer Science, Construction Management, Entomology, Environmental Geography (QwaQwa), Environmental Geology, Environmental Rehabilitation, 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 (QwaQwa), Plant Breeding, Plant Health Ecology, Plant Pathology, Polymer Science (only QwaQwa) Soil Science, Statistics, Quantity Surveying, and Zoology (QwaQwa).

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

- Master's Degrees is offered in the following fields of study: Architecture, Architecture (Professional), Agricultural Management, Consumer Science, Disaster Management, Environmental Management, Human Settlements

(MLHD), Irrigation Management, Mineral Resource Throughput Management (MRTM), Sustainable Agriculture, Land and Property Development, Urban and Regional Planning (Professional) and Urban and Regional Planning (Research), Wildlife Management

- Master's of Science is awarded in the following fields of study: Agricultural Economics, Actuarial Sciences, Agrometeorology, Applied Mathematics, Astronomy, Behavioural Genetics, Biochemistry, Botany, Chemistry, Computer Information Systems, Construction Management, Consumer Science, Entomology, Environmental Geology, Environmental Rehabilitation, Food Science, Forensic Genetics, Forensic Sciences, Forensic Sciences Interdisciplinary, Genetics, Geochemistry, Geography, Geography and Environmental Science, Geohydrology, Geology, Grassland Science, Limnology, Mathematics, Mathematical Statistics, Mathematical Statistics and Risk Analysis, Microbial Biotechnology, Microbiology, Nano Science Physics, Polymer Science, Plant Breeding, Plant Health Ecology, Plant Pathology, Soil Science, Statistics, Quantity Surveying, Zoology.
- Master's of Science in Agriculture are offered in the following fields of study: Agrometeorology, Agronomy, Animal Sciences, Food Science, Grassland Science, Plant Breeding, Plant Pathology, Soil Science.

PhD degrees are offered in the following fields of study:

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

NAS3.1 – Admission requirements for the Postgraduate Diploma

In addition to the requirements contained in General Regulation A32 (a), a candidate has to comply with the additional faculty requirements:

(a) A applicant have at least a minimum three-year degree (at NQF 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.

1. Postgraduate Diploma in Disaster Management	• Admission depends on previously acquired knowledge and experience in the disaster management field.

NAS3.2 – Admission requirements for Bachelor Honours Degrees

In addition to the requirements contained in General Regulation A21 (a), a candidate has to comply with the additional faculty requirements:

(a) A Bachelor degree or equivalent NQF Level 7 qualification including one of the following: BArchStud, BAgric, B Consumer Sciences, BSc, BScIT, BScQS or BScConst and the following additional requirements per discipline.
(b) A deserving applicant in possession of a BSc degree with the required major subjects 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 BScAgric Hons, 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.
(d) Applicants should apply for admission to the Honours degree on the prescribed form. These forms should be completed and handed to the Academic Departmental Head. 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.

NAS3.3 – Specific programme requirements for Honours degrees

2. Architecture	• Application must reach the UFS before 31 May. • A selection process takes place before admission. A maximum of 45 students will be admitted. • All information pertaining to the selection process will be communicated in writing by the department to the applicants, after the closing date for applications on 31 May. • To be eligible for BArchStud Hons selection, a candidate must have obtained a BArchStud 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, BOW306, OGT304 and TAR304, as well as a subminimum of 60% for ONW300 or its equivalent. • Candidates who do not comply with the above prerequisite must either repeat (only once) selected module(s) or work in an architect's office for a year in order to be eligible for BArchStud Hons selection the following year. • Candidates must (at the discretion of the Academic Departmental Head) attend a personal interview, present a portfolio and provide verified academic records. The final discretion on whether the candidate is regarded as being ready for the programme will rest with the selection panel. • Language proficiency in the medium of instruction that students want to do the programme (English or Afrikaans) will be tested as part of selection.
3. Actuarial Science	• A candidate must have a BSc or BCom degree in Actuarial Science, as well as being qualified for at least four exemptions in the subjects of the Faculty / Institute of Actuaries, of which at least one exemption has to be for CT1, CT4 or CT6.
4. Agricultural Economics	• A minimum of 60% in Agricultural Economics at third year level.
5. Agriculture	**Agricultural Management, Irrigation Management, Wildlife Management** • A minimum of 60% in agricultural management and/or agricultural 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 courses.
6. Agrometeorology	• Agrometeorology at third-year level.
7. Behavioural Genetics (Human Genetics)	• Admission into BSc Hons 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 level is required. Selection will take place during August each year.
8. Biochemistry	• At least 64 credits in Biochemistry at third year level. An average of 65% in undergraduate Biochemistry modules. Admission is subject to a selection process.
9. Botany	• A minimum of 60% in Botany at third-year level and in consultation with the Academic Departmental Head.
10. Chemistry	• To be considered for BSc Hons in Chemistry, a student must have a BSc degree. Other prerequisites include WTW114 or WTW134, plus WTW124 or WTW144. An average mark of 60% in CEM314, CEM334, CEM324 and CEM344
11. Computer Information Systems	• A minimum average of 60% is required for the four third-year Computer Science modules (RIS314, RIS334, RIS324 and RIS344) or their equivalents. In exceptional cases admission may be allowed in consultation with the programme director or Academic Departmental Head..
12. Consumer Sciences	• Consumer Science or relevant NQF at Level 7 at third-year level with at least 60%.
13. Construction Management	• Students who have passed the BSc Construction Management degree, or have obtained an approved relevant qualification of equal value with an average of at least 65%, may register for the BSc Construction Management Honours degree, subject to selection and a special curriculum arising from the qualification obtained.
14. Entomology	• Entomology at third-year level.
15. Environmental Rehabilitation	• A minimum of 60% in relevant modules at third-year level and in consultation with the Academic Departmental Head.

16. Food Science	• Food Science at third-year level. An average of 65% in undergraduate Food Science modules. Admission is subject to a selection process.
17. Forensic Sciences	• Admission into BSc Hon in Forensic Sciences is subject to selection. A minimum of 60% in relevant modules at third-year level or equivalent modules are required. Selection will take place at the end of August each year.
18. Genetics	• Admission into BSc Hon in Genetics is subject to selection. A minimum of 60% in Genetics at third-year level or equivalent modules are required. Selection will take place during August of the same year.
19. Geography	• A candidate must achieve an average pass mark of 60% for all Geography modules (64 credits) at third-year level to be admitted to the honours degree. In exceptional cases the department may grant admission by virtue of an oral or written evaluation in which the candidate displays relevant knowledge of the theory and principles of the subject. Depending on a candidate's academic background, additional modules may be prescribed by the department. Proof of computer literacy is a prerequisite. A candidate's skills in English will be assessed and if the required standard is not met, additional modules (Proficient performance in the TALPS Test is required) will be prescribed. For admission to the examination, a semester mark or year mark of at least 50% is required for each module.
20. Geology, Geochemistry and Environmental Geology	• For admission to the honours degree in Geology, Geochemistry or Environmental Geology a candidate must achieve a combined average pass mark of 60% in four Geology modules (64 credits) at third-year level (two modules in the first semester and two in the second semester, including GLG314 and GLG324 or equivalent modules). Students must complete all required NQF 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 honours programme. However the Geochemistry and the Environmental Geology programme can only accommodate a maximum of five students each. Proficient performance in the TALPS Test is required.
21. Geoinformatics	• Geography at third-year 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. B.Sc in Geography with an average of 60% of 3 year modules.
22. Geohydrology	• A degree in Engineering or a BSc or a BScAgric 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. The candidate compiles his/her curriculum in consultation with the Director of the Institute of Groundwater Studies.
23. Grassland Science	• Grassland Science at third-year level.
24. Home Economics	• BSc Home Economics, B Consumer Science or an equivalent qualification.
25. Limnology	• A BSc or BScAgric degree with at least one of the following as major: Biochemistry, Botany, Chemistry,, Entomology, Mathematics, Microbiology, Physics, Soil Science, Zoology.
26. Mathematics and Applied Mathematics	• At least four Mathematics and Applied Mathematics or equivalent modules, at third-year level, completed with an average mark of 60%. Students may be required to take additional undergraduate courses based on their academic background. The Academic Departmental Head grants admission and consults on the compilation of the curriculum. Students will do an oral presentation for their final assessment. Proficient performance in the TAPLS Test is required.
27. Mathematical Statistics	• A minimum average pass mark of 60% in WKS314, WKS324, WKS334 and WKS344.
28. Microbiology	• At least 64 credits in Microbiology at third-year level. An average of 65% in undergraduate Microbiology modules. These include VWS344 and BOC314. Admission is subject to a selection process.
29. Physics	• An average mark of 60% in FSK314, FSK332, FSK352, FSK324, FSK342 and FSK362. The Academic Departmental Head may grant permission for admission to the 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.
30. Plant Breeding	• A minimum of 60% average for all the Plant Breeding modules on third-year level is required.
31. Plant Health Ecology	• Plant Health or equivalent modules at third-year level.
32. Plant Pathology	• An average of 60% for the third year in a BSc or BSc Agric degree with at least one of the following as major: Microbiology, Plant Sciences, Plant Pathology or equivalent NQF level 7 modules. Students may be required to take additional undergraduate courses based on their academic background.
33. Polymer Science	• A minimum of 60% average for all the Chemistry modules on third-year level is required.
34. Soil Science	• Soil Science at third-year level.

35. Statistics	• WTW114 and WTW124, as well as a minimum average mark of 60% in STK216, STK226, STK316 and STK326.
36. Spatial Planning	• A person may be considered for selection and admitted to the programme in Spatial Planning if he/she is in possession of an appropriate qualification at NQF Level 7 (SAQA certificate must accompany the qualification when requested), as approved by the Academic Departmental Head and has an average of at least 60% in previous qualifications for final year modules. • 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. • 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, or shall be determined by the Recognition of Prior Learning office. Supplementary courses, as determined by the Head of the Department, may be required; or a student may be expected to do an extra year of study in order to complete the programme. • Proficient language skills in the medium of instruction (English or Afrikaans) will be tested as part of selection. An acceptable module in the use of language as determined by the Academic Departmental Head, will have to be taken and passed at the students' own cost should he/she not comply with the required standard.
37. Quantity Surveying	• Students who have passed the BSc Quantity Surveying degree, or have obtained an approved relevant qualification of equal value with an average of at least 65%, may register for the BSc Quantity Surveying Honours. Subject to selection and a special curriculum arising from the qualification obtained.
38. Wildlife	• Grassland Science at third-year level or equivalent modules and in consultation with the Academic Departmental Head..
39. Zoology	• Zoology at third-year level.

NAS3.4 – Admission requirements for Master's Degrees

In addition to the requirements contained in General Regulation A46(a), a candidate 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 Academic Departmental Head. at the beginning of the second semester. Selection will take place when the results are ready. The Master's courses 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 Honours degree or equivalent NQF 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 Head of the Department, in meritorious cases, recommend that some concessions be made in respect of the requirements.

NAS3.5 – Specific programme requirements for Master's Degree

(a) Master of Architecture (Professional)	• Application must reach the UFS before 31 May. • A selection process takes place before admission. A maximum number of 45 candidates will be admitted. • All information pertaining to the selection process will be communicated in writing by the department to the applicants, after the closing date for applications on 31 May. • To be eligible for BArchStud Hons selection a candidate must have obtained a BArchStud 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: BOW608, OGT606 and TAR604, as well as a subminimum of 60% for ONW600 or its equivalent. • Candidates who do not comply with the above prerequisite must either repeat (only once) selected module(s) or work in an architect's office for a year in order to be eligible for BArchStud Hons selection the following year. • Candidates must (at the discretion of the Academic Department Head) attend a personal interview, present a portfolio and provide verified academic records. • Qualifying candidates must submit a research proposal as determined and communicated by the Academic Department Head. The final discretion whether the candidate is regarded as ready for the programme will rest with the selection panel.

(b)	**Master of Architecture**	• Apart from the general regulations the following is applicable: • Candidates must have obtained EITHER the advanced postgraduate professional qualification, BArch or an equivalent thereof OR the BArchStud Hons or its equivalent. • Candidates who are in possession of the BArch must prove that a Design Dissertation formed part of the requirements for the conferment of such degree. • Candidates who are in possession of the BArchStud Hons must have obtained a minimum of 60% in THREE of the following modules or their equivalent: ONW600, BOW608, OGT606 and TAR604. • Qualifying candidates must submit a dissertation proposal as determined and communicated by the Academic Department Head. The final discretion whether the candidate is regarded as being ready for the programme will be the selection panel's.
(c)	**Master of Agriculture**	Apart from the general regulations, the following apply: • Students must convince the specific Academic Department Head that he/she has sufficient knowledge of the subject to be admitted to the programme.
(d)	**Master of Consumer Sciences**	• No additional requirements.
(e)	**Master of Disaster Management**	Apart from the general regulations the following is applicable: • A candidate must in order to be admitted to this Master's programme have: o a disaster management Honours degree or equivalent from any other institution (Minimum 120 Credits, NQF Exit Level 8) with an average pass mark of 60%, OR o a disaster management postgraduate diploma from the UFS or any other institution(Minimum 120 Credits, NQF Exit Level 8) with an average pass mark of 60%. • A candidate 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. • A candidate must submit a research proposal together with the application. **NB: An Executive Committee of the UFS will assess the extent, nature and suitability of experience or preparatory studies mentioned above.**
(f)	**Master of Environmental Management, course code 700**	Apart from the general regulations the following is applicable: • A three-year degree on (NQF Level 6) or an equivalent qualification with appropriate experience will be considered by the University, for admission. Depending on the academic background of the candidate, additional modules may be prescribed. • Where a candidate with merit does not comply fully with the admission requirements, the Dean, in conjunction with the Faculty Management Committee, may recommend that the requirements be partially waived. • As only a limited number of candidates 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.
(g)	**Master of Human Settlements (MLHD)**	Apart from the general regulations the following is applicable: • A candidate 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 an Honours degree plus applicable studies, and/or practical experience. • A candidate must submit a research proposal together with the application.
(h)	**Master of Land and Property Development Management (MProp)**	Apart from the general regulations the following is applicable: • Candidates must, for a period of two years that may coincide with the period mentioned below, have worked under the supervision of the Academic Departmental Head, while they were registered as students for the degree of MSc(Construction Management) during the same period. A candidate must, in the period of at least two years after obtaining an approved Bachelor of Science Honours degree with at least an average of 65% within an approved discipline, have been actively involved in the theory and practice of the property sciences or relevant activities. Only 10 students will be allowed to register annually.

(i)	**Master of Mineral Resource Throughput Management**	Apart from the general regulations the following is applicable: • An Honours degree or an equivalent qualification (NQF Level 8) with 2 – 4 years relevant mining experience. Depending on the academic background of the candidate, additional modules may be prescribed. • Where a candidate with merit does not fully comply with the admission requirements, the RPL process may be followed or the Dean, in conjunction with the course co-ordinator, may recommend that the requirements be waived, with the final decision taken by the Executive Committee of Senate. • As only a limited number of candidates can be accepted for the theoretical component, an application form available from the Department of Geology must be submitted on or before 30 September of the preceding year, after which selection will take place. Proficient performance in the TALPS Test is required.
(j)	**Master of Sustainable Agriculture**	Apart from the general regulations the following is applicable: • A candidate who wishes to enrol for the degree must have one of the following: - an applicable three-year degree plus applicable practical experience and/or applicable preparatory study, OR - 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** **This qualification will only be presented to groups of students on request of their employees and in a block session format.**
(k)	**Master of Urban And Regional Planning (Research)**	Apart from the general regulations the following is applicable: • A candidate 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 an Honours degree and applicable studies, and/or practical experience. • A candidate must submit a research proposal together with the application.
(l)	**Master of Urban and Regional Planning (Professional) MURP.**	Apart from the general regulations 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). • Bachelor in Land and Property Development Management (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. If the Dean, or be determined by the Recognition of prior Learning office • Supplementary courses, as determined by the Head of the Department, 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. • A candidate must sumbit a research proposal together with the application.
(m)	**Master of Sciences**	Apart from the general regulations the following is applicable to the different disciplines: • **Geohydrology** - An applicable Honours degree with a minimum average pass mark of 65% is required. Additional coursework may be prescribed where candidates do not have the required background in Geohydrology. In special cases admission may be allowed in consultation with the Director of IGS. • **Limnology** - Candidates in possession of a BSc Hons degree in Limnology are admitted to this course for which a dissertation (LIM700 – 120 credits) is required, based on an approved research project. Persons in possession of a BSc Hons or BScAgric Hons degree in a related field of study must, in addition to the dissertation, successfully complete theoretical work and assignments (4) in Limnology in order to gain Honours status in Limnology before the dissertation is handed in for examination. The Limnology Committee will appoint supervisors and decide in which department a candidate will register. For further information: 051 401 2863. • **Mathematics or Applied Mathematics** - For admission to a Master's degree in Mathematics or Applied Mathematics, the candidate needs Mathematics or Applied Mathematics, or the equivalent at Honours level. Candidates may be required to take additional modules if their relevant background is insufficient. Proficient performance in the TALPS Test is required. • **Mathematical Statistics** - An appropriate Honours degree and mathematical background is required. Admission is subject to the approval of the Academic Departmental Head. • **Computer Information Systems** - An applicable Honours degree with a minimum average pass mark of 60% is required. • **Geology** - Proficient performance in the TALPS Test is required.

(n)	**Master of Science in Agriculture**	Apart from the general regulations the following is applicable: • The candidates must convince the head of the department/centre concerned that he/she has adequate knowledge of the subject to justify admission to the study. • In the case of Animal and Grassland Sciences, 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.
(o)	**Master of Science In Consumer Sciences**	• No additional requirements.
(p)	**Master of Science In Construction Management**	Apart from the general regulations the following is applicable: • Candidates must, for a period of two years (that may coincide with the period mentioned below), have worked under the supervision of the Academic Departmental Head, while they were registered as students for the degree of MSc(Construction Management) during the same period. • A candidate must, in the period of at least two years after obtaining an approved Bachelor of Science Honours degree with at least an average of 65%, have been actively involved in the theory and practice of Construction Management.
(q)	**Master of Science In Quantity Surveying**	Apart from the general regulations the following is applicable: • Candidates must have worked under the supervision of the Academic Departmental Head for a period of two years (that may coincide with the period mentioned below) while they were registered as students for the degree of MSc (QS). • Candidates must, in the period of at least two years after obtaining an approved Bachelor of Science Honours degree with at least an average of 65%, have practised the theory and have been actively involved in Quantity Surveying.

NAS3.6 – Transfer between higher degree studies

- In consultation with the supervisor(s) and on the recommendation of the supervisor(s), the Academic Departmental Head. and the Research Committee of the faculty, a candidate who has been admitted for the Master's degree in terms of Reg. A80 may, after a study and registration period of at least one year, apply to be allowed to continue his/her studies at the PhD degree level. Following admission to the PhD, at least two years must elapse before the PhD degree can be conferred. The period of study for the degree will therefore be at least three years.

- The MSc degree may be conferred upon a candidate if:
  - the candidate withdraws his candidature for the PhD degree, or
  - his candidature for the PhD degree is cancelled, or
  - the candidate does not meet the requirements for the Doctoral degree

NAS3.7 – Admission requirements for a doctoral degree

In addition to the admission requirements contained in General Regulation A71(a), a candidate 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 candidate 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 candidate must have a Master's degree or equivalent NQF Level 9 qualification. Master's degrees include: MArch, MArchProf, MSc, MAgric, MScAgric, MEM, MSA, MScConstr, MScQS, MUPR, MMRTM or MDisasterM. The following additional requirements for specifics disciplines apply:

NAS3.8 – Specific programme requirements for doctoral degrees

(a) Disaster Management	• In order to be admitted to the PhD, a candidate 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. A candidate's thesis is written under the guidance of a promoter, and the thesis must demonstrate that the candidate is able to conduct independent scientific research. The Management Committee of DiMTEC will assign promoters and decide in which department a candidate should register.
(b) Limnology	• In order to be admitted to the PhD, a candidate must be in possession of an MSc in Limnology. Candidates in possession of an MSc degree in a related field of study will, in addition to the dissertation, have to complete theoretical work and assignments (4) in Limnology before the thesis can be submitted for examination. Two assignments shall take the form of presentations, and an oral examination takes place. • The Limnology Committee will appoint supervisors and decide in which department a candidate should register.
(c) Environmental Management	• In order to comply with the admission requirements, a candidate must possess a MEM degree before registering for the PhD degree. Individuals holding another Master's degree may be considered for admission. In such instances the Management Committee of the Centre for Environmental Management may supplement the thesis with assignments, taken from the MOB700 course, which must be completed prior to the thesis being submitted for examination. The Management Committee of the Centre for Environmental Management will assign promoters and decide in which department a candidate should register.
(d) Microbial Biotechnology	• A candidate must be in possession of a Master's degree in Microbiology, Biochemistry, Food Science, Microbial Biotechnology or related disciplines. Candidates in possession of a Master's degree in related subjects (e.g. Botany, Zoology, Chemistry, Chemical Engineering) can be requested by the Microbial Biotechnology Committee to complete additional theoretical work, work assignments, and/ or modules before the thesis is submitted for examination.
e) Geology	• Proficient performance in the TALPS Test is required

NAS4 – Progress requirements

Regulation A8(c) 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 BScAgric and BSc Extended 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 Admissions 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 (12) modules in their three- or 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 regulation, the student can be deregistered even if the residential period has not been reached.
j) Students who do not comply with , 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.

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 under module contents p.39.
(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 4 or Computer Application Technology (CAT) at performance level 5 are exempted from BRS111/BRC111.
(d) For some modules the 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. (WTW114), if WTW114 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 GLG242, the prerequisites are 55% average for GLG114 and GLG124 and the co-requisite with GLG244.

NAS6 – Students from other faculties

(a) Students from other faculties who register for subjects in the Faculty of Natural and Agricultural Sciences must comply with the minimum regulation requirements, as set out in NAS2.1 and NAS2.2 and with the prerequisite for specific modules as indicated in the module content on p.39.

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, Information Technology and Consumer Sciences fields of interest for BSc degrees; or Soil Crop and Climate, Animal Wildlife and Grassland, Agricultural Economics, or Food Sciences for one of BScAgric degrees; or Crop Production, or Animal Production fields of interest 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 exchange 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 interests or degrees within the faculty at the end of their first year of study. If a student changes

from one field of interest to another higher studies must be completed in a maximum of five or six years, depending on the field of interest.

b) Students can change within fields of interests 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 Degrees**
If a student want endorsement with **two majors,** at least 60 credits per major discipline at NQF Level 7 is required.

(b) **BArchStud, BAgric, B Consumer Sciences, BSc, BScQS or BScConst**
A total of at least 360 credits, with a maximum of 96 credits at NQF Level 5 and at least 120 credits at Level 7 must be obtained over three years. At least 60 credits must be from one discipline and at NQF Level 7.

(c) **BSc Extended Programme (four years):**
A total of at least 498 credits, of at least 128 credits must be developmental modules, a maximum of 112 credits at NQF Level 5 and at least 120 credits at NQF Level 7 must be obtained over four study years.

(d) **BScAgric, BSc Consumer Sciences (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 Level 8 for the degree must be obtained over four years. At least 60 credits must be from the minor discipline at NQF Level 7.

NAS7.3 – Changing from BAgric to BScAgric

(a) A student who has registered for the BAgric degree can change to a suitable learning programme in the BScAgric degree in consultation with Academic Student Services and the Programme Director of Agriculture. The student must have passed the compulsory first academic year of the BAgric degree with an average mark of at least 75%. In addition, compulsory first-year modules such as WTW134, CEM114 and BMT124 and other required modules to comply with the minimum prerequisites for professional registration (SACNASP).

NAS8 – Assessment examination and promotion

NAS8.1 – Examination and promotion system

In addition to the requirements contained in General Regulation A14-27, a candidate 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 module contents starting on p.39. Students who obtain a semester for 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) For the duration of the examinations, see the module contents starting on p.39.

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

NAS8.2 – Evaluation for Departments of Architecture, Quantity Surveying and Construction Management, and Urban and Regional Planning

(a) For most the modules presented by the Department of Architecture, Quantity Surveying and Construction Management evaluation 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 or Quantity Surveying/Construction Management will be subject to the evaluation procedure of those departments.

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

10. QUALIFICATIONS IN THE FACULTY AT THE QWAQWA CAMPUS

10.1 BACHELOR DEGREES AND DIPLOMAS		MINIMUM PERIOD OF STUDY	NQF LEVEL	ABBREVIATION
DIPLOMA				
	ACCESS PROGRAMMES AND EXTENDED PROGRAMMES			
3	University Preparation Programme: Natural and Agricultural Sciences for BSc	1 year	5	UPP Mathematics & Chemistry
6	Bachelor of Science Extended Programme (Mathematics and Chemistry)	4 years	7	BSc
BACHELOR'S DEGREES				
11	Bachelor of Science	3 years	7	BSc

10.2 POSTGRADUATE DIPLOMAS, BACHELOR, HONOURS, MASTER'S AND DOCTORAL DEGREES		MINIMUM PERIOD OF STUDY	NQF LEVEL	ABBREVIATION
POSTGRADUATE DIPLOMA				
BACHELOR HONOURS DEGREES				
5	Bachelor of Science Honours	1 year	8	BScHon
MASTER'S DEGREES				
10	Master of Science	2 years	9	MSc
DOCTORAL DEGREES				
2	Philosophiae Doctor	3 years	10	PhD
3	Doctor of Science	3 years	10	DSc

11. LEARNING PROGRAMMES & MODULES REQUIRED

11.1 LEARNING PROGRAMMES FOR ACCESS AND EXTENDED PROGRAMMES

Candidates 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 programmes. The programmes provide 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 address, 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.

11.1.1 UPP NATURAL SCIENCES 40001(4006) (CHEMISTRY/MATHEMATICS)

YEAR			Semester 1	Semester 2
1	**Academic Modules**	Mathematics Chemistry	WTV154 CHE 112 + CHE132	WTV164 CHE122 + CHE142
	Development Modules	Academic language course Computer Literacy Life-long Learning – Natural Sciences	ALN108 BRS131 VBN108	
	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 interest modules of the learning programme of his/her choice as set out in the Faculty's Yearbook. The student registers for the 40901-40985 learning programme code. 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 CHE122 students must have passed CHE112 and CHE132 • To register for CHE142 students must have passed CHE112 and WTV154 or level 4 for NCS Mathematics. • To register for WTV164 students must have passed WTV154. 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 CHE151, CHE161, and BRS141 as well as all the first year main fields of interest modules in the learning programme of choice as set out in the Faculty Yearbook. Students must take note of the following requirements: • To register for CHE151 students must have passed CHE122 + CHE142 as well as WTV164. • To register for CHE161, students must have passed CHE151. • The modules CHE112, CHE122, CHE132, CHE142, CHE151 and CHE161 must be passed to get recognition for CEM114 and CEM124/CEM144 (See BSc main fields of interest learning programmes).			
3	**Follow <u>second year</u> learning programme of choice in the Faculty Yearbook.** Students must take note of the following requirement: • Students must have pass CHE151, CHE161, ALC208 and BRS141 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 Yearbook.**			

11.1.2 BSc FOUR-YEAR EXTENDED PROGRAMME 40990

		Semester 1	Semester 2
1	Mathematics Chemistry	WTV154 OR CHE 112 + CHE132	WTV164 CHE122 + CHE142
	Academic language course Computer Literacy Life-long Learning – Natural Sciences	ALN108 BRS131 VBN108	
	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 interest modules of the learning programme of his/her choice as set out in the Faculty's Yearbook. The student registers for the 40901-40985) learning programme code. Students must take note of the following requirements: • Students must pass at least two academic modules in the June examination to continue their studies in the second semester • To register for CHE122 students must have passed CHE112 and CHE132 • To register for CHE142 students must have passed CHE112 and WTV154 or level 4 for NCS Mathematics. • To register for WTV164 students must have passed WTV154. 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 CHE151, CHE161, and BRS141 as well as all the first year main fields of interest modules in the learning programme of choice as set out in the Faculty Yearbook. Students must take note of the following requirements:** • To register for CHE151 students must have passed CHE122 + CHE142 as well as WTV164. • To register for CHE161, students must have passed CHE151. • The modules CHE112, CHE122, CHE132, CHE142, CHE151 and CHE161 must be passed to get recognition for CEM114 and CEM124/CEM144. (See BSc main fields of interest learning programmes).		
3	**Follow <u>second year</u> learning programme of choice in the Faculty Yearbook. Students must take note of the following requirement:** Students must have pass CHE151, CHE161 and BRS141 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 Yearbook.**		

11.2 LEARNING PROGRAMMES FOR BACHELOR DEGREES

11.2.1 BACHELOR OF SCIENCE IN THE BIOLOGICAL SCIENCES 42065, 42765, 44965

LEARNING PROGRAMMES BIOLOGICAL SCIENCES FIELDS OF INTEREST 1

Learning programmes in the BIOLOGICAL FIELD OF INTEREST offer FOUR OPTIONS. Learning programmes consist of the combination of modules from the following disciplines: Botany, Entomology, Geography, Zoology and Life Sciences. A combination of Life Sciences and all third year modules from either Botany , Entomology or Zoology as the other major. Students include all the compulsory modules in row (C1, C2a, C2b, C3a, C3b) of each of the selected disciplines for all three study years. Students need to SELECT enough elective modules per semester to obtain at least a total of 120 credits for each study year.

DISCIPLINE	BOTANY	ENTOMOLOGY	LIFE SCIENCES	ZOOLOGY	BOTANY	ENTOMOLOGY	LIFE SCIENCES	ZOOLOGY
OLD CODE	**4302**			**4303**	**4302**			**4303**
DISCIPLINE	42065	42765	46565	44965	42065	42765	46565	44965
YEAR	**FIRST**				**FIRST**			
SEMESTER	**FIRST**				**SECOND**			
COMPULSORY C1	BIOL1514 CEM112 CEM132 CHE151 **ONE OF:** WTW114 WTW134	BIOL1514 CEM112 CEM132 CHE151 **ONE OF:** WTW114 WTW134	BIOL1514 CEM112 CEM132 CHE151 **ONE OF:** WTW114 WTW134	BIOL1514 CEM112 CEM132 CHE151 **ONE OF:** WTW114 WTW134	BIOL1624 BIOL1644 CEM142 CEM122 CEM161	BIOL1624 BIOL1644 CEM142 CEM122 CEM161	BIOL1624 BIOL1644 CEM142 CEM122 CEM161	BIOL1624 BIOL1644 CEM142 CEM122 CEM161
ELECTIVES E1	FSK134 GEO114 STK114	FSK134 GEO114 STK114	FSK134 GEO114 STK114	FSK134 GEO114 STK114	FSK144 GEO124 WTW144	FSK144 GEO124 WTW144	FSK144 GEO124 WTW144	FSK144 GGY124 WTW144
REQUIRED ***if NBT < 65%**	BRS131 UFS101 *ALN108	BRS131 UFS101 *ALN108	BRS131 UFS101 *ALN108	BRS131 UFS101 *ALN108	BRS141	BRS141	BRS141	BRS141
YEAR	SECOND	SECOND		SECOND	SECOND	SECOND	SECOND	SECOND
SEMESTER	FIRST	FIRST		FIRST	SECOND	SECOND	SECOND	SECOND
COMPULSORY C2a	BIOL2614 BIOL2634 BIOL2654 BIOL2674	BIOL2614 BIOL2634 BIOL2654 BIOL2674	BIOL2614 BIOL2634 BIOL2654 BIOL2674	BIOL2614 BIOL2634 BIOL2654 BIOL2674	BIOL2644 BIOL2664 BIOL2684	BIOL2644 BIOL2664 BIOL2684	BIOL2644 BIOL2664 BIOL2684	BIOL2644 BIOL2664 BIOL2684
COMPULSORY C2b	**ONE OF:** GEO214 UNIR2614	UNIR2614	**ONE OF:** GEO214 UNIR2614	**ONE OF:** GEO214 UNIR2614	**ONE OF:** GEO224 UNIR2624 ZOOL2684	**ONE OF:** GEO224 UNIR2624 ZOOL2684	**ONE OF:** GEO224 UNIR2624 ZOOL2684	**ONE OF:** GEO224 UNIR2624 ZOOL2684
YEAR	**THIRD**	**THIRD**	**THIRD**	**THIRD**	THIRD	THIRD	THIRD	THIRD
SEMESTER	FIRST	FIRST	FIRST	FIRST	SECOND	SECOND	SECOND	SECOND
COMPULSORY C3a	BIOL3714	BIOL3714	BIOL3714	BIOL3714	BIOL3724	BIOL3724	BIOL3724	BIOL3724
COMPULSORY C3b	BOTA3734 BOTA3754	UNIR3714 UNIR3734		ZOOL3754	BOTA3744 BOTA3724	UNIR3724 UNIR3744		ZOOL3744 ZOOL3764
ELECTIVES	**ONE OF:** GEO314 UNIR314 UNIR334 ZOOL3754	**ONE OF:** BOTA3734 BOTA3754 GEO314 ZOOL3754	**THREE OF:** BOTA3734 BOTA3754 GEO314 UNIR3714 UNIR3734 ZOOL3754	**ONE OF:** BOTA3734 BOTA3754 GEO314 UNIR3714 UNIR3734	**TWO OF:** GEO324 UNIR3724 UNIR3744 ZOOL3744 ZOOL3764	**TWO OF:** BOTA3744 BOTA3724 GEO324 ZOOL3744 ZOOL3764	**FOUR OF:** BOTA3744 BOTA3724 GEO324 UNIR324 UNIR344 ZOOL3744 ZOOL3764	**ONE OF:** BOTA3744 BOTA3724 GEO324 UNIR3724 UNIR3744

11.2.2 BACHELOR OF SCIENCE IN THE CHEMICAL AND PHYSICAL SCIENCES 44020, 42120, 42127, 42149

LEARNING PROGRAMMES PHYSICAL AND CHEMICAL SCIENCES FIELDS OF INTEREST 1

Learning programmes in Chemical and Physical sciences offer TWO main options with either

- Physic and Chemistry as the two majors or
- Chemistry in combination Biological Subjects as the other majors.

Each student Includes all the compulsory modules (row C) for all three study years enough electives modules (row E) per semester to obtain at least 120 credits per year in the first year and the second year.

DISCIPLINE	**PHYSICS & CHEMISTRY**	**CHEMISTRY & BIOLOGICAL SUBJECTS**	**PHYSICS & CHEMISTRY**	**CHEMISTRY & BIOLOGICAL SUBJECTS**	**PHYSICS & CHEMISTRY**	**CHEMISTRY & BIOLOGICAL SUBJECTS**	**PHYSICS & CHEMISTRY**	**CHEMISTRY & BIOLOGICAL SUBJECTS**	**PHYSICS & CHEMISTRY**	**CHEMISTRY & BIOLOGICAL SUBJECTS**	**PHYSICS & CHEMISTRY**	**CHEMISTRY & BIOLOGICAL SUBJECTS**
	44021	**42120, 42127, 42149**	**44021**	**42120, 42127, 4214942149**	**44021**	**42120, 42127, 42149**	**44021**	**42120, 42127, 42149**	**44021**	**42120, 42127, 42149**	**44021**	**42120, 42127, 42149**
YEAR	**FIRST**	**FIRST**	**FIRST**	**FIRST**	**SECOND**	**SECOND**	**SECOND**	**SECOND**	**THIRD**	**THIRD**	**THIRD**	**THIRD**
SEMESTER	**FIRST**	**FIRST**	**SECOND**	**SECOND**	**FIRST**	**FIRST**	**SECOND**	**SECOND**	**FIRST**	**FIRST**	**SECOND**	**SECOND**
COMPULSORY C	FSK114 CHE112 CHE132 CHE151	CHE112 CHE132 CHE151 BIOL1514	FSK124 CHE122 CHE142 CHE161	CHE122 CHE142 CHE161 BIOL1644 BIOL1624	FSK214 FSK232 CEM232 CEM214	CEM232 CEM214 BIOL2614	FSK224 FSK242 CEM242 CEM224	CEM242 CEM224 BIOL2644	FSK314 FSK332 FSK352	CEM314 CEM334	FSK324 FSK342 FSK362 CEM324 CEM344	CEM324 CEM344
						ONE OF: BOTA2614 UNIR2614 BIOL2674		**ONE OF:** BOTA2244 UNIR2624 ZOOL2684		**ONE OF:** BOTA3734 +BOTA3754 UNIR3714 +UNIR3734 BIOL3714+ ZOOL3754		**ONE OF:** BOTA3744+ BOTA3724 UNIR3724+ UNIR3734 ZOOL3744+ BIOL3764
	WTW114 **OR** WTW134	WTW114 **OR** WTW134	WTW124 **OR** WTW144	WTW124 **OR** WTW144								
ELECTIVES E	GEO114 CSIQ1532 CSIQ1513 CSIQ1512	FSK114 GEO114 CSIQ1513 CSIQ1512	CSIQ1622 CSIQ1646		BIOL2634 BIOL2654 GEO214 WTW214	BIOL2634 BIOL2654 GEO214 WTW214		BIOL2644 BIOL2664 BIOL2684 GEO224 WTW224 WTW264				
REQUIRED ***if NBT < 65%**	BRS131 UFS101 *ALN108		BRS141									

11.2.3 LEARNING PROGRAMMES IN THE INFORMATION TECHNOLOGY STREAM 42321, 42340, 42301

LEARNING PROGRAMMES IN INFORMATION TECHNOLOGY BSc(IT)

Learning programmes in Information Technology offer THREE main options with either

- Information Technology and Chemistry as the majors
- Information Technology and Physics as the majors
- Information Technology and Business subjects as the majors

Students include all the compulsory modules in row C1 and C2 of each discipline for all three study years. They need to SELECT enough elective modules per semester to obtain at least 120 credits per year in the first year and the second year.

DISCIPLINE	**INFORMATION TECHNOLOGY & CHEMISTRY**	**INFORMATION TECHNOLOGY & PHYSICS**	**INFORMATION TECHNOLOGY & MANAGEMENT**	**INFORMATION TECHNOLOGY & CHEMISTRY**	**INFORMATION TECHNOLOGY & PHYSICS**	**INFORMATION TECHNOLOGY & MANAGEMENT**
OLD CODE	**4384**	**4384**	**4384**	**4384**	**4384**	**4384**
NEW CODE	42321	42340	42301	42321	42340	42301
EXT CODE						
YEAR	**FIRST**			**FIRST**		
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	CSIQ1532 CSIQ1513 CSIQ1512 CHE112+ CHE132+ CHE151	CSIQ1532 CSIQ1513 CSIQ1512 FSK114	CSIQ1532 CSIQ1513 CSIQ1512 ONE OF EHRM51305 EBUS51305 EBCS51405	CSIQ1646 CSIQ1622 CHE122+ CHE142+ CHE161	CSIQ1646 CSIQ1622	CSIQ1646 CSIQ1622 ONE OF: EIOP52305 or EBCS52405
COMPULSORY C2	**ONE OF:** WTW134 WTW114 STK114	**ONE OF:** WTW134 WTW114 STK114	**ONE OF:** WTW134 WTW114 STK114	**ONE OF:** WTW124 WTW144 STK124	**ONE OF:** WTW124 WTW144 STK124	**ONE OF:** STK124 WTW144
ELECTIVES	STK114	STK114		STK124	STK124	
REQUIRED ***if NBT < 65%**	UFS101 ALN108	UFS101 ALN108	UFS101 ALN108			
YEAR	**SECOND**			**SECOND**		
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	RIS234 RIS294 RIS204 CEM214 CEM232	RIS234 RIS294 RIS204 FSK214 FSK232	RIS234 RIS294 RIS204 EBUS61406	RIS243 RIS264 RIS224 CEM224 CEM242	RIS243 RIS264 RIS224 FSK224 FSK242	RIS243 RIS264 RIS224 EBUS62406
C2			**ONE OF:** ECAP61406 EECF61306			ELRM62406
ELECTIVE	RIS254	RIS254	RIS254	RIS242 RIS182	RIS242 RIS182	RIS242 RIS182
YEAR	**THIRD**			**THIRD**		
SEMESTER	**FIRST**			**SECOND**		
COMPULSORY C1	RIS334 RIS308 RIS314 CEM314 CEM334	RIS334 RIS308 RIS314 FSK314 FSK332 FSK352	RIS334 RIS308 RIS314 EBUS75407 EORG7140	RIS334 RIS314 CEM324 CEM344	RIS334 RIS314 FSK324 FSK342 FSK362	RIS334 RIS314 EBUS77407 EPFM72407

11.2.4 BACHELOR OF SCIENCE IN ENVIRONMENTAL GEOGRAPHY 43300

The learning programmes in Environmental Geography 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, modeling and presentation of information and expedites decision making.

Each student includes all the compulsory modules (rows C) for all three study years and choose modules as supportive electives (E) per semester to obtain at least 120 credits for each year of study.

YEAR	**FIRST**	**FIRST**	**SECOND**	**SECOND**	**THIRD**	**THIRD**
SEMESTER	**FIRST**	**SECOND**	**FIRST**	**SECOND**	**FIRST**	**SECOND**
COMPULSORY C	GEO114 BIOL1514 OBC134	GEO124 OBC144	GEO234 BIOL2674	GEO224 GIS224 BIOL2644	GEO334 BIOL3714	GEO324 GIS324
ELECTIVES	CSIQ1532 CSIQ1512 CSIQ1513 STK114	BIOL1624 BIOL1644 CSIQ1646 CSIQ1622 STK124	GEO214 BIOL2614 BIOL2634	OBC244 BOTA2624 BIOL2664	GEO314 BOTA3734 BOTA3754 ZOOL3754	BOTA3744 BOTA3724 ZOOL364 BIOL3724
REQUIRED ***if NBT < 65%**	BRS131 UFS101 *ALN108	BRS141				

11.3 BACHELOR OF SCIENCE HONOURS
HONOURS LEARNING PROGRAMMES 45018, 45019, 45027, 45039, 45049

Students register for all compulsory modules plus enough other to obtain at least 120 credits						
DISCIPLINE	**LIFE SCIENCES BOTANY**	**LIFE SCIENCES ENTOMOLOGY**	**LIFE SCIENCES ZOOLOGY**	**GEOGRAPHY**	**CHEMISTRY POLYMER SCIENCE**	**PHYSICS**
OLD CODE	**4511**	**4520**	**4516**	**4521**	**4530**	
NEW CODE	**450018**	**4500**	**4500**	**450033**	**450021**	**450040**
			FIRST SEMESTER			
COMPULSORY	BIOL6814 BIOL6834 BIOL6808	BIOL6814 BIOL6834 BIOL6808	BIOL6814 BIOL6834 BIOL6808	GEO616 GEO692 GGF626 GEO606 BIOL6814	CMP614 CMP634 CMP654 CMP674	FSK692
ELECTIVES	BOTA6814	UNIR6814	ZOOL6814 ZOOL6854	One 1 6 credit NQF8 module from any other discipline in the biological field of interest.		FSK601 FSK602 FSK603 FSK604 FSK605 FSK606 FSK607
			SECOND SEMESTER			
COMPULSORY	BIOL6824				CMP624 CMP644 CMP664 CMP684	
ELECTIVES	BOTA6824 BOTA6864		ZOOL6824 ZOOL6844			FSK608 FSK609 FSK610 FSK611 FSK612 FSK613 FSK614

11.4 MASTER OF SCIENCES 47119, 47140, 47133, 47149

These learning programmes aims at:

(a) providing the candidate 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 evaluation 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 candidate 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 are allocated for this degree. The candidate may do a research Masters programme with a full dissertation or a structured Masters programme depending on the discipline in which they want to register. In cases where an MSc degree consists only of a dissertation the programme code will start with 471 and in the case where the MSc degree consists of both course work and research the programme code will start with 472.

- If the full dissertation option is followed the candidate must do research on an approved topic for at least two semesters, in consultation with the Departmental Chairperson, in preparation for a dissertation that shall be submitted as the only requirement for the degree. Candidates may be required to present at least one seminar/research report in each year in accordance with departmental rules.

- If the structured Master programme is all prescribed modules, a compulsory research essay must be completed. The topic for the research must be determined in consultation with the Departmental Chairperson. Candidates may be required to present at least one seminar/ research report.

RESEARCH MASTERS								
YEAR 1 + 2								
Botany	47119	PLK700	**Polymer Sciences**	47120	CEM700	**Zoology**	47149	DRK700
Physics	47140	FSK700	**Environmental Geography**	47133	GEO700			

11.5 DOCTOR OF SCIENCES DEGREES (NQF LEVEL 10)

11.5.1 PHILOSOPHIAE DOCTOR (PhD) 49119, 49140, 49149

These learning programmes aims at:
(a) providing the candidate with the opportunity to prove her/his ability to plan and do research independently and to report the results;
(b) enabling the candidate to make an original contribution to the discipline.
The minimum term of this study is 3 years and a total of 360 credits are allocated for this degree. The candidate must do research for at least four semesters on an approved topic selected in consultation with the Departmental Chairperson in preparation to complete the thesis (360 credits). The degree study therefore lasts three years. The candidate will present at least one seminar/research report in each year of study in accordance with departmental regulations.

Candidates can register for a PhD with specialisation in one of the following area:

Botany	49119	PLK900	**Polymer Sciences**	47120	CEM900	**Zoology**	49149	DRK900
Physics	49140	FSK900	**Environmental Geography**	47133	GEO900			

12. MODULE CONTENT FOR UNDERGRADUATE MODULES ALPHABETICALLY PER INTEREST FIELD AND DEPARTMENT

ABBREVIATION AND NUMBERING SYSTEM

Each module of the subject is represented by a three-digit module code, in which the year of study and semester of presentation (unless otherwise stated) are combined. In addition, the credit value, NQF level, CESM code, prerequisite pass and/or prerequisite and co-requisite modules for each, modular name, contact sessions, content and assessment for each module are given.

This is a promotion module: if a candidate participates in all assessments and obtains an average semester mark above 75%, this candidate need not write the final exam – their semester mark will become their final mark.

Key:

Subject						
Module code	**Credit value**	**NQF-level**	**CESM code**	**Prerequisite pass and/or prerequisite and co-requisite modules for each**	**Module name**	**Contact sessions**
Content					**Assessment**	

Example:

BOC 216	**24**	**6**	**CESM: 130201**	**Two of the following: BLG114, BLG124, BLG144 and (CEM124 OR 60% pass in CEM144 or CHE132+CHE122+CHE161)**	**Biochemistry of biological compounds**	**3L, 4P**
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.					Semester tests and class tests. One examination paper of three hours.	

Explanation
Subject: Biochemistry: Module BOC216:
Module code

- First digit: 2 – refers to the year of study in which the module is presented.
- Second digit: is a number that discriminates between modules of the same subject in the same year of study and refers to the semester (unless stated otherwise), according to the following pattern explained earlier (p. XXXX), (Uneven numbers: modules offered in the first semester; Even numbers: modules offered in the second semester; 0,9: modules offered over two semesters, i.e. a year module).
- Third digit: multiply by 4 to indicate the credits.

Contact sessions

- The number of contact sessions of each module is indicated in the square following the module subject.
- The following abbreviations are used:
- L – lectures lasting 50 minutes each (e.g. 1L, 2L)
- P – practical periods lasting 50 minutes each (e.g. 1P, 2P, 3P)
- S – seminars lasting 50 minutes (e.g. 1S)
- T – tutorials lasting 50 minutes each (e.g. 1T, 2T)
- D – discussion lasting 55 minutes each (e.g.3D)
- B – block sessions over one week (e.g. 3B)

- BOC216 is therefore offered as a module during the first semester of the second year and a student will acquire 24 credits on completion at NQF Level 6.
- Before a student can register for this module the following prerequisites need to be met: two of the following BLG114, BLG124, BLG144 and (CEM124 OR 60% pass in CEM144 or CHE132+CHE122+CHE161)
- The contact sessions of BOC216 amount to three lectures plus four practicals per week for the duration of the module, i.e. one semester.
- The content of the module as well as the assessment mode is indicated in the next two blocks.

NATURAL SCIENCES

BIOLOGICAL SCIENCES

12.1. DEPARTMENT OF BOTANY

BOTA3724	**16**	**7**	**130399**	**BIOL2684**	**Plant metabolism and the environment**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.
BOTA3734	**16**	**7**	**130399**	**BIOL2644**	**Introduction to plant systematics**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.
BOTA3744	**16**	**7**	**130399**	**BIOL2784**	**Ethnobotany and Plant Defence**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.
BOTA3754	**16**	**7**	**130399**	**BIOL2784**	**Vegetation ecology**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.
BOTA6814	**16**	**8**	**130601**	**Selection to Honours degree**	**Restoration ecology**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.
BOTA6824	**16**	**8**	**130601**	**Selection to Honours degree**		**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.
BOTA6864	**16**	**8**	**130301**	**Selection to Honours degree**	**Phytomedicine**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.

12.2 DEPARTMENT OF ZOOLOGY AND ENTOMOLOGY

ZOOLOGY

ZOOL2684	**16**	**6**	**130601**	**BIOL2614**	**Introduction to Parasitology**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.	
ZOOL3744	**16**	**7**	**130504**	**ZOO284**	**Molecular parasitology**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	
ZOOL3754	**16**	**7**	**130601**	**BIO2644**	**Freshwater and marine ecology**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	
ZOOL3764	**16**	**7**	**130604**	**BIOL2644**	**Introduction to Animal Behaviour**	**3L,3P**
This course introduces students to the scientific study of animal behaviour through an evolutionary lens, including aspects of human behavioural ecology. Tinbergen's 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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	
ZOOL6814	**16**	**8**	**130601**	**Selection to Honours degree**	**Applied behavioural ecology**	**3L,3P**
Students will use both the primary literature and hands-on research experience to gain a holistic understanding of the latest advances in the wide-ranging field of animal behaviour – ranging from invertebrates to humans. This course will enable students to apply principles of behavioural ecology to animals in the wild, under laboratory conditions, within captive situations (e.g., zoos and breeding centres), as well as human behaviour on both a small and large scale. Students will know how to manage and improve animal welfare and also assess patterns within human society that can be applied to political science, epidemiology, economics and psychology. A sound knowledge of behavioural studies prepares students for various careers in nature conservation, agriculture, academic institutions and consultation.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	
ZOOL6824	**16**	**8**	**130601**	**Selection to Honours degree**	**Veterinary parasitology**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	

ZOOL6844	**16**	**8**	**130601**	**Selection to Honours degree**	**Biosystematics**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	

ENTOMOLOGY

UNIR2614	**16**	**6**	**CESM: 130602**	**BIO144**	**Basic entomology**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	
UNIR2624	**16**	**6**	**CESM: 130602**	**INS214**	**Insect ecophysiology**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	
UNIR3714	**16**	**7**	**CESM: 130602**	**INS224**	**Insect ecophysiology**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	
UNIR3724	**16**	**7**	**CESM: 130602**	**INS224**	**Applied entomology**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	
UNIR3734	**16**	**7**	**CESM: 130602**	**INS224**	**Medical, veterinary and forensic entomology**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of 3 hours.	

UNIR3744	**16**	**7**	**CESM: 130602**		**Insect biochemistry and pharmacology**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.
UNIR6814	**16**	**8**	**CESM: 130602**	**Selection to Honours degree**	**Advanced insect ecology**	**3L,3P**
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)						Continous Assessment

BIOLOGY

BIOL1514	**16**	**5**	**130601**	**NCS level 5 Life Sciences or level 4 Physical Sciences**	**Lower life and molecular biology**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.
BIOL1524	**16**	**6**	**130301**	**BIOL1514**	**Introductory plant biology**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.
BIOL1544	**16**	**6**	**130601**	**BIOL1514**	**Animal biology**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.
BIOL2614	**16**	**6**	**130601**	**BIOL1524 & BIOL1544**	**Evolution, genetics and diversity**	**3L,3P**
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.						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.
BIOL2634	**16**	**6**		**BIOL1524 & BIOL1544**	**Invertebrate biodiversity**	**3L,3P**
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).						Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.

BIOL2644	**16**	**6**	**130601**	**BIOL2614**	**The physical environment: natural resources, ecology and sustainability**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.	
BIOL2654	**16**	**6**	**130301**	**TWO OF BIOL1514 OR BIOL1644 OR BIOL1624**	**Introduction to plant anatomy and morphology**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.	
BIOL2664	**16**	**6**	**130601**	**BIOL1644**	**African vertebrates**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.	
BIOL2674	**16**	**5**	**131002**		**Biostatistics**	**3L,3P**
This module will give students a thorough, applied grounding in the basic statistics used in the life sciences, including descriptive statistics, creation and testing of hypotheses, t-tests, chi-squared test, basic non-parametric and parametric analyses up to the one-way ANOVA. Successful students will be able to assess and interpret univariate statistics and become confident in judging which statistical tests to apply to specific datasets. Students will have a solid grounding in the analysis of data using pocket calculators and simple statistical packages. This course will also introduce students to the basics of multivariate statistics.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.	
BIOL3714	**16**	**6**	**131201**	**BIO224**	**Human ecological footprint**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.	
BIOL3724	**16**	**6**		**BIOL2614**	**Macroevolution and speciation**	**3L,3P**
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.					Formative practical experiment , assignments and two formal semester tests a final summative assessment, examination of at least 2 hours.	
BIOL6808	**32**	**8**	**130601**	**Selection to Honours degree**	**Research Essay**	**L 2 per month**
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)					Continous assessment of mini-dissertation or article)	
BIOL6898	**32**	**8**	**130601**	**Selection to Honours degree**	**Research Essay**	**2 per month**
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)					Continous assessment of mini-dissertation or article)	

12.3 DEPARTMENT OF CHEMISTRY

Take note: *CHE112 + CHE122 + CHE132 + CHE142 + CHE151 + CHE161 is equivalent to CEM114 + CEM124.*

Admission to second and third-year chemistry is subject to a selection process as only the 70 best students can be accommodated.

CHE112	**8**	**4**	**CESM: 140401**		**Introduction to Chemistry-Development module**	**2L,1T**
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.						Continuous: A minimum of 4 assignments. Formal: Two written assessments and a final assessment of at least 1½ hours.
CHE132	**8**	**6**	**CESM: 140404**		**Organic Chemistry**	**2L,1T**
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.						Continuous: A minimum of4 assignments. Formal: Two written assessments and a final assessment of at least 1½ hours.
CHE122	**8**	**6**	**CESM: 140405**		**Physical Chemistry**	**2L,1T**
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).						Continuous: A minimum of 4 assignments. Formal: Two written assessments and a final assessment of at least 1½ hours.
CHE142	**8**	**5**	**CESM: 140403**		**Inorganic and Analytical Chemistry**	**2L,1T**
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.						Continuous: A minimum of 4 assignments. Formal: Two written assessments and a final assessment of at least 1½ hours.
CHE151	**4**	**5**	**CESM: 140401**		**Inorganic and Analytical Chemistry (Practical)**	**3P**
Chemistry.						Continuous: a minimum of 7 practical experiments. A 70% attendance is compulsory for practicals. Formal: A final assessment of at least 1½ hours.
CHE161	**4**	**6**	**CESM: 140401**		**Analytical, Physical and Organic Chemistry (Practical)**	**3P**
Analytical, Physical and Organic Chemistry						Continuous: a minimum of 7 practical experiments. A 70% attendance is compulsory for practicals. Formal: A final assessment of at least 1½ hours.
CEM214	**16**	**6**	**CESM: 140405**	**CEM114, CEM124/144, WTW114/134**	**Physical Chemistry**	**2L, 12P**
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.						Continuous: A minimum van 10 practical experiments and 7 assignments. Formal: Two written assessments and a final assessment of 2 hours each.

CEM224	**16**	**6**	**CESM: 140404**	**CEM124/144, WTW114/134**	**Organic Chemistry**	**2L, 12 P**
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.						Continuous: A minimum van 9 practical experiments and 7 assignments. Formal: Two written assessments and a final assessment of 2 hours each.
CEM232	**8**	**6**	**CESM: 140402**	**CEM114, CEM124/144, WTW114/134**	**Analytical Chemistry**	**1L, 8P**
Basic principles of error of observation and analysis thereof, buffer systems, analytical techniques of gravimetry, oxidimetry and spectrophotometry.						Continuous: A minimum van 6 practical experiments and 4 assignments. Formal: Two written assessments and a final assessment of 1 hour each.
CEM242	**8**	**6**	**CESM: 140403**	**CEM214, CEM232**	**Inorganic Chemistry**	**1L, 8P**
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 π-acid ligands and their complexes such as carbonyls, isocyanide, dinitrogen, phosphines and cyano complexes, nomenclature of complex compounds.						Continuous: A minimum van 6 practical experiments and 4 assignments. Formal: Two written assessments and a final assessment of 1 hour each.
CEM314	**16**	**7**	**CESM: 140402**	**CEM214, CEM232, CEM242, min.WTW124/144**	**Analytical Chemistry**	**2L, 10P**
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.						Continuous: A minimum van 8 practical experiments and 4 assignments. Formal: Two written assessments and a final assessment of 2 hours each.
CEM324	**16**	**7**	**CESM: 140403**	**CEM314**	**Inorganic Chemistry**	**2L, 10P**
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.						Continuous: A minimum van 8 practical experiments and 4 assignments. Formal: Two written assessments and a final assessment of 2 hours each.
CEM334	**16**	**7**	**CESM: 140405**	**CEM214, CEM232, min.WTW124/144**	**Physical Chemistry**	**2L, 10P**
Dynamics: chemical kinetics and surface chemistry. Thermodynamics: advanced chemical thermodynamics, free energy, chemical equilibrium, multicomponent systems and electrochemistry. Macromolecular chemistry: the syntheses, characterization and molecular mass determination of polymers. Basic principles of nuclear and radiochemistry.						Continuous: A minimum van 8 practical experiments and 4 assignments. Formal: Two written assessments and a final assessment of 2 hours each.
CEM344	**16**	**7**	**CESM: 140404**	**CEM224**	**Organic Chemistry**	**2L, 10P**
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).						Continuous: A minimum van 8 practical experiments and 4 assignments. Formal: Two written assessments and a final assessment of 2 hours each.
CMP614	**16**	**8**	**CESM: 140406**	**Selection for BSc Honours**	**Polymers and Polymerization**	**1L, 2P**
• Concepts and nomenclature • Step polymerization • Radical polymerization • Ionic polymerization • Stereochemistry and coordination polymerization • Copolymerization				After successful completion of the module the student should: 1. Know and understand the basic principles underlying polymer science, and the properties that distinguish polymers from other substances 2. Develop a kinetic/mechanistic understanding of step polymerization 3. Develop a kinetic/mechanistic understanding of free-radical polymerization		One examination paper of 2 hours.

CMP624	**16**	**8**	**CESM: 140406**	**Selection for BSc Honours**	**Applied Polymer Science**	**1L, 2P**
• Polymer processing • Additives in polymers • Biomedical applications of synthetic polymers • Polymers for the electronics industry • Speciality polymer applications • Introduction to paints and adhesives				After successful completion of the module the student should: 1. Know and understand the different polymer processing techniques 2. Understand and be able to discuss the purpose of different types of additives in polymers, as well as the influence these additives have on the polymer properties 3. Know, understand and be able to discuss the use of polymers in biomedical applications, the electronics industry, paints and adhesives, as well as other speciality polymer applications	One examination paper of 2 hours.	
CMP634	**16**	**8**	**CESM: 140406**	**Selection for BSc Honours**	**Physical Polymer Science**	**1L, 2P**
• The amorphous state • The crystalline state • Elastic deformation • Viscoelasticity • Elastomers • Yield and crazing • Fracture and toughening				After successful completion of the module the student should: 1. 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 2. Know and understand the relationships between polymer structure/ morphology and the different physical properties 3. Understand and be able to apply the different principles and models related to the mechanical properties of solid polymers.	One examination paper of 2 hours.	
CMP644	**16**	**8**	**CESM: 140406**	**Selection for BSc Honours**	**Polymer Testing and Characterization II**	**1L, 2P**
• Thermal analysis • Testing of mechanical properties • Testing of thermal and electrical conductivity • Electron and atomic force microscopy				After successful completion of the module the student should: 1. Understand and be able to explain 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. 2. Be able to interpret and explain typical results obtained from the different techniques.	One examination paper of 2 hours.	
CMP654	**16**	**8**	**CESM: 140406**	**Selection for BSc Honours**	**Polymers and Polymer Reactions**	**1L, 2P**
• Inorganic, organometallic and inorganic-organic polymers • Reactions involving polymers • Properties of commercial polymers • Polymer structure-property relationships After successful completion of the module the student should: 1. Know, understand and be able to discuss a number of examples of inorganic, organometallic and inorganic-organic polymers				2. Know and understand the reactions that polymers can undergo, and the structural and morphological factors that have an influence on these reactions 3. Know, understand and be able to discuss the properties of a number of commercially important polymers 4. Be able to relate polymer structures with their thermal and mechanical properties	One examination paper of 2 hours.	

CMP664	16	8	CESM: 140406	Selection for BSc Honours	Polymer Blends, Composites and Nanocomposites	1L, 2P

- 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

After successful completion of the module the student should:

1. Know and understand the concept of polymer blending
2. Understand and be able to explain the morphology of polymer blends, and its relation to the properties of these blends
3. Understand and be able to discuss the different methods used to characterize polymer blends, and be able to interpret and explain the results obtained from these methods
4. Understand and be able to discuss the different compatibility methods used in polymer blending
5. Understand and be able to explain the relation between blend morphology and properties
6. Understand and be able to discuss a number of aspects related to polymer composites and nanocomposites
7. Understand and be able to explain the results presented and discussed in some research-based case studies

One examination paper of 2 hours.

CMP674	16	8	CESM: 140406	Selection for BSc Honours	Polymer Testing and Characterization I	1L, 2P

- 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

After successful completion of the module the student should:

1. Understand and be able to explain 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.
2. Be able to interpret and explain typical results obtained from the different techniques.

One examination paper of 2 hours.

CMP684	16	8	CESM: 140406	Selection for BSc Honours	Research Project	1L, 2P

- Mini research project with mini-dissertation

After successful completion of the module the student should be able to:

1. Plan and execute a research project in the field of polymer science
2. Search for relevant literature, read the contents, and critically and comparatively summarise the information obtained from the literature
3. Correctly present and interpret the research results
4. Neatly write a dissertation in the correct format

One examination paper of 2 hours.

12.4 DEPARTMENT OF PHYSICS

FSK114	**16**	**5**	**CESM: 140101**	**With WTW114/134**	**Mechanics, optics and electricity**	**3 L, 1 T/P**
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.					One examination paper of two hours.	
FSK124	**16**	**6**	**CESM: 140101**	**Min.FSK114/134, min.WTW114/134**	**Mechanics, thermodynamics, electricity and magnetism**	**3l, 1T/P**
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.					One examination paper of two hours.	
FSK134	**16**	**5**	**CESM: 140101**		Mechanics, optics, electricity, biologically and medically relevant topics	**3L**
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.					One examination paper of two hours.	
FSK144	**16**	**5**	**CESM: 140101**		**Mechanics, thermodynamics, electricity, magnetism, biologically and medically relevant topics**	**3L,1T/P**
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.					One examination paper of two hours.	
FSK214	**16**	**6**	**CESM: 140101**	**FSK114/134, FSK124/144, WTW114/134, WTW124/144**	**Mechanics, waves and optics**	**3L**
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.					One examination paper of three hours.	
FSK224	**16**	**6**	**CESM: 140101**	**FSK114/134, FSK124/144, WTW114/134, WTW124/144**	**Electronics**	**2L, 1P**
Electronics: Properties of semiconductors, diodes, rectifier circuits, zener diodes, power supplies, transistors, transistor amplifiers, operational amplifiers, operational amplifiers in feedback circuits, timer circuits, digital circuits and, computers ports. Practical work in electronics: Diodes, power supplies, transistors, operational amplifiers in feedback circuits, timer circuits, digital circuits and computers control. A project and seminar.					One examination paper of three hours.	
FSK232	**8**	**6**	**CESM: 140101**	**With FSK212**	**Practical work: Physics**	**1P**
Practical work on oscillations, waves and optics: experiments with mechanical oscillations, light interference, and computer simulations of waves and Fourier analysis.					One practical session of 5 hours per week during the first semester.	
FSK242	**8**	**6**	**CESM: 140101**	**FSK214**	**Electromagnetism**	**2L**
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.					One practical session of 5 hours per week during the first semester.	

FSK314	**16**	**7**	**CESM: 140101**	**FSK214**	**Modern Physics**	**3L**
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, gravitational 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.					One examination paper of three hours.	
FSK324	**16**	**7**	**CESM: 140101**	**FSK314**	**Solid-state Physics**	**3L**
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.					One examination paper of three hours.	
FSK332	**8**	**7**	**CESM: 140101**	**FSK214**	**Statistical Physics I**	**1L**
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.					One examination paper of two hours.	
FSK342	**8**	**7**	**CESM: 140101**	**FSK332**	**Statistical Physics II**	**1L**
Quantum statistics, the Fermi-Dirac and Bose-Einstein statistics and distributions, the equation of state of a quantum gas, Fermi temperature, low-temperature properties of a degenerate gas, the degenerate electron gas, valence and conduction bands in semiconductors, degenerate gases in astrophysics: white dwarfs and neutron stars, Blackbody radiation, the photon gas, stimulated emission, Debye specific heat, electron specific heat.					One examination paper of two hours.	
FSK352	**8**	**7**	**CESM: 140101**	**FSK232 (with FSK314 and FSK332)**	**Practical work: Physics**	**1P**
Practical work on phenomena that are explained by modern physics, as well as a few experiments in statistical physics and thermodynamics.						
FSK362	**8**	**7**	**CESM: 140101**	**FSK232 (with FSK324 and FSK342)**	**Practical work: Physics**	**1P**
Practical work on phenomena that are explained by solid state theory as well as a few experiments in statistical physics and thermodynamics.						

12.5 DEPARTMENT OF COMPUTER SCIENCES AND INFORMATICS

- Computer Literacy: BRS131 and BRS141 are compulsory if the programme prescribes it and the student did not pass the promotion test at the beginning of the semester. If the student passes the promotion test, he/she will receive a mark which will appear on his/her study record. Students, who passed grade 12 Information Technology (IT) on performance level 5(60%), or Computer Application Technology (CAT) on performance level 6 (70%), are exempted from BRS131.
- It will be expected from BSc (IT) students to do at least one student assistantship in the Department of Computer Science and Informatics in the second or third year of study.
- The contents of BRS121 and BRS141 are the same.
- **Modules in () indicate equivalent modules on main campus**

BRS 131 (BRS111)	**4**	**5**	**CESM: 060599**		**Computer Literacy: Part 1**	**1L, 3P**
A 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.					Continuous evaluation; no special examinations will be granted.	
BRS 141 (BRS121)	**4**	**5**	**CESM : 060599**	**BRS 131**	**Computer Literacy: Part 2**	**1L, 3P**
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.					Continuous evaluation; no special examinations will be granted.	
CSIQ1512	**8**	**5**	**CESM: 060599**		**Computer Literacy for Computer Science**	**2L, 3P**
Basic and advanced commands for a word processor, a spreadsheet, a presentation, a database program. Internet usage, operating system. Basic Hardware and Software, open source programs, and visits to companies.					Continuous assessment; no special examinations are granted.	
CSIQ1532	**8**	**6**	**CESM: 060201**	**with RIS112**	**Introduction to Software Development Concepts**	**3L, 3P**
Programming principles, procedural and logical programming concepts, basic programming with Alice or MS Scratch tools, introduction to the IDE of Visual Studio.					This is a promotion module. One examination paper (written and/or practical) of three hours.	
CSIQ1646	**24**	**6**	**CESM : 060201**	**RIS102**	**Programming and Problem Solving: Part 2**	**3L,3P**
Basic programming, basic software analysis & design process, the syntax and semantics of a high-level programming language, selection statements, classes, methods, properties, one-dimensional arrays.					This is not a promotion module. One examination paper (written and/or practical) of three hours	
RIS 134 (RIS134)	**16**	**6**	**CESM : 060201**	**with BRS 111**	**Introduction to programming**	**4L,3P**
This module provides an extended introduction into the world of computer programming and is aimed at students who do not intend to take RIS 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					This is a promotion module. One examination paper (written and/or practical) of three hours. Not for IT-students.	
RIS 144 (RIS144)	**16**	**6**	**CESM : 060201**	**RIS 134**	**Introduction to programming: Part 2**	**3L,3P**
The module is a continuation of RIS134 and deals with the use of control structures, classes, objects, properties and methods to do computerised problem solving in a high-level programming language.					This is a promotion module. One examination paper (written and/or practical) of three hours. Not for IT-students.	

CSIQ1513 (RIS153)	**12**	**5**	**CESM : 060103**		**Introduction to computer hardware**	**3L,3P**
The underlying electronics of computer hardware, supporting Microsoft Windows, servicing PC's, operating system overview, computer basics , tools and safety, inside the PC, input/output devices, miscellaneous hardware, troubleshooting, customer service and support.					This is a promotion module. One examination paper (written and/or practical) of three hours.	
CSIQ1622	**8**	**6**	**CESM : 060801**	**RIS112, RIS153**	**Introduction to Computer Networks**	**2L, 3P**
An introduction to the theory and practice of computer networks: network principles, organization, topologies, hardware, applications.					This is a promotion module. One examination paper (written and/or practical) of two hours.	
RIS 182 (RIS182	**8**	**6**	**CESM : 060202**	**BRS 131**	**Visual Basic for Applications (VBA) with the focus on Excel**	**3L,3P**
This module presents 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.					Continuous evaluation; no special examinations will be granted	
RIS 264 (2015)	**16**	**6**	**CESM : 060201**	**RIS 234**	**Software Design**	**2L,3P**
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.					This is not a promotion module. One examination paper (written and/or practical) of three hours	
RIS 224	**16**	**6**	**CESM : 060302**	**RIS 196**	**Human-Computer Interaction**	**2L,3P**
If the potential computer user is not accommodated throughout the design process of a computer system, the system will not be used and money and energy will be wasted. 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; types of interfaces, mobile HCI.					This is a promotion module. One examination paper (written and/or practical) of three hours	
RIS 242	**8**	**6**	**CESM : 060501**	**BRS 131 + BRS 141**	**Information Technology Service Learning**	**E/A**
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.					Continuous assessment is applied in this module and no special examinations are allowed.	
RIS204 (2015)	**16**	**6**	**CESM : 060904**	**RIS 196**	**Introduction to Web Page Development**	**3L,3P**
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, CSS. Javascript will also be used.					This is a promotion module. One examination paper (written and/or practical) of three hours.	
RIS 234 (2015)	**16**	**6**	**CESM : 060201**	**RIS 196**	**Software programming 1**	**2L,3P**
More advanced problem solving using object oriented concepts, UML, multidimensional arrays, event-driven programs, GUI’s, class inheritance and interfaces, libraries. This includes OOP, UML, IO, Delegates, Containers, XML.					This is a promotion module. One examination paper (written and/or practical) of three hours	
RIS243 (2015)	**12**	**6**	**CESM : 060201**	**RIS234**	**Software programming 2**	**2L,3P**
Various data structures: theory and advanced applications.					`This is a promotion module. One examination paper (written and/or practical) of three hours	

RIS294 (2015)	**16**	**6**	**CESM : 060702**	**RIS196**	**Introduction to databases and database management systems: Part 1**	**2L,3P**
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. Operations on databases, SQL queries, ER diagrams, ADO.NET.					This is a promotion module. One examination paper (written and/or practical)	
RIS254 (2015)	**16**	**6**	**CESM : 060801**	**RIS162**	**Computer Networks**	**2L,3P**
Fundamental concepts in the design and implementation of computer communication in the wired and wireless networks, their protocols, and applications. Layered network architecture in the Internet, applications, transport, Socket APIs, network, and data link layers and their protocols, multimedia networking, and network security. This includes design, setting up and maintenance of networks, Linux.					This is a promotion module. One examination paper (written and/or practical)	
RIS 306 (2016)	**16**	**7**	**CESM : 060401**	**RIS 294**	**Software Engineering**	**2L,3P**
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, and network applications, standards and models, transmission basics. This includes a year-long project.					This is not a promotion module. One examination paper (written and/or practical)	
RIS 384 (2016)	**16**	**7**	**CESM : 060903**	**RIS 153 + RIS 254**	**Intoduction to security**	**2L,3P**
The fundamentals of computer security, risks and vulnerabilities, policies, controls and protection methods, malicious logic, database security, encryption, authentication, intrusion detection, network and system security issues, security design principles, issues of law and privacy.					This is not a promotion module. One examination paper (written and/or practical)	
RIS 304 (2016)	**16**	**7**	**CESM : 060103**	**RIS 153 + RIS 234 + RIS 254**	**Operating systems**	**2L,3P**
The operating system serves as a computer's fundamental user interface; it significantly affects how you interact with the device. The hardware you choose affects what operating system(s) you can run. Various operating systems will be discussed. This includes OS structures, process management, memory management, storage management, protection and security, open source systems.					This is not a promotion module. One examination paper (written and/or practical)	
RIS 374 (2016)	**16**	**7**	**CESM : 060299**	**RIS 243 + RIS 294**	**Mobile Development**	**2L,3P**
Theory and practical applications of new mobile technologies, which will be adapted on a yearly basis. Principles of mobile applications programming, mobile programming, publishable applications.					This is not a promotion module. One examination paper (written and/or practical)	
RIS 314' (2016)	**16**	**7**	**CESM : 060801**	**RIS 294**	**Introduction to databases and database management systems: Part 2**	**2L,3P**
Advanced concepts of and operations on databases, stored procedures.					This is not a promotion module. One examination paper (written and/or practical)	
RIS 334	**16**	**7**	**CESM : 060904**	**RIS 204 + RIS 234**	**Internet Programming**	**2L,3P**
Students will learn essential web development skills related to current Internet technologies and protocols, web graphics and multimedia, web authoring and design, and web programming. Appropriate programming languages will be used for server-side programming.					This is not a promotion module. One practical examination (written and/or practical).	

12.6 DEPARTMENT OF GEOGRAPHY

GEO114	**16**	**6**	**CESM: 140501**	**NCS Mathematics level 4**	**Introduction to Physical Geography**	**3L, 3P**
Universe, solar system, earth, Climatology, hydrogeography, soilgeography, biogeography, weathering and erosion, geomorphology, environmental geography. Practicals: Elementary cartography and the representation and interpretation or data.					One three-hour examination paper.	
GEO124	**16**	**6**	**CESM: 140501**	**GEO114**	**Introduction to human Geography and cartography**	**3L, 3P**
Population dynamics, development of rural and urban settlements, urbanisation, agriculture and the provision of food, rural land use, sources of energy, economic geography.					One three-hour examination paper.	
GEO214	**16**	**6**	**CESM: 140501**	**GEO124**	**Urban development**	**3L, 3P**
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 programmes, interpretation of results, case studies.					One three-hour examination paper.	
GEO224	**16**	**6**	**CESM: 140503**	**GEO114**	**Environmental studies**	**3L, 3P**
Environmental problems and causes, history of the use and conservation of resources, ecosystems and how they work, population dynamics, economy and the environment, water sources, pollution: air and water pollution, solid waste.					One three-hour examination paper	
GEO234	**16**	**6**	**CESM: 140503**	**GEO114**	**Process geomorphology and geomorphologic hazards**	**3L, 2P**
Fluvial geomorphology. Aeolian geomorphology. Introduction to coastal geomorphology. Slopes and slope processes. Geomorphologic hazards.					One three-hour examination paper.	
GEO314	**16**	**7**	**CESM: 140501**	**GEO214**	**Applied urban development and spatial transformation**	**3P**
Geography of apartheid, inequality and post-apartheid, spatial transformation of urban areas, changing urbanisation processes and patterns, spatial re-integration of the former homelands. The following objectives are to be achieved during the module: a) to analyse the geography of apartheid scientifically; b) to interpret the geography of inequality on national, regional and local level; c) to understand the geography of post-apartheid and to be able to apply the concept; d) to critically analyse urbanisation and urban growth as spatial processes, to identify challenges associated with fast growing cities and to propose possible solutions; e) to critically analyse the spatial transformation of urban areas, to identify future challenges and to propose possible solutions in this regard.					One three-hour examination paper.	
GEO324	**16**	**7**	**CESM: 140504**	**GEO224**	**Environmental management and analysis**	**3L, 3P**
The South African environment and processes and systems in the environment, environmental management plans, integrated environmental management procedures, environmental impact analyses, environmental auditing, evaluation models.					One three-hour examination paper.	
GEO334	**16**	**7**	**CESM: 140503**	**GEO234**	**Environmental Geomorphology**	**3L, 2P**
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 engineers and geomorphology in environmental management.					One three-hour examination paper.	
GEO344	**16**	**7**	**CESM: 140501**	**GEO214**	**Rural Geography**	**3L, 2P**
Theory: The course aims to provide an introduction to rural development issues globally, It investigates the sustainable development of rural areas, the impact of migration on the development of rural areas, poverty at it manifests itself in different forms in rural areas, how poverty can be reduced in rural areas and finally the course studies rural-urban linkages. Tutorial: The course aims to provide an introduction to rural geography as to engage students in discussions related to rural development issues. Students will be provided with readings and must critically engage with concepts discussed during theory sessions.					One three-hour examination paper.	

GIS224	**16**	**6**	**CESM: 140502**	**(GEO114 &GEO124) OR (GLG114 &GLG124) OR (GKG124 & GKD214)**	**Geographic Information Systems**	**3L, 3P**
Theoretical framework of GIS, computer cartography, data structures and databases, collection and verification of data with spatial analysis and spatial modelling and the presentation of information with the aid of GIS. Elementary surveying. Identification of features and measurement on aerial photographs; image processing.					One three-hour examination paper.	
GIS324	**16**	**7**	**CESM: 140501**	**GIS224**	**Geographic Information Systems**	**2L, 4P**
Geographical data and the computer, data collection and data acquirement, data verification, quality control, raster data models, vector data models, interpolation, spatial analysis and spatial modelling, errors, the management of a GIS. Application programmes, data digitising, topology, data processing, removing of errors, digital image processing as data source, representation of information, report writing.					One three-hour examination paper.	
GEO616	**16**	**8**	**CESM: 140501**	**64 CREDITS AT NQF LEVEL 7 IN GEOGRAPHY**		**1S**
The module aims to familiarise students with philosophy 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.						
GEO692	**16**	**8**	**CESM: 140501**			**2S, 1FT**
This course advances a framework for designing a research study in Geography. This process 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. The course is divided into a number of seminars that will entail a presentation by a number of staff members. These theory presentations are followed by a discussion of the practical considerations the student will need to think through to successfully complete the final year-end project. In addition, there are four report back sessions during which students will make a 10-minute presentation to both staff and fellow research students on the progress he/she has made in the chosen field of investigation. This presentation also provides the opportunity for both staff and fellow students to ask questions, as well as make suggestions, relating to the research. The course culminates in the presentation of a research report that is a compulsory element of the Honours degree in Geography.						
GGF626	**16**	**8**	**CESM: 140504**			**2S,1E**
The GGF626 (Environmental Geography) builds on the GEO324 work. The course examines various environmental laws and the implications these have on environmental management. The module continues to investigate Environmental Impact Assessments from an academic and theoretical point of view by trying to answer questions regarding the goal, achievement, success, quality and contribution towards sustainability of EIA. This part also includes a group practical assignment focused on EIA. The last part of the course looks at Environmental Management Systems from an academic and theoretical point of view and tries to answer similar questions as those posed for EIA.						
GGF636	**16**	**8**	**CESM: 140501**			**1S**
GGH363	**16**	**8**	**CESM: 140501**			**1S**
The module aims to familiarise students with the role of geomorphology as a significant branch of earth science. Students are familiarised with: • the development of nineteenth, twentieth and twenty first century geomorphology • the move towards process-oriented studies and new methodologies (microgeomorphology) • southern African geomorphology and the Quaternary of southern Africa • the geomorphology of semi-arid and arid southern Africa, including the Free State province						
GGF636	**16**	**8**	**CESM: 140504**			**2S,3E**
* applied geomorphology in the context of land management in the Free State, in particular aeolian processes, and wind erosion and its impacts on the Free State's landforms and agricultural base.						

GIS616	**16**	**8**	**CESM: 140502**			**2S, 24P /y**
The aim of the module is to expand knowledge obtained in GIS324 and focuses on more advanced principles and concepts of spatial analyses. The successful student will: Know the organising concepts of geospatial analysis and their methodological context Know the core components of geospatial analysis including distance and directional analysis, geometrical processing map algebra and grid models Understand how to use exploratory spatial data analysis and spatial statistics, including spatial auto correlation and spatial regression Understand surface analysis, including gridding, interpolation and analysis of form Understand network and locational analysis Have a working knowledge of geocomputational methods such as cellular automata, agent based modelling, neural networks and genetic algorithms					Presentations, Assignments, Practical work, Summative assessment	
GIS626	**16**	**8**	**CESM: 140502**			**2S,18P/y**
At an intermediate level, the 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.					Presentations, Assignments, Practical work, Summative assessment	
GIS646	**16**	**8**	**CESM: 140502**			**2S**
The module consists of theoretical principles and practical applications under the following broad topics: Professionalism and professional ethics. The SA geospatial profession. SA Council for Professional and Technical Surveyors (including legislation and rules), social responsibility, also included are topics on social issues in GIS such as public participation, data privacy, project management and participatory GIS.					Assignments, Summative assessment	
GGF656	**16**	**8**	**CESM: 140502**			**2S**
The course aims to give the student a theoretical understanding of remote sensing and to cover basic practical procedures used. Topics for discussion include the fundamental of remote sensing, elements and basic principles of photogrammetry, visual image interpretation, multispectral, thermal and hyperspectral sensing, resourse 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.						
GGH666	**16**	**8**	**CESM: 140503**			**2S**
This course focuses on the relationship between society and what we call "nature". It is divided into three sections during which the following issues are examined: perceptions of wilderness and the social implications of these, especially in Africa and especially those created by the tourism industry; social justice issues related to poverty and access to wildlife and land resources; the history of more inclusive forms of conservation management, in particular community-based natural resource management, and their success in achieving conservation and equity goals; transfrontier conservation; and, on a more philosophical level, relationships between humans and the non-human, in particular animals.						

12.7 MATHEMATICS AND APPLIED MATHEMATICS

WTV154	**16**	**4**	**CESM**	**National Senior Certificate (NCS) Mathematics on performance level 3 (40%)**	**Basic Mathematics**	**3L, 5T**
Development of skills with arithmetic and mathematical calculations. Real numbers, algebraic expressions. Algebraic and graphical solution of equations. Logarithms and exponents. The use of a pocket calculator. Basic geometry and elementary trigonometry, the calculation of areas and volumes. Simple and compound interest. Grouping of data and descriptive statistics.					Tutorials, homework, class/ tutorial/semester tests, and one three-hour paper.	
WTV164/194	**16**	**5**	**CESM**	**National Senior Certificate (NCS) Mathematics on performance level 4 (50%)**	**Precalculus II**	**4L, 3P**
Algebra overview. Functions and graphs. Algebraic, linear, quadratic and polynomial functions. Trigonometric functions and trigonometry. Exponential and logarithmic functions.					Tutorials, tutorial/semester tests, and one three-hour paper.	
WTW174	**16**	**5**	**CESM**	**National Senior Certificate (NCS) Mathematics on performance level 4 (50%)**	**Precalculus I**	**3L, 3P**
Contents: Number systems and proving theorems by induction; arithmetic and geometric series; simple and compound interest, depreciation, inflation; ratio and proportion; exponentials and logarithms and the exponential and logarithmic laws; graphs of lines, parabolas, circles and hyperbolae; factoring of algebraic expressions; principles of geometry; principles of trigonometry and solving triangles; applications and modelling.					Tutorials, tutorial/semester tests, and one three-hour paper.	
WTW184	**16**	**5**	**CESM**	**WTW184**	**Precalculus II**	**3L, 3P**
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.					Tutorials, tutorial/semester tests, and one three-hour paper.	
WTW134	**16**	**5**	**CESM**	**Mathematics on performance level 5 (60%) or WTW164/WTV164 or WTW184.**	**Calculus**	**3L, 3T**
Functions, graphs, limits, continuity and the derivative. Polynomial, trigonometric, exponential and logarithmic functions. Differentiation. Critical points and local maxima and minima. Introduction to modelling. The definite integral. Integration techniques.					Tutorials, tutorial/semester tests, and one three-hour paper.	
WTW144	**16**	**6**	**CESM**	**WTW134 or at least 40% in WTW114.**	**Calculus and linear algebra**	**3L, 3T**
Further integration, elementary differential equations, systems of linear equations, matrices, complex numbers.					Tutorials, tutorial/semester tests, and one three-hour paper.	
WTW142	**16**	**6**	**CESM**	**National Senior Certificate (NCS) Mathematics on performance level 5 (60%) or WTW164/WTV164 or WTW184.**	**Introductory calculus and statics for Architecture, Quantity Surveying and Construction Management**	**2L, 1T**
Calculus: polynomial, trigonometric, exponential and logarithmic functions, curve sketching, the function concept, an outline of differentiation and integration. Statics: forces and moments, stress and strain, shear force and bending moment, trusses.					Tutorials, tutorial/semester tests, and one three-hour paper.	
WTW114	**16**	**6**	**CESM**	**National Senior Certificate Mathematics on performance level 7 (80%) or a minimum pass mark of at least 70% in WTW164/WTV164 or at least 60% in WTW184 or a pass in WTW134 is required.**	**Calculus**	**4L, 3T**
The real numbers. Functions. Limits and continuity. Differentiation: theory, techniques and applications. The Mean Value theorem. Sketching curves. Inverse functions. Transcendental functions. Integration: theory, techniques and applications.					Tutorials, tutorial/semester tests, and one three-hour paper.	

WTW124	**16**	**6**	**CESM**	**NCS Mathematics on performance level 7 (80%) or a minimum pass mark of at least 70% in WTW164/ WTV164 or at least 60% in WTW184 or a pass in WTW134 is required.**	**Algebra and differential equations**	**4L, 3T**
The binomial theorem. Complex numbers. Introductory linear algebra: Systems of linear equations, matrices, determinants, vectors in R^2 and R^3, lines and planes, Conic sections. Multivariable functions. Partial derivatives. Elementary differential equations.					Tutorials, tutorial/semester tests, and one three-hour paper.	
WTW214	**16**	**6**	**CESM**	**WTW 114 & minimum 40% in WTW124**	**Vector analysis**	**2L, 2P**
Vector functions: limits, derivatives and integrals. Curves: parameterization, tangent vectors, arc length. Multivariable functions: quadratic surfaces, partial derivatives, limits, continuity, differentiability, gradients and directional derivatives, the Mean Value theorem, the chain rule for partial derivatives, tangent planes. Multiple and line integrals: Theory and applications.					Tutorials, tutorial/semester tests, and one three-hour paper.	
WTW224	**16**	**6**	**CESM**	**minimum 40% in WTW114 of WTW134 en minimum 40% in WTW114 of**	**Linear algebra**	**2L, 2P**
Real vector spaces: basis, dimension, subspace. Linear mappings: kernel, image, representation of a linear mapping as a matrix, inverse. Inner product and orthogonality: orthogonal bases, rank, bilinear mappings, quadratic forms. Determinants. Eigenvalues and eigen-vectors: characteristic polynomial of a linear mapping, symmetric matrices, diagonalisation. The Cayley-Hamilton theorem.					Tutorials, tutorial/semester tests, and one three-hour paper.	
WTW244	**16**	**6**	**CESM**	**WTW124 of WTW144**	**Ordinary differential equations**	**2L, 3P**
Non-linear first order differential equations: substitution techniques, exact equations, integration factors. Non-homogeneous second order differential equations with constant coefficients. Series methods. Systems of linear first order differential equations. Elementary eigenvalue problems. Applications in Physics, Chemistry, Biology and Medical Science such as mixtures, mechanical vibrations, electronic circuits and resonance problems.					Tutorials, tutorial/semester tests, and one three-hour paper.	
WTW264	**16**	**6**	**CESM**	**WTW114 & WTW124**	**Sequences and series**	**2L, 2P**
Sequences of real numbers: convergence, limits, boundedness, indeterminate forms, L'Hospital's rule. Improper integrals. Infinite series: tests for convergence, absolute and conditional convergence. Taylor series. Power series: intervals of convergence. Fourier analysis					Tutorials, tutorial/semester tests, and one three-hour paper.	
STK114	**16**	**5**	**CESM 041002**	**Equivalent modules:EBCS51405**	**Introduction to Statistics (I)**	**3L, 3T**
Elementary calculations, Interest calculations, Index numbers, Time series, Introduction to statistics, and, collection of data					This is a promotion module (70%), Semester mark (50%): assignments (50%), two semester tests (50%), Examination mark (50%): one three-hour exam paper.	
STK124	**16**	**5**	**CESM 150301**	**Equivalent module: BMT124, EBCS52405**	**Introduction to Statistics (II)**	**3L, 3T**
The organising, graphical presentation and description of data, Elementary principles of probability, Confidence intervals and hypothesis testing, Correlation and regression, Contingency tables, analysis of variance					This is a promotion module (70%), Semester mark (50%): assignments (50%), two semester tests (50%), Examination mark (50%): one three-hour exam paper.	

13. RULES OF PROGRESSION AND INTERIM REQUISITE BETWEEN NEW AND OLD QUALIFICATIONS

- If a student has interrupted his/her studies and the curriculum under which the student was registered has changed due to the re-curriculation his/her studies can only continue with the new curriculum, after consultation and permission from the relevant authorised personnel.
- If a student who has register for BArchStud before 2014 and has interrupted his/her studies the total credits needed to obtain the degree must be at least 400 and must be approved by the relevant authorised personnel.
- If a student has not interrupted his/her studies but has failed certain modules and the curriculum under which the student was registered has changed due to the re-curriculation his/her studies, can only continue with his/her studies with the new curriculum, after consultation and permission from the relevant authorised personnel.
- For the Bachelor Honour in Spatial and Regional Planning a selection of the following elective modules as in the 2012 and 2013 NAS Calendar will be presented in 2014 for student registering prior to 2014 to ensure sufficient credits to obtain the degree.(CSB702, CSB704, BGM752, BGR752, BVG752, CSB752, CSB762, DGP752, ENB752, GBE752, GND752, GOB752, IHB752, KIB752, LGB752, PPB752, RBT752 ,RPB752, SOB752, STO752, TVB752).

- If students registered before 2014 and the modules listed below , in column A, are included in their curriculum and they did not successfully completed the modules thy need to register for the corresponding module(s) in column B:

Column A	Column B
MKB 334	One of B14, MKB 364, MKB 344, VWS 344
BOC 334	BOC 324
BOC 324	BOC 334
BLG 114	BLGY 1683
BLG 144	BLGY 1643 and BLG163
BLG 124	BLGY 1623
WDK 224	WDK 214
DVL 444	VWW 424
PLK 214 or PLK 232	PLK 216
PLK 224 or PLK 262	PLK 216
LWL142 or LWL172 or LWL194	VWW 124 or GKD 124
ATW 396	ATW 608

EQUIVALENT AND REPLACEMENT MODULES

The modules listed in the tables below have been replace by new modules or equivalent modules exists.

Replacement modules

Previous course	New module
CEM 601	CEM614 and CEM624 (Anorganic Chemistry)
CEM 602	CEM654 and CEM664 (Organic Chemistry)
CEM 603	CEM634 and CEM644 (Physical Chemistry)
CEM 604	CEM674 and CEM684 (Analytical Chemistry)
CEM 691	Practical in CEM614 and CEM624
CEM 692	Practical in CEM654 and CEM664
CEM 694	Practical in CEM634 and CEM644
GLG 683	GLG653

Equivalent Modules

MVL 701	MVL720 and MVL722
MVL 702	MVL723
MVL 703	MVL770
MVL 704	MVL724 or MVL730
MVL 705	MVL731
MVL 706	MVL740
MVL 707	MVL770
MVL 708	MVL761
MVL 709	MVL750
MVL 710	MVL751
MVL 711	MVL752
MVL 712	MVL733
MVL 713	MVL721
MVL 714	MVL762
MVL 791 class attendance gives recognition to MVL721	

Old module	Replace by new modules
OGT106	OGT 104
OGT206	OGT204
TAR224	TAR204
TAR714	TAR704
PAK714	PAK704

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