

## **Part 4: Agricultural Sciences: Undergraduate Programmes**

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### **Agricultural and Building Sciences (Undergraduate and Honours final-year students)**

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## **NB.**

- Take note that the Faculty of Natural and Agricultural Sciences will introduce a B.Sc. (Engineering Sciences) degree as from 2013.
- Also take note that the institutional compulsory module UFS101 will be included in ALL first year programmes.
- Contact the Faculty Manager for further enquiries: 051 401 3199.

# ACADEMIC STAFF

**DEAN**  
**VICE-DEAN**

Professor N.J.L. Heideman  
Professor R.C. Witthuhn

**PROGRAMME HEAD (QWAQWA CAMPUS)**

Professor A.S. Luyt

## PROGRAMME DIRECTORS

<b>Programme</b>	<b>Programme Director</b>	<b>Telephone</b>
Mathematical Statistics and Actuarial Science	Mr M.J. von Maltitz	051 401 2609
Architecture	Mr H.B. Pretorius	051 401 3482
<u>Biological Sciences:</u>		
• Genetics, Behavioural Genetics, Forensic Genetics	Ms Z. Odendaal	051 401 2776
• Human Molecular Biology	Prof. C.D. Viljoen	051 405 3656
• Botany, Plant Health, Plant Molecular Biology	Dr B. Visser	051 401 3278
• Zoology, Entomology	Prof. J.G. van As	051 401 2427
• Biochemistry	Dr A. van Tonder	051 401 2892
• Microbiology, Microbial Biotechnology	Prof. S.G. Kilian	051 401 2780
• Extended Programme	Dr R. Versteeg	051 401 2783
• General Biology first-year	Mr J.D. Kruger	051 401 3199
Building Sciences	Ms M-M Els	051 401 2257
Physical en Chemical Sciences	Dr R.Versteeg	051 401 2783
<u>Geosciences:</u>		
• Geography	Dr C.H. Barker	051 401 2554
• Geology	Dr H.E. Praekelt	051 401 2373
Agricultural Sciences	Prof. J.B. van Wyk	051 401 2677
Computer Science and Informatics (Information Technology)	Dr A. van Biljon	051 401 2605
Urban and Regional Planning	Prof. V.J. Nel	051 401 2486
Consumer Science	Prof. H.J.H. Steyn	051 401 2304
Mathematical Sciences	Prof. S.W. Schoombie	051 401 2329

**(Departmental Heads / Departmental Chairpersons / Qwaqwa Subject Heads are indicated with an asterisk)**

## **AGRICULTURAL ECONOMICS (051 401 2824)**

Professor	*Prof B.J. Willemse
Associate Professor	Prof. B. Grové
Affiliated Professors	Prof. Z.G. Alemu, Prof. A. Jooste, Prof. H.D. van Schalkwyk
Senior Lecturer	Dr. G. Kundhlande
Lecturers	Mr H. Jordaan, Mr D.B. Strydom, Ms N. Matthews, Ms L. Terblanche, Mr A.O. Ogundeji
Lecturer Units	Dr L. Terblanche, Mr. F.A. Maré, Mr J.I.F. Henning
Research Associates	Dr P.R. Taljaard, Dr A.C. Geyer
Agricultural Engineering	Mr J.J. van Staden

**DiMTEC (051 401 2721)**

Director  
Lecturers

\*Mr A.J. Jordaan  
Dr B. Grové, Dr G. Kundhlande, Dr L. Terblanche,  
Prof.G. Viljoen, Mr A.Kesten, Mr S. Carsten, Ms L. Nogabe,  
Prof. R. Bragg, Mr E. Du Plessis, Prof. H. Hudson,  
Prof. W. Purcell, Ms E. Vlok, Mr C. Dreyer, Dr C. Barker,  
Dr D. Sakulski, Dr H. Booysen

Junior Lecturers

Ms O. Kunguma, Ms A. Ncube, Ms J. Belle, Mr A.O. Ogundeji

**ANIMAL, WILDLIFE AND GRASSLAND SCIENCES (051 401 2211)**

Professors

\*Prof. J.P.C. Greyling, Prof. G.N. Smit, Prof. H.A. Snyman,  
Prof. J.B. van Wyk, Prof. F.W.C. Neser

Professors Extraordinary

Prof. A.J. Aucamp, Prof. G.J. Erasmus, Prof. J.P. Hayes,  
Prof. M.M. Scholtz, Prof. T.L. Nedambale, Prof. A.J. van der  
Zijpp

Associate Professor  
Lecturers

Prof. H.O. de Waal  
Mr M.D. Fair, Mr P.J. Malan, Mr F.H. de Witt,  
Mr O.B. Einkamerer

Junior Lecturers  
Junior Researcher

Mr M.B. Raito , Mr F. Deacon  
Dr B.B. Janecke

**ARCHITECTURE (051 401 2332)**

Professor  
Senior Lecturer  
Lecturers  
Junior Lecturers

Prof. W.H. Peters  
\*Ms M. Bitzer  
Mr G. Bosman, Mr J.L. du Preez, Mr J.W. Ras  
Mr R. Bitzer, Mr H.B. Pretorius, Mr J. Olivier, Mr J.H. Nel,  
Mr H. Raubenheimer

**CENTRE FOR MICROSCOPY (051 401 2264)**

Associate Professor

Prof. P.W.J. van Wyk

**CENTRE FOR ENVIRONMENTAL MANAGEMENT (051 401 2863)**

Director  
Lecturer  
Affiliated Professor

\*Prof. M.T. Seaman  
Ms M.F. Avenant  
Prof. A. Turton

**CENTRE FOR SUSTAINABLE AGRICULTURE (051 401 2163)**

Director  
Associate Professor  
Professors Extraordinary

\*Prof. I.B. Groenewald  
Dr A. Stroebel  
Prof. A.E. Nesamvuni, Prof. A. Pell, Prof. F.J.C. Swanepoel

**CHEMISTRY (051 401 2547)**

Professors  
Affiliated Professors  
Associate Professors  
Affiliated Associate Professors  
Senior Lecturer  
Lecturers  
Subject Coordinators

\*Prof. A. Roodt, Prof. J.C. Swarts, Prof. B.C.B. Bezuidenhoudt,  
prof. A. Marston  
Prof. D. Ferreira, Prof. H. Frank, Prof. J.M. Botha  
Prof. W. Purcell, Prof. C.R. Dennis, Prof. J.H. van der West-  
huizen, Prof. J. Conradie, Prof. H.G. Visser, Prof. G. Steyl  
Prof. S. Otto, Prof. L.G.J. Ackerman  
Dr S.L. Bonnet  
Dr K. von Eschwege, Dr J.A. Venter, Mr E.H.G. Langner,  
Dr E. Erasmus  
Dr M. Versteeg, Ms R. Meintjes

**Qwaqwa Campus**

Professor

Lecturers

Junior Lecturer

Prof. A.S. Luyt

\*Mr T.A. Tsotetsi, Ms M.A. Malimabe, Ms N.F. Molefe,  
Ms M.A. Jordaan

Mr R.G. Moji

**CONSUMER SCIENCE**

Associate Professor

Lecturers

Junior Lecturers

\*Prof. H.J.H. Steyn

Ms I. van der Merwe, Ms J.F. Vermaas

Ms J.S. van Zyl, Ms P.Z. Swart

**COMPUTER SCIENCE AND INFORMATICS (051 401 2754)**

Professors

Affiliated Professor

Senior Lecturers

Lecturers

Junior Lecturers

Prof. P.J. Blignaut, Prof. T. McDonald

Prof. H.J. Messerschmidt

\*Dr Anelize van Biljon, Dr L. de Wet, Dr J.E. Kotze, Dr E. Nel

Ms E.H. Dednam, Mr A.J. Burger, Mr W. Nel, Dr T. Beelders,

Mr R. Brown

Ms M.J.F. Botha, Mr R.C. Fouché, Mr J. Marais, Mr B. Campbell

**Qwaqwa Campus**

Lecturers

Junior Lecturers

Mr R.M. Alfonsi, Ms R.D. Wario

\*Mr V.F.S. Mudavanhu, Mr B. Sebastian, Mr F.M. Radebe,

Mr T. Lesesa, Mr M.B. Mase, Mr G.J. Dollman

**GENETICS (051 401 2595)**

Professor

Affiliated Professor

Affiliated Associate Professor

Lecturers

Affiliated Lecturers

Junior Lecturers

\*Prof. J.J. Spies, Prof. J.P. Grobler

Prof. T.E. Turner

Prof. A. Kotzé

Ms K. Ehlers, Mr M.F. Maleka, Ms P. Spies

Dr D.L. Dalton, Lt.-Col. A. Lucassen

Ms Z. Odendaal, Ms L. Wessels, Ms H. van der Westhuizen,

Ms S-R. Schneider

**GEOGRAPHY (051 401 2255)**

Professors

Senior Lecturers

Lecturers

Junior Lecturers

**Qwaqwa Campus**

Associate Professor

Senior Lecturer

Lecturers

Junior Lecturer

\*Prof. P.J. Holmes, Prof. G.E. Visser

Dr C.H. Barker, Dr S.J. Brooks

Ms E. Kruger, Ms S. Vrahimis, Ms T.C. Mehlomakhulu

Ms M. Rabumbulu, Ms A. Steenekamp

Prof. W.F. van Zyl

\*Dr J.H.D. Claassen

Dr G. Mukwada, Mr A. Adjei, Ms M. Naidoo

Mr P.S. Mahasa

**GEOLOGY (051 401 2515)**

Professor-researcher

Associate Professors

Senior Lecturer

Senior Lecturer-researcher

Junior Lecturer

\*Prof. W.A. van der Westhuizen

Prof. W.P. Colliston, Prof. M. Tredoux, Prof. C.D.K. Gauert

Dr F. Roelofse

Dr H.E. Praekelt

Ms H. Pretorius, Mr A.I. Odendaal

**INSTITUTE FOR GROUNDWATER STUDIES (051 401 2175)**

Professor/Director	*Vacant
Professor	Prof. G.J. van Tonder
Affiliated Associate Professors	Prof. K. Witthausser, Prof. J.L. Nieber
Lecturers/Researchers	Ms L-M. Deysel, Dr P.D. Vermeulen, Dr F.D. Fourie

**MATHEMATICS AND APPLIED MATHEMATICS (051 401 2691)**

Professors	*Prof. J.H. Meyer, Prof. A.H.J.J. Cloot, Prof. D.M. Murray, Prof. S.W. Schoombie
Associate Professor	Prof. T. Acho
Senior Lecturers	Dr H.W. Bargenda, Ms J.S. van Niekerk
Lecturers	Ms A.F. Kleynhans, Dr S. Dorfling, Mr C. Venter

**Qwaqwa Campus**

Associate Professor	Prof. J. Schröder
Lecturer	Mr S.P. Mbambo
Junior Lecturer	Ms H.C. Faber

**MATHEMATICAL STATISTICS AND ACTUARIAL SCIENCE (051 401 2311)**

Professors	*Prof. R. Schall, Prof. M.S. Finkelstein
Senior Lecturers	Dr J.M. van Zyl, Ms L van der Merwe, Mr F.F. Koning, Dr D. Chikobvu, Dr A. Verster
Lecturers	Mr A.M. Naudé, Mr M.J. von Maltitz, Mr S. van der Merwe, Ms E. Girmay, Ms W. Oosthuizen, Ms Z. Ludick, Mr M. Sjölander

**MICROBIAL, BIOCHEMICAL AND FOOD BIOTECHNOLOGY (051 401 2396)****Division of Microbiology and Biochemistry**

Professors	*Prof. J.C. du Preez, Prof. J. Albertyn, Prof. R.R. Bragg, Prof. S.G. Kilian, Prof. J.L.F. Kock, Prof. H.-G. Patterton, Prof. M.S. Smit, Prof. E. van Heerden, Prof. B.C. Viljoen
Senior Lecturers	Dr. C.H. Pohl-Albertyn, Dr A. van Tonder, Dr H.G. O'Neill, Dr F.H. O'Neill, Dr D. Opperman
Junior Lecturers	Ms C.E. Boucher, Mr W.P.D. Schabort
Researcher	Ms . Steyn
Affiliated Associate Professor	Prof. E.J. Lodolo

**Division of Food Science**

Professor	Prof. G. Osthoff
Associate Professors	Prof. A. Hugo, Prof. C.J. Hugo
Senior Lecturers	Dr J. Myburgh, Dr M. de Wit
Lecturer	Ms C. Bothma

**PHYSICS (051 401 2321)**

Professors	*Prof. H.C. Swart, Prof. P.J. Meintjes, Prof. J.J. Terblans
Associate Professors	Prof. W.D. Roos, Prof. M.J.H. Hoffman, Prof. O.M. Ntwaeaborwa
Affiliated Associate Professor	Prof. K.T. Hillie
Senior Lecturer	Dr R.E. Kroon

**Qwaqwa-kampus**

Associate Professor	Prof. B.F. Dejene
Senior Lecturer	Dr J.Z. Msomi
Lecturers	*Dr J.J. Dolo , Mr R.O. Ocaya, Mr S.V. Motloung
Junior Lecturer	Mr L.F. Koao

**PLANT SCIENCES (051 401 2514)****Plant Pathology**

Professors Prof. Z.A. Pretorius, Prof. W.J. Swart, Prof. N.W. McLaren,  
Prof. G.J. Marais  
Senior Lecturer Dr M. Gryzenhout

**Botany**

Associate Professor \*Prof. P.J. du Preez  
Affiliated Associate Professor Prof. M. van der Bank  
Senior Lecturers Dr G.P. Potgieter, Dr B. Visser  
Lecturers Dr M. Cawood, Dr L. Mohase, Dr M. Jackson, Ms L. Joubert

**Plant Breeding**

Professor Prof. M.T. Labuschagne  
Associate Professor Prof. L. Herselman  
Affiliated Associate Professors Prof. R. Prins, Prof. J.B.J. van Rensburg  
Lecturers Dr A. van Biljon, Dr A. Minnaar-Ontong, Dr R. van der Merwe

**Qwaqwa Campus**

Senior Lecturers \*Dr A.O.T. Ashafa, Dr E.J.J. Sieben  
Lecturers Dr M.J. Moloi, Mr R. Lentsoane  
Junior Lecturer Mr T.R. Pitso

**QUANTITY SURVEYING AND CONSTRUCTION MANAGEMENT (051 401 2248)**

Professor \*Prof. J.J.P. Verster  
Adjunct Professor Prof. H.J. Marx  
Senior Lecturer Mr F.H. Berry  
Lecturers Mr B.J. Swart, Mr H.J. van Vuuren, Ms B.G. Zulch,  
Mr P.M. Oosthuizen, Mr C.H. van Zyl, Mr M.S. Ramabodu,  
Ms E. Jacobs, Ms O.R.C. du Preez, Ms M.M. Els

**SOIL, CROP AND CLIMATE SCIENCES (051 401 2212)**

Professors \*Prof. C.C. du Preez, Prof. J.C. Pretorius, Prof. L.D. van Rensburg, Prof. S. Walker  
Associate Professor Prof. C.W. van Huyssteen  
Senior Lecturers Dr P.A.L. le Roux, Dr J. Allemann, Dr G.M. Ceronio,  
Dr G.M. Engelbrecht  
Lecturers Ms L. de Wet, Ms E. Kotzé, Mr A.S. Steyn

**URBAN AND REGIONAL PLANNING (051 401 2486)**

Professor \*Prof. V.J. Nel  
Senior Lecturer Dr M.M. Campbell  
Lecturers Mr P.J. Potgieter, Ms E. Barclay, Mr Y. Mashalaba

**ZOOLOGY AND ENTOMOLOGY (051 401 2427)**

Professors \*Prof. J.G. van As, Prof. S. v.d. M. Louw, Prof. L. Basson  
Associate Professor Prof. L.L. van As  
Professors Extraordinary Prof. G.L. Prinsloo, Prof. L.J. Fourie  
Lecturers Ms E.M.S.P. van Dalen, Mr H.J.B. Butler, Mr C.R. Haddad,  
Dr C. Jansen van Rensburg  
Mr V.R. Swart, Ms L. Heyns

**Qwaqwa Campus**

Senior Lecturer \*Dr M.M.O. Thekiso  
Lecturers Mr J. van As, Mr E. Bredenhand  
Junior Lecturer Ms H.J.M. Matete, Ms M. van As, Ms L.T. Mabe

# DEGREES

Apart from degrees and diplomas that may be instituted by the University in future the Faculty confers the following degrees in the Agriculture Program:

	MINIMUM PERIOD OF STUDY	ABBREVIATIONS	STUDY CODE	PAGE
<b>University Preparation Programme Agricultural Sciences (UPP Agricultural Sciences) for B.Agric. – South Campus</b>	1 year	UPP Agric.	5002	12
<b>DEGREES</b>				
<b>Baccalaureus degree</b>				
Baccalaureus Agriculturae	3 years	B.Agric.		13
Baccalaureus Scientiae Agriculturae	4 years	B.Sc.Agric.		26
<b>Honours degrees</b>				113
Baccalaureus Scientiae Agriculturae Honores		B.Sc.Agric. Hons.		
Baccalaureus Agriculturae Honores		B.Agric.Hons.		
<b>Master's degrees</b>				113
Magister Scientiae Agriculturae		M.Sc.Agric.		
Magister in Sustainable Agriculture		M.V.L.		
Magister Agriculturae		M.Agric.		
<b>Doctor's degrees</b>				113
Philosophiae Doctor		Ph.D.		
Doctor Scientiae		D.Sc.		



# REGULATIONS AND INFORMATION

## FIRST BACHELOR'S DEGREES IN AGRICULTURE

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### Degrees

The following first bachelor's degrees are awarded in the Agriculture Program:

Degree		Abbreviation
Baccalaureus Agriculturae	3 years	B.Agric.
Baccalaureus Scientiae Agriculturae	4 years	B.Sc.Agric.

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### OVERARCHING FACULTY REGULATIONS, INFORMATION AND TRANSITIONAL MEASURES

#### INFORMATION

All prospective B.Sc.Agric. students should take Life Sciences or Physical Sciences for the National Senior Certificate, over and above Mathematics, which is compulsory.

#### Module codes

All undergraduate modules are presented as semester modules. The weights awarded to the different semester modules are measured in teaching credits. A teaching credit equals ten teaching hours per semester.

The alphabetical code indicates the name of the specific subject. The modules are numbered. The first digit indicates the academic level of the module, but not necessarily the academic year of presentation for example, 100-level modules are introductory in nature; 200-level modules and higher are more advanced.

The second digit indicates the examination month - whether the semester examination in that particular module is written in June or November. Uneven numbers, 1, 3, 5 and 7, apply to the first semester (June examination). Even numbers, 2, 4, 6 and 8 apply to the second semester (November examination). Nought (0) indicates a year module where examination is written in November.

The third digit must be multiplied by 4, to indicate the number of teaching credits of the module. For example, AGR354 indicates an advanced Agronomy module, presented during the first semester, and worth 16 teaching credits.

#### REGULATIONS

**Nota Bene:** The general regulations regarding first bachelor's degrees (General Regulations A1 to A31) apply to this faculty *mutatis mutandis*. (<http://www.ufs.ac.za/content.aspx?id=57>)

#### Reg. H1 - Admission requirements

- See General Regulations A2 and A3.
- In addition to the requirements contained in General Regulation A2(a), a candidate has to comply with the following additional faculty requirements:

**For persons who matriculated before 2008, the following is applicable:**

- Senior certificate with matriculation endorsement (matriculation exemption) or an equivalent qualification.
- A minimum M-Score of 30 plus a HG = E or SG = C in an official tuition language in grade 12.
- Mathematics HG = D or SG = B. Alternatively (senior students) a pass in WTW 164 is required
- Biology HG = D or SG = B or Physical Science HG = E or SG = C.
- If the modules WTW114 and/or WKS114 are included in the learning programme, Mathematics HG = B is required. Alternatively (senior students) a pass mark of at least 70% in WTW164 is required.

**For persons who obtained the national senior certificate in 2008 or later, the following is applicable:****Faculty specific admission requirements for the B.Sc. Agric:**

- A minimum AP of 30 plus a performance level 4 in an official tuition language.
- Mathematics on performance level 5. Alternatively (senior students) a pass mark in WTW 164 is required.
- Life Sciences on performance level 5 or Physical Sciences on performance level 4.

**Faculty specific admission requirements for the B. Agric:**

- A minimum AP of 30 plus a performance level 4 in an official tuition language.
- Mathematics on performance level 3.

**Reg. H2 - Re-admission requirements**

See General Regulation A19.

**Reg. H3 - Insertion of modules on the time table**

The curricula of the agricultural programme consist as from the second year of study of compulsory and selective modules. It is the responsibility of the student to ensure that the relevant selective modules that he/she wants to select do not clash with each other or the compulsory modules on the time table. Provision will be made to accommodate the compulsory modules on the time table as far as possible.

**Reg. H4 - Pass requirements**

- (a) See General Regulation A17.
- (b) The aggregate mark for modules in this faculty is the arithmetic mean of the semester plus the examination mark, rounded to a whole percentage unless stipulated differently in the module manual.
- (c) A semester mark of 50% is needed for passing a module in which no official examination is required.

**Reg. H5 - First degrees with distinction**

- (a) See General Regulation A18.

**Reg. H6 - Presentation of seminar modules**

- (a) The seminar modules can only be taken simultaneously with all the prescribed final year modules of the particular major subject, in the same semester or afterwards, with due regard for further preconditions applying to certain seminar modules.
- (b) If a student needs only modules of the first- (or second-) semester to complete her/his degree, as well as either one or more seminar modules, which may be presented in the second- (or first-) semester, he/she can be allowed to complete these modules during the first (or second) semester.

**Reg. H9 - Changing from B.Agric. to B.Sc.Agric.**

A student who has registered for the B.Agric. degree, can change to a suitable Learning programme in the B.Sc.Agric. degree, in consultation with the Academic Student Services, but only if the student has passed the compulsory first academic year of the B.Agric. degree with an average mark of at least 70% and additional first-year B.Sc.Agric. modules enrolled for in consultation with the Programme Director to comply with the minimum prerequisites for Professional registration (SACNASP). In such a case the first academic year B.Agric. will be considered as a deviation from the first academic year for the B.Sc.Agric. In changing to a B.Sc.Agric, Learning programme compliance with the prerequisites is essential. Credit will be given for modules that have been passed in the second and/or third academic year.

**Reg. H10 - Changing of Learning Programmes**

A student can in exceptional cases submit a motivated application to the Dean to change the module composition of a Learning programme.

**Reg. H10(a)** – Students who passed grade 12 Information Technology (IT) on performance level 4, or Computer Application Technology (CAT) on performance level 5, are exempted from BRS111.

**UNIVERSITY PREPARATION PROGRAMME AGRICULTURAL SCIENCES**  
**(UPP AGRICULTURAL SCIENCES – 5002)**  
**B.AGRIC. (Agriculture) Programme – SOUTH CAMPUS**

This programme extends over 1 year and gives the successful student a chance for entrance to the B.Agric. Learning Programmes on the main campus. \*Modules with an asterisk are year modules.

Year		Semester 1	Semester 2	Entrance Requirements
1	<b>MAINSTREAM MODULES</b>			<ul style="list-style-type: none"> <li>• National Senior Certificate (NCS)</li> <li>• Minimum Application Point (AP) 20</li> <li>• Official tuition language - level 3 (40%)</li> <li>• Mathematical Literacy - level 6 (70%) <b>or</b> Mathematics - level 3 (40%)</li> </ul>
	Economic management of resources	<b>Compulsory</b> -	<b>Compulsory</b> LEC124	
	Biological principals in Agriculture	LWB114	-	
	Chemistry	LWC112	LWC121	
	<b>DEVELOPMENTAL MODULES</b>			
Mathematical Literacy in Agriculture	<b>Compulsory</b> MTA108*	<b>Compulsory</b>		
Life-long Learning	VBL108*			
Academic language skills course in English or Afrikaans	ALN108* or AFA108*			
Basic Computer Literacy	BRC111			
<b>NB</b>	<b>TRANSITION TO MAINSTREAM B.AGRIC. (MAIN CAMPUS)</b> <ul style="list-style-type: none"> <li>• Pass <b>ALL</b> the <u>Mainstream</u> modules (LEC124, LWC112, LWC121 and LWB114)</li> </ul> <b>PLUS at least <u>THREE</u> of the four <u>Developmental</u> modules:</b> <ul style="list-style-type: none"> <li>• <b>Mathematical Literacy in Agriculture (MTA108)</b></li> <li>• <b>Life-long Learning (VBL108)</b></li> <li>• <b>Academic language skills course in English (ALN108) or Afrikaans (AFA108)</b></li> <li>• <b>Basic Computer Literacy (BRC111)</b></li> </ul>			
2	Follow the mainstream <u>first</u> year B.Agric. Learning Programme of choice as set forth in the Faculty Yearbook.			
3	Follow the mainstream <u>second</u> year B.Agric. Learning Programme of choice as set forth in the Faculty Yearbook.			
4	Follow the mainstream <u>third</u> year B.Agric. Learning Programme of choice as set forth in the Faculty Yearbook.			

**Please note:**

- Students receive recognition for LWL134 (Main Campus) only upon successful completion of the following modules: LWC112 (UPP 1st semester) + LWC121 (UPP 2nd semester) + LWL151 (Practical main campus – second year of study).
- LWC112 is a prerequisite for LWC121.

**INFORMATION**

Degree objective:

The objective of the degree is the training of students who will be able to apply agricultural knowledge practically on farm level as well as in agricultural related organisations. The B. Agric. qualification will allow persons to apply their knowledge in the fields of resource utilisation, agricultural production, processing, management and communication.

**Faculty specific admission requirements for the B. Agric:**

- A minimum AP of 30 plus a performance level 4 in an official tuition language.
- Mathematics on performance level 3.

<b>Specialisation</b>	<b>Study code</b>	<b>Learning programme</b>
Irrigation Management	5311	1
Animal Production Management	5312	2
Mixed-farming Management	5313	3
Crop Production Management	5314	4
Agricultural Management	5316	5
Wildlife Management	5317	6
Agricultural Economics	5318	7

## REGULATIONS

### Reg. H12 - Curricula

#### Learning programme 1 - Study code 5311

#### B.Agric.: Specialisation in Irrigation Management

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##### First academic year

###### *First semester*

- BRS111 : Computer literacy
- LWL114 : Biological principles in Agriculture
- LWL134 : Chemical principles in Agriculture
- LWL154 : Physical and mechanised principles in Agriculture
- LWL194 : Mathematical calculations in Agriculture

###### *Second semester*

- LEK124 : Economic management of resources
  - LWL144 : Biochemical principles in Agriculture
  - LWL164 : Microbiological principles in Agriculture
  - LWL142 : Biometrical principles in Agriculture
  - BRS121 : Advanced computer literacy
- 

##### Second academic year

###### *Third semester*

- GKD214 : Soil ecology
- LEK214 : Agricultural finance
- LWR214 : Introduction to Agrometeorology

*Choose at least 16 credits from the following*

- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as insect pests of importance to agriculture and control measures
- GEO114 : Introduction to Physical Geography
- PPG214 : Principles of Plant Pathology

###### *Fourth semester*

- AGR224 : Crop production principles
  - LBV224 : Communication and agricultural extension
  - LEK224 : Farm planning and management
  - LNG224 : Engineering principles in agricultural practices
-

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### Third academic year

#### *Fifth semester*

- GKD314 : Soil evaluation and land use planning  
LEK314 : Introduction to agricultural marketing  
LNG314 : Hydraulics  
LWL312 : Professional skills

*Choose at least 16 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops  
HRT314 : Vegetable production  
LWR314 : Influence of climate on agricultural practices

#### *Sixth semester*

- GKD324 : Sustainable soil and water management  
LBB344 : Strategic Agricultural management  
LBB362 : Seminar in Agricultural management  
LNG324 : Irrigation systems and irrigation surveying

*Choose at least 16 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops  
HRT324 : Fruit production  
LEK324 : Advanced Agricultural marketing  
PPG324 : Plant health management  
WDK324 : Intensive pasture production
-

## Learning programme 2 - Study code 5312

### B.Agric.: Specialisation in Animal Production Management

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#### First academic year

##### *First semester*

- BRS111 : Computer literacy  
LWL114 : Biological principles in  
Agriculture  
LWL134 : Chemical principles in  
Agriculture  
LWL154 : Physical and mechanised  
principles in Agriculture  
LWL194 : Mathematical calculations  
in Agriculture

##### *Second semester*

- LEK124 : Economic management of  
resources  
LWL144 : Biochemical principles in  
Agriculture  
LWL164 : Microbiological principles in  
Agriculture  
LWL142 : Biometrical principles in  
Agriculture  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- LEK214 : Agricultural finance  
VKD214 : Introductory ruminant  
production

*Choose at least 32 credits from the  
following:*

- ENT114 : Introduction to morphology,  
anatomy and bio-ecology of  
insects as well as insect  
pests important to  
agriculture and control  
measures  
GKD214 : Soil ecology  
LWR214 : Introduction to  
Agrometeorology

##### *Fourth semester*

- LBV224 : Communication and  
agricultural extension  
LEK224 : Farm planning and  
management  
VKD224 : Introductory monogastric,  
wildlife and aquaculture  
production  
WDK224 : Veld as natural resource
- 

#### Third academic year

##### *Fifth semester*

- DAF314 : Animal anatomy and  
physiology of farm animals  
VKD314 : Advanced livestock  
production  
LEK314 : Introduction to agricultural  
marketing  
LWL312 : Professional skills  
WDK314 : Applied veld management  
and veld evaluation

##### *Sixth semester*

- DAF324 : Animal health  
DVL344 : Properties of feeds,  
balancing rations and  
fodder flow planning  
LBB344 : Strategic Agricultural  
management  
LBB362 : Seminar in Agricultural  
management  
WDK324 : Intensive pasture  
production
-



## Learning programme 3 - Study code 5313

### B.Agric.: Specialisation in Mixed-farming Management

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#### First academic year

##### *First semester*

- BRS111 : Computer literacy  
LWL114 : Biological principles in Agriculture  
LWL134 : Chemical principles in Agriculture  
LWL154 : Physical and mechanised principles in Agriculture  
LWL194 : Mathematical calculations in Agriculture

##### *Second semester*

- LEK124 : Economic management of resources  
LWL144 : Biochemical principles in Agriculture  
LWL164 : Microbiological principles in Agriculture  
LWL142 : Biometrical principles in Agriculture  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- LEK214 : Agricultural finance  
VKD214 : Introductory ruminant production

*Choose at least 32 credits from the following:*

- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects as well as insect pests important to agriculture and control measures  
GKD214 : Soil ecology  
LWR214 : Introduction to Agrometeorology  
VWS212 : Introductory Food Science  
**AND**  
VWS232 : Food chemistry

##### *Fourth semester*

- LBV224 : Communication and agricultural extension  
LEK224 : Farm planning and management  
VKD224 : Introductory monogastric, wildlife and aquaculture production

*Choose at least 16 credits from the following:*

- AGR224 : Crop production principles  
WDK224 : Veld as natural resource
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### Third academic year

#### *Fifth semester*

- VKD314 : Advanced livestock production
- LEK314 : Introduction to agricultural marketing
- LWL312 : Professional skills

*Choose at least 32 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops
- DAF314 : Animal anatomy and physiology of farm animals
- HRT314 : Vegetable production
- WDK314 : Applied veld management and veld evaluation

#### *Sixth semester*

- DVL344 : Properties of feeds, balancing rations and fodder flow planning
- LBB344 : Strategic Agricultural management
- LBB362 : Seminar in Agricultural management

*Choose at least 32 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops
  - DAF324 : Animal health
  - LEK324 : Advanced Agricultural marketing
  - WDK324 : Intensive pasture production
-

## Learning programme 4 - Study code 5314

### B.Agric.: Specialisation in Crop Production Management

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#### First academic year

##### *First semester*

- BRS111 : Computer literacy  
LWL114 : Biological principles in  
Agriculture  
LWL134 : Chemical principles in  
Agriculture  
LWL154 : Physical and mechanised  
principles in Agriculture  
LWL194 : Mathematical calculations  
in Agriculture

##### *Second semester*

- LEK124 : Economic management of  
resources  
LWL144 : Biochemical principles in  
Agriculture  
LWL164 : Microbiological principles in  
Agriculture  
LWL142 : Biometrical principles in  
Agriculture  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology  
LEK214 : Agricultural finance  
LWR214 : Introduction to  
Agrometeorology  
PPG214 : Principles of Plant  
Pathology

##### *Fourth semester*

- AGR224 : Crop production principles  
LBV224 : Communication and  
agricultural extension  
LEK224 : Farm planning and  
management

*Choose at least 16 credits from the  
following:*

- LNG224 : Engineering principles in  
agricultural practices  
PLT224 : Breeding techniques
-

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### Third academic year

#### *Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
HRT314 : Vegetable production  
LEK314 : Introduction to agricultural marketing  
LWL312 : Professional skills

*Choose at least 16 credits from the following:*

- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects as well as insect pests important to agriculture and control measures  
GKD314 : Soil evaluation and land use planning  
LWR314 : Influence of climate on agricultural practices  
PLT314 : Selection methods

#### *Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
HRT324 : Fruit production  
LBB344 : Strategic Agricultural management  
LBB362 : Seminar in Agricultural management

*Choose at least 16 credits from the following:*

- GKD324 : Sustainable soil and water management  
LEK324 : Advanced Agricultural marketing  
PPG324 : Plant health management
-

## Learning programme 5 - Study code 5316

### B.Agric.: Specialisation in Agricultural Management

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#### First academic year

##### *First semester*

- BRS111 : Computer literacy  
LWL114 : Biological principles in  
Agriculture  
LWL134 : Chemical principles in  
Agriculture  
LWL154 : Physical and mechanised  
principles in Agriculture  
LWL194 : Mathematical calculations  
in Agriculture

##### *Second semester*

- LEK124 : Economic management of  
resources  
LWL144 : Biochemical principles in  
Agriculture  
LWL164 : Microbiological principles in  
Agriculture  
LWL142 : Biometrical principles in  
Agriculture  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology  
LEK214 : Agricultural finance  
LWR214 : Introduction to  
Agrometeorology

*Choose at least 16 credits from the following:*

- EECF61306 : Economic systems  
and basic microeconomics  
ENT114 : Introduction to morphology,  
anatomy and bio-ecology of  
insects as well as insect  
pests important to  
agriculture and control  
measures  
PPG214 : Principles of Plant  
Pathology  
VKD214 : Introductory ruminant  
production  
VWS212 : Introductory Food Science

##### *Fourth semester*

- LBV224 : Communication and  
agricultural extension  
LEK224 : Farm planning and  
management  
LNG224 : Engineering principles in  
agricultural practices

*Choose at least 16 credits from the following:*

- AGR224 : Crop production principles  
EECF62306 : Introduction to  
macroeconomics  
VKD224 : Introductory monogastric,  
wildlife and aquaculture  
production  
WDK224 : Veld as natural resource

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### Third academic year

#### *Fifth semester*

- LEK314 : Introduction to agricultural marketing
- LWL312 : Professional skills
- LWR314 : Influence of climate on agricultural practices

*Choose at least 32 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops
- DAF314 : Animal anatomy and physiology of farm animals
- VKD314 : Advanced livestock production
- EECS71407 : Microeconomics
- GKD314 : Soil evaluation and land-use planning
- HRT314 : Vegetable production
- LNG314 : Hydraulics
- VWS314 : Food products from animals
- WDK314 : Applied veld management and veld evaluation

#### *Sixth semester*

- LBB344 : Strategic Agricultural management
- LBB362 : Seminar in Agricultural management
- LEK324 : Advanced Agricultural marketing

*Choose at least 32 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops
  - DAF324 : Animal health
  - DVL344 : Properties of feeds, balancing rations and fodder flow planning
  - ECS724 : Macroeconomics
  - GKD324 : Sustainable soil and water management
  - HRT324 : Fruit production
  - LNG324 : Irrigation systems and irrigation surveying
  - LWR324 : Climate change and variability
  - PPG324 : Plant health management
  - VWS324 : Food products from plants
  - WDK324 : Intensive pasture production
-

## Learning programme 6 - Study code 5317

### B.Agric.: Specialisation in Wildlife Management

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#### First academic year

##### *First semester*

- BRS111 : Computer literacy  
LWL114 : Biological principles in Agriculture  
LWL134 : Chemical principles in Agriculture  
LWL154 : Physical and mechanised principles in Agriculture  
LWL194 : Mathematical calculations in Agriculture

##### *Second semester*

- LEK124 : Economic management of resources  
LWL144 : Biochemical principles in Agriculture  
LWL164 : Microbiological principles in Agriculture  
LWL142 : Biometrical principles in Agriculture  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology  
LEK214 : Agricultural finance  
LWR214 : Introduction to Agrometeorology

*Choose at least 16 credits from the following:*

- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects as well as insect pests important to agriculture and control measures  
GEO114 : Introduction to Physical Geography  
VKD214 : Introductory ruminant production

##### *Fourth semester*

- LBV224 : Communication and agricultural extension  
LEK224 : Farm planning and management  
WDK224 : Veld as natural resource

*Choose at least 16 credits from the following:*

- LNG224 : Engineering principles in agricultural practices  
VKD224 : Introductory monogastric, wildlife and aquaculture production
-

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### Third academic year

#### *Fifth semester*

- GKD314 : Soil evaluation and land use planning
- LEK314 : Introduction to agricultural marketing
- LWL312 : Professional skills
- WDK314 : Applied veld management and veld evaluation

*Choose at least 16 credits from the following:*

- VKD314 : Advanced livestock production
- LWR314 : Influence of climate on agricultural practices

#### *Sixth semester*

- LBB344 : Strategic Agricultural management
- LBB362 : Seminar in Agricultural management
- WDK324 : Intensive pasture production

*Choose at least 32 credits from the following:*

- DAF324 : Animal health
  - DRK344 : Animal behaviour
  - DVL344 : Properties of feeds, balancing rations and fodder flow planning
  - GKD324 : Sustainable soil and water management
  - LEK324 : Advanced Agricultural marketing
-



**Learning programme 7 - Study code 5318**  
**B.Agric.: Specialisation in Agricultural Economics**

Year		Semester 1	Semester 2
1	Computer literacy Mathematics / Biometry Core Business Activity / General Management Commercial Law Accounting Agricultural Economics	BRS111 LWL194 EBUS61406 HRG114 EACC61406	BRS121 LWL142 EBUS62406 HRG124  LEK124
2	Agricultural Economics Brand Management / Innovation Management Agricultural Engineering Agricultural Extension  Taxation (Year module) Soil Science Animal Science Agronomy Animal Science Grassland Science	LEK214 EBUS63406	LEK224 EBUS64406 LNG224 LBV224
		<b>Choose 32 credits</b>	
		*ETXA60806 GKD214 VKD214	*ETXA60806  ARG224 VKD224 WKD224
3	Agricultural Economics Agricultural Economics Strategic Management / Financial Management Agricultural Management  Agronomy Animal Science Soil Science Grassland Science	LEK314 LEK414 EBUS75407	LEK324 LEK424 EBUS76407 LBB362
		<b>Choose 32 credits</b>	
		AGR314 VKD314 GKD314 WDK314	AGR324 DVL344 GKD324 WDK324

\* Year module

**INFORMATION****Study aims**

The objective is the training of scientists who, through research and practically orientated development, can promote a scientific subject in particular or agricultural science in general. After acquiring the B.Sc.Agric. qualification, the person will have the following skills, e.g. problem identification and aim formulation, collecting and verification of data, systematisation and interpretation of data, effective communication of information and making recommendations.

**Faculty specific admission requirements for the B.Sc. Agric.:**

- A minimum AP of 30 plus a performance level 4 in an official tuition language.
- Mathematics on performance level 5. Alternatively a pass mark in WTW 164 is required.
- Life Sciences on performance level 5 or Physical Sciences on performance level 4.

**Major subject combinations**

There are different curricula for the degree B.Sc. Agric. with the following major subject combinations:

<b>Specialisation</b>	<b>Study code</b>	<b>Learning programme</b>
Agricultural Economics (General)	5337	17
Agricultural Economics/Agronomy	5322	2
Agricultural Economics/Animal Science	5344	24
Agricultural Economics/Food Science	5339	19
Agricultural Economics/Natural resources	5338	18
Agronomy/Agricultural Economics	5322	2
Agronomy/Agrometeorology	5323	3
Agronomy/Animal Science	5326	6
Agronomy/Entomology	5351	31
Agronomy/Food Science	5327	7
Agronomy/Plant Breeding	5324	4
Agronomy/Plant Pathology	5325	5
Agronomy/Irrigation field	5329	9
Agronomy/Soil Science	5321	1
Agrometeorology/Agronomy	5323	3
Agrometeorology/Grassland Science	5341	21
Agrometeorology/Plant Pathology	5340	20
Agrometeorology/Soil Science	5334	14
Animal Science	5345	25
Animal Science/Agronomy	5326	6
Animal Science/Agricultural Economics	5344	24
Animal Science/Food Science	5346	26
Animal Science/Grassland Science	5347	27
Food Science/Agricultural Economics	5339	19
Food Science/Agronomy	5327	7
Food Science/Animal Science	5346	26

Food Science/Biochemistry	5348	28
Food Science/Chemistry	5350	30
Food Science/Microbiology	5349	29
Grassland Science/Agrometeorology	5341	21
Grassland Science/Animal Science	5347	27
Grassland Science/Soil Science	5336	16
Grassland Science/Plant Breeding	5342	22
Irrigation field/Agronomy	5329	9
Irrigation field/Natural resources	5331	11
Irrigation field/Soil Science	5330	10
Plant Breeding/Agronomy	5324	4
Plant Breeding/Grassland Science	5342	22
Plant Breeding/Plant Pathology	5343	23
Plant Pathology/Agronomy	5325	5
Plant Pathology/Agrometeorology	5340	20
Plant Pathology/Entomology	5332	12
Plant Pathology/Plant Breeding	5343	23
Plant Pathology/Soil Science	5335	15
Soil Science/Agronomy	5321	1
Soil Science/Agrometeorology	5334	14
Soil Science/Irrigation field	5330	10
Soil Science/Grassland Science	5336	16
Soil Science/Plant Pathology	5335	15

## REGULATIONS

### Reg. H13 - Curricula

#### Learning programme 1 - Study code 5321

#### B.Sc.Agric.: Specialisation in Agronomy and Soil Science

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##### First academic year

###### *First semester*

BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

###### *Second semester*

BLG144 : Organisms and the Environment  
CEM144 : Physical and organic chemistry  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy

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##### Second academic year

###### *Third semester*

GKD214 : Soil ecology  
LWR214 : Introduction to Agrometeorology

*Choose at least 32 credits from the following:*

BCC214 : Biochemistry for agriculture and health sciences  
ENT114 : Introduction to morphology, anatomy and bio-ecology of insects as well as insect pests important to agriculture and control measures  
GEO114 : Introduction to Physical Geography  
PPG214 : Principles of Plant Pathology

###### *Fourth semester*

AGR224 : Crop production principles

*Choose at least 48 credits from the following:*

GLG124 : General geology  
LNG224 : Engineering principles in agricultural practices  
PLK224 : Plant growth and developmental physiology  
PLT224 : Breeding techniques  
WDK224 : Veld as natural resource

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**Third academic year***Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
GKD314 : Soil evaluation and land use planning  
HRT314 : Vegetable production

*Choose at least 16 credits from the following:*

- LEK314 : Introduction to agricultural marketing  
LWR314 : Influence of climate on agricultural practices  
WDK314 : Applied veld management and veld evaluation

*Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
GKD324 : Sustainable soil and water management  
DMT322 : Statistical analyses

*Choose at least 32 credits from the following:*

- HRT324 : Fruit production  
LEK324 : Advanced Agricultural marketing  
LWR324 : Climate change and variability  
PPG324 : Plant health management  
WDK324 : Intensive pasture production
- 

**Fourth academic year***Seventh semester*

- AGR414 : Crop and stress physiology  
AGR434 : Research methodology  
AGR451 : Seminar in Agronomy  
GKD414 : Soil chemistry  
GKD434 : Soil physics

*Eighth semester*

- AGR424 : Crop production under protection  
AGR444 : Weed control  
GKD424 : Soil biology  
GKD444 : Soil geography  
GKD461 : Seminar in Soil Science
-

## Learning programme 2 - Study code 5322

### B.Sc.Agric.: Specialisation in Agronomy and Agricultural Economics

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#### First academic year

##### *First semester*

BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

BLG144 : Organisms and the Environment  
CEM144 : Physical and organic chemistry  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy

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#### Second academic year

##### *Third semester*

GKD214 : Soil ecology  
LEK214 : Agricultural finance

*Choose at least 32 credits from the following :*

BCC214 : Biochemistry for agriculture and health sciences  
LWR214 : Introduction to Agrometeorology  
LNG224 : Engineering principles in agricultural practices  
STK216 : Multiple regression analysis

##### *Fourth semester*

AGR224 : Crop production principles  
LEK224 : Farm planning and management

*Choose at least 32 credits from the following :*

LBV224 : Communication and agricultural extension  
PLK224 : Plant growth and developmental physiology  
STK226 : Multiple regression: Variance and time series analysis

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**Third academic year***Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
GKD314 : Soil evaluation and land use planning  
LEK314 : Introduction to agricultural marketing

*Choose at least 16 credits from the following :*

- ABR214 : Labour law  
ENT114 : Introduction to morphology, anatomy and bio-ecology of insects as well as insect pests important to agriculture and control measures  
EFES71407 : Money and interest rates  
HRT314 : Vegetable production  
LNG314 : Hydraulics

*Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
GKD324 : Sustainable soil and water management  
LEK324 : Advanced Agricultural marketing  
DMT322 : Statistical analyses

*Choose at least 16 credits from the following :*

- ABR224 : Labour law  
EFES72407 : Financial markets, instruments and institutions  
HRT324 : Fruit production  
LNG324 : Irrigation systems and irrigation surveying  
LWR324 : Climate change and variability  
PLK324 : Plant metabolism  
PPG324 : Plant health management
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**Fourth academic year***Seventh semester*

- AGR414 : Crop and stress physiology  
AGR434 : Research methodology  
AGR451 : Seminar in Agronomy  
LEK414 : Managerial economics  
LEK434 : Agribusiness management

*Eight semester*

- AGR424 : Crop production under protection  
AGR444 : Weed control  
LEK424 : Resource economics  
LEK444 : Agricultural policy and development  
LEK461 : Seminar in Agricultural Economics
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### Learning programme 3 - Study code 5323

#### B.Sc.Agric.: Specialisation in Agronomy and Agrometeorology

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##### First academic year

###### *First semester*

- BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

###### *Second semester*

- BLG144 : Organisms and the Environment  
CEM144 : Physical and organic chemistry  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy
- 

##### Second academic year

###### *Third semester*

- GKD214 : Soil ecology  
LWR214 : Introduction to Agrometeorology

###### *Fourth semester*

- AGR224 : Crop production principles  
LNG224 : Engineering principles in agricultural practices

*Choose at least 32 credits from the following :*

- BCC214 : Biochemistry for agriculture and health sciences  
ENT114 : Introduction to morphology, anatomy and bio-ecology of insects as well as insect pests important to agriculture and control measures  
GEO114 : Introduction to Physical Geography  
PPG214 : Principles of Plant Pathology  
WTW234 : Introductory to mathematical modelling

###### **AND**

- WTW254 : Computer mathematics
- 

*Choose at least 32 credits from the following :*

- GIS224 : Geographic information systems  
PLK224 : Plant growth and developmental physiology  
PLT224 : Breeding techniques  
WDK224 : Veld as natural resource



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**Third academic year***Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
GKD314 : Soil evaluation and land use planning  
HRT314 : Vegetable production  
LWR314 : Influence of climate on agricultural practices

*Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
GKD324 : Sustainable soil and water management  
LWR324 : Climate change and variability  
DMT322 : Statistical analyses

*Choose at least 16 credits from the following :*

- HRT324 : Fruit production  
PPG324 : Plant health management  
WDK324 : Intensive pasture production

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**Fourth academic year***Seventh semester*

- AGR414 : Crop and stress physiology  
AGR434 : Research methodology  
AGR451 : Seminar in Agronomy  
LWR414 : Operational Agrometeorology  
LWR434 : Physical and dynamic meteorology

*Eighth semester*

- AGR424 : Crop production under protection  
AGR444 : Weed control  
LWR424 : Micrometeorology  
LWR444 : Synoptic meteorology  
LWR461 : Seminar in Agrometeorology

## Learning programme 4 - Study code 5324

### B.Sc. Agric.: Specialisation in Agronomy and Plant Breeding

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144\* : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- \*NB – Students who want to continue with GEN216 and GEN246 must get special permission to take BLG124. (prerequisite for GEN modules)
- 

#### Second academic year

##### *Third semester*

- GEN216 : Principles of Genetics
- GKD214 : Soil ecology

*Select at least 24 credits out of the following:*

- BCC214 : Biochemistry for agriculture and health sciences
  - ENT114 : Introduction to morphology, anatomy and bio-ecology of insects as well as insect pests important to agriculture and control measures
  - LWR214 : Introduction to Agrometeorology
  - PLK214 : Plant anatomy and introductory biotechnology
  - PPG214 : Principles of Plant Pathology
  - VWS212 : Introductory Food Science
- 

##### *Fourth semester*

- AGR224 : Crop production principles
- GEN246 : Molecular Genetics
- GEN344 : Population and conservation Genetics
- PLT224 : Breeding techniques

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### Third academic year

#### *Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
PLT314 : Selection methods

*Select at least 32 credits out of the following:*

- GKD314 : Soil evaluation and land use planning  
HRT314 : Vegetable production  
LWR314 : Influence of climate on agricultural practices

#### *Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
DMT322 : Statistical analyses

*Select at least 48 credits out of the following:*

- GKD324 : Sustainable soil and water management  
HRT324 : Fruit production  
LWR324 : Climate change and variability  
PLK324 : Plant metabolism  
PPG324 : Plant health management  
VWS324 : Food products from plants

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### Fourth academic year

#### *Seventh semester*

- AGR414 : Crop and stress physiology  
AGR434 : Research methodology  
AGR451 : Seminar in Agronomy  
BOC314 : Molecular Biology

*Choose 16 credits from the elective modules in the **third** study year*

#### *Eighth semester*

- AGR424 : Crop production under protection  
AGR444 : Weed control  
GEN324 : Evolutionary genetics  
PLT424 : Advanced breeding techniques  
PLT461 : Seminar in Plant Breeding

## Learning programme 5 - Study code 5325

### B.Sc.Agric.: Specialisation in Agronomy and Plant Pathology

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology
- PPG214 : Principles of Plant Pathology

*Choose at least 32 credits from the following:*

- BCC214 : Biochemistry for agriculture and health sciences
- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as agriculturally important insect pests and control measures
- LWR214 : Introduction to Agrometeorology
- MKB216 : Introduction to Microbiology
- PLK214 : Plant anatomy and introductory biotechnology

##### *Fourth semester*

- AGR224 : Crop production principles

*Choose at least 48 credits from the following:*

- ENT224 : Eco physiology of insects
  - LNG224 : Engineering principles in agricultural practices
  - PLK224 : Plant growth and developmental physiology
  - AND**
  - PLK262 : Experimental plant physiology (practical)
  - PLT224 : Breeding techniques
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**Third academic year***Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
GKD314 : Soil evaluation and land use planning  
PPG334 : Molecular Plant Pathology

*Choose at least 16 credits from the following:*

- LWR314 : Influence of climate on agricultural practices  
PLT314 : Selection methods

*Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
GKD324 : Sustainable soil and water management  
PPG324 : Plant health management  
DMT322 : Statistical analyses

*Choose at least 16 credits from the following:*

- LWR324 : Climate change and variability  
PLK324 : Plant metabolism  
PLK344 : Plant defence and biotechnology
- 

**Fourth academic year***Seventh semester*

- AGR414 : Crop and stress physiology  
AGR434 : Research methodology  
AGR451 : Seminar in Agronomy  
  
PPG414 : Fungal diseases of plants  
PPG434 : Epidemiology and ecology of plant pathogens

*Eighth semester*

- AGR424 : Crop production under protection  
AGR444 : Weed control  
PPG424 : Plant diseases caused by bacteria and viruses  
PPG444 : Host-pathogen interactions  
PPG461 : Seminar in Plant Pathology
-

## Learning programme 6 - Study code 5326

### B.Sc.Agric.: Specialisation in Agronomy and Animal Science

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#### First academic year

##### *First semester*

BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical  
          chemicals  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

BLG144 : Organisms and the  
          Environment  
CEM144 : Physical and organic  
          chemistry  
LEK124 : Economic management of  
          resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy

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#### Second academic year

##### *Third semester*

BCC214 : Biochemistry for agriculture  
          and health sciences  
VKD214 : Introductory ruminant  
          production

*Choose at least 24 credits from the  
following:*

GKD214 : Soil ecology  
LEK214 : Agricultural finance  
LWR214 : Introduction to  
          Agrometeorology  
VWS212 : Introductory Food Science  
**AND**  
VWS232 : Food chemistry

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##### *Fourth semester*

AGR224 : Crop production principles  
LEK224 : Farm planning and  
          management  
VKD224 : Introductory monogastric,  
          wildlife and aquaculture  
          production  
WDK224 : Veld as natural resource

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### Third academic year

#### *Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
DAF314 : Animal anatomy and physiology of farm animals  
DTL314 : Theory of animal breeding  
**OR**  
DVL334 : Fundamental and experimental animal nutrition  
HRT314 : Vegetable production

#### *Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
DAF324 : Animal health  
DTL324 : New technologies in animal breeding  
**OR**  
DVL344 : Properties of feeds, balancing rations and fodder flow planning  
HRT324 : Fruit production  
DMT322 : Statistical analyses
- 

### Fourth academic year

#### *Seventh semester*

- AGR414 : Crop and stress physiology  
AGR434 : Research methodology  
AGR451 : Seminar in Agronomy  
DAF414 : Applied reproduction physiology in farm animals  
DTL414 : Animal breeding: Mixed model theory  
**OR**  
DVL434 : Applied monogastric nutrition

#### *Eighth semester*

- AGR424 : Crop production under protection  
AGR444 : Weed control  
DAF424 : Growth and lactation physiology  
VKD461 : Seminar in Animal Science

*Choose at least 16 credits from the following:*

- DTL424 : Animal breeding; Practical application  
DVL464 : Applied ruminant nutrition  
DVL444 : Applied nutrition of wild herbivores and carnivores
-

## Learning programme 7 - Study code 5327

### B.Sc.Agric.: Specialisation in Agronomy and Food Science

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- BCC214 : Biochemistry for agriculture and health sciences
- MKB216 : Introduction to Microbiology
- VWS212 : Introductory Food Science
- VWS232 : Food chemistry

##### *Fourth semester*

- AGR224 : Crop production principles
- IQM242 : Industrial quality management
- VWS222 : Chemical analysis of food
- VWS224 : Food systems

*Choose at least 16 credits out of the following:*

- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as agriculturally important insect pests and control measures
- EBUS61406 : Core business activities
- EHRM51305 : Introduction to human resource management
- VKD214 : Introductory ruminant production

*Choose at least 16 credits out of the following:*

- LEK224 : Farm planning and management
  - EBUS62406 : General Management
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**Third academic year***Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
VDG314 : Human nutrition  
VWS314 : Food products from animals  
VWS334 : Food engineering

*Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
EIOP52305 : Introduction to individual differences  
VWS324 : Food products from plants  
VWS344 : Food microbiology  
DMT322 : Statistical analyses
- 

**Fourth academic year***Seventh semester*

- AGR414 : Crop and stress physiology  
AGR434 : Research methodology  
AGR451 : Seminar in Agronomy  
  
VWS414 : Food products from plants: advanced  
VWS434 : Product development and sensory analysis

*Eighth semester*

- AGR424 : Crop production under protection  
AGR444 : Weed control  
VWS424 : Dairy Science  
VWS444 : Meat Science  
VWS461 : Seminar in Food Science
-

## Learning programme 9 - Study code 5329

### B.Sc.Agric.: Specialisation in Irrigation Science and Agronomy

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology
- LWR214 : Introduction to Agrometeorology

*Choose at least 32 credits from the following:*

- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as agriculturally important insect pests and control measures
  - GEO114 : Introduction to Physical Geography
  - LEK214 : Agricultural finance
  - PPG214 : Principles of Plant Pathology
- 

##### *Fourth semester*

- AGR224 : Crop production principles
- LEK224 : Farm planning and management
- LNG224 : Engineering principles in agricultural practices
- WDK224 : Veld as natural resource

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### Third academic year

#### *Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
GKD314 : Soil evaluation and land use planning  
LNG314 : Hydraulics

*Choose at least 16 credits from the following:*

- HRT314 : Vegetable production  
LEK314 : Introduction to agricultural marketing  
LWR314 : Influence of climate on agricultural practices

#### *Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
GKD324 : Sustainable soil and water management  
LNG324 : Irrigation systems and irrigation surveying  
DMT322 : Statistical analyses

*Choose at least 16 credits from the following:*

- HRT324 : Fruit production  
LBB344 : Strategic agricultural management  
LWR324 : Climate change and variability  
PPG324 : Plant health management  
WDK324 : Intensive pasture production
- 

### Fourth academic year

#### *Seventh semester*

- AGR451 : Seminar in Agronomy  
GKD434 : Soil physics  
LNG414 : Flood and mechanised irrigation

*Choose at least 32 credits from the following:*

- AGR414 : Crop and stress physiology  
AGR434 : Research methodology  
GKD414 : Soil chemistry

#### *Eighth semester*

- GKD461 : Seminar in Soil Science  
LNG424 : Specialised micro, drip and underground irrigation systems

*Choose at least 48 credits from the following:*

- AGR424 : Crop production under protection  
AGR444 : Weed control  
GKD424 : Soil biology  
GKD444 : Soil geography
-

## Learning programme 10 - Study code 5330

### B.Sc.Agric.: Specialisation in Irrigation Science and Soil Science

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology
- LWR214 : Introduction to Agrometeorology

*Choose at least 32 credits from the following:*

- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as agriculturally important insect pests and control measures
  - GEO114 : Introduction to Physical Geography
  - LEK214 : Agricultural finance
  - PPG214 : Principles of Plant Pathology
- 

##### *Fourth semester*

- AGR224 : Crop production principles
- LEK224 : Farm planning and management
- LNG224 : Engineering principles in agricultural practices
- WDK224 : Veld as natural resource

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### Third academic year

#### *Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
GKD314 : Soil evaluation and land use planning  
LNG314 : Hydraulics

*Choose at least 16 credits from the following:*

- LEK314 : Introduction to agricultural marketing  
LWR314 : Influence of climate on agricultural practices

#### *Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
GKD324 : Sustainable soil and water management  
LNG324 : Irrigation systems and irrigation surveying  
DMT322 : Statistical analyses

*Choose at least 16 credits from the following:*

- LBB344 : Strategic agricultural management  
LWR324 : Climate change and variability  
PPG324 : Plant health management  
WDK324 : Intensive pasture production

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### Fourth academic year

#### *Seventh semester*

- AGR451 : Seminar in Agronomy  
GKD434 : Soil physics  
LNG414 : Flood and mechanised irrigation

*Choose at least 32 credits from the following:*

- AGR414 : Crop and stress physiology  
AGR434 : Research methodology  
GKD414 : Soil chemistry

#### *Eighth semester*

- GKD461 : Seminar in Soil Science  
LNG424 : Specialised micro, drip and underground irrigation systems

*Choose at least 48 credits from the following:*

- AGR424 : Crop production under protection  
AGR444 : Weed control  
GKD424 : Soil biology  
GKD444 : Soil geography

## Learning programme 11 - Study code 5331

### B.Sc.Agric.: Specialisation in Irrigation Science and Natural resources

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology
- LWR214 : Introduction to Agrometeorology

##### *Fourth semester*

- LNG224 : Engineering principles in agricultural practices
- WDK224 : Veld as natural resource

*Choose at least 32 credits from the following:*

- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as agriculturally important insect pests and control measures
- GEO114 : Introduction to Physical Geography
- LEK214 : Agricultural finance
- PPG214 : Principles of Plant Pathology
- VKD214 : Introductory ruminant production

*Choose at least 32 credits from the following:*

- AGR224 : Crop production principles
  - LEK224 : Farm planning and management
  - VKD224 : Introductory monogastric, wildlife and aquaculture production
-

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### Third academic year

#### *Fifth semester*

- GKD314 : Soil evaluation and land use planning  
LNG314 : Hydraulics  
LWR314 : Influence of climate on agricultural practices  
WDK314 : Applied veld management and veld evaluation

#### *Sixth semester*

- GKD324 : Sustainable soil and water management  
LNG324 : Irrigation systems and irrigation surveying  
LWR324 : Climate change and variability  
WDK324 : Intensive pasture production  
DMT322 : Statistical analyses

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### Fourth academic year

#### *Seventh semester*

- GKD434 : Soil physics  
LNG414 : Flood and mechanised irrigation  
  
LWR451 : Seminar in Agrometeorology

*Choose at least 32 credits from the following:*

- GKD414 : Soil chemistry  
LWR414 : Operational Agrometeorology  
LWR434 : Physical and dynamical meteorology  
WDK414 : Production and utilisation ecology  
WDK434 : Defoliation phenology and physiology

#### *Eighth semester*

- GKD461 : Seminar in Soil Science  
LNG424 : Specialised micro, drip and underground irrigation systems

*Choose at least 48 credits and two modules from the following:*

- GKD424 : Soil biology  
GKD444 : Soil geography  
LWR424 : Micrometeorology  
LWR444 : Synoptic meteorology  
WDK424 : Advanced veld management  
WDK444 : Advanced fodder plant evaluation

## Learning programme 12 - Study code 5332

### B.Sc.Agric.: Specialisation in Plant Pathology and Entomology

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- ENT216 : Functional morphology and anatomy, classification and identification of evolutionary biology of insects
- PPG214 : Principles of Plant Pathology

*Choose at least 32 credits from the following:*

- BCC214 : Biochemistry for agriculture and health sciences
- GKD214 : Soil ecology
- LWR214 : Introduction to Agrometeorology
- PLK214 : Plant anatomy and introductory biotechnology

##### *Fourth semester*

- ENT224 : Eco-physiology of insects
- ENT262 : Eco-physiology of insects (practical)

*Choose at least 40 credits from the following:*

- AGR224 : Crop production principles
- LNG224 : Engineering principles in agricultural practices
- PLK224 : Plant growth and developmental physiology

#### **AND**

- PLK262 : Experimental plant physiology (practical)
  - PLT224 : Breeding techniques
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### Third academic year

#### *Fifth semester*

- ENT314 : Advanced ecology and agricultural entomology of insects  
PPG334 : Molecular Plant Pathology

*Choose at least 32 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops  
GKD314 : Soil evaluation and land use planning  
HRT314 : Vegetable production  
LWR314 : Influence of climate on agricultural practices  
PLT314 : Selection methods

#### *Sixth semester*

- ENT324 : Applied insect pest management  
PPG324 : Plant health management  
DMT322 : Statistical analyses

*Choose at least 32 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops  
GKD324 : Sustainable soil and water management  
HRT324 : Fruit production  
LWR324 : Climate change and variability

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### Fourth academic year

#### *Seventh semester*

- ENT354 : Agricultural entomology  
PPG414 : Fungal diseases of plants  
PPG434 : Epidemiology and ecology of plant pathogens

*Choose at least 16 credits from the module options in the 2<sup>nd</sup> and 3<sup>rd</sup> year of study*

#### *Eighth semester*

- ENT344 : Applied insect biochemistry and pharmacology  
PPG424 : Plant diseases caused by bacteria and viruses  
PPG444 : Host-pathogen interactions  
PPG461 : Seminar in Plant Pathology

*Choose at least 16 credits from the module options in the 2<sup>nd</sup> and 3<sup>rd</sup> year of study*

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## Learning programme 14 - Study code 5334

### B.Sc.Agric.: Specialisation in Soil Science and Agrometeorology

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology
- LWR214 : Introduction to Agrometeorology

*Choose at least 32 credits from the following:*

- BCC214 : Biochemistry for agriculture and health sciences
- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as agriculturally important insect pests and control measures
- GEO114 : Introduction to Physical Geography
- PPG214 : Principles of Plant Pathology

##### *Fourth semester*

- AGR224 : Crop production principles
- LNG224 : Engineering principles in agricultural practices
- WDK224 : Veld as natural resource

*Choose at least 16 credits from the following:*

- FSK124 : Mechanics, thermodynamics, electricity and magnetism
  - WTW144 : Calculus and linear algebra
  - GIS224 : Geographical information systems
  - PLT224 : Breeding techniques
-

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**Third academic year***Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops
- GKD314 : Soil evaluation and land use planning
- HRT314 : Vegetable production
- LWR314 : Influence of climate on agricultural practices

*Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops
- GKD324 : Sustainable soil and water management
- LWR324 : Climate change and variability
- DMT322 : Statistical analyses

*Choose at least 16 credits from the following:*

- FSK224 : Electronics
- AND**
- FSK242 : Electromagnetism
- HRT324 : Fruit production
- PPG324 : Plant health management
- WDK324 : Intensive pasture production

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**Fourth academic year***Seventh semester*

- GKD414 : Soil chemistry
- GKD434 : Soil physics
- LWR414 : Operational Agrometeorology
- LWR434 : Physical and dynamical meteorology
- LWR451 : Seminar in Agrometeorology

*Eighth semester*

- GKD424 : Soil biology
- GKD444 : Soil geography
- GKD461 : Seminar in Soil Science
- LWR424 : Micrometeorology
- LWR444 : Synoptic meteorology

## Learning programme 15 - Study code 5335

### B.Sc.Agric.: Specialisation in Soil Science and Plant Pathology

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment  
CEM144 : Physical and organic chemistry  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology  
PPG214 : Principles of Plant Pathology

*Choose at least 32 credits from the following:*

- BCC214 : Biochemistry for agriculture and health sciences  
ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as agriculturally important insect pests and control measures  
GEO114 : Introduction to Physical Geography  
LWR214 : Introduction to Agrometeorology  
MKB216 : Introduction to Microbiology

##### *Fourth semester*

- AGR224 : Crop production principles

*Choose at least 48 credits from the following:*

- LNG224 : Engineering principles in agricultural practices  
MKB226 : Microbial diversity and Ecology  
PLK224 : Plant growth and developmental physiology  
**AND**  
PLK262 : Experimental plant physiology (practical)  
PLT224 : Breeding techniques
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**Third academic year***Fifth semester*

- GKD314 : Soil evaluation and land use planning  
PPG334 : Molecular Plant Pathology

*Sixth semester*

- GKD324 : Sustainable soil and water management  
PPG324 : Plant health management  
DMT322 : Statistical analyses

*Choose at least 32 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops  
HRT314 : Vegetable production  
LWR314 : Influence of climate on agricultural practices  
PLT314 : Selection methods

*Choose at least 32 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops  
HRT324 : Fruit production  
LWR324 : Climate change and variability

---

**Fourth academic year***Seventh semester*

- GKD414 : Soil chemistry  
GKD434 : Soil physics  
  
PPG414 : Fungal diseases of plants  
PPG434 : Epidemiology and ecology of plant pathogens  
PPG451 : Seminar in Plant Pathology

*Eighth semester*

- GKD424 : Soil biology  
GKD444 : Soil geography  
GKD461 : Seminar in Soil Science  
PPG424 : Plant diseases caused by bacteria and viruses  
PPG444 : Host-pathogen interactions

## Learning programme 16 - Study code 5336

### B.Sc.Agric.: Specialisation in Soil Science and Grassland Science

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
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#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology
- LWR214 : Introduction to Agrometeorology

##### *Fourth semester*

- LNG224 : Engineering principles in agricultural practices
- WDK224 : Veld as natural resource

*Choose at least 32 credits from the following:*

- BCC214 : Biochemistry for agriculture and health science
- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as agriculturally important insect pests and control measures
- GEO114 : Introduction to Physical Geography
- PPG214 : Principles of Plant Pathology
- VKD214 : Introductory ruminant production

*Choose at least 32 credits from the following:*

- AGR224 : Crop production principles
  - DRK214 : Parasites, vectors and toxic (poisonous and venomous) animals
  - LEK224 : Farm planning and management
  - VKD224 : Introductory monogastric, wildlife and aquaculture production
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### Third academic year

#### *Fifth semester*

- GKD314 : Soil evaluation and land use planning  
LWR314 : Influence of climate on agricultural practices  
WDK314 : Applied veld management and veld evaluation

*Choose at least 16 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops  
HRT314 : Vegetable production  
LEK314 : Introduction to agricultural marketing

#### *Sixth semester*

- GKD324 : Sustainable soil and water management  
WDK324 : Intensive pasture production  
DMT322 : Statistical analyses

*Choose at least 32 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops  
HRT324 : Fruit production  
LEK324 : Advanced Agricultural marketing  
LWR324 : Climate change and variability  
PPG324 : Plant health management
- 

### Fourth academic year

#### *Seventh semester*

- GKD414 : Soil chemistry  
GKD434 : Soil physics  
WDK414 : Production and utilisation ecology  
WDK434 : Defoliation phenology and physiology  
WDK451 : Professional skills

#### *Eighth semester*

- GKD424 : Soil biology  
GKD444 : Soil geography  
GKD461 : Seminar in Soil Science  
WDK424 : Advanced veld management  
WDK444 : Advanced fodder plant evaluation
-

## Learning programme 17 - Study code 5337

### B.Sc.Agric.: Specialisation in Agricultural Economics (General)

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#### First academic year

##### First semester

- BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### Second semester

- BLG144 : Organisms and the Environment  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy

*Choose at least 16 credits out of the following:*

- CEM144 : Physical and organic chemistry  
<sup>1</sup>WTW144 : Calculus and linear algebra
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#### Second academic year

##### Third semester

- EECF61306 : Economic systems and basic microeconomics  
LEK214 : Agricultural finance  
STK216 : Multiple regression analysis

*Choose at least 16 credits out of the following:*

- GKD214 : Soil ecology  
<sup>2</sup>HRG204 : Mercantile Law  
LWR214 : Introduction to Agrometeorology  
EBUS61406 : Core Business Activities  
EHRM51305 : Introduction to human resource management  
RIS114 : Introduction to computers  
<sup>2</sup>RLB108 : Accounting for agricultural students  
VKD214 : Introductory ruminant production

##### Fourth semester

- EECF62306 : Introduction to macroeconomics  
LEK224 : Farm planning and management  
STK226 : Multiple regressions: variance- and time series analysis

*Choose at least 16 credits out of the following:*

- AGR224 : Crop production principles  
EIOP52305 : Introduction to individual differences  
LBV224 : Communication and agricultural extension  
LNG224 : Engineering principles in agricultural practices  
EBUS62406 : General Management  
RIS124 : Advanced programming  
<sup>2</sup>RLB108 : Accounting for agricultural students  
VKD224 : Introductory monogastric, wildlife and aquaculture production  
WDK224 : Veld as natural resource
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### Third academic year

#### *Fifth semester*

- EECS71407 : Microeconomics  
LEK314 : Introduction to agricultural marketing

*Choose at least 32 credits out of the following:*

- ABR214 : Labour law  
AGR314 : Production of summer grain, oil and protein rich crops  
<sup>2</sup>BEL208 : Fundamental tax  
EFES71407 : Money and interest rates  
GKD314 : Soil evaluation and land use planning  
HRT314 : Vegetable production  
LNG314 : Hydraulics  
EBUS63406: Brand Management  
LWR314 : Influence of climate on agricultural practices  
<sup>2</sup>EACC60806 : Accounting  
RIS212 : Introduction to object design  
RIS214 : Data structures  
STK316 : Statistical inference (applied)  
WDK314 : Applied veld management and veld evaluation

#### *Sixth semester*

- ECS724 : Macroeconomics  
LEK324 : Advanced Agricultural marketing  
DMT322 : Statistical analyses

*Choose at least 32 credits out of the following:*

- ABR224 : Labour law  
AGR324 : Production of winter grain, industrial and diverse crops  
<sup>2</sup>BEL208 : Fundamental tax  
EFES72407 : Financial markets, instruments and institutions  
GKD324 : Sustainable soil and water management  
LBB344 : Strategic agricultural management  
LNG324 : Irrigation systems and irrigation surveying  
LWR324 : Climate change and variability  
EBUS64406 : Innovation management  
<sup>2</sup>EACC60806 : Accounting  
RIS222 : Introduction to networks and the internet  
RIS224 : User interfaces  
STK326 : Applied regression and time series analysis  
WDK324 : Intensive pasture production
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#### **Fourth academic year**

##### *Seventh semester*

- LEK414 : Managerial economics
- LEK434 : Agribusiness management

*Choose at least 32 credits out of the following:*

- EECT71407 : International economics
- EFET71407 : Investment management
- LNG414 : Flood and mechanised irrigation
- EBUS75407 : Strategic management
- RIS314 : Introduction to data-bases and database management systems
- RIS334 : Introduction to artificial intelligence
- WDK414 : Production and utilisation ecology

##### *Eight semester*

- LEK424 : Resource economics
- LEK444 : Agricultural policy and development
- LEK461 : Seminar in Agricultural Economics

*Choose at least 32 credits out of the following:*

- AGR424 : Crop production under protection
- EECT72407 : South African economics policy issues
- EFET72407 : Bank management and financial services
- GKD444 : Soil geography
- LNG424 : Specialised micro, drip and underground irrigation systems
- EBUS76407 : Financial management
- RIS324 : Software engineering
- RIS344 : Operating systems

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<sup>1</sup>**See prerequisites**

<sup>2</sup>**These modules are all year subjects and count as two semester modules**

## Learning programme 18 - Study code 5338

### B.Sc.Agric.: Specialisation in Agricultural Economics and Natural Resources

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment  
CEM144 : Physical and organic chemistry  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- EECF61306 : Economic systems and basic microeconomics  
GKD214 : Soil ecology  
LEK214 : Agricultural finance  
LWR214 : Introduction to Agrometeorology

##### *Fourth semester*

- EECF62306 : Introduction to macroeconomics  
LEK224 : Farm planning and management  
LNG224 : Engineering principles in agricultural practices  
WDK224 : Veld as natural resource
- 

#### Third academic year

##### *Fifth semester*

- EECS71407 : Microeconomics  
LEK314 : Introduction to agricultural marketing

*Choose at least 32 credits from the following:*

- GKD314 : Soil evaluation and land use planning  
LWR314 : Influence of climate on agricultural practices  
WDK314 : Applied veld management and veld evaluation

##### *Sixth semester*

- ECS724 : Macroeconomics  
LEK324 : Advanced Agricultural marketing  
DMT322 : Statistical analyses

*Choose at least 32 credits from the following:*

- GKD324 : Sustainable soil and water management  
LWR324 : Climate change and variability  
WDK324 : Intensive pasture production
-

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**Fourth academic year***Seventh semester*

- LEK414 : Managerial economics  
LEK434 : Agribusiness management

*Choose at least 32 credits from the following:*

- GKD414 : Soil chemistry  
GKD434 : Soil physics  
LWR414 : Operational Agrometeorology  
LWR434 : Physical and dynamical meteorology  
WDK414 : Production and utilisation ecology  
WDK434 : Defoliation phenology and physiology

*Eighth semester*

- GKD461 : Seminar in Soil Science  
LEK424 : Resource economics  
LEK444 : Agricultural policy and development  
LEK461 : Seminar in Agricultural Economics

*Choose at least 32 credits from the following:*

- GKD424 : Soil biology  
GKD444 : Soil geography  
LWR424 : Micrometeorology  
LWR444 : Synoptic meteorology  
WDK424 : Advanced veld management  
WDK444 : Advanced fodder plant evaluation
-

## Learning programme 19 - Study code 5339

### B.Sc.Agric.: Specialisation in Agricultural Economics and Food Science

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- BCC214 : Biochemistry for agriculture and health sciences
- EECF61306 : Economic systems and basic microeconomics
- LEK214 : Agricultural finance
- VWS212 : Introductory Food Science
- VWS232 : Food chemistry

##### *Fourth semester*

- EECF62306 : Introduction to macroeconomics
  - LEK224 : Farm planning and management
  - VWS222 : Chemical analysis of food
  - IQM242 : Industrial quality management
  - VWS224 : Food systems
- 

#### Third academic year

##### *Fifth semester*

- EECS71407 : Microeconomics
- LEK314 : Introduction to agricultural marketing
- VWS314 : Food products from animals

*Choose at least 16 credits out of the following:*

- STK216 : Multiple regression and time series analyses
- VWS334 : Food engineering

##### *Sixth semester*

- ECS724 : Macroeconomics
- LEK324 : Advanced Agricultural marketing
- VWS324 : Food products from plants
- DMT322 : Statistical analyses

*Choose at least 16 credits out of the following:*

- STK226 : Multiple regressions: variance- and time series analysis
  - VWS344 : Food microbiology
-

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**Fourth academic year***Seventh semester*

LEK414 : Managerial economics  
LEK434 : Agribusiness management

VWS414 : Food products from plants:  
advanced  
VWS434 : Product development and  
sensory analysis  
VWS451 : Seminar in Food Science

*Eighth semester*

LEK424 : Resource economics  
LEK444 : Agricultural policy and  
development  
LEK461 : Seminar in Agricultural  
Economics  
VWS424 : Dairy Science  
VWS444 : Meat Science

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## Learning programme 20 - Study code 5340

### B.Sc.Agric.: Specialisation in Agrometeorology and Plant Pathology

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy  
WTW144 : Calculus and linear algebra
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology  
LWR214 : Introduction to Agrometeorology  
PPG214 : Principles of Plant Pathology  
PLK214 : Plant anatomy and introductory biotechnology

##### *Fourth semester*

- AGR224 : Crop production principles  
LNG224 : Engineering principles in agricultural practices  
PLK224 : Plant growth and developmental physiology  
**AND**  
PLK262 : Experimental plant physiology (practical)  
PLT224 : Breeding techniques
- 

#### Third academic year

##### *Fifth semester*

- LWR314 : Influence of climate on agricultural practices  
PPG334 : Molecular Plant Pathology

##### *Sixth semester*

- LWR324 : Climate change and variability  
PPG324 : Plant health management  
DMT322 : Statistical analyses

*Choose at least 32 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops  
ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as insect pests of importance to agriculture and control measures  
GKD314 : Soil evaluation and land use planning  
HRT314 : Vegetable production

*Choose at least 32 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops  
GKD324 : Sustainable soil and water management  
HRT324 : Fruit production  
LNG324 : Irrigation systems and irrigation surveying
- 

#### Fourth academic year

##### *Seventh semester*

##### *Eighth semester*

- LWR424 : Micrometeorology
-

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LWR414	:	Operational Agrometeorology	LWR444	:	Synoptic meteorology
LWR434	:	Physical and dynamic meteorology	LWR461	:	Seminar in Agrometeorology
PPG414	:	Fungal diseases of plants	PPG424	:	Plant diseases caused by bacteria and viruses
PPG434	:	Epidemiology and ecology of plant pathogens	PPG444	:	Host-pathogen interactions
PPG451	:	Seminar in Plant Pathology			

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## Learning programme 21 - Study code 5341

### B.Sc.Agric.: Specialisation in Agrometeorology and Grassland Science

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment  
CEM144 : Physical and organic chemistry  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- GKD214 : Soil ecology  
LWR214 : Introduction to Agrometeorology

##### *Fourth semester*

- LNG224 : Engineering principles in agricultural practices  
WDK224 : Veld as natural resource

*Choose at least 32 credits from the following:*

- BCC214 : Biochemistry for agriculture and health sciences  
ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as insect pests of importance to agriculture and control measures  
GEO114 : Introduction to Physical Geography  
PPG214 : Principles of Plant Pathology  
VKD214 : Introductory ruminant production

*Choose at least 32 credits from the following:*

- AGR224 : Crop production principles  
FSK144 : Mechanics, thermodynamics, electricity, magnetism, biologically and medically relevant topics  
LEK224 : Farm planning and management  
PLT224 : Breeding techniques  
VKD224 : Introductory monogastric, wildlife and aquaculture production  
WTW144 : Calculus and linear algebra
-

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### Third academic year

#### *Fifth semester*

- GKD314 : Soil evaluation and land use planning  
LWR314 : Influence of climate on agricultural practices  
WDK314 : Applied veld management and veld evaluation

*Choose at least 16 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops  
HRT314 : Vegetable production  
LEK314 : Introduction to agricultural marketing  
LNG314 : Hydraulics  
PLT314 : Selection methods

#### *Sixth semester*

- GKD324 : Sustainable soil and water management  
LWR324 : Climate change and variability  
WDK324 : Intensive pasture production  
DMT322 : Statistical analyses

*Choose at least 16 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops  
HRT324 : Fruit production  
LEK324 : Advanced Agricultural marketing  
LNG324 : Irrigation systems and irrigation surveying  
PPG324 : Plant health management
- 

### Fourth academic year

#### *Seventh semester*

- LWR414 : Operational Agrometeorology  
LWR434 : Physical and dynamic meteorology  
WDK414 : Production and utilisation ecology  
WDK434 : Defoliation phenology and physiology  
WDK451 : Professional skills

#### *Eighth semester*

- LWR424 : Micrometeorology  
LWR444 : Synoptic meteorology  
LWR461 : Seminar in Agrometeorology  
WDK424 : Advanced veld management  
WDK444 : Advanced fodder plant evaluation
-

## Learning programme 22 - Study code 5342

### B.Sc.Agric.: Specialisation in Plant Breeding and Grassland Science

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144\* : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- \*NB – Students who want to continue with GEN216 and GEN246 must get special permission to take BLG124. (prerequisite for GEN modules)
- 

#### Second academic year

##### *Third semester*

- GEN216 : Principles of Genetics
- GKD214 : Soil ecology

*Choose at least 48 credits from the following:*

- BCC214 : Biochemistry for agriculture and health sciences
  - ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as insect pests of importance to agriculture and control measures
  - GEO114 : Introduction to Physical Geography
  - LWR214 : Introduction to Agrometeorology
  - PPG214 : Principles of Plant Pathology
  - VKD214 : Introductory ruminant production
- 

##### *Fourth semester*

- GEN246 : Molecular Genetics
- GEN344 : Population and conservation Genetics
- PLT224 : Breeding techniques
- WDK224 : Veld as natural resource

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### Third academic year

#### *Fifth semester*

- PLT314 : Selection methods  
WDK314 : Applied veld management  
and veld evaluation

*Choose at least 32 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops  
GKD314 : Soil evaluation and land use planning  
HRT314 : Vegetable production

#### *Sixth semester*

- GEN224 : Principles of genetics  
GEN282 : Heritability in practice  
WDK324 : Intensive pasture production  
DMT322 : Statistical analyses

*Choose at least 32 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops  
GKD324 : Sustainable soil and water management  
HRT324 : Fruit production  
LWR324 : Climate change and variability  
PPG324 : Plant health management

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### Fourth academic year

#### *Seventh semester*

- AGR434 : Research methodology  
BOC314 : Molecular Biology  
WDK414 : Production and utilisation ecology  
WDK434 : Defoliation phenology and physiology  
WDK451 : Professional skills

#### *Eighth semester*

- GEN324 : Evolutionary genetics  
PLT424 : Advanced breeding techniques  
PLT461 : Seminar in Plant Breeding  
WDK424 : Advanced veld management  
WDK444 : Advanced fodder plant evaluation

## Learning programme 23 - Study code 5343

### B.Sc.Agric.: Specialisation in Plant Pathology and Plant Breeding

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#### First Academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144\* : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- \*NB – Students who want to continue with GEN216 and GEN246 must get special permission to take BLG124. (prerequisite for GEN modules)
- 

#### Second academic year

##### *Third semester*

- GEN216 : Principles of Genetics
- PPG214 : Principles of Plant Pathology

*Choose at least 32 credits from the following:*

- BCC214 : Biochemistry for agriculture and health sciences
- ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as insect pests of importance to agriculture and control measures
- GKD214 : Soil ecology
- LWR214 : Introduction to Agrometeorology

##### *Fourth semester*

- GEN246 : Molecular Genetics
- GEN344 : Population and conservation Genetics
- PLT224 : Breeding techniques

*Choose at least 16 credits from the following:*

- AGR224 : Crop production principles
  - PLK224 : Plant growth and developmental physiology
- AND**
- PLK262 : Experimental plant physiology (practical)
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### Third Academic year

#### *Fifth semester*

- PLT314 : Selection methods  
PPG334 : Molecular Plant Pathology

*Choose at least 32 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops  
GKD314 : Soil evaluation and land use planning  
HRT314 : Vegetable production

#### *Sixth semester*

- PPG324 : Plant health management  
DMT322 : Statistical analyses

*Choose at least 48 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops  
GKD324 : Sustainable soil and water management  
HRT324 : Fruit production  
LWR324 : Climate change and variability  
PLK344 : Plant defence and biotechnology

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### Fourth Academic year

#### *Seventh semester*

- BOC314 : Molecular Biology  
PPG414 : Fungal diseases of plants  
PPG434 : Epidemiology and ecology of plant pathogens  
PPG451 : Seminar in Plant Pathology

*Choose 16 credits from the elective modules in the third study year*

#### *Eighth semester*

- GEN324 : Evolutionary genetics  
PLT424 : Advanced breeding techniques  
PLT461 : Seminar in Plant Breeding  
PPG424 : Plant diseases caused by bacteria and viruses  
PPG444 : Host-pathogen interactions

## Learning programme 24 - Study code 5344

### B.Sc.Agric.: Specialisation in Animal Science and Agricultural Economics

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#### First academic year

##### *First semester*

BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical  
chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

BLG144 : Organisms and the  
Environment  
CEM144 : Physical and organic  
chemistry  
LEK124 : Economic management of  
resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy

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#### Second academic year

##### *Third semester*

BCC214 : Biochemistry for agriculture  
and health sciences  
EECF61306 : Economic systems  
and basic microeconomics  
LEK214 : Agricultural finance  
VKD214 : Introductory ruminant  
production

##### *Fourth semester*

EECF62306 : Introduction to  
macroeconomics  
LEK224 : Farm planning and  
management  
VKD224 : Introductory monogastric,  
wildlife and aquaculture  
production  
WDK224 : Veld as natural resource

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### Third academic year

#### *Fifth semester*

- DAF314 : Animal anatomy and physiology of farm animals  
DTL314 : Theory of animal breeding  
**OR**  
DVL334 : Fundamental and experimental animal nutrition  
LEK314 : Introduction to agricultural marketing

*Choose at least 16 credits from the following:*

- EECS71407 : Microeconomics  
STK216 : Multiple regression analysis and time series analysis

#### *Sixth semester*

- DAF324 : Animal health  
DTL324 : New technologies in animal breeding  
**OR**  
DVL344 : Properties of feeds, balancing rations and fodder flow planning  
LEK324 : Advanced Agricultural marketing  
DMT322 : Statistical analyses

*Choose at least 16 credits from the following:*

- ECS724 : Macroeconomics  
EFES72407 : Financial markets, instruments and institutions  
STK226 : Multiple regressions: variance- and time series analysis
- 

### Fourth academic year

#### *Seventh semester*

- DAF414 : Applied reproduction physiology in farm animals  
DTL414 : Animal breeding: Mixed model theory  
**OR**  
DVL434 : Applied monogastric nutrition  
LEK414 : Managerial economics  
LEK434 : Agribusiness management  
VKD451 : Seminar in Animal Science

#### *Eighth semester*

- DAF424 : Growth and lactation physiology  
LEK424 : Resource economics  
LEK444 : Agricultural policy and development  
LEK461 : Seminar in Agricultural Economics

*Choose at least 16 credits from the following:*

- DTL424 : Animal breeding; Practical application  
DVL464 : Applied ruminant nutrition  
DVL444 : Applied nutrition of wild herbivores and carnivores
-



## Learning programme 25 - Study code 5345

### B.Sc. Agric.: Specialisation in Animal Science

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM144 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- BCC214 : Biochemistry for agriculture and health sciences
- VKD214 : Introductory ruminant production

*Choose at least 32 credits from the following:*

- DRK214 : Parasites, vectors and toxic (poisonous and venomous) animals
  - LEK214 : Agricultural finance
  - LWR214 : Introduction to Agrometeorology
  - VWS212 : Introductory Food Science
  - AND**
  - VWS232 : Food chemistry
- 

##### *Fourth semester*

- AGR224 : Crop production principles
- LEK224 : Farm planning and management
- VKD224 : Introductory monogastric, wildlife and aquaculture production
- WDK224 : Veld as natural resource

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### Third academic year

#### *Fifth semester*

- DAF314 : Animal anatomy and physiology of farm animals  
DTL314 : Theory of animal breeding  
DVL334 : Fundamental and experimental animal nutrition

*Choose at least 16 credits from the following:*

- AGR314 : Production of summer grain, oil and protein rich crops  
LEK314 : Introduction to agricultural marketing  
VWS314 : Food products from animals  
WDK314 : Applied veld management and veld evaluation

#### *Sixth semester*

- DAF324 : Animal health  
DTL324 : New technologies in animal breeding  
DVL344 : Properties of feeds, balancing rations and fodder flow planning  
DMT322 : Statistical analyses

*Choose at least 16 credits from the following:*

- AGR324 : Production of winter grain, industrial and diverse crops  
LEK324 : Advanced Agricultural marketing  
VWS344 : Food microbiology  
WDK324 : Intensive pasture production
- 

### Fourth academic year

#### *Seventh semester*

- DAF414 : Applied reproduction physiology in farm animals  
DTL414 : Animal breeding: Mixed model theory  
DVL434 : Applied monogastric nutrition

*Choose at least 16 credits from the following:*

- LEK434 : Agribusiness management  
WDK414 : Production and utilisation ecology

#### *Eighth semester*

- DAF424 : Growth and lactation physiology  
DTL424 : Animal breeding: Practical application  
DVL464 : Applied ruminant nutrition  
VKD461 : Seminar in Animal Science

*Choose at least 16 credits from the following:*

- DVL444 : Applied nutrition of wild herbivores and carnivores  
LEK424 : Resource economics  
LEK444 : Agricultural policy and development  
VWS424 : Dairy Science  
VWS444 : Meat Science  
WDK424 : Advanced veld management
-

## Learning programme 26 - Study code 5346

### B.Sc.Agric.: Specialisation in Animal Science and Food Science

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment  
CEM144 : Physical and organic chemistry  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- BCC214 : Biochemistry for agriculture and health sciences  
MKB216 : Introduction to Microbiology  
VKD214 : Introductory ruminant production  
VWS212 : Introductory Food Science  
VWS232 : Food chemistry

##### *Fourth semester*

- VKD224 : Introductory monogastric, wildlife and aquaculture production  
VWS222 : Chemical analysis of food  
VWS224 : Food systems

*Choose at least 16 credits from the following:*

- LEK224 : Farm planning and management  
EBUS64406 : Innovation management
- 

#### Third academic year

##### *Fifth semester*

- DAF314 : Animal anatomy and physiology of farm animals  
VWS314 : Food products from animals  
VWS334 : Food engineering

*Choose at least 16 credits out of the following:*

- DVL334 : Fundamental and experimental animal nutrition  
VDG314 : Human nutrition

##### *Sixth semester*

- DAF324 : Animal health  
VWS324 : Food products from plants  
VWS344 : Food microbiology  
DMT322 : Statistical analyses

*Choose at least 16 credits out of the following:*

- DVL344 : Properties of feeds, balancing rations and fodder flow planning  
EIOP52305 : Introduction to individual differences
-

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**Fourth academic year***Seventh semester*

- DAF414 : Applied reproduction  
physiology in farm animals
- DVL434 : Applied monogastric  
nutrition
- VKD451 : Seminar in Animal Science
- VWS414 : Food products from plants:  
advanced
- VWS434 : Product development and  
sensory analysis

*Eighth semester*

- DAF424 : Growth and lactation  
physiology
- DVL464 : Applied ruminant nutrition
- OR**
- DVL444 : Applied nutrition of wild  
herbivores and carnivores
- VWS424 : Dairy Science
- VWS444 : Meat Science
- VWS461 : Seminar in Food Science
-

## Learning programme 27 - Study code 5347

### B.Sc.Agric.: Specialisation in Animal Science and Grassland Science

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment  
CEM144 : Physical and organic chemistry  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- BCC214 : Biochemistry for agriculture and health sciences  
GKD214 : Soil ecology  
VKD214 : Introductory ruminant production

*Choose at least 16 credits from the following:*

- DRK214 : Parasites, vectors and toxic (poisonous and venomous) animals  
LEK214 : Agricultural finance  
LWR214 : Introduction to Agrometeorology

##### *Fourth semester*

- VKD224 : Introductory monogastric, wildlife and aquaculture production  
WDK224 : Veld as natural resource

*Choose at least 32 credits from the following:*

- AGR224 : Crop production principles  
LEK224 : Farm planning and management  
LNG224 : Engineering principles in agricultural practices
-

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### Third academic year

#### *Fifth semester*

- DAF314 : Animal anatomy and physiology of farm animals  
DTL314 : Theory of animal breeding  
**OR**  
DVL334 : Fundamental and experimental animal nutrition  
WDK314 : Applied veld management and veld evaluation

*Choose at least 16 credits from the following:*

- GKD314 : Soil evaluation and land use planning  
LEK314 : Introduction to agricultural marketing  
LWR314 : Influence of climate on agricultural practices

#### *Sixth semester*

- DAF 324 : Animal health  
DTL324 : New technologies in animal breeding  
**OR**  
DVL344 : Properties of feeds, balancing rations and fodder flow planning  
WDK324 : Intensive pasture production  
DMT322 : Statistical analyses

*Choose at least 16 credits from the following:*

- GKD324 : Sustainable soil and water management  
LEK324 : Advanced Agricultural marketing

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### Fourth academic year

#### *Seventh semester*

- DAF414 : Applied reproduction physiology in farm animals  
DTL414 : Animal breeding: Mixed model theory  
**OR**  
DVL434 : Applied monogastric nutrition  
WDK414 : Production and utilisation ecology  
WDK434 : Defoliation phenology and physiology  
WDK451 : Professional skills

#### *Eighth semester*

- DAF424 : Growth and lactation physiology  
VKD461 : Seminar in Animal Science  
WDK424 : Advanced veld management  
WDK444 : Advanced fodder plant evaluation

*Choose at least 16 credits from the following:*

- DTL424 : Animal breeding; Practical application  
DVL464 : Applied ruminant nutrition  
DVL444 : Applied nutrition of wild herbivores and carnivores
-

## Learning programme 28 - Study code 5348

### B.Sc.Agric.: Specialisation in Food Science and Biochemistry

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#### First academic year

##### *First semester*

BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical  
          chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

BLG144 : Organisms and the  
          Environment  
CEM124 : Physical and organic  
          chemistry  
LEK124 : Economic management of  
          resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy

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#### Second academic year

##### *Third semester*

BOC216 : Biochemistry of biological  
          compounds  
MKB216 : Introduction to Microbiology  
VWS212 : Introductory Food Science  
VWS232 : Food chemistry

##### *Fourth semester*

BOC226 : Enzymology and  
          introductory metabolism  
MKB226 : Microbial diversity and  
          Ecology  
VWS222 : Chemical analysis of food  
VWS224 : Food systems

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#### Third academic year

##### *Fifth semester*

BOC314 : Molecular biology  
BOC334 : Proteome analysis  
VWS314 : Food products from animals  
VWS334 : Food engineering

##### *Sixth semester*

BOC324 : Advanced enzyme kinetics  
          and metabolics  
BOC344 : Structure, function and  
          topology of membrane  
VWS324 : Food products from plants  
VWS344 : Food microbiology  
DMT322 : Statistical analyses

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**Fourth academic year***Seventh semester*

- VDG314 : Human nutrition  
VWS414 : Food products from plants:  
advanced  
VWS434 : Product development and  
sensory analysis

*Choose at least 16 credits out of the  
following:*

- LEK214 : Agricultural finance  
EBUS61406 : Core Business  
Activities  
EHRM51305 : Introduction to human  
resource management

*Eighth semester*

- VWS424 : Dairy Science  
VWS444 : Meat Science  
VWS461 : Seminar in Food Science

*Choose at least 32 credits out of the  
following:*

- EIOP52305 : Introduction to individual  
differences  
LEK224 : Farm planning and  
management  
EBUS62406 : General Management  
EBUS64406 : Innovation  
management
-



## Learning programme 29 - Study code 5349

### B.Sc.Agric.: Specialisation in Food Science and Microbiology

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life
- BRS111 : Computer literacy
- CEM114 : Inorganic and analytical chemistry
- FSK134 : Physics
- WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment
  - CEM124 : Physical and organic chemistry
  - LEK124 : Economic management of resources
  - BMT124 : Introductory Biostatistics
  - BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- BOC216 : Biochemistry of biological compounds
- MKB216 : Introduction to Microbiology
- VWS212 : Introductory Food Science
- VWS232 : Food chemistry

##### *Fourth semester*

- BOC226 : Enzymology and introductory metabolism
  - MKB226 : Microbial diversity and Ecology
  - VWS222 : Chemical analysis of food
  - VWS224 : Food systems
- 

#### Third academic year

##### *Fifth semester*

- BOC314 : Molecular biology
- VWS314 : Food products from animals
- VWS334 : Food engineering

##### *Sixth semester*

- MKB324 : Microbial physiology
- MKB344 : Pathogene and immunity
- VWS324 : Food products from plants
- VWS344 : Food microbiology
- DMT322 : Statistical analyses

*Choose at least 16 credits from the following:*

- MKB314 : Microbial growth, nutrition and death
  - MKB334 : Microbial eukaryotic diversity and ecology
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**Fourth academic year***Seventh semester*

- VDG314 : Human nutrition  
VWS414 : Food products from plants:  
advanced  
VWS434 : Product development and  
sensory analysis

*Choose at least 16 credits out of the  
following:*

- LEK214 : Agricultural finance  
EBUS61406 : Core Business  
Activities  
EHRM51305 : Introduction to human  
resource management

*Eighth semester*

- VWS424 : Dairy Science  
VWS444 : Meat Science  
VWS461 : Seminar in Food Science

*Choose at least 32 credits out of the  
following:*

- EIOP52305 : Introduction to individual  
differences  
LEK224 : Farm planning and  
management  
EBUS62406 : General Management  
EBUS64406 : Innovation  
management
-

## Learning programme 30 - Study code 5350

### B.Sc.Agric.: Specialisation in Food Science and Chemistry

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#### First academic year

##### *First semester*

BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

CEM124 : Physical and organic chemistry  
BRS121 : Advanced computer literacy  
<sup>1</sup>WTW144 : Calculus and linear algebra

*Choose at least 32 credits out of the following:*

BLG124 : Evolution and Biodiversity  
BLG144 : Organisms and the Environment  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics

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#### Second academic year

##### *Third semester*

BOC216 : Biochemistry of biological compounds  
CEM214 : Physical chemistry  
CEM232 : Analytical chemistry  
MCB214 : Introduction to Microbiology for health sciences  
VWS212 : Introductory Food Science  
VWS232 : Food chemistry

##### *Fourth semester*

CEM224 : Organic chemistry  
CEM242 : Inorganic chemistry  
VWS222 : Chemical analysis of food  
VWS224 : Food systems

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#### Third academics year

##### *Fifth semester*

CEM314 : Analytical chemistry  
CEM334 : Physical chemistry  
VWS314 : Food products from animals  
VWS334 : Food engineering

##### *Sixth semester*

CEM324 : Inorganic chemistry  
CEM344 : Organic chemistry  
VWS324 : Food products from plants  
VWS344 : Food microbiology  
DMT322 : Statistical analyses

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**Fourth academic year***Seventh semester*

- VDG314 : Human nutrition  
VWS414 : Food products from plants:  
advanced  
VWS434 : Product development and  
sensory analysis

*Choose at least 16 credits out of the  
following:*

- LEK214 : Agricultural finance  
EBUS61406 : Core Business  
Activities  
EHRM51305 : Introduction to human  
resource management

*Eighth semester*

- VWS424 : Dairy Science  
VWS444 : Meat Science  
VWS461 : Seminar in Food Science

*Choose at least 32 credits out of the  
following:*

- EIOP52305 : Introduction to individual  
differences  
LEK224 : Farm planning and  
management  
EBUS62406 : General Management  
EBUS64406 : Innovation  
management

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<sup>1</sup>See prerequisite

## Learning programme 31 - Study code 5351

### B.Sc.Agric.: Specialisation in Agronomy and Entomology

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#### First academic year

##### *First semester*

- BLG114 : Buildings blocks of life  
BRS111 : Computer literacy  
CEM114 : Inorganic and analytical chemistry  
FSK134 : Physics  
WTW134 : Calculus

##### *Second semester*

- BLG144 : Organisms and the Environment  
CEM144 : Physical and organic chemistry  
LEK124 : Economic management of resources  
BMT124 : Introductory Biostatistics  
BRS121 : Advanced computer literacy
- 

#### Second academic year

##### *Third semester*

- ENT216 : Functional morphology and anatomy and evolutionary biology of insects

##### *Fourth semester*

- AGR224 : Crop production principles  
ENT224 : Ecophysiology of insects  
ENT262 : Ecophysiology of insects (practical)

*Choose at least 40 credits from the following:*

- BCC214 : Biochemistry for agriculture and health sciences  
GKD214 : Soil ecology  
LWR214 : Introduction to Agrometeorology  
MKB216 : Introduction to Microbiology  
PLK214 : Plant anatomy and introductory biotechnology  
PPG214 : Principles of Plant Pathology

*Choose at least 24 credits from the following:*

- LNG224 : Engineering principles in agricultural practices  
PLK224 : Plant growth and developmental physiology  
**AND**  
PLK262 : Experimental plant physiology (practical)  
PLT224 : Breeding techniques
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### Third academic year

#### *Fifth semester*

- AGR314 : Production of summer grain, oil and protein rich crops  
ENT314 : Advanced ecology and agricultural entomology of insects  
HRT314 : Vegetable production

*Choose at least 16 credits from the following:*

- GKD314 : Soil evaluation and land use planning  
LWR314 : Influence of climate on agricultural practices  
PLT314 : Selection methods

#### *Sixth semester*

- AGR324 : Production of winter grain, industrial and diverse crops  
ENT324 : Applied insect pest management  
DMT322 : Statistical analyses

*Choose at least 32 credits from the following:*

- GEN324 : Evolutionary genetics  
GKD324 : Sustainable soil and water management  
HRT324 : Fruit production  
LWR324 : Climate change and variability  
PLK324 : Plant metabolism  
PLK344 : Plant defence and biotechnology  
PPG324 : Plant health management
- 

### Fourth academic year

#### *Seventh semester*

- AGR414 : Crop and stress physiology  
AGR434 : Research methodology  
ENT354 : Agricultural entomology

*Choose at least 16 credits out of the module options in the 2<sup>nd</sup> and 3<sup>rd</sup> year of study*

#### *Eighth semester*

- AGR424 : Crop production under protection  
AGR444 : Weed control  
AGR461 : Seminar in Agronomy  
ENT344 : Applied insect biochemistry and pharmacology

*Choose at least 24 credits out of the module options in the 2<sup>nd</sup> and 3<sup>rd</sup> year of study*

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Particulars regarding the syllabuses of modules falling under other faculties can be found in the yearbooks of the faculties concerned.

The syllabuses of modules offered by the various departments of Agriculture follow.

## Agricultural Datametry

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### **DMT214 (16 credits) - Agricultural Datametry**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student will learn how to calculate and interpret statistics (mean, variance, analysis of variance (ANOVA) and multiple comparison of means) from various experimental designs. Data sets will be analysed during tutorials to illustrate the techniques learned.

### **DMT224 (16 credits) - Agricultural Datametry**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student will learn about regression (simple linear regression and multiple regression), correlation and co-variance analysis. Data sets will be analysed during tutorials to illustrate the techniques learned.

### **DMT322 (8 credits) - Statistical analyses**

One lecture and a three hour practical per week.

One examination paper of two hours (Including analysis of data on a computer).

After completion the student will be able to use software packages in the analyses of ANOVA designs (fully randomized design, randomized complete block design, Latin squares, factorial experiments, (co)variance analyses), regression analyses (linear, non linear, multi linear), frequency tables and Chi square analyses of categorical data, graphical presentations, univariate and mixed model analyses applicable to Agricultural related industries. The ability to interpret and to make inferences regarding the analysed data will also be mastered.

## Agricultural Economics

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### **LBB344 (16 credits) - Strategic agricultural management**

**(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Strategic thinking is in the present turbulent agricultural environment of crucial importance. In this module the student will gain knowledge about implementing the steps in strategic management as well as the tasks of the strategic manager; strategic management of new technologies; developing creative and innovative thoughts; setting a paradigm shift for a farm; re-engineering of a farm; drawing a scenario for any agricultural product or possible outcomes in the future; discounting droughts strategically in the decision-making process; developing a community development programme for any community (commercial agriculture) in the form of an executable plan.

#### **Practical work**

Development of a paradigm shift, re-engineering, scenarios and strategic plan for a farming business and a community development project as well as creativity exercises; practical

demonstrations of new technologies in agriculture.

**LBB362 (8 credits) - Seminar in agricultural management  
(Department of Agricultural Economics)**

Written seminar plus an oral examination.

After completion of this module the student will be able to develop an integrated farm management model on a spreadsheet and to defend the model in an oral exam.

**LEK122 (8 credits) - Economic development in Africa  
(Department of Agricultural Economics)**

Two lectures per week.

One examination paper of two hours.

After completing this course the student will understand the different phases in the economic development of Africa. The student will also have a broader understanding of the economic problems with which Africa is struggling. Africa's position in the world and the impact which the rest of the world will have on Africa will also be understood by the student. Factors causing poverty in Africa and possible solutions will be treated in an introductory fashion.

**LEK124 (16 credits) - Economic management of resources  
(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of two hours.

After completion of this course, the student will be able to understand:

the role of resources in the agricultural economy; supply and demand of agricultural products; marketing and the determination of prices; farm management- and financing principles; the current agricultural-, trade- and developmental policies in South Africa.

**Practical work**

Practical assignments will be given which to complement the theory done in class.

**LEK214 (16 credits) – Agricultural recordkeeping and finance  
(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After the completion of this module the student will have knowledge about the purpose and components of a farm record keeping system. The handling of depreciation, also in terms of the income tax act as well as the procedure for taking the impact of inflation into consideration. A basic overview of income tax as well as the handling of Value Added Tax (VAT) is also covered. The purpose, components, completion and analysis of each of the financial statements. An economic and financial analysis of a farming business with interpretation and advice on the results. Budgets for different enterprises (both livestock and crops).

**Practical work**

Upkeep and analysis of farming records and application of different techniques, also by means of a personal computer.

**LEK224 (16 credits) - Farm planning and management  
(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The main purpose of this module is to enable the student to analyse and plan changes (risks and opportunities) within a farming business.

The module is divided into two sections: **Section I**, which consists of the planning of livestock and crop production enterprises, and **Section II** which consists of the composition of livestock and crop production enterprises in a whole farm production plan, given the marketing and financial plans, which include mechanisation and human resource planning as well as the planning of the business



agreement. The focus is further placed on all aspects of human resource management.

**Practical work**

The development of enterprise budgets, mechanisation planning, human resource planning and practical exercises to apply risk management instruments in practice.

**LEK314 (16 credits) - Introduction to agricultural marketing**

**(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The objective of this module is (a) To provide the student with knowledge on the nature and dynamics of the food marketing system, from the production of agricultural commodities to the final consumption of food products and services; (b) To enable the student to plan and employ programs to manage the price risks of agricultural commodities through the use of forward contracts, futures, and option strategies; and (c) To introduce the students to the forecasting of agricultural product prices.

**Practical work**

Forecasting the prices of grains and oilseeds.

**LEK324 (16 credits) - Advanced agricultural marketing**

**(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After the completion of this module the student will understand how to do analysis and interpretations of demand and supply, price and income elasticities. Knowledge of the quantification of agricultural marketing questions, the fitting of supply and demand curves, identification of variables that influence agricultural prices, the inter-dependence of the agriculture sector with the rest of the economy, the international environment and strategic planning will be obtained.

**Practical work**

Analysing of supply, demand and price by means of basic econometric techniques. Compiling a marketing plan for an agricultural product taking cognisance of the financial implications.

**LEK414 (16 credits) - Managerial economics**

**(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student will understand how micro economics provides the framework for "economic" ways of thinking and how this basic knowledge was developed in techniques such as linear programming (LP) that solve agricultural economic problems to make efficient decisions. In addition, the student will have an understanding of the principles underlying decision-making under uncertainty.

**Practical work**

Spread sheet models of production and cost functions. Fitting of production functions by means of regressions. Application of LP-models. Measurement of risk with subjective probabilities. Forecasting.

**LEK424 (16 credits) - Resource economics**

**(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After the completion of this module the student will have knowledge on the theory of natural resource and environmental economics. Aspects that will be addressed include: property rights, externalities and environmental problems, market and government failures, optimal use/management of natural resources and the environment with special reference to water, soil, natural vegetation, fisheries and other species, and pollution.

**Practical work**

Application of measuring techniques to determine the economic effects of natural resource and environmental problems. Evaluation of alternative solutions to problems.

**LEK434 (16 credits) - Agribusiness management  
(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Analyze and confidently handle challenges pertaining to the agribusiness system such as entrepreneurship, strategic management in agriculture, quality management, role and importance of value chains, competitiveness of SA agriculture, choice of legal business forms(sole proprietorship, partnership, close corporation, private company, business trust, co-operative, new generation co-operative) and handling collaboration structures in the value chain, as well as human resource management within a modern transformed society.

**Practical work**

Develop a detailed and coherent business plan for an agribusiness deploying a wide range of agricultural economics techniques.

**LEK444 (16 credits) - Agricultural policy and development  
(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Knowledge will be gained in this module about the involvement of the government in agriculture, reasons for government interference, how agricultural policy causes distortions and the spill over effect of it, the effect of policy on the welfare of populations and on the competitiveness of agriculture, factors that prevent small scale farmers from becoming surplus producers, transaction costs and the utilisation of new technologies, the role of research in developing countries, the development of human capital and poverty.

**Practical work**

Discussion of reading material and analyses of agricultural policy on computers.

**LEK461 (4 credits) - Seminar in Agricultural Economics  
(Department of Agricultural Economics)**

No formal examination is required.

After the completion of this module the student will understand how to do a written assignment on specific agricultural economic and related topics.

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## **Agricultural Engineering**

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**LNG224 (16 credits) - Engineering principles in agricultural practises  
(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Engineering skills in aspects of soil and water conservation. The design of water ways, terraces, contours in conservation farming practises. The learning of how to determine flow and the protection of soil conservation works, weirs and farm dams. Recovery of erosion trenches with the help of mechanical control measures. Basic hydraulics and the practical design of stock-watering systems and pipelines.

**Practical work**

The development of designer skills and the application of calculations. Measurements and standardisation with specific application in the agriculture.

**LNG314 (16 credits) - Hydraulics  
(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Knowledge of basic hydraulics and the solving of problems. Applications of hydraulics in the instalment of agricultural networks, pumps and electrical motors. The student must be familiar with the practical implementation and application of escom-networks and tariffs.

**Practical work**

Introduction with irrigation systems, solving of hydraulic problems, determining of HQ-curves of pumps, deciding on pumps and the power requirements of pumps. Practical calculations of electricity tariffs.

**LNG324 (16 credits) - Irrigation systems and irrigation surveying  
(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Ability to determine the use of the relevant irrigation systems in specific circumstances and conditions. Practical experience in the basic planning and design of irrigation systems.

**Practical work**

The learning of methods in the selection of the correct irrigation systems and the determining of the cost effectiveness of the different systems. Practical surveying and design.

**LNG414 (16 credits) - Flood and mechanised irrigation  
(Department of Agricultural Economics)**

Two lectures and a three hour practical per week.

One examination paper of three hours.

Knowledge on the subject, management and evaluation of specific flood and mechanised irrigation systems. The study and application of SAIB norms and principles.

**Practical work**

Design and evaluation of flood and sprinkler systems. Determining the effectiveness of above-mentioned systems.

**LNG424 (16 credits) - Specialised micro, drip and underground irrigation systems  
(Department of Agricultural Economics)**

Two lectures and a three hour practical per week.

One examination paper of three hours.

Ability to design, manage and evaluation of drip and micro-irrigation systems. Application of practice directed norms and principles.

**Practical work**

Design and evaluation of drip and micro-irrigation systems. Determining of the effectiveness and cost effectiveness of the above-mentioned systems.

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## Agricultural Extension

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**LBV224 (16 credits) - Communication and agricultural extension  
(Department of Agricultural Economics)**

Three lectures and a three hour practical per week.

One examination paper of three hours.

**Communication:** Frame of reference of the sender/receiver; what has to be communicated in a farming enterprise; communication channels/media/aids (labour councils regarding the transfer and feedback process in communication); communication systems and strategies in a farming enterprise.

**Agricultural extension:** Synopsis of extension and historical development; applied learning theories in extension; communication strategies (diffusion of innovations); extension techniques and methodology (mass communication, group handling, individual contracts); programme planning (work with people); leadership development and leadership identification; management of extension organisations.

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## Agricultural Science

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### **LWL114 (16 credits) - Biological principles in Agriculture**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the students will be able to apply the principles of the physiology of farm animals and agricultural and horticultural crops within different disciplines in agriculture. The different body systems of the animal and other aspects, i.e. histology, endocrinology, cardiology, urology and reproductive physiology are addressed. The aim is to give background knowledge on the functioning, optimal utilisation and possible manipulation of the physiological processes in farm animals. The inherent physiological differences in plants are demonstrated, the establishment and vegetative and reproductive growth are discussed, while the surveying, transport and working of fertilisers, water and pesticides are addressed. Factors that are involved with crop production, basic principles of breeding theory and relevant parasitic micro-organism are also dealt with.

#### **Practical work**

Knowledge of the general anatomy of the mammal will be gained from demonstrations of respiratory, circulatory, neurological functioning and physiological principles that are involved in the body. The most important theoretical aspects of crops are practically conducted in the laboratory and greenhouse.

### **LWL134 (16 credits) - Chemical principles in Agriculture**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Students will be equipped with simple chemical principles, concepts, processes and calculations that are important in agriculture sciences, especially with respect to soils, plants, animals and food.

#### **Practical work**

Students will acquire laboratory skills which will be used to do simple chemical experiments that bear reference to soils, plants, animals and food. Reports of these experiments will be submitted for evaluation.

### **LWL142 (8 credits) - Biometric principles in Agriculture**

One lecture and a three hour practical per week.

One examination paper of two hours.

The student will be introduced to concepts such as mean, variance, frequencies, probabilities, normal distribution, regression and correlation. This will enable the student to describe statistically and perform elementary analyses of experimental and research data. Tutorials will include collection and analysis of data using a pocket calculator as well as introductory level use of statistical functions in Excel.

### **LWL144 (16 credits) - Biochemical principles in Agriculture**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student will be learned how to apply biochemical principles in agriculture, with respect to the use of water as dissolvant, principles of pH and buffer, the chemical composition and importance of carbohydrates, lipids, vitamins and protein nucleic acids. The student will also be learned how to enzyme action, flow of energy and matter throughout the cells, the integration of the metabolically process (aerobic and anaerobic) and the explanation of metabolically disorders, could be applied in the specialised fields in agriculture.

#### **Practical work**

Students will apply certain biochemical techniques in the laboratory and will become familiar with certain biochemical concepts and principles.

### **LWL154 (16 credits) - Physical and mechanised principles in Agriculture**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The learners will be equipped to apply the basic physical concepts with respect to mechanics, hydrodynamics and hydrostatics, electricity, energy and the application of the gas laws in agriculture and agricultural sciences. This knowledge will be used to explain the influence of these processes on the behaviour of animals, plants and the natural resources. The student will be familiar with the SI-system.

#### **Practical work**

The students will gain practical experience by performing laboratory experiments and calculations will be done to illustrate some of the key concepts mentioned above.

### **LWL164 (16 credits) - Microbiological principles in Agriculture**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Students that successfully complete this module will be qualified to describe the basic characteristics and importance of micro-organisms, with specific reference to their role in agriculture. This knowledge is based on the introductory cell structure, taxonomy, nutrition, microbial physiology, interaction between micro-organisms and plants or animals, the production of high-quality food products, as well as the factors that corrupt food.

#### **Practical work**

Students that complete the practical part successfully will be equipped to conduct basic microbiological investigations. The students will also understand the agricultural importance of micro-organisms by virtue of demonstrations of their utilisation/application in food production.

### **LWL194 (16 credits) - Mathematical calculations in Agriculture**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Skills will be developed in arithmetical and mathematical calculations. The use of algebraic and graphical solutions of comparisons as applied in practical problems. The calculation of surface areas and volumes for application in the determination of maximum perimeters, areas and volumes. Basic knowledge of logarithms and exponents and the use of a pocket calculator. The determination of single and compound interest for application in financial systems. Mastering the skills needed to determine basic areas with the help of differentiation and integration. The use of statistical grouping of data in the calculation of averages and other important values and the application thereof to solve agricultural related problems.

#### **Practical work**

Calculations will be done applying the theoretical knowledge in solving advanced agricultural orientated mathematical problems.

### **LWL224 (16 credits) - Sustainable production practises**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Students will be introduced to the principles of sustainable production practises. Practical orientated experience would be acquired to describe and explain the nature and extent of natural resources, crop and animal production and farm management.

### **LWL 312 (8 credits) - Professional skills**

Continuous evaluation. No formal examination is required.

After completion, students will be able to do literature searches, know how to write a scientific review, including technical editing, correct citation and compilation of a bibliography. Students will be trained in oral presentations, with specific reference to the contents and structure and the use of visual media.

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# **Agronomy and Horticulture**

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## **AGRONOMY**

### **AGR224 (16 credits) - Crop production principles**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion of this module the student will be familiar with the underlying principles important for the production of crops, the role of plant production in South Africa, morphology of these crops and the effect of environmental factors on the growth and development of crops. The student will also have acquired practical knowledge on soil tillage, plant nutrition, sowing and plant practices, crop rotation, irrigation, fertilisation and weed control on a basic level.

#### **Practical work**

During practicals the student will attain skills regarding the classification and identification of crops, soil tillage, plant propagation, weed control and plant nutrition. Students will also be introduced to basic principles of crop research through simple greenhouse experiments.

### **AGR314 (16 credits) - Production of summer grain, oil and protein rich crops**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completing this module students will be familiar with cultivation practices concerning the most important summer grain, oil and protein rich crops of South Africa. The students will also be able to apply the theoretical and practical aspects of soil tillage, seedbed preparation, planting techniques, plant nutrition and weed control as it relates to these crops, on a higher level.

#### **Practical work**

During practical sessions the student will study the morphology of these crops and skills concerning the practical aspects of crop cultivation will be developed and practised by the students.

### **AGR324 (16 credits) - Production of winter grain, industrial and diverse crops**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completing this module students will be familiar with cultivation practices concerning the most important winter grain, industrial and diverse crops of South Africa. The students will also be able to apply the theoretical and practical aspects of soil tillage, seedbed preparation, planting techniques, plant nutrition and weed control as it relates to these crops, on a higher level.

#### **Practical work**

During practical sessions the student will study the morphology of these crops and skills concerning the practical aspects of crop cultivation will be developed and practised by the students.

#### **AGR414 (16 credits) - Crop and stress physiology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion of this module students will be familiar with advanced and recent knowledge regarding enzymology, respiration, photorespiration, the oxidative pentose phosphate pathway, regulation of metabolism, the effect of drought-, heat- and chemical stress on the physiology of a crop, physiological manipulation and the potential for the development of alternative agricultural crops. The subject matter is approached from a research perspective which will enable the student to identify shortcomings in our knowledge as well as to identify future research needs and in this way to make a personal contribution by anticipating post graduate research. The role physiology has to play in the discipline agronomy will be emphasized throughout the module in order to synchronize the two disciplines. The latter will enable students to anticipate ways and means, on submolecular level, to improve the harvestable yield of crops.

##### **Practical work**

After completion of a series of practicals students will be able to apply the following research techniques successfully: *in vitro* enzyme activity measurement, spectrophotometry, substrate level determinations, respiration rate measurement, the use of radio-active isotopes in research as well as the isolation and purification of secondary metabolites by means of different chromatography techniques.

#### **AGR424 (16 credits) - Crop production under protection**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion of this module students will have the required knowledge to manage a greenhouse. They will gain knowledge about the most important crops that are produced under protection in South Africa. Skills will be developed in the following aspects: structures; environmental control; substrates, mineral nutrition and irrigation (hydroponics); insect and disease management, plant growth regulators.

##### **Practical work**

Students will attain skills concerning the successful production of crops under protection.

#### **AGR434 (16 credits) - Research methodology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completing of this module students will be able to plan agronomic research, lay out laboratory, glasshouse, climacabinet and field trials, and select an appropriate experimental design. Besides the former, students will also have mastered the skills to handle different research materials, to sample accurately, to determine different plant parameters and to write up the results of experiments in the form of a research article.

##### **Practical work**

Students will learn how to analyse and interpret trial data and be able to write up the results in a meaningful way. They will also be taught how to conduct basic statistical analyses on a computer by writing simple SAS programmes.

#### **AGR444 (16 credits) - Weed control**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion of this module students will be familiar with aspects concerning the negative effect of weeds on crops, weed biology and the importance thereof for control mechanisms, as well as principles of herbicide selectivity, factors influencing it, usage and chemical classification of herbicides, residual activity, principles of herbicide choice and the herbicide application in order to enable the student to identify and apply these principles in practice. The theoretical aspects of leaf and root absorption of herbicides, translocation, action mechanisms and breakdown in the plant will be covered thoroughly in order to enable the student to make the correct choices when required.

### **Practical work**

Students will develop the skills required to be able to identify the most important weeds, collect them in the correct manner, calibrate a herbicide spray and identify the phytotoxic symptoms on crops sprayed with specific herbicides, as well as being acquainted with factors affect the efficacy of herbicides.

### **AGR451/461 (4 credits) - Seminar in Agronomy**

No formal examination is required.

Students will obtain experience to accumulate knowledge on an agronomic topic, assimilate this knowledge in an orderly and logical manner according to the requirements for a scientific publication and present the seminar orally in order to prepare the student for addressing audiences during conferences and farmers' days.

## **HORTICULTURE**

### **HRT314 (16 credits) - Vegetable production**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion of this module students will be familiar with the growth and development of vegetable crops and also the cultivation practices concerning the most important vegetable crops in South Africa. Students will also be able to apply on a higher level theoretical and practical aspects that include the following: seedling propagation, planting techniques, weed control, plant nutrition, harvesting, handling and storage, as it relates to these crops.

### **Practical work**

Student will attain skills concerning the practical aspects of vegetable cultivation, which will enable them to apply it on an advanced level.

### **HRT324 (16 credits) - Fruit production**

Three lectures and a three hour practical per week in the second semester.

One examination paper of three hours.

Students will be introduced to fundamental principles in fruit production such as the biology and phenology of most important fruit crops, dormancy, flowering, pollination, fertilization, fruit set and fruit growth, climatic and soil requirements. A foundation will also be laid in the principles of orchard establishment and management, including propagation methods, cultivar and rootstock choice, orchard design and spacing, fertilization, irrigation, pruning and manipulation techniques, fruit thinning, and harvesting.

### **Practical work**

Student will gain practical knowledge and skills regarding important fruit production aspects such as propagation, pruning and fruit thinning. They will also be familiarized with the practical day to day operations on fruit farms with compulsory excursions to fruit production areas.

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# **Agrometeorology**

### **LWR214 (16 credits) - Introduction to Agrometeorology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

On completion of this module students will be able to identify and discuss the various climatic elements and appraise the interaction between weather/climate and agriculture on various spatial and temporal scales; describe the climate of any region within Southern Africa and explain the El Niño Southern Oscillation phenomenon and its influence on worldwide weather patterns; use weather data to schedule irrigation and evaluate the use of wind breaks and frost protection to



create more favourable plant environments.

#### **Practical work**

Students will be familiarised with the automatic weather station, temperature calibration, cloud identification and use of the psychrometric diagram. Buys Ballots law will be tested in synoptic chart analysis and calculation of daily evapotranspiration rate from weather data will be done. Skills will also be developed in irrigation scheduling and crop-ecotope matching with the use of climatic data.

#### **LWR314 (16 credits) - Influence of climate on agricultural practices**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Upon completion of this module students will have a good knowledge of climatological influences on management and planning decision-making; determination of potential, climatological predictions and production risks of crops and animals; climatic indices (including ENSO) for management and planning during droughts and above-normal rainfall cycles. Content is learned by problem-solving and therefore students will also be able to make applications of the influence of temperature (cold and heat stress), fire danger, frost and pests and diseases on agricultural production in Southern Africa and calculate water requirements and water use for planning and scheduling of irrigation.

#### **Practical work**

The course is problem-based and a student will be expected to identify, analyse and solve actual problems by collaborating with other students. They must tackle a problem in a structured way, by using all the available resources. In this way the student develops and applies skills during the learning process.

#### **LWR324 (16 credits) - Climate change and variability**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Upon completion of this module students will be able to describe the major causes and characteristics of internal climate variability and externally forced climate change; explain the concepts of radiative forcing and climate feedback; evaluate recently observed changes in climate relative to changes that have occurred in the past; describe the formulation of climate models and evaluate their strengths and weaknesses; discuss the basis, methods and limitations of climate prediction as well as provide a review of the latest climate change projections and how this will affect the agricultural sector together with mitigation and adaptation options.

#### **Practical work**

Students will be expected to acquire the necessary climate data to analyse and describe the past climate and its variability for a specific location and identify any trends in the climatic record if present. They will also be introduced to basic concepts of climate modelling and contemplate how the climate change projections for their home countries/areas will affect the local agricultural sector.

#### **LWR414 (16 credits) - Operational Agrometeorology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

This module is problem-based and aimed at the development of the analytical, writing and climatological advisory skills of students. They learn these skills through the collection, processing, interpreting and reporting of relevant data and information for long-term planning and operational applications. The students will be able to perform the tasks of an operational agrometeorologist professionally.

### **Practical work**

Weekly assignments lead students through the process of data collection, analysis and presentation as they write up results, discussions and conclusions in the form and style of an agrometeorological scientific article.

### **LWR424 (16 credits) - Micrometeorology**

Three lectures and a three hour practical per week.

One examination paper.

Students will obtain a knowledge of micrometeorology – radiation, wind, turbulence, momentum, heat, air moisture, and evaporation; become familiar with mass and momentum transfer and exchange processes in plant communities in connection with radiation, energy and evaporation; gain insight into determination of the influence of the environment on plant processes: photosynthesis, transpiration, leaf temperature and the leaf energy balance; analyse the micrometeorology of urban areas, forests and crops using models and meteorological data.

### **Practical work**

Practical skills will be acquired in the calibration of instruments used for observation of environmental variables above and within plant communities and soil surfaces.

### **LWR434 (16 credits) - Physical and dynamical meteorology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion of this module the student will be able to describe the atmospheric composition and structure; discuss atmospheric heat transfer and the earth's energy balance; derive the various forces which are at work in the atmosphere, and apply them in wind calculations; explain the physical processes involved in cloud formation and precipitation; assess the possibility of thunderstorm development with the use of tephigrams and certain stability indices and explain various atmospheric phenomena such as hail and lightning.

### **Practical work**

Calculation of atmospheric forces and wind components using basic numerical modelling; plotting and analysing of thermodynamic diagrams in weather forecasting.

### **LWR444 (16 credits) - Synoptic meteorology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student will be made familiar with the synoptic climatology and the large scale tropical and extra-tropical weather systems that may affect southern Africa. Various theoretical models are introduced and explained with the use of numerical models. Skill in the interpretation of satellite and radar imagery is expanded. After completion students will be able to issue general weather forecasts.

### **Practical work**

Various forecasting techniques are used to compile a five-day forecast on a weekly basis. Such a forecast is based on theoretical knowledge as well as the analysis and interpretation of synoptic weather charts, meteorological observations, numerical model outputs and remotely sensed imagery.

### **LWR451/461 (4 credits) - Seminar in Agrometeorology**

No formal examination is required.

The student will gain knowledge of the principles of writing seminars by using the library for literature searches. During the preparation, writing and presentation of a seminar on an approved topic in agrometeorology, students will develop the necessary evaluation and communication skills required to succeed as a research scientist.

## **DAF314 (16 credits) - Animal anatomy and physiology of farm animals**

Three lectures and a three hour practical per week.

One examination paper of three hours and an oral examination.

After completion the student is familiar with the micro- and macroscopic studying of the animal body according to the systematic method; the physiology of the nervous system, muscle system, blood and circulatory system, respiratory system and the basic endocrine control of growth, metabolism, behaviour and reproduction.

### **Practical work**

The student performs macro and microscopic studies and dissections of tissues and organs. Basic physiological concepts such as muscle contraction, blood pressure, blood composition, heart action and endocrine glands are demonstrated.

## **DAF324 (16 credits) - Animal health**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with the causes, symptoms, lesions, diagnoses and control measures of the most important animal diseases of farm animals; vaccination and dosing of farm animals; general characteristics of the immune reaction; resistance against parasites and pathogens; dystocia.

### **Practical work**

Elementary diagnostic procedures and post mortem procedures and simple surgery and obstetrics are performed. RIA determinations and other immunological techniques are studied.

## **DAF414 (16 credits) - Applied reproduction physiology in farm animals**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with concepts such as rate of reproduction and means of increasing it in farm animals and poultry; gametogenesis; endocrine control of reproduction; puberty; factors influencing normal reproduction; teratology; principles and application of synchronisation, artificial insemination, super-ovulation and embryo transfer in sheep goats, cattle and pigs; mating systems and management practices; pregnancy diagnosis; reproduction abnormalities.

### **Practical work**

Macroscopic examination of sex organs; semen evaluation, demonstration of synchronisation, laparoscopy and pregnancy diagnosis in sheep and cattle are performed. Visits are brought to AI stations, pig and poultry production units and dairies.

## **DAF424 (16 credits) - Growth and lactation physiology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with the endocrine control of growth and lactation; embryology; histology of muscle and mammary gland tissue and manipulation of growth; milk production and the biological efficiency of milk production; theoretical aspects regarding milk production; lactation disturbances and mammary gland abnormalities; managerial aspects of sustained high milk yield and the manipulation of growth.

### **Practical work**

Visits are brought to production units and the evaluation of production practices.

## **DTL314 (16 credits) - Theory of animal breeding**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with concepts such as Mendelian inheritance, gene and

genotypic frequencies, simply inherited and polygenic traits, selection for simply inherited traits, the resemblance between relatives; heritability and repeatability; prediction of selection response; short and long term results of selection; inbreeding and crossbreeding; threshold values and scale effects; genetic and environmental correlations; correlated responses; natural selection; major genes.

**Practical work**

The student estimates heritability; genetic and phenotypic correlation and other parameters.

**DTL324 (16 credits) - New technologies in animal breeding**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Reproductive technologies, cloning, molecular genetic technologies, genetic markers, major genes and the ethical aspects of new technologies in livestock improvement.

**Practical work**

The student gain new knowledge of the practical aspects of this new technology through demonstrations.

**DTL414 (16 credits) - Animal breeding: Mixed model theory**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with the genetic model for quantitative traits, the use of matrix algebra in breeding value prediction; statistics and the use in animal breeding; importance of heritability and repeatability in animal breeding; methodologies for genetic prediction: selection index and BLUP; comparison of contemporaries; correction factors and optimisation of selection; prediction of breeding values and the principle of mixed models: Sire model, animal model, Bayes theory, QTL's.

**Practical work**

The student estimates breeding values and is familiarised with the application of breeding values. The use of computer programmes is mastered.

**DTL424 (16 credits) - Animal breeding: Practical application**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with the basics of practical animal breeding; selection objectives; selection trials; mating systems; selection techniques; national livestock improvement schemes; selection for growth and efficiency; genotype x environment interactions; unique breeding problems in different breeds and species; linear type traits.

**Practical work**

The student interprets performance test data and herd profiles; conduct practical selection of breeding stock; evaluate breeding programmes. Demonstration of commercial herd/flock management software as used in different livestock industries.

**DVL334 (16 credits) - Fundamental and experimental animal nutrition**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with the concepts of feeds and nutrients (water, carbohydrates, lipids, proteins, minerals and vitamins); digestive systems (monogastric, ruminant and lower digestive tract fermenters), digestion, absorption and metabolism; nutrient deficiencies, toxicity and metabolic disturbances; digestibility of feeds and feed components; techniques for the evaluation of feeds and pastures; nutrient requirements for monogastric animals, ruminants and lower digestive tract fermenters.

**Practical work**

Students perform feeding and digestion trials, and laboratory analyses.

#### **DVL344 (16 credits) - Properties of feeds, balancing rations and fodder flow planning**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with the classification, nutritional characteristics, processing and toxicity of feeds; feed additives and by-products; quality control, balancing of diets and feeding management.

##### **Practical work**

The student performs linear programming, computer assisted balancing of diets and fodder flow management. Visits are brought to farming production units.

#### **DVL434 (16 credits) - Applied monogastric nutrition**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with the principles of nutrition; feed type; formulation of diets; feeding systems; feeding facilities; housing and production management in poultry and pigs.

##### **Practical work**

Visits to various production systems for broilers, laying hens and pigs will be arranged. Writing of a literature review.

#### **DVL464 (16 credits) - Applied ruminant nutrition**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with the nutrient requirements and nutritional management of dairy cattle, dairy calves, beef cattle, sheep and goats during different physiological stages; extensive and semi-intensive feeding systems for livestock, including drought feeding, over-wintering, stall feeding and supplementation on veld.

##### **Practical work**

Balancing of rations.

#### **DVL444 (16 credits) - Applied nutrition of wild herbivores and carnivores**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student is familiar with the principles of nutrition, nutrients and the digestive systems of important groups of wild herbivores and carnivores in Africa. Diet selection, as well as the utilization of grasses, shrubs and trees by different wild herbivore species, is related to habitat preferences. Activities such as prey selection, hunting techniques, scavenging and the utilization of prey animals by wild carnivore species are related to their social behaviour and habitat. The nutrition and dietary requirements of wild animals are studied for both *in situ* and *ex situ* situations.

##### **Practical work**

Assignments form an integral part of the module, both for the theory and the practical work. Developing skills in identifying wild animal species, including their spoor and faecal excretion. Prey animals are identified anatomically by means of the remains of carcasses and the faeces of predators. Techniques are studied and applied to determine and study qualitative and quantitative aspects of the nutrition of wild animals.

#### **VKD214 (16 credits) - Introductory ruminant production**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student will be familiar with the general principles of beef, dairy, sheep and goat production, the role of the four industries in South Africa, different breeds, the effect of nutrition, breeding, physiology and health on the efficient production of beef, mutton (lamb meat), milk and wool.

### **Practical work**

Visits to beef, dairy, sheep and goat production and processing units will be arranged to expose students to the different aspects of the production systems commonly used in South Africa. Basic animal husbandry skills (dipping, dosing, vaccination, castration, dehorning etc.) will be demonstrated and performed. The basic principles of meat, milk and wool evaluation will be demonstrated.

### **VKD224 (16 credits) - Introductory monogastric, wildlife and aquaculture production**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student will be familiar with the general principles of horse husbandry, pig, poultry, wildlife, ostrich and aquaculture production, the role of the industries in South Africa, different breeds, the effect of nutrition, breeding, physiology and health on the efficient production of meat and eggs.

### **Practical work**

Visits to various production and processing units will be arranged to expose students to the different production systems commonly used in South Africa. Basic animal husbandry skills (dipping, dosing, vaccination, castration, docking etc.) will be demonstrated and performed. The basic principles of meat and egg evaluation will be demonstrated.

### **VKD314 (16 credits) - Advanced livestock production**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Having successfully completed this module the student will understand the integrated management aspects related to nutrition, breeding, products, ecology, animal diseases, husbandry and economy; how nutrition, breeding, products, ecology, animal diseases, husbandry and economy can be manipulated within different production systems to increase efficiency of production in sheep, dairy and beef enterprises.

### **Practical work**

Students must compile and evaluate a management system for sheep, dairy and beef enterprises.

### **VKD451/461 (4 credits) - Seminar in Animal Science**

Continuous evaluation. No formal exam is required.

Knowledge concerning the principles for writing seminars and scientific publications, assimilating literature using the library for searches, writing and presenting a seminar according approved procedures are conveyed to students. Students are expected to apply this knowledge by writing and presenting a seminar on an animal science topic.

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## **Food Science**

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### **VWS212 (8 credits) - Introductory Food Science**

Three lectures per week.

One examination paper of three hours.

The student will learn to know the nutritional aspects of food components, food fermentation, milk, milk production, meat, poultry, eggs and egg processing, fruit and vegetables, alcoholic and non-alcoholic beverages, banquetry and chocolate products.

### **VWS222 (8 credits) - Chemical analysis of food**

Three hour practical per week.

One examination paper of three hours.

The student will be able to do the following: basic chemical concepts and calculations, water content and water activity determination in food. Qualitative and quantitative determinations of carbohydrates, proteins, lipids, minerals, vitamins and additives based on gravimetric, photometric

and chromatographic techniques.

### **VWS224 (16 credits) - Food systems**

Three lectures and a three hour practical per week.

One examination paper of three hours.

FOOD SYSTEMS: The student will get acquainted with classification, composition, properties, structure, application, nutritional values, preservation, decay, toxicology, quality. Intermediate moisture foods. Food analogues. FOOD ADDITIVES: classification and application. CONVENIENCE FOODS: classification and factors which influence application. Applied nutritional and human physiological principles.

#### **Practical work**

The students will be able to use the classification, composition of the structure and application of food additives practically.

### **VWS232 - Food chemistry**

Three lectures per week.

One examination paper of three hours.

The student will be exposed to the following aspects: chemical and physical properties of water, carbohydrates, proteins and lipids. WATER, physical properties of water and ice, sorption phenomena, water types, freezing and ice structure, water activity. CARBOHYDRATES: classes, structure, chemical reactions and functions in food, PROTEINS: amino acid composition, classification, protein structure, denaturation, chemical reactions and functions in food. Proteins of different origin. LIPIDS: composition and structure, types, chemical reactions during deterioration due to heat, irradiation and storage, chemical reactions and functions in food.

### **VWS314 (16 credits) - Food products from animals**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The following principles of processing of meat and milk will be addressed in the module:

#### **Meat**

Composition and chemistry of meat. Conversion of muscle to meat. Pigments of meat and its effect on meat processing. Chemistry involved in the ripening of meat and the flavour and taste of meat. Functional properties of meat proteins. Principles involved in stunning, bleeding and skinning animals. Electrical stimulation. Warm deboning of meat. Processing of by-products. Quality of fresh meat. Packaging of meat.

#### **Dairy**

Milk processing, the production of milk powder, condensed milk, frozen dairy products, dairy smears. Introduction to fermented products with special reference to cheese and yoghurt.

#### **Practical work**

#### **Meat**

Studying the slaughter line at an abattoir. Ability to cut a carcass into different cuts. Evaluate the quality of meat. Process meat products.

#### **Dairy**

Studying the processing line at a dairy. Evaluate the chemical and microbiological quality of milk. Process dairy products.

### **VWS324 (16 credits) - Food products from plants**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student will be qualified with knowledge for the processing of sorghum, barley, rice, malting and brewing practices, starch technology and extrusion practices. Plant pigment and flavours will be studied, as well as after-harvest technology of vegetables and fruit, minimal processing requirements (MPR), fruit juices, dehydration and drying of plant products. Packaging of liquid and solid food is done.

**Practical work**

The student will be able to evaluate ripeness stages and quality determinations of cereals, oil seeds, vegetables and fruit, as well as apply storage and basic processing techniques.

**VWS334 (16 credits) - Food engineering**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student will be able to use the following principles:

Factory planning. Energy, thermodynamics and heat transfer. Conduction, convection, radiation, heat exchangers. Mass transfer. Steam supply. Design of a factory for evaporation and drying of liquid foods and applicable principles. Supply of refrigeration and cold rooms. Compressed air: In work place cleaning and its engineering principles. Engineering aspects involved in factory effluents. Automatisation and instrumentation.

**Practical work**

A study tour during the April holiday is undertaken during which the student will study the layout and functioning of production lines.

**VWS344 (16 credits) - Food microbiology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student will study and be able to apply the following aspects:

The microbiology of plant and animal products (dairy meat, vegetables, fruit, cereals). Contamination, spoilage and pathogens in food products. Organisms involved with the processing of food products. Predictive microbiology.

Quality management and sanitation in the food industry. Quality management and control. Quality assurance programmes (HACCP, ISO, etc.). Sanitation with regard to quality assurance.

**Practical work**

Sampling of a variety of food types and food contact surfaces. Isolation and identification of organisms and pathogens from food products. Laboratory management and safety. Setting critical control points for a specific food factory.

**VWS414 (16 credits) - Food products from plants: advanced**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student studies the functional, biochemical and quality aspects of the components of wheat and thus importance in baked goods. Functional biochemical and quality aspects of soy and their importance in soy products.

Concerning vegetables and fruit, quality before and after processing, shelf life, microbiology with relationship to different processing techniques, biological and chemical changes during modified atmosphere storage of MPR vegetables and fruit is studied.

**Practical work**

The student will learn to interpret quality parameters of wheat quality and oil quality, as well as the determination of anti-nutrients in legumes. Pigments and colour determinations will be mastered. Processing techniques of seeds, vegetables and fruit will be mastered.

**VWS424 (16 credits) - Dairy Science**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Dairy products: Scientific principles during the industrial processing of cheese and other fermented dairy products. The evaluation and handling of raw product and raw material. Rennet and acid coagulation of milk and the factors that effect it. Handling of starter cultures. Curd processing. After treatment of curd. Ripening, packaging, storage and evaluation of cheese. Mechanisation. Classification of cheese. Processing, packaging and handling of yoghurt and cottage cheese.



**Practical work**

Case studies regarding production management and -planning of products will be studied. Processing of fermented products will be mastered, with associating analysis, quality control and packaging aspects.

**VWS434 (16 credits) - Product development and sensory analysis**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student studies the multi-disciplinary nature of product development. Definitions and criteria for new product development, principles, approaches. The consumer. Relationship between sensory evaluation and product development. The student will apply the role of product development in the food industry.

**Practical work**

The student develops a product in which all theoretical aspects of product development will be applied, along with knowledge obtained in previous years. Techniques used in sensory analysis will be mastered.

**VWS444 (16 credits) - Meat Science**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Meat products: Principles involved in manufacturing whole-muscle, minced and emulsified meat products. Restructured, canned, fermented, dried and intermediary moisture meat products. Curing, smoking and cooking of meat products. Additives in meat products. Non-meat ingredients in meat products. Formulation of a meat product.

**Practical work**

Case studies will be done regarding the slaughter line at poultry and red meat abattoirs. Effect of processing and storage on meat quality is studying with respect to: processing techniques, analysis, quality control and packaging.

**VWS451/461 (4 credits) - Seminar in Food Science**

Two theory periods per week.

Literature oriented instructions with regard to food problems of a microbiological, chemical or process-related nature as well as other aspects of concern to the food industry.

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## Grassland Science

**WDK224 (16 credits) - Veld as natural resource**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completing this module the student will know the ecological and economic significance of veld in the RSA and certain other parts of the world. Development of skills in identifying southern African veld types, game farming areas and biomes: characteristics, agricultural potential, production capacity and conservation status. Students will describe and evaluate the causes and results of vegetation changes. Identification and description of South African fodder plants: grasses, bushes, Karoo shrubs, trees and legumes as well as indicator and problem plants will be done. Bringing physiological approach to ecosystem utilisation in proper relation to optimal growth and development of fodder plants on a basic level. After completion of the module the student will be able to evaluate the ecological aspects which influence the functioning of the grassland ecosystem (domestic and wildlife).

**Practical work**

Identification of fodder plants and veld types regarding desirability, production capacity and ecological status will be done. Herbarium collection of fodder plants.

### **WDK314 (16 credits) - Applied veld management and veld evaluation**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The aims and principles of veld management with livestock and wildlife will be studied in this module. Knowledge of grazing habits of livestock and wildlife and selective grazing will be attained. Identification and analysing of veld management methods and strategies will be discussed. Determination of production and quality of veld will be studied. The student will be equipped to determine grazing capacity and stocking rate. Students will be familiar with the importance of record-keeping of veld. The student will be able to do scientific planning of a farm unit and study the methods for evaluating grasslands in respect of cover, botanical composition and veld condition. The student will bring game farm planning in proper relation to management and utilisation of game.

#### **Practical work**

Physical and biological planning of a farming unit will be done. Students will gain practical skills in application of different techniques to establish veld condition, production, quality and grazing capacity. Practical reports must be handed in.

### **WDK324 (16 credits) - Intensive pasture production**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion of the module the student will know of the importance, extent and purpose of intensive pasture production in the RSA. The student will gather information about seed germination of fodder plants. Evaluation of factors important in veld reclamation and veld reinforcement will be discussed. Identification and evaluation of suitable crops for planting/cultivating: cultivation aspects, choice of crops, nutritive value, quality, utilisation and forage conservation will be studied. The student must integrate all the information to do fodder flow planning.

#### **Practical work**

The student should be able to develop skills on identification of grasses and legumes for establishment and veld improvement. Study and evaluation of management practices on farms. Designing fodder flow programmes.

### **WDK414 (16 credits) - Production and utilisation ecology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The grassland ecosystem (interactions, structure and functioning) and the farmer as manager will be studied in this module. The student should be able to evaluate the sustainability of the grassland ecosystem and the factors that may influence it. The student should have a higher level of knowledge on the outputs of the grassland ecosystem. Identification and analysing of ecological game farming areas and ecosystem characteristics in connection with game-species and its social behaviour and habitat preferences. Evaluation and analysing the hydrological and other cycles in the grassland ecosystem with reference to the influence of utilisation and management will be discussed. The student will be equipped with the development of models for the prediction of production and utilisation of the grassland ecosystem. After completion the student should be familiar with pollution and preservation of the grassland ecosystem.

#### **Practical work**

Evaluation of the influence of utilisation and management on productivity of the grassland ecosystem under different veld conditions will be done. Identification and description of plant growth habitat relationships.

### **WDK424 (16 credits) - Advanced veld management**

Three lectures and a three hour practical per week.

One examination paper of three hours.

Knowledge of the extent and history of the conservation idea will be studied in this module. Identification of the causes and results of veld deterioration (erosion) and measures to combat it will be done. The student should be able to identify the importance of veld management in different veld types and the critical evaluation of system/practices. Identification and analysing the grazing habits of livestock and game and selective grazing. Determination of grazing capacity and stocking rate and application of special treatments for veld will be discussed. Students will carry out veld management planning and bringing applied wildlife management in proper relation to marketing, legal aspects, economics and socio-economical aspects of game. Students will be familiar with the management of communal areas.

#### **Practical work**

Determination of veld condition and production planning will be applied for the physical and biological planning of a veld management system on both a livestock and game farming unit.

Excursions, during which practical work regarding veld condition, evaluation and practical veld management will be critically discussed, are compulsory. Practical reports on these excursions must be submitted.

### **WDK434 (16 credits) - Defoliation phenology and physiology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The student will have a higher level of knowledge on physiological and phenological aspects of fodder plants. The student have to gain information about water absorption, translocation and food storage in fodder plants as applicable to grassland management. Identification of critical periods (phenological and physiological) in the seasonal growth cycle of grasses, legumes, fodder shrubs and bushes. Be adjusted to the influence of intensity, frequency and season of defoliation on net assimilation rate, root growth, growth reserves and plant growth changes of grasses, bushes and Karoo shrubs. Bringing the influence of water shortages in proper relation to the growth and development of fodder plants. Students will gain knowledge of seasonal variation in nutritional value and quality of fodder plants.

#### **Practical work**

Analysing of the influence of intensity and frequency of defoliation on production and root growth of fodder plants will be done. Identification of the growth cycle, leaf lengths and leaf surfaces of fodder plants. Introduction to devices such as infrared gas analyser, leaf surface meter, neutron water meter and transpiration meter.

### **WDK444 (16 credits) - Advanced fodder plant evaluation**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completion the student will have a higher level of knowledge on the classification of vegetation and identification of the variables that influence the grassland ecosystem. Planning and conducting of grassland science research will be carried out. Sampling, arrangement, statistical tests and simulation models applicable to the grassland ecosystem will be done. Student should be able to identify methods to measure variables and the productivity of the grassland ecosystem and knowledge of the practical application of the techniques. Evaluation of applied livestock and wildlife management systems will be studied. Student should be familiar with the principles, application and limitations of the most important wildlife management Research methodology.

#### **Practical work**

Practical skills will be developed in different techniques (veld work and computer), applicable to grassland science. Report and processing of data.

### **WDK451/461 ( 4 credits) - Professional skills**

Continuous evaluation. No formal exam is required.

Knowledge attain concerning the principles for writing seminars and scientific publications, acquiring literature and consultation thereof, gathering of information, writing and presenting a seminar on a grassland scientific subject, project presentations and reports; communication skills development.

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## **Plant Breeding**

### **PLT224 (16 credits) - Breeding techniques**

Three lectures and a three hour practical per week.

One examination paper of three hours.

This module serves as an introduction to plant breeding. On completion the student will be acquainted with the basic concepts and terminology of plant breeding. The student will have the knowledge to develop self-pollinated, cross-pollinated and vegetatively propagated species. Although the emphasis is on conventional plant breeding, students are exposed to laboratory and biotechnological techniques that may improve breeding efficiency. Differences between qualitative and quantitative characteristics, and how the breeder can select for them, are also addressed.

#### **Practical**

Practical breeding techniques as applicable under greenhouse and field conditions.

### **PLT314 (16 credits) - Selection methods**

Three lectures and a three hour practical per week.

This module concerns the different selection methods that can be used by the breeder for crop improvement. These methods include selection for qualitative and quantitative characteristics in self-pollinating, cross-pollinating and vegetatively propagated species. Response to selection, the influence of environment on the genotype and the genetic basis of inbreeding and heterosis are emphasized. On completion of the module the student will have the knowledge to decide on the most appropriate selection procedure for a specific breeding aim.

#### **Practical**

Practical breeding in the greenhouse and tutorials.

### **PLT424 (16 credits) - Advanced breeding techniques**

Three lectures and a three hour practical per week.

One examination paper of three hours.

This module will equip the student with knowledge on breeding techniques such as mutation breeding, tissue and anther culture, recombinant DNA-technology and plant transformation. Furthermore, legislative, labeling and ethical issues of genetically modified organisms (GMO's) are addressed.

This knowledge will make the student competitive in the workplace where new technology and GMO's have become an everyday reality.

#### **Practical**

Practical exercises in selected techniques, supported by demonstrations and discussions.

### **PLT461 (4 credits) - Seminar in Plant Breeding**

Continuous assessment. No formal examination is required.

The student acquires information on a specified topic in plant breeding and assimilates the information in an organized and logical format according to the requirements for scientific publications. The seminar is also presented orally.

# Plant Pathology

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## **PPG214 (16 credits) - Principles of Plant Pathology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

On completion of this module the student will be acquainted with the impact, causes and diagnosis of plant diseases and the reasons why plant pathology is considered an important field of study. The student will have a sound understanding, based on the basic concepts of infection and colonization of plant tissue, of how plant diseases arise and develop and how to approach disease problems.

### **Practical work**

In conjunction with the theory of plant pathology the student will be capable of identifying diseases of the most important economic crops and of prescribing control methods. The student will also be experienced in the collection, identification, description and preservation of herbarium specimens.

## **PPG334 (16 credits) - Molecular Plant Pathology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

On completion of the module, students will be acquainted with the molecular techniques used in plant pathology and their application in the taxonomy of plant pathogens, population diversity, selection for disease resistance and host x pathogen interactions. The module will provide the necessary background to analyse and quantify genetic variation in plant and pathogen populations at DNA level.

### **Practical work**

After completion of the practical module the student will be skilled in certain aspects of plant pathological research.

## **PPG324 (16 credits) - Plant health management**

Three lectures and a three hour practical per week.

One examination paper of three hours.

On completion of this module the student will be acquainted with ecological and economic concepts that underlie the management of plant diseases within the context of a sustainable and integrated pest management (IPM) system. The student will be well versed in the basic ecological principles pertaining to the stability and diversity of natural ecosystem vs. agro-ecosystems as influenced by variation in agricultural crops and pathogenic micro-organisms. An understanding of economic thresholds as they relate to crop yield, or losses, will enable the student to translate ecological considerations into economic ones.

### **Practical work**

Together with a sound knowledge of integrating disease control tactics, by means of case studies, the student will thus be well trained in developing disease control strategies that are both efficient and cost-effective.

## **PPG414 (16 credits) - Fungal diseases of plants**

Three lectures and a three hour practical per week.

One examination paper of three hours.

On completion of this module the student will be acquainted with the taxonomy and general characteristics of fungi, with specific reference to plant pathogens. The student will also be trained in the types of diseases that are caused by the main groups of fungi.

### **Practical work**

After completing the practical module the student will be able to identify the most important groups of plant pathogenic fungi and the symptoms they produce in plants.

### **PPG424 (16 credits) - Plant diseases caused by bacteria and viruses**

Three lectures and a three hour practical per week.

One examination paper of three hours.

This module will equip the successful student with a sound knowledge of the characterisation (i.e. morphology and classification) and ecology (survival and transmission) of bacteria, viruses and other prokaryotic organisms that cause plant diseases. Various methods of managing or controlling diseases caused by these organisms will also be discussed.

#### **Practical work**

The practical module will teach the student how to isolate and identify important plant pathogenic bacteria using specialised culture media.

### **PPG434 (16 credits) – Epidemiology of Plant Diseases**

Three lectures and a three hour practical per week.

One examination paper of three hours.

After completing this module the candidate will understand the temporal and spatial aspects of plant disease development. The student will also be acquainted with how these aspects, together with the environment and host factors influence disease development in populations and how they can be integrated to control diseases.

#### **Practical work**

Following this module, the student will have practical experience in quantitative epidemiology.

### **PPG444 (16 credits) - Host-pathogen interactions**

Three lectures and a three hour practical per week.

One examination paper of three hours.

The successful student will after completing this module have a sound knowledge of the physical and physiological effects that plant pathogens have on their hosts, particularly the methods they use to attack plants and how plants in turn defend themselves.

#### **Practical work**

Tutorial classes dealing with case studies of specific diseases extend the knowledge base of the student, particularly with regard to the variety of interactions between host and pathogen.

### **PPG451/461 (4 credits) - Seminar in Plant Pathology**

Continuous evaluation. No formal examination.

A student will, after completing this module, have practical experience in assimilating literature, writing and presenting a review of a plant pathological subject. Important communication skills of specific relevance to the profession of plant pathology will also form part of the student's skills.

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## **Soil Science**

### **GKD214 (16 credits) - Soil ecology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

#### **Outcome:**

Introduction to soil as a natural resource and the role of soil in natural, agricultural and urban ecosystems.

#### **Contents:**

Composition of soil and the function in natural, agricultural and urban ecosystems. The soil profile, master horizons, soil forming factors and processes. Basic morphological, physical, chemical and biological soil properties.

**Practical work**

Field investigations of selected soil profiles and the study of morphological, physical, chemical and biological soil properties.

**GKD314 (16 credits) - Soil evaluation and land use planning**

One examination paper of three hours.

**Outcome:**

Expertise on the identification, classification, mapping and land use suitabilities of soils in natural, agricultural and urban ecosystems.

**Contents:**

Soil classification with special reference to the South African system. Soil mapping techniques and guidelines for compiling soil maps. Soil evaluation for natural, agricultural and urban ecosystems.

**Practical work**

Fieldwork in soil classification and mapping as well as the evaluation of soils for different land uses.

**GKD324 (16 credits) - Sustainable soil and water management**

Three lectures and a three hour practical per week.

One examination paper of three hours.

**Outcome:**

Managing knowledge to evaluate and adjust production processes in order to maintain or improve soil and water quality.

**Contents:**

Importance of soil and water quality for sustainable agricultural production. Optimising of soil water use for dry land and irrigation farming. Principles on the management of soil fertility, acidity, alkalinity and erosion. Soil tillage methods and practices.

**Practical work**

Laboratory and field studies in soil and water management. Interpretation of soil analyses and the compilation of fertilisation programs.

**GKD414 (16 credits) - Soil chemistry**

Three lectures and a three hour practical per week.

One examination paper of three hours.

**Outcome:**

Advanced knowledge of chemical reactions and processes in soils and its effect on natural, agricultural and urban ecosystems.

**Contents:**

Advanced soil colloid chemistry, ion exchange reactions, redox reactions, and soil acidity and alkalinity. Chemistry of important plant nutrients in soil. Soil pollution and its impact on the environment.

**Practical work**

Laboratory analyses of a soil sample for selected chemical properties.

**GKD424 (16 credits) - Soil biology**

Three lectures and a three hour practical per week.

One examination paper of three hours.

**Outcome:**

Knowledge on organisms and their involvement in decomposition of organic residues, synthesis of humus and the impact on soil quality of natural, agricultural and urban ecosystems.

**Contents:**

Activity and role of macro- and micro-organisms in soil. Interaction between plant roots and micro-organisms in soil. Chemical changes of biological residues in soil. Composition of humus and the fractionation of it. Properties of humus and the effect of it on the biological, chemical and physical properties of soils. Maintenance and improvement of biological soil quality.

**Practical work**

Comparison of different ecosystems through the isolation of bacteria, fungi, algae, actinomycete and nematodes from soil and the extraction of humus from soil and its fractionation.

**GKD434 (16 credits) - Soil physics**

Three lectures and a three hour practical per week.

One examination paper of three hours.

**Outcome:**

Advanced knowledge of the physical properties and processes in soils and its effect on natural, agricultural and urban ecosystems.

**Contents:**

The physical and hydraulic properties of and the processes in soils. Analysis of the flow processes of water, heat and air in saturated and unsaturated soils. Factors affecting the flow processes.

**Practical work**

Field and laboratory investigations in soils of different physical, hydraulic and mechanic properties.

**GKD444 (16 credits) - Soil geography**

Three lectures and a three hour practical per week.

One examination paper of three hours.

**Outcome:**

Advanced knowledge of the genesis, geographical distribution and behaviour of soils in the landscape.

**Contents:**

The genesis, properties, classification and behaviour of soils in the landscape. Global soil classification systems with reference to the South African system.

**Practical work**

Case studies of soils in the landscape on their genesis, properties, classification and behaviour.

**GKD461 (4 credits) - Seminar in Soil Science**

No formal examination is required.

**Outcome:**

Knowledge and skills to gather information on a soil science topic, writing it up and presenting it to an audience.

**Contents:**

The principles concerning the collection and synthesis of information with literature searches as well as the written and oral presentation thereof according approved procedures. Students are expected to apply this knowledge by writing and presenting a seminar on a soil science topic.

## Module contents not in this yearbook

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The contents of modules not in this book can be found in other yearbooks.

For BOC, BCC, BLG, BMT, BRS, CEM, ENT, FSK, GEN, GLG, MKB, PLK, BRS, STK and WTW consult the yearbook of the Faculty of Natural and Agricultural Sciences, Part 1.

For FES, ECT, ECF, FET, BUS, IOP, HRM and BEL consult the yearbook for the Faculty of Economic and Management Sciences.



**Postgraduate Agricultural Programmes: See Yearbook Part 3, Faculty of Natural and Agricultural Sciences.**

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# PREREQUISITES

AGR314	Min. (AGR224)
AGR324	Min. (AGR224) or concurrently
AGR424	AGR224
AGR444	Min. (AGR414) or concurrently
BRS121	BRS111
DTL414	DTL314
DVL334	Min. (BCC214)
GKD314	Min. (GKD214)
GKD324	Min. (GKD214)
GKD414	GKD214
GKD424	GKD214
GKD434	GKD214
GKD444	GKD214
GKD461	GKD214
HRT314	Min. (AGR224) or concurrently
LEK214	Min (LEK124)
LEK224	Min (LEK124)
LEK314	Min (LEK124)
LEK324	LEK314
LEK414	LEK224
LEK424	LEK124
LEK434	LEK214
LNG224	LWL194 or WTW134
LNG314	LNG224
LNG324	LNG314
LNG414	LNG324
LNG424	LNG414
LWR214	LWL154 or FSK134 or concurrently
LWR314	Min. (LWR214) or concurrently
LWR324	LWR214
LWR414	LWR214
LWR424	LWR214 and LWL154 or FSK114 or FSK134
LWR434	LWR214 and LWL154 or FSK114 or FSK134
LWR444	LWR214 and LWL154 or FSK114 or FSK134
PLT314	PLT224
PLT424	PLT224
PPG334	PPG214
PPG414	PPG214
PPG424	PPG214
PPG434	PPG214
PPG444	PPG214
STK216	STK124 of BMT124
STK226	STK216
VWS222	VWS232 and [CEM114 or (CHE112+CHE142+CHE151)] and [(CEM124/144) or [CHE132+CHE122+CHE161]] or (LWL134 en LWL144)
VWS224	VWS212 or VDS214
VWS232	CEM114 and CEM124 or CEM114 and CEM144 or LWL134 and LWL144
VWS314	VWS212 or VKD224

VWS324	VWS212
VWS334	VWS212
VWS344	VWS212 and MKB214 or MCB212 and MCB232
VWS414	VWS324
VWS424	VWS314
VWS434	VWS314 and VWS324 and VWS224
VWS444	VWS314 or VKD224
WDK314	WDK224
WDK414	WDK314
WDK434	WDK314
WDK424	WDK314
WDK444	WDK314
WTW144	Min (WTW114) of WTW134

**NB.** For modules presented in Natural Sciences, see Yearbook Part 1: Undergraduate Programmes.