Faculty of Natural and Agricultural Sciences

Yearbook 2011

Part 4: Agricultural Sciences: Undergraduate Programmes

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CONTENTS

ACADEMIC STAFF

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PROGRAMME HEAD (QWAQWA CAMPUS) Professor A.S. Luyt

PROGRAMME DIRECTORS

Programme	Programme Director	Telephone
Actuarial Sciences and Risk Analysis	Mr M. von Maltitz	051 401 2609
Architecture	Mr H.B. Pretorius	051 401 3482
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• Zoology, Entomology	Prof. Jo van As	051 401 2427
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Consumer Science	Prof. H.J.H. Steyn	051 401 2304
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(Departmental Heads / Departmental Chairpersons / Qwaqwa Subject Heads are indicated with an asterisk)

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Junior Lecturer	Mr R.G. Moji

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Junior Lecturers	Ms J.S. van Zyl, Ms P.Z. Swart, Ms J.F. Vermaas

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Senior Lecturer-researcher	Dr H.E. Praekelt
Junior Lecturer	Ms H. Joubert

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Professor	Prof. G.J. van Tonder
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Division Microbiology and Biochemistry

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Qwaqwa-kampus	
Associate Professor	Prof. B.F. Dejene
Senior Lecturer	*Dr J.Z. Msomi
Lecturers	Dr R.O. Ocaya, Mr J.J. Dolo, Dr B.M. Mothudi

PLANT SCIENCES (051 401 2514)

Plant Pathology

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Senior Lecturer	Dr. M. Gryzenhout

Botany

Professor	Prof. A.J. van der Westhuizen
Associate Professor	*Prof. P.J. du Preez
Senior Lecturers	Dr. G.P. Potgieter, dr B. Visser
Lecturers	Dr L. Mohase, dr. M. Bezuidenhout, me. L. Joubert

Plant Breeding

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Asociate Professor	Prof. L. Herselman
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Junior Lecturer	Mr T.R. Pitso

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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

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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

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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. T.C. de K. van der Linde, 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
Junior Lecturers	Mr V.R. Swart, Ms L. Heyns
Qwaqwa Campus	
Senior Lecturers	*Dr M.J. Cunningham, Dr M.M.O. Thekisoe
Lecturers	Mr J. van As, Mr E. Bredenhand, Ms H.J.M. Matete
Junior Lecturer	Ms S.F.C. Nyaile

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
University Preparation Programme Agricultural Sciences (UPP Agricultural Sciences) for B.Agric. – South Campus	1 year	UPP Agric.	5002	12
DEGREES				
Baccalaureus degree				
Baccalaureus Agriculturae	3 years	B.Agric.		13
Baccalaureus Scientiae Agriculturae	4 years	B.Sc.Agric.		25
Honours degrees				113
Baccalaureus Scientiae Agriculturae Honores		B.Sc.Agric. Hons.		
Baccalaureus Agriculturae Honores		B.Agric.Hons.		
Master's degrees				113
Magister Scientiae Agriculturae		M.Sc.Agric.		
Magister in Sustainable Agriculture		M.V.L.		
Magister Agriculturae		M.Agric.		
Doctor's degrees				113
Philosophiae Doctor		Ph.D.		
Doctor Scientiae		D.Sc.		

REGULATIONS AND INFORMATION
FIRST BACHELOR'S DEGREES IN AGRICULTURE

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.

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*.

Reg. H1 - Admission requirements

(a) See General Regulations A2 and A3.

(b) 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 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 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 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) FOR B.AGRIC. – 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. **Students who wrote the UFS Afrikaans skills test, but did not comply with the required skill, must register additionally for AFA108 or ALN108.**

Modules with an asterisk are year modules.

Year		Semester 1	Semester 2	Entrance Requirements
	MAINSTREAM MODULES			
1		**Compulsory**	**Compulsory**	• National Senior Certificate (NCS) • Minimum Application Point (AP) 20 • Official tuition language - level 3 (40%) • Mathematical Literacy - level 6 (70%) **or** Mathematics - level 3 (40%)
	Economic management of resources	-	LEC124	
	Biological principals in Agriculture	LWB114	-	
	Chemistry	LWC112	LWC121	
	DEVELOPMENTAL MODULES			
		Compulsory	**Compulsory**	
	Mathematical Literacy in Agriculture	MTA108*		
	Life-long Learning	VBL108*		
	Academic language skills course in English or Afrikaans	ALN108* or AFA108*		
	Basic Computer Literacy	BRC111		
NB	**TRANSITION TO MAINSTREAM B.AGRIC. (MAIN CAMPUS)** • **Pass ALL the <u>Mainstream</u> modules** **PLUS at least THREE of the <u>Developmental</u> modules:** • **Mathematical Literacy in Agriculture (MTA108)** • **Life-long Learning (VBL108)** • **Academic language skills course in English (ALN108) or Afrikaans (AFA108)** • **Basic Computer Literacy (BRC111)**			
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.**			

<u>Please note:</u>

- Students receive recognition for LWL134 (Chemistry principles in Agriculture) 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.

BACCALAUREUS AGRICULTURAE B.Agric.

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.

Specialisation	Study code	Learning programme
Irrigation Management	5311	1
Animal Production Management	5312	2
Mixed-farming Management	5313	3
Crop Production Management	5314	4
Agricultural Management	5316	6
Wildlife Management	5317	7

REGULATIONS

Reg. H12 - Curricula

Learning programme 1 - Study code 5311

B.Agric.: Specialisation in Irrigation Management

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 their control measures
GEO114 : Introduction to Physical Geography
PPG214 : Principles of Plant Pathology

Fourth semester

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

Third academic year

Fifth semester

GKD314 : Soil evaluation and land use planning
LEK314 : 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

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 their 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 academical year

Fifth semester

DAF314 : Animal anatomy and physiology of farm animals
VKD314 : Advanced livestock production
LEK314 : 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

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 their 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

Third academic year

Fifth semester

VKD314 : Advanced livestock production
LEK314 : 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

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

Third academic year

Fifth semester

AGR314 : Production of summer grain, oil and protein rich crops
HRT314 : Vegetable production
LEK314 : 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 their 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 6 - Study code 5316

B.Agric.: Specialisation in Agricultural Management

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:

EKN114 : Introduction to economics and micro-economics
ENT114 : Introduction to morphology, anatomy and bio-ecology of insects as well as insect pests important to agriculture and their 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
EKN124 : Introduction to macro-economics
VKD224 : Introductory monogastric, wildlife and aquaculture production
WDK224 : Veld as natural resource

Third academic year

Fifth semester

LEK314 : 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
EKN214 : Micro-economics
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
EKN224 : Macro-economics
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 7 - Study code 5317

B.Agric.: Specialisation in Wildlife Management

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 their 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

Third academic year

Fifth semester

GKD314 : Soil evaluation and land use planning
LEK314 : 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

BACCALAUREUS SCIENTIAE AGRICULTURAE B.Sc.Agric.

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:

Specialisation	Study code	Learning programme
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 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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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 insect pests important to agriculture and their 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

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 : 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

First academic year

First semester

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

Second semester

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

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

Third academic year

Fifth semester

AGR314 : Production of summer grain, oil and protein rich crops
GKD314 : Soil evaluation and land use planning
LEK314 : 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 their control measures
FEC214 : Money and banking
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
GEB224 : Money and banking
HRT324 : Fruit production
LNG324 : Irrigation systems and irrigation surveying
LWR324 : Climate change and variability
PLK324 : Plant metabolism
PPG324 : Plant health management

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 economy
LEK444 : Agricultural policy and development
LEK461 : Seminar in Agricultural Economics

Learning programme 3 - Study code 5323
B.Sc.Agric.: Specialisation in Agronomy and Agrometeorology

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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 insect pests important to agriculture and their control measures
GEO114 : Introduction to Physical Geography
PPG214 : Principles of Plant Pathology
WTW234 : Introductory to mathematical modelling

AND

WTW254 : Computer mathematics

Fourth semester

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

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

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

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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

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 their 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 Genetics
PLT224 : Breeding techniques

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

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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 insect pests of importance to agriculture 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

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemicals
FSK134 : General 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 24 credits from the following:

GKD214 : Soil ecology
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

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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

Choose at least 16 credits out of the following:

ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as insect pests of importance to agriculture and control measures
OBS134 : Business management
HUM114 : Organisation psychology
VKD214 : Introductory ruminant production

Fourth semester

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

Choose at least 16 credits out of the following:

LEK224 : Farm planning and management
OBS244 : Business management

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
ORG124	:	Personnel psychology
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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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 insect pests of importance to agriculture and their 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

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 : 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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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 asinsect pests important to agriculture and their 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

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 : 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

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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 insect pests important to agriculture and their control measures
GEO114 : Introduction to Physical Geography
LEK214 : Agricultural finance
PPG214 : Principles of Plant Pathology
VKD214 : Introductory ruminant production

Fourth semester

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

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

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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

ENT214 : Functional morphology and anatomy of insects, as well as insect pests of importance to agriculture and their control measures
ENT252 : Classification and identification of insects
PPG214 : Principles of Plant Pathology

Choose at least 32 credits from the following:

BCC214 : Biochemistry for agriculture and health sciences
GEN216 : Principles of Genetics
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
GEN246 : Molecular Genetics
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

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

Fourth academic year

Seventh semester

ENT354 : Advanced medical, veterinary and forensic entomoly

PPG414 : Fungal diseases of plants
PPG434 : Epidemiology and ecology of plant pathogens

Choose at least 16 credits from the module options in the 2nd and 3rd 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 2nd and 3rd year of study

Learning programme 14 - Study code 5334

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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 insect pests important to agriculture and their 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, thermo-dynamics, electricity and magnetism
WTW144 : Calculus and linear algebra
GIS224 : Geographical information systems
PLT224 : Breeding techniques

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

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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 nsect pests important to agriculture and their 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

Third academic year

Fifth semester

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

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

Sixth semester

GKD324 : Sustainable soil and water 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
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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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 science
ENT114 : Introduction to morphology, anatomy and bio-ecology of insects, as well as insect pests important to agriculture and their control measures
GEO114 : Introduction to Physical Geography
PPG214 : Principles of Plant Pathology
VKD214 : Introductory ruminant production

Fourth semester

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

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

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 : 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)

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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
[1]WTW144 : Calculus and linear algebra

Second academic year

Third semester

EKN114 : Introductory economics and micro economics
LEK214 : Agricultural finance
STK216 : Multiple regression analysis

Choose at least 16 credits out of the following:

GKD214 : Soil ecology
[2]HRG204 : Commercial Law
LWR214 : Introduction to Agrometeorology
OBS134 : Business management
HUM114 : Organisation psychology
RIS114 : Introduction to computers
[2]RLB108 : Accounting for agricultural students
VKD214 : Introductory ruminant production

Fourth semester

EKN124 : Introduction to macro economics
LEK224 : Farm planning and management
STK226 : Analysis of variance and time series analysis

Choose at least 16 credits out of the following:

AGR224 : Crop production principles
ORG124 : Personnel psychology
LBV224 : Communication and agricultural extension
LNG224 : Engineering principles in agricultural practices
OBS144 : Marketing
RIS124 : Advanced programming
[2]RLB108 : Accounting for agricultural students
VKD224 : Introductory monogastric, wildlife and aquaculture production
WDK224 : Veld as natural resource

Third academic year

Fifth semester

EKN214 : Micro-economics
LEK314 : Agricultural marketing

Choose at least 32 credits out of the followng:

ABR214 : Labor law
AGR314 : Production of summer grain, oil and protein rich crops
[2]BEL208 : Taxation
FEC214 : Money and banking
GKD314 : Soil evaluation and land use planning
HRT314 : Vegetable production
LNG314 : Hydraulics
LWR314 : Influence of climate on agricultural practices
OBS234 : Financial management
[2]REK208 : Accounting
RIS212 : Introduction to object design
RIS214 : Data structures
STK316 : Statistical inference (applied)
WDK314 : Applied veld management and veld evaluation

Sixth semester

EKN224 : Macro-economics
LEK324 : Advanced Agricultural marketing
DMT322 : Statistical analyses

Choose at least 32 credits out of the following:

ABR224 : Labor law
AGR324 : Production of winter grain, industrial and diverse crops
[2]BEL208 : Taxation
GEB224 : South African financial management
GKD324 : Sustainable soil and water management
LBB344 : Strategic agricultural management
LNG324 : Irrigation systems and irrigation surveying
LWR324 : Climate change and variability
OBS244 : Business management
[2]REK208 : Accounting
RIS222 : Introduction to networks and the internet
RIS224 : User interfaces
STK326 : Applied regression and time series analysis
WDK324 : Intensive pasture production

Fourth academic year

Seventh semester

LEK414	:	Managerial economics
LEK434	:	Agribusiness management

Choose at least 32 credits out of the following:

EKN314	:	Political economy and development
FEC314	:	International finance
LNG414	:	Flood and mechanised irrigation
OBS314	:	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
EKN324	:	South African economic policy
FEC324	:	Bank Management
GKD444	:	Soil geography
LNG424	:	Specialised micro, drip and underground irrigation systems
OBS324	:	Marketing
OBS364	:	Financial management
RIS324	:	Software engineering
RIS344	:	Operating systems

[1]See prerequisites
[2]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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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

EKN114 : Introduction to economics and micro-economics
GKD214 : Soil ecology
LEK214 : Agricultural finance
LWR214 : Introduction to Agrometeorology

Fourth semester

EKN124 : Introduction to macro-economics
LEK224 : Farm planning and management
LNG224 : Engineering principles in agricultural practices
WDK224 : Veld as natural resource

Third academic year

Fifth semester

EKN214 : Micro-economics
LEK314 : 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

EKN224 : Macro-economics
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

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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
EKN114 : Economics
LEK214 : Agricultural finance
VWS212 : Introductory Food Science
VWS232 : Food chemistry

Fourth semester

EKN124 : Economics
LEK224 : Farm planning and management
VWS222 : Chemical analysis of food
IQM242 : Industrial quality control
VWS224 : Food systems

Third academic year

Fifth semester

EKN214 : Micro-economics
LEK314 : 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

EKN224 : Macro-economics
LEK324 : Advanced Agricultural marketing
VWS324 : Food products from plants
DMT322 : Statistical analyses

Choose at least 16 credits out of the following:

STK226 : Variance and categorical data analysis
VWS344 : Food microbiology

Fourth academic year

Seventh semester			*Eighth semester*		
LEK414	:	Managerial economics	LEK424	:	Resource economics
LEK434	:	Agribusiness management	LEK444	:	Agricultural policy and development
VWS414	:	Food products from plants: advanced	LEK461	:	Seminar in Agricultural Economics
VWS434	:	Product development and sensory analysis	VWS424	:	Dairy Science
VWS451	:	Seminar in Food Science	VWS444	:	Meat Science

Learning programme 20 - Study code 5340

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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

Choose at least 16 credits from the following:

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

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

Sixth semester

LWR324 : Climate change and variability
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
LNG324 : Irrigation systems and irrigation surveying

Fourth academic year

Seventh semester

LWR414 : Operational Agrometeorology
LWR434 : Physical and dynamic meteorology
PPG414 : Fungal diseases of plants
PPG434 : Epidemiology and ecology of plant pathogens
PPG451 : Seminar in Plant Pathology

Eighth semester

LWR424 : Micrometeorology
LWR444 : Synoptic meteorology
LWR461 : Seminar in Agrometeorology
PPG424 : Plant diseases caused by bacteria and viruses
PPG444 : Host-pathogen interactions

Learning programme 21 - Study code 5341

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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 asinsect pests important to agriculture and their control measures
GEO114 : Introduction to Physical Geography
PPG214 : Principles of Plant Pathology
VKD214 : Introductory ruminant production

Fourth semester

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

Choose at least 32 credits from the following:

AGR224 : Crop production principles
FSK144 : Mechanics, thermo-dynamics, 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

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 : 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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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

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 their control measures
GEN216 : Principles of Genetics
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 Genetics
PLT224 : Breeding techniques
WDK224 : Veld as natural resource

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

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

First Academic year

First semester

BLG114	:	Buildings blocks of life
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General 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

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 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)

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

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

First academic year

First semester

BLG114	:	Buildings blocks of life
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General 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
EKN114	:	Introduction to economics and micro-economics
LEK214	:	Agricultural finance
VKD214	:	Introductory ruminant production

Fourth semester

EKN124	:	Introduction to macro-economics
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
DTL314 : Theory of animal breeding
OR
DVL334 : Fundamental and experimental animal nutrition
LEK314 : Agricultural marketing

Choose at least 16 credits from the following:

EKN214 : Micro-economics
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:

EKN224 : Macro-economics
GEB224 : Money and banking
STK226 : Variance and categorical data 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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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

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 : 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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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
OBS244 : Business 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
ORG124 : Personnel psychology

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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

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 : 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

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

First academic year

First semester

BLG114	:	Buildings blocks of life
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General 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
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

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
OBS134 : Business management
OBS234 : Financial management
HUM114 : Organisation psychology

Eighth semester

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

Choose at least 32 credits out of the following:

ORG124 : Personnel psychology
LEK224 : Farm planning and management
OBS144 : Marketing
OBS244 : Business management

Learning programme 29 - Study code 5349

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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

Choose at least 16 credits from the following:

MKB314 : Microbial growth, nutrition and death
MKB334 : Microbial eukaryotic diversity and ecology

Sixth semester

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

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
OBS134 : Business management
OBS234 : Financial management
HUM114 : Organisation psychology

Eighth semester

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

Choose at least 32 credits out of the following:

ORG124 : Personnel psychology
LEK224 : Farm planning and management
OBS144 : Marketing
OBS244 : Business management

Learning programme 30 - Study code 5350

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

First academic year

First semester

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

Second semester

CEM124	:	Physical and organic chemistry
BRS121	:	Advanced computer literacy
[1]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

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

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

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
OBS134	:	Business management
OBS234	:	Financial management
HUM114	:	Organisation psychology

Eighth semester

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

Choose at least 32 credits out of the following:

ORG124	:	Personnel psychology
LEK224	:	Farm planning and management
OBS144	:	Marketing
OBS244	:	Business management

[1]**See prerequisite**

Learning programme 31 - Study code 5351

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

First academic year

First semester

BLG114 : Buildings blocks of life
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General 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

ENT214 : Functional morphology and anatomy and evolusionary biology of insects
ENT252 : Classification and identification of insects

Choose at least 40 credits from the following:

BCC214 : Biochemistry for agriculture and health sciences
GEN216 : Principles of Genetics
GKD214 : Soil ecology
LWR214 : Introduction to Agrometeorology
MKB216 : Introduction to Microbiology
PLK214 : Plant anatomy and introductory biotechnology
PPG214 : Principles of Plant Pathology

Fourth semester

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

Choose at least 24 credits from the following:

GEN246 : Molecular Genetics
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

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 : Evolusionary 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 : Advanced medical, veterinary and forensic entomology

Choose at least 16 credits out of the module options in the 2nd and 3rd 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 2nd and 3rd year of study

SYLLABI

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

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

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 inter-pretations 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. Fore-casting.

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/manage-

ment 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.

Agricultural Engineering

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.

Agricultural Extension

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.

Agricultural Science

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 aquire 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.

LWL172 (8 credits) - Introductory Mathematics
One lecture and a three hour practical per week.
One examination paper of two hours.
This is a basic module in mathematical calculations with the application to introductory agricultural fields. The student will develop skills in the calculation of percentages and ratios. Knowledge and practical use of a pocket calculator. This will enable the student access to a more advanced basic module in mathematics, namely LWL194.
Practical work
Calculations will be done applying the theoretical knowledge in solving agricultural orientated mathematical problems.

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.

Agronomy and Horticulture

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 this module students will be able to plan research as well as to lay out glasshouse-, clima-cabinet and field trials. 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 in the form of a publishable research article.

Practical work

Students will be allowed to plan and conduct either a glasshouse or a field trial on their own and also to present, interpret and write up the data in article format.

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.

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.

Animal Science

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.

Food Science

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.

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 bare 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.

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-polinated, cross-polinated 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

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 procaryotic 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 understanding 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.

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 and agricultural ecosystems.
Contents:
Composition of soil and the function in natural and agricultural 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.
Contents*:*
Soil classification with special reference to the South African system. Soil mapping techniques and guidelines for compiling soil maps. Soil evaluation for agricultural and non-agricultural land use planning.
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. Optimisation 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 the chemical reactions and processes that occur in soils and its effect on

natural and agricultural ecosystems.
Contents:
Advanced colloid chemistry. Soil pH, cation and anion exchange reactions. Redox reactions of soil constituents. Soil acidity and alkalinity. Chemistry of important plant nutrients in soil. Soil pollution and its impact on the environment.
Practical work
Soil analyses and determination of chemical equilibriums in soils.

GKD424 (16 credits) - Soil biology
Three lectures and a three hour practical per week.
One examination paper of three hours.
Outcome:
Knowledge of the decomposition of organic matter, synthesis of humus and the impact on soil quality of natural and agricultural ecosystems.
Contents:
Activity and role of macro- and micro-organisms in soil. Interaction between plant roots and micro-organisms in soil. Chemical changes that biological residues undergo 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
Isolation of bacteria, fungi, algae, actinomycete and nematodes from soil. 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 hydraulic and physical processes in soils and the effect on natural and agricultural ecosystems.
Contents:
A study on the physical and hydraulic properties of and the processes in soils. Analysis of the flow process of water through saturated and unsaturated soils, the infiltration, redistribution and evaporation process. Movement of water to plant roots. Soil temperature and heat flow. Soil aeration and gas exchange. Mechanical properties of soils.
Practical work
Laboratory and field investigations in respect 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 suitability of the soils in South Africa.
Contents:
The study of soil as three-dimensional bodies in the landscape in respect of genesis, morphology and mineralogy. Soil classification with special reference to other countries. Distribution, genesis and properties of South African soil types.
Practical work
Discussion of the origin, morphology, classification and use of soil during field excursions and a compulsory tour. Identification of primary and secondary minerals in soils.

GKD461 (4 credits) - Seminar in Soil Science
No formal examination is required.
Outcome:
Skills to gather information on a specific topic in soil science, 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 are conveyed to students. Students are expected to apply this knowledge by writing and presenting a seminar on a soil science topic.

Module contents not in this yearbook

The contents of modules not in this book can be found in other yearbooks.

For BOC, BCC, BLG, BMT, BRS, BTG, CEM, ENT, FSK, GEN, GWS, GLG, MKB, PLK, BRS, STK, VMD and WTW consult the yearbook of the Faculty of Natural and Agricultural Sciences, Part 1.

For BEL, EKN, GEB, HUM, OBS, ORG, REK and RLB consult the yearbook for the Faculty of Economic and Management Sciences.

Postgraduate Agricultural Programmes: See Yearbook Part 3, Faculty of Natural and Agricultural Sciences.

Transitional regulations

New module codes

- *First registration 2009 and earlier:*
  A student who has one of the 2009 modules listed below outstanding, must again register for it in 2010 in accordance with the 2009 module code.
- *First registration 2010 and later:*
  Students register according to new module codes.

Previous modules (until first registration 2009)	New modules (as from first registration 2010)
B.Sc.Agric. students	
DVL314	DVL434
DVL324	DVL464
DVL414	DVL334
DVL424	DVL344
B.Agric. students	
DVL314	VKD314
DVL324	DVL344

PREREQUISITES

AGR314	Min. (AGR224)
AGR324	Min. (AGR224) or concurrently
AGR424	AGR224
AGR444	Min. (AGR414) or concurrently
BRS121	BRS111
DTL414	DTL314
DVL334	Min. (BCC214)
FEC314	EKN 114 and EKN 124 or EBN 114 and EBN 124 passed with an average of 60%
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	EKN214
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
REK208	REK114 of REK124; of FIN114 of FIN124
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.