Faculty of Natural and Agricultural Sciences

Calendar 2007

Part 4: Agricultural Sciences: Undergraduate Programmes

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CONTENTS

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Junior Lecturer	Mr A.S. Steyn

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Senior Lecturer	Dr M.M. Campbell
Lecturers	Mr P.J. Potgieter, Ms E. Barclay

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Junior Lecturer	Mr J. Parau

Qwaqwa Campus

Lecturers	*Dr M. Cunningham, Mr S. Mtshali

DEGREES AND DIPLOMA

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

Degree/Diploma	Abbreviation
Diploma	
Diploma in Agriculture	Dipl.Agric.
Bachelor's degrees	
Baccalaureus Scientiae Agriculturae	B.Sc.Agric.
Baccalaureus Agriculturae	B.Agric.
Honours degrees	
Baccalaureus Scientiae Agriculturae Honores	B.Sc.Agric.Hons.
Baccalaureus Agriculturae Honores	B.Agric.Hons.
Master's degrees	
Magister Scientiae Agriculturae	M.Sc.Agric.
Magister of Sustainable Agriculture	M.V.L.
Magister Agriculturae	M.Agric.
Doctor's degrees	
Philosophiae Doctor	Ph.D.
Doctor Scientiae	D.Sc.

DIPLOMA IN AGRICULTURE AND FIRST BACHELOR'S DEGREES

Degrees

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

Degree	Minimum period of study	Abbreviation
Diploma in Agriculture	2 years	Dipl.Agric.
Baccalaureus Agriculturae	3 years	B.Agric.
Baccalaureus Scientiae Agriculturae	4 years	B.Sc.Agric.

OVERARCHING FACULTY REGULATIONS, INFORMATION AND TRANSITIONAL MEASURES

INFORMATION

Excepting curricula for which Grade 12 level Science is compulsory, it is strongly recommended that all prospective B.Sc.Agric. students take Grade 12 Science or Biology, but preferably both, for an endorsed 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:

(i) For admission to the B.Sc.Agric. degree an E-symbol in Grade 12 Mathematics (higher grade) **or** a C-symbol in Grade 12 Mathematics (standard grade) is a minimum prerequisite. A pass in Grade 12 Science and/or Biology is recommended.

(ii) For admission to the B.Agric. degree Grade 12 Mathematics (Standard Grade F-symbol) or N4 Mathematics is a minimum prerequisite.
The Dipl.Agric. can allow admittance to the final year B.Agric. provided that LWL 194, if not yet obtained, must be additionally presented.

(iii) For admission to the Dipl.Agric. the minimum requirement is a Grade 12 Certificate with an M-score of at least 24.

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. H7 - Changing from Dipl.Agric. to B.Agric.

A prospective B.Agric. student can apply for admission to the B.Agric. learning programme before receiving the Dipl.Agric. qualification, on the following conditions:

(i) That the prospective student is in possession of an endorsed Grade 12 Certificate;
(ii) that LWL194, if not already passed, is additionally enrolled for;
(iii) that the compulsory first year modules of the B.Agric. learning programme, have already been passed.

Reg. H8 - Changing from B.Agric. to Dipl.Agric.

A student who has registered for the B.Agric. degree, can obtain the Dipl.Agric.:

(i) if the candidate has passed all the modules required for the Diploma in the first academic year;
(ii) has obtained at least 104 credits on second year level*;
(iii) has passed LWL224.

*SOS112 and SOS124 qualify as second year modules.

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 60% . 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 curricula

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) - Exemption for BRS111 will be granted if Computer Science Grade 12 level was passed on HG D or SG C.

DIPLOMA IN AGRICULTURE Dipl.Agric.

INFORMATION

Study aims

The study aims entail the training of students in the basic principles and skills needed for agricultural production. After obtaining the qualification, the student will have background knowledge of the natural sciences and management principles that are applicable to agriculture.

Admission requirements

Grade 12 certificate and a M-score of at least 24.

Major streams

There are four learning programmes for the Dipl.Agric. qualification.

Specialisation	Study code	Learning programme
Animal Production	5011	1
Crop Production	5012	2
Agricultural Management	5013	3
Natural Resources	5014	4

REGULATIONS

Reg. H11 - Curricula

Learning programme 1 - Study code 5011
Dipl. Agric.: Specialisation in Animal Production

First academic year

First semester

BRS111	:	Computer end usage
LWL114	:	Biological principles in Agriculture
LWL134	:	Chemical principles in Agriculture
LWL154	:	Physical and mechanised principles in Agriculture
LWL172	:	Introductory mathematics
OR		
LWL 194	:	Mathematical calculations in Agriculture

Second semester

LEK124	:	Statistical analysis and the economic management of resources
LWL144	:	Biochemical principles in Agriculture
LWL164	:	Microbiological principles in Agriculture
RIS121	:	Advanced computer end usage

Second academic year

Third semester

LEK214	:	Agricultural finance
VKD214	:	Animal breeding and animal nutrition

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
LWL224	:	Sustainable production practices
VKD224	:	Reproduction and animal products

Choose at least 16 credits from the following:

AGR224	:	Crop production principles
LEK224	:	Farm planning and management
WDK224	:	Veld as natural resource

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
LWL172 : Introductory mathematics
OR
LWL194 : Mathematical calculations in Agriculture

Second semester

LEK124 : Statistical analysis and the economic management of resources
LWL144 : Biochemical principles in Agriculture
LWL164 : Microbiological principles in Agriculture
RIS121 : Advanced computer literacy

Second academic year

Third semester

ENT114 : Introduction to morphology, anatomy and bio-ecology of insects as well as insect pests important to agriculture and their control measures
LEK214 : Agricultural finance

Choose at least 32 credits from the following:

GKD214 : Soil ecology
LWR214 : Introduction to Agrometeorology
PPG214 : Principles of Plant Pathology

Fourth semester

AGR224 : Crop production principles
LBV224 : Communication and agricultural extention
LEK224 : Farm planning and management
LWL224 : Sustainable production practices

Learning programme 3 - Study code 5013

Dipl.Agric.: Specialisation in Agricultural Management

First academic year

First semester

RS111	:	Computer literacy
LWL114	:	Biological principles in Agriculture
LWL134	:	Chemical principles in Agriculture
LWL154	:	Physical and mechanised principles in Agriculture
LWL172	:	Introductory mathematics
OR		
LWL194	:	Mathematical calculations in Agriculture

Second semester

LEK124	:	Statistical analysis and the economic management of resources
LWL144	:	Biochemical principles in Agriculture
LWL164	:	Microbiological principles in Agriculture
RIS121	:	Advanced computer literacy

Second academic year

Third semester

LEK214	:	Agricultural finance

Choose at least 48 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
PPG214	:	Principles of Plant Pathology
VKD214	:	Animal breeding and animal nutrition

Fourth semester

LBV224	:	Communication and agricultural extension
LEK224	:	Farm planning and management
LWL224	:	Sustainable production practices

Choose at least 16 credits from the following:

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

First academic year

First semester

RS111 : Computer literacy
LWL114 : Biological principles in Agriculture
LWL134 : Chemical principles in Agriculture
LWL154 : Physical and mechanised principles in Agriculture
LWL172 : Introductory mathematics
OR
LWL194 : Mathematical calculations in Agriculture

Second semester

LEK124 : Statistical analysis and the economic management of resources
LWL144 : Biochemical principles in Agriculture
LWL164 : Microbiological principles in Agriculture
RIS121 : 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

LBV224 : Communication and agricultural extension
LWL224 : Sustainable production practices

Choose at least 32 credits from the following:

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

INFORMATION

Study aims

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.

Admission requirements

Grade 12 Mathematics at standard grade level or Mathematics N4 is required for admission to the B.Agric. degree.

A prospective B.Agric. student can apply for admission to the B.Agric. learning programme before receiving the Dipl.Agric. qualification, on the following conditions:

(i) That the prospective student is in possession of an endorsed Grade 12 Certificate;
(ii) that LWL194, if not already passed, is additionally enrolled for;
(iii) that the compulsory first year modules of the B.Agric. learning programme, have already been passed.

Specialisation	**Study code**	**Learning programme**
Irrigation Management	5311	1
Animal Production Management	5312	2
Mixed-farming Management	5313	3
Crop Production Management	5314	4
Horticultural Management	5315	5
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

RS111	:	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	:	Statistical analysis and the economic management of resources
LWL144	:	Biochemical principles in Agriculture
LWL164	:	Microbiological principles in Agriculture
RIS121	:	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
GWS114	:	Introduction to general Geo Science
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 : Agricultural statistical analyses

Choose at least 16 credits from the following:

AGR314 : Production of summer crops
HRT314 : Nursery management and cutflower production
LWR314 : Climate and its influence on management practices
PPG314 : Principles of plant disease control

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 crops
HRT324 : Fruit cultivation
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

RS111	:	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	:	Statistical analysis and the economic management of resources
LWL144	:	Biochemical principles in Agriculture
LWL164	:	Microbiological principles in Agriculture
RIS121	:	Advanced computer literacy

Second academic year

Third semester

LEK214	:	Agricultural finance
VKD214	:	Animal breeding and animal nutrition

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	:	Reproduction and animal products
WDK224	:	Veld as natural resource

Third academical year

Fifth semester

DAF314	:	Animal anatomy and physiology of farm animals
DVL314	:	Applied monogastric nutrition
LEK314	:	Agricultural marketing
LWL312	:	Agricultural statistical analyses
WDK314	:	Applied veld management and veld evaluation

Sixth semester

DAF324	:	Animal health
DVL324	:	Applied ruminant nutrition
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

RS111 : 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 : Statistical analysis and the economic management of resources
LWL144 : Biochemical principles in Agriculture
LWL164 : Microbiological principles in Agriculture
RIS121 : Advanced computer literacy

Second academic year

Third semester

LEK214 : Agricultural finance
VKD214 : Animal breeding and animal nutrition

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 : Reproduction and animal products

Choose at least 16 credits from the following:

AGR224 : Crop production principles
WDK224 : Veld as natural resource

Third academic year

Fifth semester

DVL314 : Applied monogastric nutrition
LEK314 : Agricultural marketing
LWL312 : Agricultural statistical analyses

Choose at least 32 credits from the following:

AGR314 : Production of summer crops
DAF314 : Animal anatomy and physiology of farm animals
WDK314 : Applied veld management and veld evaluation

Sixth semester

DVL324 : Applied ruminant nutrition
LBB344 : Strategic Agricultural management
LBB362 : Seminar in Agricultural management

Choose at least 32 credits from the following:

AGR324 : Production of winter 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

RS111	:	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	:	Statistical analysis and the economic management of resources
LWL144	:	Biochemical principles in Agriculture
LWL164	:	Microbiological principles in Agriculture
RIS121	:	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 crops
LEK314 : Agricultural marketing
LWL312 : Agricultural statistical analyses

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
GKD314 : Soil evaluation and land use planning
HRT314 : Nursery management and cutflower production
LWR314 : Climate and its influence on management practices
PLT314 : Selection methods
PPG314 : Principles of plant disease control

Sixth semester

AGR324 : Production of winter crops
LBB344 : Strategic Agricultural management
LBB362 : Seminar in Agricultural management

Choose at least 32 credits from the following:

GKD324 : Sustainable soil and water management
HRT324 : Fruit cultivation
LEK324 : Advanced Agricultural marketing
PPG324 : Plant health management

Learning programme 5 - Study code 5315

B.Agric.: Specialisation in Horticultural Management

First academic year

First semester

RS111	:	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	:	Statistical analysis and the economic management of resources
LWL144	:	Biochemical principles in Agriculture
LWL164	:	Microbiological principles in Agriculture
RIS121	:	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 crops
HRT314	:	Nursery management and cutflower production
LEK314	:	Agricultural marketing
LWL312	:	Agricultural statistical analyses

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	:	Climate and its influence on management practices
PLT314	:	Selection methods
PPG314	:	Principles of plant disease control

Sixth semester

AGR324	:	Production of winter crops
HRT324	:	Fruit cultivation
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

RS111	:	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	:	Statistical analysis and the economic management of resources
LWL144	:	Biochemical principles in Agriculture
LWL164	:	Microbiological principles in Agriculture
RIS121	:	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	:	Animal breeding and animal nutrition
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	:	Reproduction and animal products
WKD224	:	Veld as natural resource

Third academic year

Fifth semester

LEK314 : Agricultural marketing
LWL312 : Agricultural statistical analyses
LWR314 : Climate and its influence on management practices

Choose at least 32 credits from the following:

AGR314 : Production of summer crops
DAF314 : Animal anatomy and physiology of farm animals
DVL314 : Applied monogastric nutrition
EKN214 : Micro-economics
GKD314 : Soil evaluation and land-use planning
HRT314 : Nursery management and cutflower production
LNG314 : Hydraulics
PPG314 : Principles of plant disease control
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 crops
DAF324 : Animal health
DVL324 : Applied ruminant nutrition
EKN224 : Macro-economics
GKD324 : Sustainable soil and water management
HRT324 : Fruit cultivation
LNG324 : Irrigation systems and irrigation surveying
LWR324 : Crop growth modeling
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

RS111	:	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	:	Statistical analysis and the economic management of resources
LWL144	:	Biochemical principles in Agriculture
LWL164	:	Microbiological principles in Agriculture
RIS121	:	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
GWS114	:	Introduction to general Geo Science
VKD214	:	Animal breeding and animal nutrition

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	:	Reproduction and animal products

Third academic year

Fifth semester

GKD314 : Soil evaluation and land use planning
LEK314 : Agricultural marketing
LWL312 : Agricultural statistical analyses
WDK314 : Applied veld management and veld evaluation

Choose at least 16 credits from the following:

DVL314 : Applied mongastric nutrition
LWR314 : Climate and its influence on management 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
DVL324 : Applied ruminant nutrition
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.

Admission requirements
See Regulations H1 and H9.

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	5354	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/Grassland Science	5328	8
Agronomy/Plant Breeding	5324	4
Agronomy/Plant Pathology	5325	5
Agronomy/Irrigation field	5329	9
Agronomy/Soil Science	5321	1
Agrometeorology/Agricultural Economics	5338	18
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/Agricultural Economics	5338	18
Grassland Science/Agronomy	5328	8
Grassland Science/Agrometeorology	5341	21
Grassland Science/Animal Science	5347	27
Grassland Science/Soil Science	5336	16
Grassland Science/Plant Breeding	5342	22
Irrigation field/Agronomy	5329	9
Irrigation field/Natural resources	5331	11
Irrigation field/Soil Science	5330	10
Plant Breeding/Agronomy	5324	4
Plant Breeding/Grassland Science	5342	22
Plant Breeding/Plant Pathology	5343	23
Plant Pathology/Agronomy	5325	5
Plant Pathology/Agrometeorology	5340	20
Plant Pathology/Entomology	5332	12
Plant Pathology/Plant Breeding	5343	23
Plant Pathology/Soil Science	5335	15
Soil Science/Agricultural Economics	5338	18
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

Reg. H13 - Curricula

Learning programme 1 - Study code 5321

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

First academic year

First semester

BLG114	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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
GWS114	:	Introduction to general Geo Science
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 crops
GKD314 : Soil evaluation and land use planning

Choose at least 32 credits from the following:

HRT314 : Nursery management and cutflower production
LEK314 : Agricultural marketing
LWR314 : Climate and its influence on management practices
PPG314 : Principles of plant disease control
WDK314 : Applied veld management and veld evaluation

Sixth semester

AGR324 : Production of winter crops
GKD324 : Sustainable soil and water management

Choose at least 32 credits from the following:

HRT324 : Fruit cultivation
LEK324 : Advanced Agricultural marketing
LWR324 : Crop growth modeling
PPG324 : Plant health management
WDK324 : Intensive pasture production

Fourth academic year

Seventh semester

AGR414 : Crop and stress physiology
AGR434 : Research techniques
AGR451 : Seminar in Agronomy
GKD414 : Soil chemistry
GKD434 : Soil physics
LWL312 : Agricultural statistical analyses

Eighth semester

AGR424 : Post-harvest handling and storage
AGR444 : Chemical 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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of recourses
RIS121	:	Advanced computer literacy

Second academic year

Third semester

GKD214	:	Soil ecology
LEK214	:	Agricultural finance

Choose at lest 32 credits from the following :

BCC214	:	Biochemistry for agriculture and health sciences
LWR214	:	Introduction to Agrometeorology
STK216	:	Multiple regression analysis

Fourth semester

AGR224	:	Crop production principles
LEK224	:	Farm planning and management

Choose at lest 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 crops
GKD314	:	Soil evaluation and land use planning
LEK314	:	Agricultural marketing

Choose at lest 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
GEB214	:	Money and banking
HRT314	:	Nursery management and cutflower production
LNG314	:	Hydraulics
PPG314	:	Principles of plant disease control

Sixth *semester*

AGR324	:	Production of winter crops
GKD324	:	Sustainable soil and water management
LEK324	:	Advanced Agricultural marketing

Choose at lest 16 credits from the following :

ARB224	:	Labour law
GEB224	:	Money and banking
HRT324	:	Fruit cultivation
LNG324	:	Irrigation systems and irrigation surveying
LWR324	:	Crop growth modeling
PLK324	:	Plant metabolism
PPG324	:	Plant health management

Fourth academic year

Seventh semester

AGR414	:	Crop and stress physiology
AGR434	:	Research techniques
AGR451	:	Seminar in Agronomy
LEK414	:	Managerial economics
LEK434	:	Agribusiness management
LWL312	:	Agricultural statistical analyses

Eight semester

AGR424	:	Post-harvest handling and storage
AGR444	:	Chemical weed control
LEK424	:	Resource economy
LEK444	:	Agricultural policy and development
LEK461	:	Seminar in Agricultural Economics

First academic year

First semester

BLG114 : Cell biology
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General physics
WTW134 : Calculus

Second semester

BLG124 : Plant biology
BLG144 : Animal biology
CEM144 : Physical and organic chemistry
LEK124 : Statistical analysis and the economic management of resources
RIS121 : 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
GWS114 : Introduction to general Geo Science
PPG214 : Principles of Plant Pathology
WTW236 : Introductory to mathematical modelling

AND

WTW252 : 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 crops
GKD314	:	Soil evaluation and land use planning
LWR314	:	Climate and its influence on management practices

Choose at least 16 credits from the following :

HRT314	:	Nursery management and cutflower production
PPG314	:	Principles of plant disease control
WDK314	:	Applied veld management and veld evaluation

Sixth semester

AGR324	:	Production of winter crops
GKD324	:	Sustainable soil and water management
LWR324	:	Crop growth modeling

Choose at least 16 credits from the following :

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

Fourth academic year

Seventh semester

AGR414	:	Crop and stress physiology
AGR434	:	Research techniques
AGR451	:	Seminar in Agronomy
LWL312	:	Agricultural statistical analyses
LWR414	:	Operational Agrometeorology
LWR434	:	Physical and dynamic meteorology

Eighth semester

AGR424	:	Post-harvest handling and storage
AGR444	:	Chemical 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 : Cell biology
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General physics
WTW134 : Calculus

Second semester

BLG124 : Plant biology
BLG144 : Animal biology
CEM144 : Physical and organic chemistry
LEK124 : Statistical analysis and the economic management of resources
RIS121 : Advanced computer literacy

Second academic year

Third semester

GEN212 : Introductory molecular genetics
GEN214 : Applied molecular 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
PLK212 : Practical plant morphology and propagation (practical)

AND

PLK214 : Plant anatomy and introductory biotechnology
PPG214 : Principles of Plant Pathology
VWS212 : Introductory Food Science

Fourth semester

AGR224 : Crop production principles
GEN224 : Principles of genetics
GEN282 : Heritability in practice
PLT224 : Breeding techniques

Select at least 16 credits out of the following.

LNG224 : Engineering principles in agricultural practices
PLK262 : Experimental plant physiology (practical)

AND

PLK224 : Plant growth and developmental physiology
WDK224 : Veld as natural resource

Third academic year

Fifth semester

AGR314 : Production of summer crops
PLT314 : Selection methods

Select at least 32 credits out of the following:

GKD314 : Soil evaluation and land use planning
HRT314 : Nursery management and cutflower production
LWR314 : Climate and its influence on management practices
PPG314 : Principles of plant disease control

Sixth semester

AGR324 : Production of winter crops

Select at least 48 credits out of the following:

GKD324 : Sustainable soil and water management
HRT324 : Fruit cultivation
LWR324 : Crop growth modeling
PLK324 : Plant metabolism
PPG324 : Plant health management
VWS324 : Food products from plants

Fourth academic year

Seventh semester

AGR414 : Crop and stress physiology
AGR434 : Research techniques
AGR451 : Seminar in Agronomy
GEN314 : Genetic engineering
GEN334 : Animal genomics
LWL312: : Agricultural statistical analyses

Eighth semester

AGR424 : Post-harvest handling and storage
AGR444 : Chemical 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 : Cell biology
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General physics
WTW134 : Calculus

Second semester

BLG124 : Plant biology
BLG144 : Animal biology
CEM144 : Physical and organic chemistry
LEK124 : Statistical analysis and the economic management of resources
RIS121 : 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
GEN214 : Applied molecular genetics
LWR214 : Introduction to Agrometeorology
MKB214 : 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 crops
GKD314	:	Soil evaluation and land use planning
PPG314	:	Principles of plant disease control

Choose at least 16 credits from the following:

LWR314	:	Climate and its influence on management practices
PLT314	:	Selection methods

Sixth semester

AGR324	:	Production of winter crops
GKD324	:	Sustainable soil and water management
PPG324	:	Plant health management

Choose at least 16 credits from the following:

LWR324	:	Crop growth modeling
PLK324	:	Plant metabolism
PLK344	:	Plant defence and biotechnology

Fourth academic year

Seventh semester

AGR414	:	Crop and stress physiology
AGR434	:	Research techniques
AGR451	:	Seminar in Agronomy
LWL312	:	Agricultural statistical analyses
PPG414	:	Fungal diseases of plants
PPG434	:	Epidemiology and ecology of plant pathogens

Eighth semester

AGR424	:	Post-harvest handling and storage
AGR444	:	Chemical 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	:	Cell biology
BRS111	:	Basic omputer literacy
CEM114	:	Inorganic and analytical chemicals
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	Advanced computer literacy

Second academic year

Third semester

BCC214	:	Biochemistry for agriculture and health sciences
VKD214	:	Animal breeding and animal nutrition

Choose at least 24 credits from the following:

GEN272	:	Introductory molecular genetics
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	:	Reproduction and animal products
WDK224	:	Veld as natural resource

Third academic year

Fifth semester

AGR314	:	Production of summer crops
DAF314	:	Animal anatomy and physiology of farm animals
DTL314	:	Theory of animal breeding
OR		
DVL314	:	Applied monogastric nutrition
HRT314	:	Nursery management and cutflower production

Sixth semester

AGR324	:	Production of winter crops
DAF324	:	Animal health
DTL324	:	New technologies in animal breeding
OR		
DVL324	:	Applied ruminant nutrition
HRT324	:	Fruit cultivation

Fourth academic year

Seventh semester

AGR414	:	Crop and stress physiology
AGR434	:	Research techniques
AGR451	:	Seminar in Agronomy
DAF414	:	Applied reproduction physiology in farm animals
DTL414	:	Animal breeding: Mixed model theory
OR		
DVL414	:	Fundamental and experimental animal nutrition
LWL312	:	Agricultural statistical analyses

Eighth semester

AGR424	:	Post-harvest handling and storage
AGR444	:	Chemical 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
DVL424	:	Properties of feeds, balancing rations and fodder flow planning
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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	Advanced computer literacy

Second academic year

Third semester

BCC214	:	Biochemistry for agriculture and health sciences
MKB214	:	Introduction to microbiology
MKB252	:	Introduction to microbiology practical
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
ORG114	:	Organisation psychology
VKD214	:	Animal breeding and animal nutrition

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 crops
VDG314	:	Human nutrition
VWS314	:	Food products from animals
VWS334	:	Food engineering

Sixth semester

AGR324	:	Production of winter crops
HUM124	:	Personnel psychology
VWS324	:	Food products from plants
VWS344	:	Food microbiology

Fourth academic year

Seventh semester

AGR414	:	Crop and stress physiology
AGR434	:	Research techniques
AGR451	:	Seminar in Agronomy
LWL312	:	Agricultural statistical analyses
VWS414	:	Food products from plants: advanced
VWS434	:	Product development and sensory analysis

Eighth semester

AGR424	:	Post-harvest handling and storage
AGR444	:	Chemical weed control
VWS424	:	Dairy Science
VWS444	:	Meat Science
VWS461	:	Seminar in Food Science

Learning programme 8 - Study code 5328

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

First academic year

First semester

BLG114	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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 of importance to agriculture and control measures
GEN214	:	Applied molecular genetics
		AND
GEN272	:	Introductory molecular genetics
PLK212	:	Practical plant morphology and propagation (practical)
		AND
PLK214	:	Plant anatomy and introductory biotechnology
PPG214	:	Principles of Plant Pathology
VKD214	:	Animal breeding and animal nutrition

Fourth semester

AGR224	:	Crop production principles
WDK224	:	Veld as natural resource

Choose at least 32 credits from the following:

LEK224	:	Farm planning and management
LNG224	:	Engineering principles in agricultural practices
PLK224	:	Plant growth and developmental physiology
		AND
PLK262	:	Experimental plant physiology (practical)
PLT224	:	Breeding techniques
VKD224	:	Reproduction and animal products

Third academic year

Fifth semester

AGR314 : Production of summer crops
WDK314 : Applied veld management and veld evaluation

Choose at least 32 credits from the following:

GEN314 : Genetic engineering
GKD314 : Soil evaluation and land use planning
HRT314 : Nursery management and cutflower production
LEK314 : Agricultural marketing
LNG314 : Hydraulics
LWR314 : Climate and its influence on management practices
PLK214 : Plant anatomy and introductory biotechnology
PLT314 : Selection methods
PPG314 : Principles of plant disease control

Sixth semester

AGR324 : Production of winter crops
WDK324 : Intensive pasture production

Choose at least 32 credits from the following:

GEN324 : Evolusionary genetics
GKD324 : Sustainable soil and water management
HRT324 : Fruit cultivation
LEK324 : Advanced Agricultural marketing
LNG324 : Irrigation systems and irrigation surveying
LWR324 : Crop growth modeling
PPG324 : Plant health management

Fourth academic year

Seventh semester

AGR414 : Crop and stress physiology
AGR434 : Research techniques
AGR451 : Seminar in Agronomy
LWL312 : Agricultural statistical analyses
WDK414 : Production and utilisation ecology
WDK434 : Defoliation phenology and physiology

Eighth semester

AGR424 : Post-harvest handling and storage
AGR444 : Chemical weed control
WDK424 : Advanced veld management
WDK444 : Advanced fodder plant evaluation
WDK461 : Professional skills

Learning programme 9 - Study code 5329

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

First academic year

First semester

BLG114	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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
GWS114	:	Introduction to general Geo Science
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 crops
GKD314	:	Soil evaluation and land use planning
LNG314	:	Hydraulics

Choose at least 16 credits from the following:

HRT314	:	Nursery management and cutflower production
LEK314	:	Agricultural marketing
LWR314	:	Climate and its influence on management practices
PPG314	:	Principles of plant disease control

Sixth semester

AGR324	:	Production of winter crops
GKD324	:	Sustainable soil and water management
LNG324	:	Irrigation systems and irrigation surveying

Choose at least 16 credits from the following:

HRT324	:	Fruit cultivation
LBB344	:	Strategic agricultural management
LWR324	:	Crop growth modeling
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
LWL312	:	Agricultural statistical analyses

Choose at least 32 credits from the following:

AGR414	:	Crop and stress physiology
AGR434	:	Research techniques
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	:	Post-harvest handling and storage
AGR444	:	Chemical 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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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
GWS114	:	Introduction to general Geo Science
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 crops
GKD314 : Soil evaluation and land use planning
LNG314 : Hydraulics

Choose at least 16 credits from the following:

LEK314 : Agricultural marketing
LWR314 : Climate and its influence on management practices
PPG314 : Principles of plant disease control

Sixth semester

AGR324 : Production of winter crops
GKD324 : Sustainable soil and water management
LNG324 : Irrigation systems and irrigation surveying

Choose at least 16 credits from the following:

LBB344 : Strategic agricultural management
LWR324 : Crop growth modeling
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
LWL312 : Agricultural statistical analyses

Choose at least 32 credits from the following:

AGR414 : Crop and stress physiology
AGR434 : Research techniques
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 : Post-harvest handling and storage
AGR444 : Chemical 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 : Cell biology
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General physics
WTW134 : Calculus

Second semester

BLG124 : Plant biology
BLG144 : Animal biology
CEM144 : Physical and organic chemistry
LEK124 : Statistical analysis and the economic management of resources
RIS121 : 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
GWS114 : Introduction to general Geo Science
LEK214 : Agricultural finance
PPG214 : Principles of Plant Pathology
VKD214 : Animal breeding and animal nutrition

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 : Reproduction and animal products

Third academic year

Fifth semester

GKD314	:	Soil evaluation and land use planning
LNG314	:	Hydraulics
LWR314	:	Climate and its influence on management practices
WDK314	:	Applied veld management and veld evaluation

Sixth semester

GKD324	:	Sustainable soil and water management
LNG324	:	Irrigation systems and irrigation surveying
LWR324	:	Crop growth modeling
WDK324	:	Intensive pasture production

Fourth academic year

Seventh semester

GKD434	:	Soil physics
LNG414	:	Flood and mechanised irrigation
LWL312	:	Agricultural statistical analyses
LWR451	:	Seminar in Agrometeorology

Choose at least 32 credits from the following:

GKD414	:	Soil chemistry
LWR414	:	Operational Agrometeorology
LWR434	:	Physical and dynamic 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

First academic year

First semester

BLG114 : Cell biology
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General physics
WTW134 : Calculus

Second semester

BLG124 : Plant biology
BLG144 : Animal biology
CEM144 : Physical and organic chemistry
LEK124 : Statistical analysis and the economic management of resources
RIS121 : 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
GKD214 : Soil ecology
LWR214 : Introduction to Agrometeorology
PLK214 : Plant anatomy and introductory biotechnology

Fourth semester

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

Choose at least 40 credits from the following:

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

AND

PLK262 : Experimental plant physiology (practical)
PLT224 : Breeding techniques

Third academic year

Fifth semester

ENT314 : Advanced ecology and agricultural entomology of insects
PPG314 : Principles of plant disease control

Choose at least 32 credits from the following:

AGR314 : Production of summer crops
GKD314 : Soil evaluation and land use planning
HRT314 : Nursery management and cutflower production
LWR314 : Climate and its influence on management practices
PLT314 : Selection methods

Sixth semester

ENT324 : Applied insect pest management
PPG324 : Plant health management

Choose at least 32 credits from the following:

AGR324 : Production of winter crops
GKD324 : Sustainable soil and water management
HRT324 : Fruit cultivation
LWR324 : Crop growth modeling

Fourth academic year

Seventh semester

ENT334 : Advanced medical, veterinary and forensic entomoly
LWL312 : Agricultural statistical analyses
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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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
GWS114	:	Introduction to general Geo Science
PPG214	:	Principles of Plant Pathology
WTW236	:	Mathematical modelling
AND		
WTW252	:	Computer mathematics

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
FSK224	:	Electromagnetism and electronics
FSK242	:	Practical
GIS224	:	Geographical information systems
PLT224	:	Breeding techniques

Third academic year

Fifth semester

AGR314	:	Production of summer crops
GKD314	:	Soil evaluation and land use planning
LWR314	:	Climate and its influence on management practices

Choose at least 16 credits from the following:

HRT314	:	Nursery management and cutflower production
PPG314	:	Principles of plant disease control
WDK314	:	Applied veld management and veld evaluation

Sixth semester

AGR324	:	Production of winter crops
GKD324	:	Sustainable soil and water management
LWR324	:	Crop growth modeling

Choose at least 16 credits from the following:

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

Fourth academic year

Seventh semester

GKD414	:	Soil chemistry
GKD434	:	Soil physics
LWL312	:	Agricultural statistical analyses
LWR414	:	Operational Agrometeorology
LWR434	:	Physical and dynamic 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 : Cell biology
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General physics
WTW134 : Calculus

Second semester

BLG124 : Plant biology
BLG144 : Animal biology
CEM144 : Physical and organic chemistry
LEK124 : Statistical analysis and the economic management of resources
RIS121 : 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
GWS114 : Introduction to general Geo Science
LWR214 : Introduction to Agrometeorology
MKB214 : Introduction to Microbiology

Fourth semester

AGR224 : Crop production principles

Choose at least 48 credits from the following:

LNG224 : Engineering principles in agricultural practices
MKB224 : 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
PPG314 : Principles of plant disease control

Choose at least 32 credits from the following:

AGR314 : Production of summer crops
HRT314 : Nursery management and cutflower production
LWR314 : Climate and its influence on management practices
PLT314 : Selection methods

Sixth semester

GKD324 : Sustainable soil and water management
PPG324 : Plant health management

Choose at least 32 credits from the following:

AGR324 : Production of winter crops
HRT324 : Fruit cultivation
LWR324 : Crop growth modeling

Fourth academic year

Seventh semester

GKD414 : Soil chemistry
GKD434 : Soil physics
LWL312 : Agricultural statistical analyses
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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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
GWS114	:	Introduction to general Geo Science
PPG214	:	Principles of Plant Pathology
VKD214	:	Animal breeding and animal nutrition

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	:	Reproduction and animal products

Third academic year

Fifth semester

GKD314 : Soil evaluation and land use planning
LWR314 : Climate and its influence on management practices
WDK314 : Applied veld management and veld evaluation

Choose at least 16 credits from the following:

AGR314 : Production of summer crops
HRT314 : Nursery management and cutflower production
LEK314 : Agricultural marketing
PPG314 : Principles of plant disease control

Sixth semester

GKD324 : Sustainable soil and water management
WDK324 : Intensive pasture production

Choose at least 32 credits from the following:

AGR324 : Production of winter crops
HRT324 : Fruit cultivation
LEK324 : Advanced Agricultural marketing
LWR324 : Crop growth modeling
PPG324 : Plant health management

Fourth academic year

Seventh semester

GKD414 : Soil chemistry
GKD434 : Soil physics
LWL312 : Agricultural statistical analyses
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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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
HRG204	:	Commercial Law
LWR214	:	Introduction to Agrometeorology
OBS134	:	Business management
ORG114	:	Organisation psychology
RIS114	:	Introduction to computers
[2]RLB108	:	Accounting for agricultural students
VKD214	:	Animal breeding and animal nutrition

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
HUM124	:	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	:	Reproduction and animal products
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 crops
[2]BEL208 : Taxation
GEB214 : Money and banking
GKD314 : Soil evaluation and land use planning
LNG314 : Hydraulics
LWR314 : Climate and its influence on management 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

Choose at least 32 credits out of the following:

ABR224 : Labor law
AGR324 : Production of winter 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 : Crop growth modeling
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
LWL312	:	Agricultural statistical analyses

Choose at least 32 credits out of the following:

EKN314	:	Political economy and development
GEB314	:	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	:	Post-harvest handling and storage
EKN324	:	South African economic policy
GEB324	:	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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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	:	Climate and its influence on management practices
WDK314	:	Applied veld management and veld evaluation

Sixth semester

EKN224	:	Macro-economics
LEK324	:	Advanced Agricultural marketing

Choose at least 32 credits from the following:

GKD324	:	Sustainable soil and water management
LWR324	:	Crop growth modeling
WDK324	:	Intensive pasture production

Fourth academic year

Seventh semester

LEK414	:	Managerial economics
LEK434	:	Agribusiness management
LWL312	:	Agricultural statistical analyses
WDK451	:	Professional skills

Choose at least 32 credits from the following:

GKD414	:	Soil chemistry
GKD434	:	Soil physics
LWR414	:	Operational Agrometeorology
LWR434	:	Physical and dynamic 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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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
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

Choose at least 16 credits out of the following:

STK226	:	Variance and categorial data analysis
VWS344	:	Food microbiology

Fourth academic year

Seventh semester

LEK414	:	Managerial economics
LEK434	:	Agribusiness management
LWL312	:	Agricultural statistical analyses
VWS414	:	Food products from plants: advanced
VWS434	:	Product development and sensory analysis
VWS451	:	Seminar in Food Science

Eighth semester

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

Learning programme 20 - Study code 5340

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

First academic year

First semester

BLG114 : Cell biology
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General physics
WTW134 : Calculus

Second semester

BLG124 : Plant biology
BLG144 : Animal biology
LEK124 : Statistical analysis and the economic management of resources
RIS121 : Advanced computer literacy
[1]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:

PLK212 : Practical plant morphology and propagation (practical)

AND

PLK214 : Plant anatomy and introductory biotechnology
WTW236 : Introductory to mathematical modelling

AND

WTW252 : Computer mathematics

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	:	Climate and its influence on management practices
PPG314	:	Principles of plant disease control

Choose at least 32 credits from the following:

AGR314	:	Production of summer 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	:	Nursery management and cutflower production

Sixth semester

LWR324	:	Crop growth modeling
PPG324	:	Plant health management

Choose at least 32 credits from the following:

AGR324	:	Production of winter crops
GKD324	:	Sustainable soil and water management
HRT324	:	Fruit cultivation
LNG324	:	Irrigation systems and irrigation surveying

Fourth academic year

Seventh semester

LWL312	:	Agricultural statistical analyses
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

[1]**See prerequisite**

Learning programme 21 - Study code 5341

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

First academic year

First semester

BLG114	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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
GWS114	:	Introduction to general Geo Science
PPG214	:	Principles of Plant Pathology
VKD214	:	Animal breeding and animal nutrition
WTW236	:	Introductory to mathematical modelling
AND		
WTW252	:	Computer mathematics

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
PLT224	:	Breeding techniques
VKD224	:	Reproduction and animal products
[1]WTW124	:	Algebra and differential equations

Third academic year

Fifth semester

GKD314 : Soil evaluation and land use planning
LWR314 : Climate and its influence on management practices
WDK314 : Applied veld management and veld evaluation

Choose at least 16 credits from the following:

AGR314 : Production of summer crops
HRT314 : Nursery management and cutflower production
LEK314 : Agricultural marketing
LNG314 : Hydraulics
PLT314 : Selection methods
PPG314 : Principles of plant disease control

Sixth semester

GKD324 : Sustainable soil and water management
LWR324 : Crop growth modeling
WDK324 Intensive pasture production

Choose at least 16 credits from the following:

AGR324 : Production of winter crops
HRT324 : Fruit cultivation
LEK324 : Advanced Agricultural marketing
LNG324 : Irrigation systems and irrigation surveying
PPG324 : Plant health management

Fourth academic year

Seventh semester

LWL312 : Agricultural statistical analyses
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

[1]**See prerequisite**

Learning programme 22 - Study code 5342

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

First academic year

First semester

BLG114	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	Advanced computer literacy

Second academic year

Third semester

GEN214	:	Applied molecular genetics
GEN272	:	Introductory molecular genetics
GKD214	:	Soil ecology

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 their control measures
GWS114	:	Introduction to general Geo Science
LWR214	:	Introduction to Agrometeorology
PPG214	:	Principles of Plant Pathology
VKD214	:	Animal breeding and animal nutrition

Fourth semester

PLT224	:	Breeding techniques
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
VKD224	:	Reproduction and animal products

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 crops
GKD314	:	Soil evaluation and land use planning
HRT314	:	Nursery management and cutflower production
PPG314	:	Principles of plant disease control

Sixth semester

GEN224	:	Principles of genetics
GEN282	:	Heritability in practice
WDK324	:	Intensive pasture production

Choose at least 32 credits from the following:

AGR324	:	Production of winter crops
GKD324	:	Sustainable soil and water management
HRT324	:	Fruit cultivation
LWR324	:	Crop growth modeling
PPG324	:	Plant health management

Fourth academic year

Seventh semester

AGR434	:	Research techniques
GEN314	:	Genetic engineering
LWL312	:	Agricultural statistical analyses
WDK414	:	Production and utilisation ecology
WDK434	:	Defoliation phenology and physiology
WDK451	:	Professional skills

Eighth semester

GEN324	:	Evolusionary 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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	Advanced computer literacy

Second academic year

Third semester

GEN214	:	Applied molecular genetics
GEN272	:	Introductory molecular 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

GEN224	:	Principles of genetics
GEN282	:	Heritability in practice
PLT224	:	Breeding techniques

Choose at least 24 credits from the following:

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

AND

PLK262	:	Experimental plant physiology (practical)

Third Academic year

Fifth semester

PLT314 : Selection methods
PPG314 : Principles of plant disease control

Choose at least 32 credits from the following:

AGR314 : Production of summer crops
GKD314 : Soil evaluation and land use planning
HRT314 : Nursery management and cutflower production

Sixth semester

PPG324 : Plant health management

Choose at least 48 credits from the following:

AGR324 : Production of winter crops
GKD324 : Sustainable soil and water management
HRT324 : Fruit cultivation
LWR324 : Crop growth modeling
PLK344 : Plant defence and biotechnology

Fourth Academic year

Seventh semester

GEN314 : Genetic engineering
GEN334 : Animal genomics
LWL312 : Agricultural statistical analyses
PPG414 : Fungal diseases of plants
PPG434 : Epidemiology and ecology of plant pathogens
PPG451 : Seminar in Plant Pathology

Eighth semester

GEN324 : Evolusionary 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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	Advanced computer literacy

Second academic year

Third semester

EKN114	:	Introduction to economics and micro-economics
GEN272	:	Introductory molecular genetics
LEK214	:	Agricultural finance
VKD214	:	Animal breeding and animal nutrition

Choose at least 16 credits from the following:

BCC214	:	Biochemistry for agriculture and health sciences
GEN214	:	Applied molecular genetics

Fourth semester

EKN124	:	Introduction to macro-economics
LEK224	:	Farm planning and management
VKD224	:	Reproduction and animal products
WDK224	:	Veld as natural resource

Third academic year

Fifth semester

DAF314 : Animal anatomy and physiology of farm animals
DTL314 : Theory of animal breeding
OR
DVL314 : Applied monogastric 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
DVL324 : Applied ruminant nutrition
LEK324 : Advanced Agricultural marketing

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
DVL414 : Fundamental and experimental animal nutrition
LEK414 : Managerial economics
LEK434 : Agribusiness management
LWL312 : Agricultural statistical analyses
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
DVL424 : Properties of feeds, balancing rations and fodder flow planning
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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	Advanced computer literacy

Second academic year

Third semester

BCC214	:	Biochemistry for agriculture and health sciences
GEN272	:	Introductory molecular genetics
VKD214	:	Animal breeding and animal nutrition

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	:	Reproduction and animal products
WDK224	:	Veld as natural resource

Third academic year

Fifth semester

DAF314	:	Animal anatomy and physiology of farm animals
DTL314	:	Theory of animal breeding
DVL314	:	Applied monogastric nutrition

Choose at least 16 credits from the following:

AGR314	:	Production of summer 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
DVL324	:	Applied ruminant nutrition

Choose at least 16 credits from the following:

AGR324	:	Production of winter 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
DVL414	:	Fundamental and experimental animal nutrition
LWL312	:	Agricultural statistical analyses

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
DVL424	:	Properties of feeds, balancing rations and fodder flow planning
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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	Advanced computer literacy

Second academic year

Third semester

BCC214	:	Biochemistry for agriculture and health sciences
MKB214	:	Introduction to Microbiology
VKD214	:	Animal breeding and animal nutrition
VWS212	:	Introductory Food Science
VWS232	:	Food chemistry

Fourth semester

IQM242	:	Industrial quality control
VKD224	:	Reproduction and animal products
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:

DVL314	:	Applied monogastric nutrition
VDG314	:	Human nutrition

Sixth semester

DAF324	:	Animal health
VWS324	:	Food products from plants
VWS344	:	Food microbiology

Choose at least 16 credits out of the following:

DVL324	:	Applied ruminant nutrition
HUM124	:	Personnel psychology

Fourth academic year

Seventh semester			*Eighth semester*		
DAF414	:	Applied reproduction physiology in farm animals	DAF424	:	Growth and lactation physiology
DVL414	:	Fundamental and experimental animal nutrition	DVL424	:	Properties of feeds, balancing rations and fodder flow planning
LWL312	:	Agricultural statistical analyses	**OR**		
VKD451	:	Seminar in Animal Science	DVL444	:	Applied nutrition of wild herbivores and carnivores
VWS414	:	Food products from plants: advanced	VWS424	:	Dairy Science
VWS434	:	Product development and sensory analysis	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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	Advanced computer literacy

Second academic year

Third semester

BCC214	:	Biochemistry for agriculture and health sciences
GKD214	:	Soil ecology
VKD214	:	Animal breeding and animal nutrition

Choose at least 16 credits from the following:

DRK214	:	Parasites, vectors and toxic (poisonous and venomous) animals
GEN272	:	Introductory molecular genetics
LEK214	:	Agricultural finance
LWR214	:	Introduction to Agrometeorology

Fourth semester

VKD224	:	Reproduction and animal products
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
DVL314 : Applied monogastric 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 : Climate and its influence on management practices

Sixth semester

DAF324 : Animal health
DTL324 : New technologies in animal breeding
OR
DVL324 : Applied ruminant nutrition
WDK324 : Intensive pasture production

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
DVL414 : Fundamental and experimental animal nutrition
LWL312 : Agricultural statistical analyses
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
DVL424 : Properties of feeds, balancing rations and fodder flow planning
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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM124	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	Advanced computer literacy

Second academic year

Third semester

BOC212	:	Biochemistry of biological compounds
BOC252	:	Biochemical analyses
GEN272	:	Introductory molecular genetics
MKB214	:	Introduction to Microbiology
MKB252	:	Introduction to Microbiology practical
VWS212	:	Introductory Food Science
VWS232	:	Food chemistry

Fourth semester

BOC224	:	Enzymology and introductory metabolism
BOC262	:	Practical enzymology and metabolism
IQM242	:	Industrial quality control
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

Fourth academic year

Seventh semester

LWL312	:	Agricultural statistical analyses
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
ORG114	:	Organisation psychology

Eighth semester

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

Choose at least 32 credits out of the following:

HUM124	:	Personnel psychology
LEK224	:	Farm planning and management
OBS144	:	Marketing
OBS244	:	Business management

First academic year

First semester

BLG114 : Cell biology
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General physics
WTW134 : Calculus

Second semester

BLG124 : Plant biology
BLG144 : Animal biology
CEM124 : Physical and organic chemistry
LEK124 : Statistical analysis and the economic management of resources
RIS121 : Advanced computer literacy

Second academic year

Third semester

BOC212 : Biochemistry of biological compounds
BOC252 : Biochemical analysis
GEN272 : Introductory molecular genetics
MKB214 : Introduction to Microbiology
MKB252 : Introduction to Microbiology practical
VWS212 : Introductory Food Science
VWS232 : Food chemistry

Fourth semester

BOC224 : Enzymolgy and introductory metabolism
BOC262 : Practical enzymology and metabolism
MKB222 : Microbial diversity and ecology practical
MKB224 : 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

Fourth academic year

Seventh semester

LWL312	:	Agricultural statistical analyses
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
ORG114	:	Organisation psychology

Eighth semester

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

Choose at least 32 credits out of the following:

HUM124	:	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 : Cell biology
BRS111 : Computer literacy
CEM114 : Inorganic and analytical chemistry
FSK134 : General physics
WTW134 : Calculus

Second semester

CEM124 : Physical and organic chemistry
RIS121 : Advanced computer literacy
[1]WTW144 : Algebra and differential equations

Choose at least 32 credits out of the following:

BLG124 : Plant biology
BLG144 : Animal biology
LEK124 : Statistical analysis and the economic management of resources

Second academic year

Third semester

BOC212 : Biochemistry of biological compounds
BOC252 : Biochemical analysis
CEM214 : Physical chemistry
CEM232 : Analytical chemistry
MKB214 : Introduction to Microbiology
VWS212 : Introductory Food Science
VWS232 : Food chemistry

Fourth semester

CEM224 : Organic chemistry
CEM242 : Inorganic chemistry
IQM242 : Industrial quality control
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

Fourth academic year

Seventh semester

LWL312	:	Agricultural statistical analyses
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
ORG114	:	Organisation psychology

Eighth semester

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

Choose at least 32 credits out of the following:

HUM124	:	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	:	Cell biology
BRS111	:	Computer literacy
CEM114	:	Inorganic and analytical chemistry
FSK134	:	General physics
WTW134	:	Calculus

Second semester

BLG124	:	Plant biology
BLG144	:	Animal biology
CEM144	:	Physical and organic chemistry
LEK124	:	Statistical analysis and the economic management of resources
RIS121	:	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
GEN214	:	Applied molecular genetics
AND		
GEN272	:	Introductory molecular genetics
GKD214	:	Soil ecology
LWR214	:	Introduction to Agrometeorology
MKB214	:	Introduction to Microbiology
PLK212	:	Practical plant morphology and propagation (practical)
AND		
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:

GEN224	:	Principles of genetics
GEN282	:	Heritability in practice
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 crops
ENT314 : Advanced ecology and agricultural entomology of insects

Choose at least 32 credits from the following:

GKD314 : Soil evaluation and land use planning
HRT314 : Nursery management and cutflower production
LWR314 : Climate and its influence on management practices
PLT314 : Selection methods
PPG314 : Principles of plant disease control

Sixth semester

AGR324 : Production of winter crops
ENT324 : Applied insect pest management

Choose at least 32 credits from the following:

GEN324 : Evolusionary genetics
GKD324 : Sustainable soil and water management
HRT324 : Fruit cultivation
LWR324 : Crop growth modeling
PLK324 : Plant metabolism
PLK344 : Plant defence and biotechnology
PPG324 : Plant health management

Fourth academic year

Seventh semester

AGR414 : Crop and stress physiology
AGR434 : Research techniques
ENT334 : Advanced medical, veterinary and forensic entomology
LWL312 : Agricultural statistical analyses

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

Eighth semester

AGR424 : Post-harvest handling and storage
AGR444 : Chemical 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

PREREQUISITES

AGR314	AGR224
AGR324	AGR224
AGR424	AGR314 and AGR324
AGR444	AGR414
DTL414	DTL314
GKD314	GKD214
GKD324	GKD214
GKD414	GKD214
GKD424	GKD214
GKD434	GKD214
GKD444	GKD214
GKD461	GKD214
LEK214	LEK124
LEK224	LEK124
LEK314	LEK124
LEK324	LEK124, LEK314 or BRS111
LEK414	LEK224 or BRS111
LEK424	LEK124
LEK434	LEK124 and LEK214
LEK444	LEK124
LEK461	LEK124
LNG224	LWL194 or WTW134 or LWL116
LNG314	LNG224
LNG324	LNG314
LNG414	LNG324
LNG424	LNG414
LWR214	LWL154 or FSK134
LWR314	LWR214
LWR324	LWR214
LWR414	LWR214
LWR424	LWR214
LWR434	LWR214
LWR444	LWR214

PLT314	PLT224
PLT424	PLT224
PPG314	PPG214
PPG414	PPG214
PPG424	PPG214
PPG434	PPG214
PPG444	PPG214
VWS222	CEM114 and CEM124 or CEM114 and CEM144 or LWL134 and LWL144
VWS232	CEM114 and CEM124 or CEM114 and CEM144 or LWL134 and LWL144
VWS314	VWS212 or VKD224
VWS324	VWS212
VWS334	VWS212
VWS344	VWS212 and MKB212 or MCB212 and MCB232
VWS414	VWS324
VWS424	VWS314
VWS434	VWS314 and VWS324 and VWS224
VWS444	VWS314 or VKD224
WDK314	WDK224
WDK414	WDK224 or WDK314
WDK434	WDK224 or WDK314
WDK424	WDK224 or WDK314
WDK444	WDK224 or WDK314

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

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

Agricultural Datametry

DMT214 - Agricultural Datametry: (2+1)
One examination paper.
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 - Agricultural Datametry: (2+1)
One examination paper.
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.

Agricultural Economics

LBB344 (16 credits) - Strategic agricultural management
(Department of Agricultural Economics)
Three lectures and a three hour practical per week in the second semester
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)
Second semester.
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 in the second semester
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) - Statistical analysis and the economic management of resources
(Department of Agricultural Economics)
Three lectures and a three hour practical per week in the second semester
One examination paper of two hours.
After the completion of this module the student will understand the role of resources in the economy, the structure of international systems and South Africa's position in the world economy. The student will also have knowledge about factors that influence the demand and supply of products, market forces and the determination of prices, optimal input/input; input/output and output/output relations in resource management and the influence of natural and economic conditions on the use of resources. On completion of the course the student will be familiar with the statistical parameters like descriptive statistics, probability, regression, correlation and analysis of variance in order to implement this knowledge for agricultural related aspects in general.
Practical work
Use of a computer to do practical analysis

LEK214 (16 credits) - Agricultural finance
(Department of Agricultural Economics)
Three lectures and a three hour practical per week in the first semester
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. 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). Development of a financing policy for a farming business and the identification of financing requirements to be able to obtain and manage credit. Financial planning with the help of different budgeting techniques.
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 in the second semester
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) - Agricultural marketing
(Department of Agricultural Economics)
Three lectures and a three hour practical per week in the first semester.
One examination paper of three hours.
The objective with this module is to provide the student with knowledge in micro and macro marketing, price theory, utility theory, marketing functions, marketing channels, the international environment, grain marketing strategies and marketing hints, as well, as strategic marketing which will empower producers and agribusiness to formulate and implement strategic marketing plans.
Practical work
The analysis of different market scenarios on computer.

LEK324 (16 credits) - Advanced Agricultural marketing
(Department of Agricultural Economics)
Three lectures and a three hour practical per week in the second semester
One examination paper of three hours.
After the completion of this module the student will understand how to do analysis and interpretations of economical terms such as demand, price and income elasticities. Knowledge of the quantification of agricultural marketing questions, the fitting of supply and demand curves, identification of variables that influence 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
Fitting of supply and demand curves by means of regression. The calculation and use of correlation, standard deviations, etc.

LEK414 (16 credits) - Managerial economics
(Department of Agricultural Economics)
Three lectures and a three hour practical per week in the first semester
One examination paper of three hours.
The student will understand how micro economics provides the framework for “economic” ways of thinking and how this basic knowledge was developed in techniques such as linear programming (LP) that solve agricultural economic problems to make efficient decisions. In addition, the student will have an understanding of the principles underlying decision-making under uncertainty.
Practical work
Spread sheet models of production and cost functions. Fitting of production functions by means of regressions. Application of LP-models. Measurement of risk with subjective probabilities. Forecasting.

LEK424 (16 credits) - Resource economics
(Department of Agricultural Economics)
Three lectures and a three hour practical per week in the second semester
One examination paper of three hours.
After the completion of this module the student will have knowledge on the theory of natural resource and environmental economics. Aspects that will be addressed include: property rights, externalities and environmental problems, market and government failures, optimal use/management of natural resources and the environment with special reference to water, soil, natural vegetation, fisheries and other species, and pollution.
Practical work
Application of measuring techniques to determine the economic effects of natural resource and environmental problems. Evaluation of alternative solutions to problems.

LEK434 (16 credits) - Agribusiness management
(Department of Agricultural Economics)
Three lectures and a three hour practical per week in the first semester
One examination paper of three hours.
Agribusiness management structure: a system approach. In this module knowledge is gained on the co-ordination of activities in Agribusiness systems. Market segmentation, market choice and the positioning of the business. Product development, structures and distribution channels. Quality control and improvement. Distribution management and value adding. Product planning, stock control and information technology. Price decisions, business laws and contracting. Development and documentation of a business plan.
Practical work
The development of a business plan. Most of the assignments will be computer based.

LEK444 (16 credits) - Agricultural policy and development
(Department of Agricultural Economics)
Three lectures and a three hour practical per week in the second semester
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)
Second semester
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.

LNG224 (16 credits) - Engineering principles in agricultural practises
(Department of Agricultural Economics)
Three lectures and a three hour practical per week in the second semester
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 in the first semester
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 in the second semester
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 in the first semester
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 in the second semester
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 in the second semester
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 - Biological principles in Agriculture: (3+1)
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 - Chemical principles in Agriculture: (3+1)
One examination paper of three hours.
Students will be qualified in 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.

LWL144 - Biochemical principles in Agriculture: (3+1)
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 - Physical and mechanised principles in Agriculture: (3+1)
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 understand the influence of these processes on the behaviour of animals, plants and the natural resources. The student will be qualified to use the SI-system.
Practical work
The student will gain practical experience by doing calculations involving the above-mentioned subjects.

LWL164 - Microbiological principles in Agriculture: (3+1)
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 - Introductory mathematics: (2+½)
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 - Mathematical calculations in Agriculture: (3+1)
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 - Sustainable production practises: (3+1)
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.

LWL312 - Agricultural statistical analyses (1+1)
One examination paper of two hours (Including analysis of data on a computer)
After completion of the course the student will be able to perform statistical analyses using SAS and Excel software. The ability to interperate and make inferences regarding the analysed data will also be mastered. This knowledge will enable the student to analyse and interpret data arising from statistical problems in agriculture. The student will solve typical agricultural problems in the tutorials using the statistical programs, SAS and Excel.

Agronomy and Horticulture

AGRONOMY

AGR224 - Crop production principles: (3 + 1)
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 field- and horticultural 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 be able to apply the theoretical as well as the practical aspects of 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 field- and horticultural crops, soil tillage, practical aspects of seedbed preparation, weed control and plant nutrition. The student will, after completing this module, also be able to distinguish between agricultural implements and their uses as well as to identify the symptoms caused by environmental factors affecting the growth and development of crops.

AGR314 - Production of summer crops: (3 + 1)
One examination paper of three hours.
After completing this module students will be familiar with cultivation practices concerning the most important summer crops, oil- and protein rich seedcrops as well as vegetable crops in South Africa and will also be able to apply the theoretical and practical aspects of soil tillage, seedbed

preparation, planting techniques, weed control and plant nutrition, as it relates to these crops, on a higher level.

Practical work

During practicals the student will study the morphology of the mentioned summer crops and will, on completion, be able to distinguish the different growth stages of the different crops. Skills concerning the practical aspects of crop cultivation will be attained during practicals which will enable the student to apply these aspects on a much higher level.

AGR324 - Production of winter crops: (3 + 1)

One examination paper of three hours.

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

Practical work

During practical sessions the student will study the morphology grading of the mentioned winter crops and will, on completion, be able to distinguish the different growth stages of the different crops. Skills concerning the practical aspects of crop cultivation will be attained during practical sessions, which will enable the student to apply these aspects on a much higher level.

AGR414 - Crop and stress physiology: (3+1)

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 form 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, spectrophotomety, 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 - Post-harvest handling and storage: (3+1)
One examination paper of three hours.
After completing this study students will be familiar with the most important post-harvest physiological aspects of field- and horticultural crops, determining maturity indexes, harvesting dates and methods, handling, grading and packaging of products. The student will also acquire insight regarding the storage and transport as well as value adding to products.
Practical work
After completion of the practical sessions students will be able to determine fruit maturity, test for quality, harvest products in the correct manner as well as handle and process products. Students will also acquire additional experience regarding the grading of products from field- and horticultural crops as well as the practical handling and storage of these products.

AGR434 - Research techniques: (3+1)
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 - Chemical weed control: (3+1)
One examination paper of three hours.
After completion of this module students will be able to identify the most important weeds in South Africa. Moreover, students will be familiarized with aspects concerning the negative effect of weeds on crops, including weed biology, and the importance of control mechanisms as well as principles of herbicide selectivity, factors influencing it, usage- and chemical classification of herbicides, post application activity, principles of herbicide choice and the application practices 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 practice so requires.
Practical work
After completion of this series of practicals students will be able to identify the most important weeds, to collect them in the correct manner, to calibrate a herbicide spray and to identify the phytotoxic symptoms on crops sprayed with specific herbicides.

AGR461 - Seminar in Agronomy: (1+0)
No formal examination is required.
Students will obtain the necessary experience to accumulate specific knowledge on a specific topic, to assimilate knowledge in an orderly and logic manner according to the requirements for a scientific publication and to present the seminar orally in order to prepare the student for addressing audiences during conferences or farmer’s days.

HORTICULTURE

HRT314 - Nursery management and cutflower production: (3+1)
One examination paper of three hours.
On completion of this module students will be familiar with aspects regarding advanced reproduction techniques, propogation of horticultural crops, outlay of a nursery, greenhouses and its management, plant covering, heating and cooling as well as erecting a greenhouse. Additionally cultivation of horticultural crops and cutflowers, such as roses, crysanthemums and carnations, in pots.
Practical work
Students will attain skills regarding practical applications of different reproduction- and cultivation practices and will be enabled to apply them on an advanced level.

HRT324 - Fruit cultivation: (3+1)
One examination paper of three hours.
Students will be familiarized with aspects concerning the cultivation of different fruit crops including characteristic properties and adaptations of important cultivars and rootstocks, orchard tillage, fertilization, irrigation, pruning, manipulation, spacing, cold requirements as well as fruit thinning and will be able to apply this in practice on an advanced level.
Practical work
During practical sessions students will attain skills necessary for successfully cultivating deciduous fruit and will be able to prune trees, manipulate them in different ways and also to apply tree and fruit thinning practices. Additionally, the student will be acquainted with general orchard practices.

Agrometeorology

LWR214 - Introduction to Agrometeorology: (3+1)
One examination paper of three hours.
Knowledge of the principles, aims and scope of Agrometeorology - weather elements, climatological and meteorological control mechanisms. Develop skills in elementary weather forecasting using S.A. weather charts. Be familiar with seasonal changes and climatic variation over S.A. Agricultural applications will focus on the calculation of evapotranspiration, irrigation scheduling with the use of weather data; frost and frost protection, windbreaks and the influence of weather variables on pests and diseases.
Practical work
Develop skills in the installation and calibration of the most important agrometeorological instruments including automatic weather stations and interpretation of weather charts and data processing for agricultural purposes.

LWR314 - Climate and its influence on management practices: (3+1)
One examination paper of three hours.
A knowledge of climatological influences on management and planning decision-making. Be able to make applications of the influence of temperature (cold & heat stress), frost and wind breaks on production in SA agriculture. Be familiar with the determination of potential, climatological predictions and production risks of crops and animals. A knowledge of the climatic regions of SA and climatic indices (including ENSO) for management and planning during droughts and rainfall cycles. Be able to calculate water requirements and water use for planning and scheduling of irrigation.
Practical work
Proficiency in the use of computerized weather data to support agricultural management decisions.

LWR324 - Crop growth modeling: (3+1)

One examination paper of three hours.
A knowledge of the influence of weather on crop development and leaf growth and radiation in the plant community. Be familiar with evaporation from soil and crop (soil water balance and plant water status) and the influence of nutritional status, radiation, CO_2, temperature and water status on photosynthesis and crop growth. Develop reasoning capacity to test crop growth models - sensitivity analysis, statistical verification and the application of crop growth models in agriculture.
Practical work
Develop skills to quantify and computerize the relationships between weather elements, growth factors and growth and incorporate of all these elements into a comprehensive crop growth model.

LWR414 - Operational Agrometeorology: (3+1)
One examination paper of three hours.
This course is problem-based and aimed at developing analytical, writing and climatological advisory skills. The student will be able to do the work of an operational agrometeorologist. Specific skills, namely information-, professional- and transferable skills will be developed as the student learns to write a report in the form of a scientific article. Data analyses for both the long term planning and operational application will be included in the report.
Practical work
The writing of a report in the format of a scientific article.

LWR424 - Micrometeorology: (3+1)
One examination paper.
Knowledge of micrometeorology - radiation, wind, turbulence, momentum, heat, air moisture, and evaporation. Be familiar with mass and momentum transfer, exchange processes in plant communities in connection with radiation, energy and evaporation. Determine the influence of the environment on plant processes: photosynthesis, transpiration leaf temperature and the leaf energy balance. Be able to analyze the micrometeorology of urban areas, forests and crops using models and meteorological data.
Practical work
Practical skills in calibration of instruments used for observation of environmental variables above and within plant communities and soil surfaces.

LWR434 - Physical and dynamic meteorology: (3+1)
One examination paper of three hours.
Knowledge is gained on atmospheric structure and composition, the transfer of electromagnetic radiation and the global energy balance. The thermodynamics of the atmosphere as well as the physical processes involved in cloud formation and precipitation are dealt with. The forces acting on atmospheric particles are derived and calculated with the use of basic numerical modelling. Pressure, temperature and density relations are also highlighted.
Practical work
Calculation of wind components with the use of basic numerical modelling and the use of thermodynamic diagrams in weather forecasting.

LWR444 - Synoptic meteorology: (3+1)
One examination paper of three hours.
The student is made familiar with the synoptic climatology of southern Africa 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 put up a 5-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 - Seminar in Agrometeorology: (1+0)
No formal examination is required.
The student will gain knowledge of the principles of writing seminars, library use, and literature studies. During the preparation, writing and presentation of a seminar on an approved topic in Agrometeorology, they will develop the necessary evaluation and communication skills.

Animal Science

ANIMAL ANATOMY AND PHYSIOLOGY MODULES

DAF314 - Animal anatomy and physiology of farm animals: (3+1)
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 - Animal health: (3+1)
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 - Applied reproduction physiology in farm animals: (3+1)
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 - Growth and lactation physiology: (3+1)
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 - Theory of animal breeding: (3+1)
One examination paper of three hours.
After completion the student is familiar with concepts such as the resemblance of Mendelic heritance between relatives; heritability; 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 - New technologies in animal breeding: (3+1)
One examination paper of three hours.
Reproductive technologies, Cloning, Molecular genetic technologies, Genetic markers, Major genes and Ethical implications of new technologies.
After completion the student is familiar with the identification of the genetic material; protein synthesis; the genetic code; fine structure of the gene; regulation of gene action.
Practical work
The student is familiarised with the structure of DNA.

DTL414 - Animal breeding; Mixed model theory: (3+1)
One examination paper of three hours.
After completion the student is familiar with matrix algebra; 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 - Animal breeding; Practical application: (3+1)
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; conduct practical selection of breeding stock; evaluate breeding programmes.

DVL314 - Applied monogastric nutrition: (3+1)
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, pigs and horses.
Practical work
Visits are brought to production systems for broilers, laying hens and pigs.

DVL324 - Applied ruminant nutrition: (3+1)
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, goats and game 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 rations.

DVL414 - Fundamental and experimental animal nutrition: (3+1)
One examination paper of three hours and an oral examination.
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 fermentors), digestion, absorption and metabolism; nutrient deficiencies, toxicity and metabolic disturbances; digestibility of feeds and feed components; techniques for the evaluation of feeds and pastures; protein and energy requirements for monogastric animals, ruminants and lower digestive tract fermentors.
Practical work
Students perform practical feeding and the handling of animals, digestion trials and carry out laboratory techniques.

DVL424 - Properties of feeds, balancing rations and fodder flow planning: (3+1)
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.

DVL444 - Applied nutrition of wild herbivores and carnivores: (3+1)
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.

MVE114 - Subject didactics Animal Science: (1+0)
One examination paper of two hours.
After completion the student is familiar with the aim and place of Animal Science in school; a critical study of the content of the school syllabus in Animal Science; *capita selecta* from advanced aspects of Animal Science with a view to the expansion of knowledge of the subject in the educational situation.

VKD214 - Animal breeding and animal nutrition: (3+1)
One examination paper of three hours.
Module A: The student is introduced to the principles of heredity; genetic progress.
Module B: The student is introduced to the principles of introductory nutritional management.
Practical work
Practical application of genetic principles is performed with the computer; handling of livestock; visits are brought to production units and the evaluation of feeds and animals are performed.

VKD224 - Reproduction and animal products: (3+1)
One examination paper of three hours.
Module A: The student is introduced to livestock and poultry reproduction physiology and behaviour (conception, gestation, birth and lactation); breeding seasons; reproduction management.
Module B: The student is introduced to livestock and poultry products (meat, wool, milk, eggs, hides and skins).
Practical work
Visits are brought to production units; handling and evaluation of animal products are performed; castration, de-horning, vaccination of farm animals are demonstrated and performed.

VKD451/461 - Seminar in Animal Science: (1+0)
No formal examination required.
Final year B.Sc.Agric. students must submit a seminar on an approved topic for examination. Each student will also be evaluated orally.

VDS214 - Food preparation: (3+1)
One examination paper of three hours.
Measuring and recipe science: practical application of principles. WATER: latent and specific heat. Conventional heat and microwave heat transfer. COOKING METHODS: dry and moist heat. Fruit, vegetables, legumes and nuts. Natural colour pigments. Lipids as applied to food preparation. Salads and salad dressings. Protein as applied to food preparation. Gelatine and gelatine dishes. Milk and milk products. Cheese and cheese products. Eggs and egg dishes. MEAT: selection, storage and cooking. POULTRY: selection, storage and cooking. FISH: classification, selection, storage and cooking. SOUP: classification and preparation.
Practical work
Food preparation concerning aspects of the theory.

VDS224 - Food preparation: (3+1)
One examination paper of three hours.
Measuring and recipe science: practical application of principles. Terminology of food preparation. Carbohydrates as applicable to food preparation. Cereals, cereal products and sauces. BAKING: ingredients, batter and kinds of dough. SUGAR: classification, properties and uses. SUGAR COOKERY: crystalline and amorphous sweets. PRINCIPLES OF MEAL PLANNING: food groups. Daily menu plan with portion sizes. Herbs and spices.
Practical work
Food preparation with regard to aspects of the theory.

VDS244 - Food preservation and meal planning: (3+1)
One examination paper of three hours.
Preserving. Freezing of food. Packaging of food. Meal planning: menus and application of economic and gastronomic principles. Art of entertaining: formal and informal. International eating habits.
Practical work
Preserving. Planning and preparation of meals and receptions.

VWS212 - Introductory Food Science: (3+0)
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 - Chemical analysis of food: (0+1)
One questions 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 - Food systems: (3+1)
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: (3+0)
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 - Food products from animals: (3+1)
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 - Food products from plants: (3+1)
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 - Food engineering: (3+1)
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 - Food microbiology: (3+1)
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 - Food products from plants: advanced: (3+1)
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 - Dairy Science: (3+1)
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 - Product development and sensory analysis: (3+1)
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 - Meat Science: (3+1)
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 - Seminar in Food Science: (2+0)
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 - Veld as natural resource: (3+1)
One examination paper of three hours.
Knowledge of the 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. 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. Bringing physiological approach to ecosystem utilisation in proper relation to optimal growth and development of fodder plants. To 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. Herbarium collection of fodder plants.

WDK314 - Applied veld management and veld evaluation: (3+1)
One examination paper of three hours.
Familiar with the aims and principles of veld management with livestock and wildlife. Knowledge of grazing habits of livestock and wildlife and selective grazing. Identification and analysing of veld management methods and strategies. Bringing game farm planning in proper relation to management and utilisation of game. Determination of production and quality of veld. Determination of grazing capacity and stocking rate. Familiar with the importance of records of veld. To be able to do scientific planning of a farm unit and methods for evaluating grasslands in respect of cover, botanical composition and veld condition.
Practical work
Physical and biological planning of a farming unit. Practical skills in application of different techniques to establish veld condition, production, quality and grazing capacity. Practical reports must be handed in.

WDK324 - Intensive pasture production: (3+1)
One examination paper of three hours.
Knowledge of the importance, extent and purpose of intensive pasture production in the RSA. Familiar with seed germination of fodder plants. Evaluation of factors important in veld reclamation and veld reinforcement. Identification and evaluation of suitable crops for planting/cultivating: cultivation aspects, choice of crops, nutritive value, quality, utilisation and forage conservation. To be able to do fodder flow planning.
Practical work
Development of skills in identification of grasses and legumes for establishment and veld improvement. Study and evaluation of management practices on farms. Designing a fodder flow programme.

WDK414 - Production and utilisation ecology: (3+1)
One examination paper of three hours.
Knowledge of the grassland ecosystem (interactions, structure and functioning) and the farmer as manager. Be able to evaluate the sustainability of the grassland ecosystem and the factors that may influence it. Bare knowledge of 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. The development of models for the prediction of production and utilisation of the grassland ecosystem. 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. Identification and description of plant growth habitat relationships.

WDK424 - Advanced veld management: (3+1)
One examination paper of three hours.
Knowledge of extent and history of the conservation idea. Identification of the causes and results of veld deterioration (erosion) and measures to combat it. Be able to identify the importance of veld management in different veld types and the critical evaluation of system/practices. Identification and analysing of grazing habits of livestock and game and selective grazing. Determination of grazing capacity and stocking rate and application of special treatments for veld. Carry out veld management planning. Bringing applied wildlife management in proper relation to marketing, legal aspects, economics and sosio-economical aspects of game. Familiar with the management of

communal areas.

Practical work

Physical and biological planning of a veld management system on a farming unit. Determining veld condition and production planning. An excursion during which practical work regarding veld condition, evaluation and practical veld management will be done, is compulsory. Practical report on the excursion must be submitted.

WDK434 - Defoliation phenology and physiology: (3 + 1)

One examination paper of three hours.

Knowledge of physiological and phenological aspects of fodder plants. Familiar with 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. 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. 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 - Advanced fodder plant evaluation: (3+1)

One examination paper of three hours.

Knowledge of the classification of vegetation and identification of the variables that influence the grassland ecosystem. Planning and conducting of grassland science research. Sampling, arrangement, statistical tests and simulation models applicable to the grassland ecosystem. 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. Familiar with the principles, application and limitations of the most important wildlife management research techniques.

Practical work

Practical skills in different techniques (veld work and computer), applicable to grassland science. Report and processing of data.

WDK451/461 - Professional skills: (1+0)

Continuous evaluation. No formal exam is required.

Knowledge of the principles in 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.

PLT224 - Breeding techniques: (3+1)
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 - Selection methods: (3+1)
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 - Advanced breeding techniques: (3+1)
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 - Seminar in Plant Breeding: (1+0)
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 - Principles of Plant Pathology: (3+1)
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.

PPG314 - Principles of plant disease control: **(3+1)**
One examination paper of three hours.
On completion of this module the student will be acquainted with the measuring of plant disease and control of diseases based on the principles of *exclusion, eradication, protection* and *resistance.* Following identification of a specific disease the student must therefore know which principle(s) of control is relevant and which strategies should be followed for the prevention or control of the disease.
Practical work
After completion of the practical module the student will be skilled in certain aspects of plant pathological research.

PPG324 - Plant health management: (3+1)
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 - Fungal diseases of plants: (3+1)
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 - Plant diseases caused by bacteria and viruses: **(3+1)**
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 - Epidemiology and ecology of plant pathogens: (3+1)
One examination paper of three hours
The candidate on completion of this module will understand the ecological considerations that are relevant to the germination, dispersal and survival of plant pathogens. The student will also be acquainted as to how these aspects, together with environmental and host factors, influence disease development in populations.
Practical work
Following the practical experience offered by this module the student would be well versed in the technical aspects of plant pathological research, particularly those relating to the eco-physiology of fungi.

PPG444 - Host-pathogen interactions: (3+1)
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 - Seminar in Plant Pathology: (1+0)
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 - Soil ecology: (3+1)
One examination paper of three hours.
Outcome:
Introduction to soil as a natural resource and the role of soil in natural and production ecosystems.
Contents:
The definition of soil and its role in natural en agro-ecological systems. Soil profile and 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 - Soil evaluation and land use planning: (3+1)
One examination paper of three hours.
Outcome:
Expertise of 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 - Sustainable soil and water management: (3+1)
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 - Soil chemistry: (3+1)
One examination paper of three hours.
Outcome:
Advanced knowledge of the chemical reactions and processes that occur in soils and its effect on soil properties and the environment.
Contents:
Advanced colloid chemistry. Cation and anion exchange reactions. Chemisorption and precipitation of inorganic ions. 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 - Soil biology: (3+1)
One examination paper of three hours.
Outcome:
Knowledge of the decomposition of organic matter, synthesis of humus and the impact on soil properties, soil quality and the environment.
Contents:
Activity and role of macro- and micro-oragnisms 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. Rehabilitation of soils.

Practical work
Isolation of bacteria, fungi, algae, actinomycete and nematodes from soil. Extraction of humus from soil and its fractionation.

GKD434 - Soil physics: (3+1)
One examination paper of three hours.

Outcome:
Advanced knowledge of the hydraulic and physical processes in soils.
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. Simulation of water movement under different conditions.

GKD444 - Soil geography: (3+1)
One examination paper of three hours.
Outcome:
Advanced knowledge of the geographical distribution, genesis and use of 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 soils.
Practical work
Identification of primary and secondary minerals in soils. Discussion of the origin, morphology, classification and use of soil during field excursions and a compulsory tour to the Eastern and Northern Free State.

GKD461 - Seminar in Soil Science: (1+0)
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 course is only for final-year major students and it is required from everyone to prepare and present a seminar on a topic relating to soil.

Module contents not in this calendar

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

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

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

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