OP 1/27/18

Faculty of

2000

Science & Agriculture

Pietermaritzburg

- Agricultural Management
- Agricultural Sciences
- Consumer Studies
- Dietetics
- Environment and Development
- Food Security
- Human/Community Nutrition
- Protected-Area Management
- Rural Resource Management
- Science

UNIVERSITY OF NATAL

DURBAN & PIETERMARITZBURG CAMPUSES

STELLA AURORAE

THE POWER TO SUCCEED

OP 1/27/18

FACULTY OF SCIENCE & AGRICULTURE
PIETERMARITZBURG

HANDBOOK FOR 2000

QUALIFICATIONS IN:

AGRICULTURAL MANAGEMENT
AGRICULTURAL SCIENCES
CONSUMER STUDIES
DIETETICS
ENVIRONMENT AND DEVELOPMENT
FOOD SECURITY
HUMAN/COMMUNITY NUTRITION
PROTECTED-AREA MANAGEMENT
RURAL RESOURCE MANAGEMENT
SCIENCE

DEAN
Professor R J Haines

DEPUTY DEAN
Professor P J K Zacharias

FACULTY MANAGER
Mrs V A Dove

FACULTY OFFICER
Mrs B E Rivers-Moore

HIGHER DEGREES OFFICER
Mrs B J Roberts

ASSISTANT FACULTY OFFICERS
Mrs I Sokhela (Agricultural Sciences) Mrs J Van Blerk (Science)

ADMISSIONS OFFICER
Mrs P Emslie

PUBLIC RELATIONS OFFICER
Mrs S J Upfold

FACULTY OF SCIENCE AND AGRICULTURE
UNIVERSITY OF NATAL
PRIVATE BAG X01
SCOTTSVILLE
3209 PIETERMARITZBURG
TELEPHONE (LOCAL): (033) 260 5183
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CONTENTS

Appendix 1

SYLLABI FOR MODULES OFFERED IN

STAFF OF THE FACULTY OF SCIENCE & AGRICULTURE

Dean	Professor R J Haines *MSc (Natal) PhD (London) FRSSAf*
Deputy Dean	Professor P J K Zacharias *BScAgric MScAgric (Natal) DSc (UFH) (M.G.S.S.A.)*

SCHOOL OF AGRICULTURAL SCIENCES & AGRIBUSINESS

PROFESSORS Head of School	Professor G F Ortmann
Horticultural Science	J P Bower *BScAgric MScAgric PhD (Natal)*
Crop Science (SA Sugar Association Chair)	A L P Cairns *BScAgric(Hons) MScAgric PhD (Stell)*
Horticultural Science	A K Cowan *BSc(Hons) PhD (Rhodes)*
Poultry Science	R M Gous *BScAgric MScAgric PhD (Natal)*
Agricultural Economics	M C Lyne *BScAgric MScAgric PhD (Natal)*
Dietetics and Nutrition	E M W Maunder *PGDipDiet (Leeds MU) BSc(Hons) Nutrition (London) PhDNutrition (London)*
Agricultural Economics	W L Nieuwoudt *BScAgric (Stell) MScAgric (Pret) MEcon (N Carolina) PhD (Natal)*
	G F Ortmann *BScAgric MScAgric PhD (Natal)*

ASSOCIATE PROFESSORS	
Animal Science	**N S Ferguson** *BScAgric MScAgric PhD (Natal)*
Crop Science	**P L Greenfield** *BScAgric (Natal) MS PhD (Wisconsin)*
Forestry	**J Zwolinski** *MSc (Kra Kow) PhD (Stell)*
SENIOR LECTURERS	
Agricultural Economics	**M A G Darroch** *BScAgric MScAgric (Natal)*
Community Resources	**J M Green** *BScHomeEcon HED (Stell) MScHomeEcon (Natal) PhD (Oklahoma State)*
Agricultural Production	**J R Klug** *BScAgric MScAgric (Natal)*
Animal Science	**I V Nsahlai** *BScMaitrise PGDip (Y'de) PhD (Reading)*
Plant Breeding	**P E Shanahan** *BScAgric PhD (Natal)*
LECTURERS	
Horticultural Science	**I Bertling** *MSc PhD (Hohenheim)*
Animal Science	**G D Bradford** *BScHons (Nottingham) MScAgric (Natal)*
Dietetics and Nutrition	**A E Grobler** *BScDiet BScDiet(Hons) (Stell)*
Community Resources	**A G Haselau** *BScHomeEcon (Stell) ScHomeEcon(Hons)(Natal)* **S L Hendriks** *BScHomeEcon(Hons) MScHomeEcon (Natal)*
Crop Science	**A T Modi** *BScAgric (UFH) MScAgric (Natal) PhD (Ohio)*
Horticultural Science	**R Oberholster** *BScAgric (Pret)*

Dietetics and Nutrition	M Paterson *DiplHospDiet (Stell) BScDiet (Pret)*
	F M Ross *DiplHospDiet (Pret) BSc BScDiet (Natal) MSNutrEd (Columbia)*
Animal Science	S C Slippers *BAgric BScAgricHons MScAgric (Free State)*
	P G Stewart *BScAgric (Natal) MS (Mich State)*
Community Forestry	M J Underwood *BScHons (London) MSc (Sheffield)*
JUNIOR LECTURER Nutrition	to be appointed
HONORARY PROFESSOR Agricultural Hydrology	P J T Roberts *SciNat Ph (USA) MSc PhD (Rhodes) MGSSA MAGU MIAH MSAGS MSASAS MIAHS MAIH MSAIF*
Forestry (Director, ICFR)	C Dyer *BScHons MSc PhD (Witwatersrand)*
HONORARY RESEARCH ASSOCIATES Horticultural Science	P Allan *BScAgric PhD (Natal)*

CENTRE FOR RURAL DEVELOPMENT SYSTEMS

Director	Professor R H J Rijkenberg *BScAgric MScAgric PhD (Natal)*
Senior Lecturer	Reverend S Luckett *BSc(Hons) (Stell) MPhil (Oxon)*

SCHOOL OF APPLIED ENVIRONMENTAL SCIENCES

Head of School	Professor M J Savage
PROFESSORS	
Human Geography	R J Fincham *BA(Hons) UED (Natal) MA (Western Mich) PhD (Rhodes)*
Soil Science	R J Haynes *BHortSci(Hons) PhD (Lincoln NZ)*
	J C Hughes *BSc(Hons) (Reading) MSc (Queens)PhD (Reading)*
Range Ecology	T G O'Connor *BSc(Hons) (Witwatersrand) MSc (Zimbabwe) PhD (Witwatersrand) (M.G.S.S.A.)*
Plant Pathology	F H J Rijkenberg *BScAgric MScAgric PhD (Natal)*
Agrometeorology	M J Savage *BSc(Hons) PhD (Natal)*
Microbiology	E Senior *BSc(Hons) (Liverpool) PhD (Kent)*
	F M Wallis *BScAgric MScAgric PhD (Natal)*
ASSOCIATE PROFESSORS	
Physical Geography	H R Beckedahl *BSc(Hons) MSc HDE (Witwatersrand) PhD(Natal) PrSciNat*
Soil Science	M A Johnston *BScAgric MScAgric PhD (Natal)*
Plant Pathology	M D Laing *BSc(Hons) PhD (Natal)*
Physical Geography	O S McGee *BSc(Hons) UED (Natal) MSc (Wisconsin)PhD (Natal)*

Human Geography — D G B Slade
BSc(Hons) (Cape Town) PhD (Liverpool)PrSciNat

Grassland Science — P J K Zacharias
BScAgric MScAgric (Natal) DSc (UFH) (M.G.S.S.A.)

SENIOR LECTURERS

Rehabilitation Ecology — J E Granger
BSc(Hons) PhD (Natal) (M.G.S.S.A.)

Geography — T R Hill
BScHons, PhD (Rhodes)

LECTURERS

Physical Geography — F B Ahmed
BSc(Hons) MSc PhD (Cantab)

Soil Science — H C Bester
BScAgric MScAgric (Natal)

Human Geography — K S Burton
BScHons (Natal)

Grassland Science — T M Everson
BScAgric MSc PhD (Natal) (M.G.S.S.A.)

Microbiology — C H Hunter
MSc (Natal)

HONORARY LECTURER

Grassland Science — C D Morris
BScAgric (Natal)

HONORARY RESEARCH ASSOCIATE

Geology — V von Brunn
BA BSc(Hons) MSc PhD (Cape Town) FGSSA PrSciNat

CENTRE FOR ENVIRONMENT AND DEVELOPMENT

Director — R J Fincham
BA(Hons) UED (Natal) MA (Western Mich)PhD (Rhodes)

Deputy Director — D J Brothers
BSc(Hons) (Rhodes) PhD (Kansas)

SCHOOL OF BOTANY & ZOOLOGY

Head of School	**Professor E G J Akhurst**
PROFESSORS	
Entomology	**D J Brothers** *BSc(Hons) (Rhodes) PhD (Kansas)*
Zoology	**R C Hart** *BSc(Hons) (Natal) PhD (Rhodes) DSc (Natal)*
	M R Perrin *BSc(Hons) (London) PhD (Exeter) MIBiol FLS*
Entomology	**M J Samways** *BSc(Hons) (Nottingham) PhD (London) CertTropAgric (Internat Corres Schools)*
Botany	**J van Staden** *BSc(Hons) MSc (Stell) PhD (Natal) FRSSAf*
ASSOCIATE PROFESSORS	
Biology	**E G J Akhurst** *BSc(Hons) BEd (Natal) MA (York) PhD (Natal)*
Botany	**R P Beckett** *BSc (St Andrews) PhD (Bristol)*
Zoology	**M J Lawes** *BSc(Hons) PhD (Natal)*
	S E Piper *BSc (Natal) MSc (Witwatersrand) PhD (Cape Town)*
SENIOR LECTURERS	
Botany	**J F Finnie** *BSc(Hons) PhD (Natal)*
	S D Johnson *BSc(Hons) PhD (Cape Town)*
Zoology	**B G Lovegrove** *BSc(Hons) PhD (Cape Town)*
Entomology	**R M Miller** *BSc (Muskingum) MA (Kent State) PhD (Iowa State)*

Botany	M T Smith *BSc(Hons) MSc PhD (Natal)*
Ethnobotany	A K Jäger *MSc PhD (Copenhagen)*

LECTURERS

Biology	C T Downs *BSc(Hons) PhD (Natal)*
Botany	T J Edwards *BSc(Hons) MSc PhD (Natal)*
	C W Fennell *BSc(Hons) (Natal)*
	N P Makunga *BSc(Hons) MSc (Natal)*
Zoology	M S Meusel *MSc PhD (Frankfurt-am-Main)*
	M Hamer *BSc (Hons) MSc PhD (Natal)*

TUTOR

Biology	to be appointed
Herbarium Curator	T J Edwards *BSc(Hons) MSc PhD (Natal)*

HONORARY SENIOR LECTURER

Zoology	J Heeg *BSc(Hons) MSc PhD (Rhodes) MIBiol*

HONORARY LECTURERS

Botany	E F Hennessy *BSc(Hons) MSc PhD (Natal)*
Zoology	N A Rayner *BSc(Hons) MSc PhD (Natal)*

HONORARY RESEARCH FELLOW

Zoology	P B Taylor *BSc(Hons) (Bristol) PhD (Natal)*

SCHOOL OF CHEMICAL & PHYSICAL SCIENCES

Head of School	Professor J S Field
PROFESSORS	
Physics	O L de Lange *BSc(Hons) MSc (Witwatersrand)PhD (Clarkson)*
Inorganic Chemistry	J S Field *BSc(Hons) MSc (Natal) PhD (Cantab)*
Physics	C Graham *BSc(Hons) MSc PhD (Natal) PhD (Cantab)*
Inorganic Chemistry	R J Haines *BSc(Hons) MSc (Natal) PhD (London) FRSSAf*
ASSOCIATE PROFESSOR	
Physical Chemistry	I V Nikolaenko *BSc(Hons) MSc PhD (Kiev)*
SENIOR LECTURERS	
Physics	N Chetty *BSc(Hons) (Natal) MS PhD (Illinois)*
	J Pierrus *BSc(Hons) (Natal) MSc (Witwatersrand)PhD (Natal)*
Physical Chemistry	D Jaganyi *BSc(Hons) MSc (Nairobi) PhD (London) DIC*
LECTURERS	
Chemical Technology	N J S Brown *BSc (Chem Eng) PhD (Cape Town)*
	M R Low *BSc(Hons) PhD (Edinburgh)*
Physics	V W Couling *BSc(Hons) MSc PhD (Natal)*
Organic Chemistry	D Gravestock *BSc(Hons) PhD (Witwatersrand)*
	R S Robinson *BSc(Hons) PhD (Rhodes)*

Inorganic Chemistry	O Q Munro *BSc(Hons) PhD (Witwatersrand)*
	J Perils *BSc(Hons) MSc PhD (Port Elizabeth)*
Analytical Chemistry	C Southway *BSc(Hons) PhD (Salford)*
SENIOR TUTOR Physics	S J Grussendorff *BSc(Hons) MSc HDE (Natal)*
TUTORS Physics	B J McGladdery *BSc(Hons) HDE (Natal)*
Chemistry	S A A Spankie *BSc(Hons) (Edin) PhD (Heriot-Watt) LIOH*
	A van der Hoven *BScAgric MSc (Natal) PhD (Iowa)*
HONORARY RESEARCH ASSOCIATES Organic Chemistry	S E Drewes *BSc(Hons) MSc (Natal) PhD (Rhodes) DSc (Natal) CChem FRSSAf FRSC*
Physics	R E Raab *BSc (Hons) (Natal) DPhil (Oxon)*

SCHOOL OF MATHEMATICS, STATISTICS & INFORMATION TECHNOLOGY

Head of School	Professor J Swart
PROFESSORS Biometry	G P Y Clarke *BScAgric (Natal) PhD (London)*
Statistics	L M Haines *BSc(Hons) (Natal) MA (Cantab) MPhil (London) PhD (Unisa)*
Applied Mathematics	J W Hearne *BSc(Hons) (Cape Town) DSc (Pret)*

Mathematics	M A Henning *BSc(Hons) PhD (Natal)*
	J Moori *BSc (Iran) PhD (Birmingham)*
	J Swart *BSc(Hons) MSc (Witwatersrand) PhD (Unisa)*
Information Systems	D Petkov *MSc (Tech Univ Brno) PhD (Sofia)*
Computer Science	P R Warren *BSc(Hons) (Natal) MSc (Cape Town) PhD (Cantab) DiplDatametrics (Unisa)*
ASSOCIATE PROFESSORS	
Computer Science	Y Velinov *MSc(Engineer-Mathematician) PhD (Sofia)*
SENIOR LECTURERS	
Computer Science	R Dempster *BSc UED (Natal) DiplDatametrics (Unisa)* *BSc(Hons) (Unisa) MSc (Natal) MCSSA MICS*
Biometry	H M Dicks *BScAgric (Natal)*
	P Njuho *BSc(Hons) (Nairobi) MSc (North Carolina) PhD (Kansas)*
Mathematics	J I A Houston *BSc (Pret) STD (Cape Town)*
	S-A Ng *BA(Hons) MA PhD (Wisconsin)*
	P W Uys *BSc(Hons) MSc PhD (Natal)*
	J E van den Berg *BSc(Hons) MSc PhD (Natal)*
Statistics	K Stielau *BSc(Hons) (Natal)*
LECTURERS	
Mathematics	S Bau *BSc(Hons)(China), MSc, PhD(Otago, NZ)*

Computer Science — R Stewart
BSc (Hons) MSc (Natal)

SENIOR TUTORS
Statistics — S Brittain
BSc(Hons) (Natal)

TUTORS
Mathematics — H Kennedy
BSc(Hons) (Natal)

E Uys
BSc HDE (Natal)

J L Warren
BEd(Hons) (London)

Computer Science — E Randiki
BSc (Egerton)

HONORARY SENIOR LECTURER
Mathematics — C Zaverdinos
BSc(Hons) (Witwatersrand) PhD (Natal)

SCHOOL OF MOLECULAR & CELLULAR BIOSCIENCES

Head of School — Professor J W Hastings

PROFESSORS
Biochemistry — C Dennison
BScAgric MScAgric PhD (Natal)

Genetics — J W Hastings
BSc (Witwatersrand) MSc (Pret) PhD (Alberta)

ASSOCIATE PROFESSOR
Genetics — A Fossey
BSc(Hons) MSc PhD (Natal)

SENIOR LECTURERS
Biochemistry — T R Anderson
BScAgric MScAgric PhD (Natal)

T H T Coetzer
BSc(Hons) MSc (Stell) PhD (Natal)

E Elliott
BSc(Hons) MSc PhD (Natal)

J P D Goldring
BSc (Dundee) DPhil (Zimbabwe)

LECTURERS
Molecular Genetics

M Beukes
BSc(Hons) (UWC)

Genetics

R Filter
BScAgric(Hons) (Pretoria)

C Hancock
BSc(Hons) MSc (Natal)

SCIENCE FOUNDATION PROGRAMME

Manager

Mrs J I A Houston
BSc (Pret) STD (Cape Town)

Special Counsellor

S A Barnsley MA
(Natal)Registered Counselling Psychologist

SCHOOLS ALLIED TO SCIENCE AND AGRICULTURE

SCHOOL OF BIORESOURCES ENGINEERING & ENVIRONMENTAL HYDROLOGY

Head of School	Professor P W L Lyne
PROFESSORS	
Agricultural Engineering	P W L Lyne *PrEng MScEng PhD (Natal) FSAIAE*
Hydrology	R E Schulze *MSc PhD UED (Natal) FRSSAf PH(USA) MASAE* MSAIAE MSAGS
SENIOR LECTURERS	
Agricultural Engineering	to be appointed
	to be appointed
SAPPI Hydrology	G Jewitt *MSc (Natal) PhD (Stell)*
LECTURERS	
Agricultural Engineering	G A Kiker *MScEng (Florida) PhD (Cornell)*
Irrigation Engineering	M Zartman *MScEng (Natal) MSAIAE*
SENIOR RESEARCH FELLOWS	
Process Hydrology	S A Lorentz *BScEng (Witwatersrand) MS PhD (Colorado)*
Hydrology	S D Lynch *MSc (UOFS)*
Agricultural & Water Resources Engineering	J C Smithers *MScEng PhD (Natal) MSAIAE*
RESEARCH FELLOW	
Hydrology	A Pike *MSc (Natal)*

INFORMATION FOR STUDENTS

Location

The Faculty of Science and Agriculture comprises the six Schools of: *Agricultural Sciences and Agribusiness*; *Applied Environmental Sciences*; *Botany and Zoology*; *Chemical and Physical Sciences*; *Mathematics, Statistics and Information Technology*; and *Molecular and Cellular Biosciences*.

The disciplines of Agriculture, Agribusiness and Life Sciences are housed in the Rabie Saunders Building and John Bews Complex on the Life Sciences Campus, which is about 1 km from the main campus in Pietermaritzburg. Field work for teaching and research is conducted at the Research Station, Ukulinga, a farm of 300 hectares on the outskirts of the city as well as at several other venues, including the Electron Microscope Unit, Controlled Environment Research Unit, private farms and conservation areas.

The disciplines of Computational, Mathematical and Natural Sciences are housed on the main campus in the Chemistry Complex and the Main Science building. Several well equipped laboratories serve the practical requirements of these disciplines together with Glass-blowing and Mechanical Instrument workshops.

Degrees and Diplomas Offered

The Faculty offers a wide range of under- and postgraduate degrees and diplomas in programmes ranging from Agribusiness to Information Technology, from Resource Ecology to Commercial Forestry, from Chemical Technology to Plant Molecular Biosciences, as well as Botany, Crop Science, Horticultural Science, Mathematics, Physics and Zoology, among others. The under- and postgraduate degrees and diplomas offered in these disciplines and areas of specialisation are described in the **Rules for Qualifications** section of this Handbook. The **Rules and Syllabi** sections, contain the details of each programme and qualification offered in the **Faculty of Science and Agriculture**.

In designing a degree curriculum the most important points to note are:

(1) each programme has a specified combination of modules and there is a limitation on the distribution of modules in any semester;

(2) some modules have prerequisite or corequisite requirements. The details of these are contained under **Syllabi** below (the meanings of these terms are given under **Definitions** in the **Rules**);

(3) by careful consideration of the combination of modules offered in each programme, a candidate may bias the training towards a single area (this applies mainly to students studying for the Bachelor of Science degree, as other qualifications have specified curricula); and

(4) all combinations of modules are subject to the constraints of the time-table.

Semester System

The Faculty follows the semester system of teaching. Modules are given in either the first semester, with a final examination in June, or in the second semester, with a final examination in November. The modules of the Science Foundation Programme (SFP) are given as year courses with assessment throughout the year and examinations in November. Only a limited number of specialist modules are offered in the winter semester.

Credit System

Every module for a qualification has a credit rating. Credit ratings are given under **Syllabi**. Unless specially exempted candidates obtain the credit points indicated for a module by passing the assessments for that module with an average mark of not less than 50%.

Entrance Requirements for Degrees

1. Standard requirements

All candidates must produce evidence to the satisfaction of the Senate that they have either obtained a matriculation certificate or a certificate of exemption from the matriculation examination. Foreign applicants who do not have a pass in a prescribed second language may qualify through a certificate of foreign conditional exemption. Specific requirements for certain programmes are detailed under each **Curriculum**.

2. Alternative entry route

Matriculated applicants for the programmes in the Faculty who do not meet the specified Faculty entrance requirements may be admitted by the Dean provided they avail themselves of one or more Foundation Courses which are offered through the *Science Foundation Programme* (SFP) (ie. Biology 010, Chemistry 010, Mathematics 010, and Physics 010). These **additional** courses carry no credit points in the Agricultural programmes and consequently the minimum duration of the degree may be increased by one year. For candidates registering for programmes in Science these modules contribute to credits for some qualifications.

Agricultural Engineering Degrees

The Faculty of Engineering's *School of Bioresources Engineering and Environmental Hydrology*, in association with the disciplines of Agriculture, offer a degree in Agricultural Engineering. The curriculum extends over four years of study of which the first is spent in either Durban or Pietermaritzburg, the next two in the Faculty of Engineering in Durban, and the final year in the Faculty of Science and Agriculture in Pietermaritzburg. Interested candidates are referred to the Faculty of Engineering Handbook where full particulars are given, or to the *School of Bioresources Engineering and Environmental Hydrology* which is also housed in the Rabie Saunders Building.

Postgraduate Study

A candidate may be admitted to postgraduate study in any of the areas of specialisation in the Faculty of Science and Agriculture, provided that the candidate holds an acceptable primary degree, and provided also that the standard of proficiency previously attained in the intended area is sufficiently high.

Extra Curricula Activities

Although the Faculty encourages participation of students in all university activities, the holding of office in certain student organisations and committees can be extremely time consuming and may be incompatible with full-time study in certain disciplines. Students should only accept such positions or responsibilities after consultation with their Programme Directors.

Careers

Among careers open to graduates of the Faculty are positions in commercial and industrial organisations, government departments, research institutes and the teaching profession. Students wishing to follow research careers should complete at least an Honours degree, and preferably a Masters degree.

Intending Teachers

The Head of the *School of Education, Training and Development* in the Faculty of Human Sciences should be contacted for information regarding subject choices in the BSc degree for careers in the Teaching Profession.

Scholarships and Bursaries

Various general and specific scholarships and bursaries are available to students of the University of Natal. For details, the Financial Aid office of the University may be contacted. The following bursaries are reserved for students in the Faculty of Science and Agriculture:

TITLE	AVAILABILITY	VALUE	APPLY TO	BY
Roy Muller Memorial Bursaries	For 2nd-, 3rd- or 4th-year students in Agriculture majoring in Biometry, or in Science majoring in Statistics, BScHons in Statistics or Biometry, in Pietermaritzburg	No fixed value	Head of Statistics, University of Natal, Private Bag X01, Scottsville 3209	31 March
SA Cyanamid	First year postgraduate Postgraduate student in Agriculture, taking into account relevance to rural development of the project and financial need of applicant	R2500	Head of Decipline for transmission to the Dean	30 Nov

Prizes and Medals

The following Prizes and Medals are awarded to students in the disciplines of the Faculty of Science and Agriculture:

TITLE	AVAILABILITY	VALUE	NOMINATED BY
Agricultural Economics Association of South Africa (AEASA) Prize	Best Final year student in Agricultural Economics	Free Registration for Annual AEASA Conference	Head of Agricultural Economics
Association for Dietetics in Southern Africa: Award for Community Nutrition	Post Graduate Diploma in Dietetics: Best Intern Final Course mark taking approach and participation in Community Nutrition into account	R200	Head of Dietetics
G I Bateman Memorial Prize	Outstanding student in Mathematics at level 3 or Honours	Book prize	Head of Mathematics
Adolf Bayer Prize	Best level 3 Plant Ecology student	Book prize	Head of Botany
H I Behrmann Book Prize	Final year BScAgric, BAgricMgt (Hons) or BCom(Hons) candidate with the best performance in Agricultural Economics 790/791	Book Prize	Head of Agricultural Economics
Chris Bornman Prize	Best student in Plant Physiology at level 3	Book prize	Head of Botany
J P Boulle Animal Breeding Book Prize	Best overall student in Animal Science 751 (Animal Breeding)	Book prize	Head of Animal and Poultry Science
L R Caney Prize in Zoology	Best dissection in Zoology	Book prize	Professor of Zoology
D H Davies Prize	Outstanding student in Geography at level 3	Book prize	Retired Head of Geography
De Beers' Medal	Best student in Physics in level 3	Medal and R1000	Head of Physics

TITLE	AVAILABILITY	VALUE	NOMINATED BY
Environment and Development	Leadership award	Book Prize	Director, Centre for Environment and Development
L R Caney Prize in Zoology	Best dissection in Zoology	Book prize	Head of Zoology
Fedics Food Services Prize	Final year BScDietetics student who obtains the highest average mark for the Food Service Management modules	R500	Head of Dietetics
Food Systems Award	Best first year Dietetics student	R1000	Head of Africa Dietetics
Geography Prize	Best overall level 3 student in Geography	Book prize	Head of Geography
Geography Prize	Best student in Honours	Book prize	Staff of Geography
Grassland Society of Southern Africa Medal	Student with best average mark for seminar and research project at level 7	Medal	Head of Grassland Science
Kathleen Gordon-Gray Prize	Best student in Plant Systematics at level 3	Book prize	Head of Botany
Greytown Parish Lionel Ashfield Prize	Horticultural Science: best overall practically oriented student in third or fourth year	Book Prize	Head of Horticultural Science
Kwazulu-Natal Poultry Institute Book Prize	Best student in Poultry Science 210	R150	Head of Animal and Poultry Science
Merck Prize	Best student in Chemistry at level 3	Medal and R1000	Head of Chemistry
Nestle Book Prize	BScDietetics: best final year student	R200	Board of the Faculty
Old Mutual Finance Prize	Best student in a course dealing with finance	R1000 Unit Trusts	Head of Agricultural Economics
Outspan International Floating Trophy	Best final year student in Horticultural Science	Floating Trophy and cash award	Head of Horticultural Science

TITLE	AVAILABILITY	VALUE	NOMINATED BY
J A Pentz Memorial Medal	Best farm planning student in Agricultural Production	Bronze medal	Board of the Faculty
G V Quicke Book Prize	Best Biochemistry student at level 7	Book Prize	Head of Biochemistry
A A Rayner Book prize	(a) Best BScAgric candidate in Biometry 210, 222 who is not a Biometry major student (b) Best student in level 2 Statistics	Approx. cost of good textbook	Head of Biometry
Ross Laboratories Prize	Most improved Intern in Therapeutic Nutrition registered for Postgraduate Diploma in Dietetics	R400	Board of the Faculty
Roussel Floating Trophy	Top second year BScDietetics student	Trophy	Head of Dietetics
S A Genetics Society: Hofmeyr - Van Schaik Medal	Best fourth year student in Genetics	Medal	Head of Genetics
SAICS Award for Excellence in Computer Science	Best MSc thesis in Computer Science	Citation plus cash award	South African Institute of Computer Science
S A Sugar Community Dietetics Award	Final year BScDietetics student who achieves the most outstanding performance in Community Dietetics	R500	Head of Dietetics
S A Plant Breeders Association	Best final year student in Plant Breeding	R250	Board of the Faculty
SA Society for Animal Science prize	Best final year student in Animal Science	R1000	Head of Animal and Poultry Science
SA Society for Crop Production medal	BScAgric: best final year student in Crop Science	Bronze Medal	Board of the Faculty
SASOL Medal	Best student in Chemistry at level 2	Medal andR750	Head of Chemistry

TITLE	AVAILABILITY	VALUE	NOMINATED BY
SASOL Medal	Best student in Chemistry at level 3	Medal andR1000	Head of Chemistry
SASOL Medal	Best student in Chemistry Honours continuing with a research degree in Chemistry	Medal andR1500	Head of Chemistry
Soil Society of S A Silver Medal	Best soil Science student at level 7	Silver Medal	Head of Soil Science
A R Saunders medal (Farmers' Weekly)	Agriculture: *dux* student	Medal	Board of the Faculty
J D Scott book prize	Most outstanding student taking the final year of the BScAgric degree in Grassland Science	Approx. R100	Board of the Faculty
Kagiso Khulani Supervision Food Services Award	Best student in Food Admin. module in Postgraduate Diploma in Dietetics	R200	Board of the Faculty
Umgeni Water Medal	Best overall student in Masters programme in Environment and Development	Medal	Director, School of Environment and Development
Umgeni Water Prize	Best student in Chemical Technology at level 3	Book prize	Head of Chemistry
Frank Warren Medal	Outstanding student in Chemistry at level 3 or Honours	Bronze medal	Head of Chemistry
Peggy Warren Prize	Best student at level 1 Chemistry who did not do Physical Science at School	Book prize	Head of Chemistry

RULES FOR QUALIFICATIONS DEGREES, DIPLOMAS AND CERTIFICATES

Note:

For Rules concerning qualifications in Bio-Resource Engineering, see the Faculty of Engineering Handbook.

Definitions

The terms used in this section and those in the section on Syllabi of this Handbook have the following meanings:

Module: any separate course of study for which credits may be obtained. Modules shall be designated as being at level 0, level 1 (or 100), level 2 (or 200), level 3 (300), level 7 (or 700) or level 8 (or 800), depending on the complexity of the material.

(1) *Capstone module:* a module which is designed to simultaneously assess the learner's mastery of the skills and knowledge referred to in the learning outcomes of the programme. It specifically requires an assessment of the learner's **integration** of the learning outcomes.

(2) *Core module:* a module, without which, the programme would not succeed and the modules described as core, refer specifically to the learning outcomes of the programme. Without these modules, the programme would not have an identity and the qualification from the programme could not be awarded.

(3) *Elective module:* these are free-choice modules in the programme, but may also be chosen to provide certain skills referred to in the learning outcomes of the programme.

(4) *Foundational module:* a module upon which further knowledge is built, eg. Physics, Mathematics and Chemistry would be *foundational* for say, an Engineering or Agriculture programme. Chemistry 111 and 112 would also be foundational for a Chemistry programme (these are also referred to as fundamental modules).

Credit: the value assigned to ten (10) notional hours of learning and assessment.

Duly performed certificate: due performance (DP) of the work of a module shall be assessed by the instructor on the basis of attendance, assignments and tests. Such assessment may be qualitative (amount of work done) or quantitative or both (individual modules have a prescribed minimum which allows entry into the examination for that module).

Examination: comprises all the prescribed assessments for a module including tests, assignments and the final examination.

Named qualification: a programme with a predefined purpose consisting of modules in a defined area of specialisation which leads to a certificate, diploma or degree.

Notional study hours (NSH): the learning time that it is conceived it would take an average learner to meet the defined outcomes for the module entering with the correct level of assumed knowledge.

Programme: a purposeful and structured set of learning experiences in a substantial area of specialization leading to one or more qualifications.

Rules of combination: Rules governing the arrangement of *foundation*, *core*, *capstone* and *elective* modules, pre- and corequisites etc. which prescribe the different learning pathways available to a student on a programme leading to a qualification.

Senior years: applies to the years of study for undergraduate students who are in their second, third or fourth year of study as defined below.

Subject: related material presented over several modules at one or more levels of study.

Year of study:

(1) *Foundation year (level 0)* applies to students who are registered for the Faculty's Foundation Programme;

(2) *First year of study (level 1)* applies to students who have not yet completed modules totalling 64 credits at level 1;

(3) *Second year of study (level 2)* applies to students who have completed modules totalling at least 64 credits, who have or who are registered for at least one module at a level higher than level 1, and who have not registered for modules which, if passed, will lead to the completion of a degree;

(4) *Third year of study (level 3)* 1) applies to students registered for a three-year programme who are registered for modules which, if passed, will lead to the completion of the qualification; and 2) to students registered for a four-year programme who have earned at least 50% of the credits for the qualification; and

(5) *Fourth year of study (level 7)* applies to students registered for a four-year programme who are registered for modules which, if passed, will lead to the completion of the qualification.

GENERAL RULES

SA1 Qualifications

The following degrees are conferred and diplomas and certificates awarded:

1. In Science:

Preparatory Certificate in Mathematics and Science	PrepCertMathSc
Certificate in Geographical Science	CertGeogSc
Undergraduate Diploma in Geographical Science	UGDipGeogSc
Bachelor of Science	BSc
Bachelor of Science Honours	BScHons
Postgraduate Diploma in Geographical Science	PGDipGeogSc
Master of Science	MSc
Master of Science (Biological Systematics)	MSc(BiolSys)
Doctor of Philosophy	PhD
Doctor of Science	DSc

2. In Agricultural Sciences:

Undergraduate Diploma in Sports Turf Management	UGDipSportsTurfMgt
Bachelor of Agriculture	BAgric
Bachelor of Science in Agriculture	BScAgric
Master of Science in Agriculture	MScAgric
Master of Science in Agriculture (Agricultural & Environmental Instrumentation)	MScAgric(AgricEnvInst)
Doctor of Philosophy	PhD
Doctor of Science in Agriculture	DScAgric

3. In Agricultural Management:

Bachelor of Agricultural Management	BAgricMgt
Bachelor of Agricultural Management Honours	BAgricMgtHons
Master of Agricultural Management	MAgricMgt
Doctor of Philosophy	PhD

4. In Rural Resource Management:

Undergraduate Diploma in Rural Resource Management	UGDipRRM
Bachelor of Agriculture (Rural Resource Management)	BAgric(RRM)
Advanced Postgraduate Diploma in Rural Resource Management	AdvPGDipRRM
Master of Agriculture	MAgric
Doctor of Philosophy	PhD

5. In Dietetics and Human Nutrition:

Bachelor of Science in Dietetics	BScDiet
Bachelor of Science in Human Nutrition	BScHumNut
Bachelor of Science in Dietetics Honours	BScDietHons
Bachelor of Science in Human Nutrition Honours	BScHumNutHons
Postgraduate Diploma in Community Nutrition	PGDipCommunNut
Postgraduate Diploma in Dietetics	PGDipDiet
Master of Science in Dietetics	MScDiet
Master of Science in Human Nutrition	MScHumNut
Doctor of Philosophy	PhD

6. In Community Resources:

Bachelor of Science in Consumer Studies Honours	BScConsumStudHons
Master of Science in Consumer Studies	MScConsumStud
Doctor of Philosophy	PhD

7. In Food Security:

Postgraduate Diploma in Food Security	PGDipFoodSecur
Advanced Postgraduate Diploma in Food Security	AdvPGDipFoodSecur
Master of Food Security	MFoodSecur
Doctor of Philosophy	PhD

8. In Environment and Development:

Advanced Postgraduate Certificate in Environment and Development	AdvPGCertEnvDev
Advanced Postgraduate Diploma in Environment and Development	AdvPGDipEnvDev
Master of Environment and Development	MEnvDev
Doctor of Philosophy	PhD

9. In Protected-area Management:

Advanced Postgraduate Certificate in Protected-area Management	AdvPGCertProtAreaMgt
Advanced Postgraduate Diploma in Protected-area Management	AdvPGDipProtAreaMgt
Master of Protected-area Management	MProtAreaMgt
Doctor of Philosophy	PhD

SA2 Applicability of common rules

(1) The Common Rules of the University shall be of effect where applicable.

(2) All candidates for degrees, diplomas and certificates offered in this Faculty are subject to the rules contained in this section of the Handbook. Any exceptions, other than those specified below, require the approval of the Senate.

SA3 Entrance

(1) Unless specified otherwise, candidates shall be eligible to register for undergraduate qualifications provided they have previously obtained passes of at least E (40%) at the higher grade (or C (60%) at the standard grade) in Mathematics, and a pass of at least E (40%) at the higher grade (or C (60%) at standard grade) in a Natural Science or Biology in the matriculation or equivalent examination.

(2) A candidate who has not met the requirements set out above may, in certain circumstances, be registered in the Science Foundation Programme (SFP) and shall be required to obtain credits at level 0 in addition to the numbers of credits specified for the qualification sought; this will result in the duration of the programme being extended by one year.

(3) The Senate may refuse to register a candidate for any postgraduate qualification if the standard of proficiency previously attained by the candidate in the relevant area is, in its opinion, not sufficiently high.

SA4 Completion of a module

A module is completed by passing the examination (see Definitions) prescribed for that module with a minimum mark of 50%.

SA5 Module credits

A candidate shall, on meeting all pre- and corequisite requirements (see SA9) and on passing the examination prescribed for a module, receive the credits listed for that module under its syllabus.

SA6 Duration and structure of the curriculum

The curriculum for a qualification shall extend over the period specified in the Rules, and candidates must obtain at least the prescribed number of credits and complete the specified combinations of modules to complete the qualification.

SA7 Maximum number of credits registered

Unless otherwise specified, or with the permission of the Dean, a candidate shall not register for modules totalling more than:

(1) 64 credits per semester in the first two semesters of registration.

(2) 72 credits per semester subsequent to the first two semesters of registration.

SA8 Choice of programme

(1) On first registering in the senior years of an undergraduate programme or for a postgraduate qualification, candidates must nominate the intended subject or area of specialisation. Should candidates wish at any time to change the nominated programme, they may do so only with the permission of the Board of the Faculty.

SA9 Prerequisite and corequisite modules

(1) A *prerequisite* module is a module in which a student has met all the requirements for the granting of a supplementary examination or such higher mark as may be prescribed by the Board of the Faculty, before admission to the module for which it is a prerequisite.

(2) A *corequisite* module is a module in which the examination must be written prior to or in the same semester as the module for which it is prescribed as a corequisite.

No candidate shall be permitted to register for any module unless the prerequisite requirements have been met, and the candidate is in a position to comply with the corequisite requirements for that module. All pre- and corequisite modules must be completed (see SA4) before the credits for a module may be accepted for the qualification concerned.

Note: The prerequisite and corequisite requirements for each module are listed with its syllabus. If module A is a prerequisite (or corequisite) for module B, and module B is a prerequisite (or corequisite) for module C, then module A is automatically a prerequisite (or corequisite) for module C.

SA10 Practical work or project work

Candidates may be required, for specific modules, to spend such periods during vacations as may be determined by the Board of the Faculty in carrying out practical work under the guidance of an appointed supervisor.

SA11 Exemption from modules completed towards another qualification

(1) Candidates may, subject to the approval of the Senate, and in terms of Rule R19 or R20, receive exemption from a maximum of 50% of the credits towards a qualification for modules completed either at another recognised institution of higher education or towards another qualification of the University, and shall be required to attend as a registered student of the University for at least four semesters.

(2) Candidates who have obtained credit for modules completed at another recognised institution of higher education prior to having obtained a matriculation exemption or equivalent access requirement for entrance into the University, shall not obtain credit for such modules towards a qualification of the University.

SA12 Permission to enter for any examination

Candidates shall not be allowed to present themselves for final examination in any module unless the prescribed minimum standard in the class work of such module, as approved by the Board of the Faculty, has been attained.

SA13 Oral examination

Candidates for examination in any module may be required to present themselves for oral examination in addition to such written and practical examinations as may be prescribed for that module.

SA14 Supplementary examinations

(1) With the exception of level-0, Honours and Masters modules or where otherwise specified, a candidate who has failed any module with a mark that is not less than 40% shall be permitted to write a supplementary examination in such module.

(2) A candidate who fails in any module other than those provided for in paragraph (1) above, shall not be admitted to a supplementary examination except by permission of the Board of the Faculty under such conditions as may be approved by the Senate from time to time.

(3) A candidate who fails to write a supplementary or special examination during the examination session specified for that examination shall forfeit the right to such examination.

(4) If the failed module, for which a Duly Performed Certificate has been granted, is the outstanding module to complete a qualification, the candidate may be granted a supplementary examination by the Board of the Faculty.

SA15 Medium of instruction

The medium of instruction shall be English.

SA16 Distinction

Certificates and diplomas may be awarded with distinction. Undergraduate degrees may be conferred *summa cum laude*, or *cum laude*, or with a distinction in the major subject or area of specialization. Honours and Masters degrees may be conferred *cum laude*. All awards of distinction are subject to criteria approved by the Senate.

SA17 Progression

(1) Candidates may not (a) proceed to any level-2 module until they have obtained at least 64 credits for modules at level 1; and (b) proceed to any level-3 module until they have obtained at least 128 credits, including at least 32 credits at level 2.

(2) Undergraduate candidates who fail to maintain the minimum rate of progress shown in the table below or who, at the end of any semester, are not able to propose a future curriculum acceptable to the Board of the Faculty which will allow them to achieve this minimum rate of progress, may be refused readmission to the Faculty.

Number of semesters of full-time study completed	Minimum number of credits required	
	Normal curriculum	Extended curricula including Science Foundation Programme
1	16	See Note 3
2	64	96 (^{3}72 at level 0)
3	96	128
4	128	160
5	160 (≥24 at level 2)	192
6	192 (≥48 at level 2 or 3)	224 (^{3}24 at level 2)
7	240 (≥96 at levels 2 and 3, including ≥16 at level 3)	272 (^{3}48 at level 2 or 3)
8	288 (≥160 at levels2 and 3)	320 (≥96 at levels 2 and 3, including ≥16 at level 3)
9	336 (≥48 at level 3)	352 (≥160 at levels 2 and 3)
10	384 (3-year qualification complete) (≥96 at level 3)	392 (≥48 at level 3)
11	448	456
12	512 (4-year qualification complete)	520
13		584

Notes:

1. *If refused readmission to the Faculty, candidates may apply, on the prescribed form, to be readmitted. Readmission will be granted in special circumstances and additional targets or conditions may be specified.*
2. *Periods of study in other faculties or at other universities may be taken into account when calculating the number of semesters completed.*
3. *Students in the SFP programme must achieve at least 40% for each of two level-0 modules and an average of 40% for all level-0 modules by the end of the first semester.*
4. *Part-time students may be permitted an additional two semesters to complete a qualification.*

(3) Except with the permission of the Dean, any candidate who fails the level-0 module in Mathematics or any other level-0 modules worth a total of more than 24 credits within two consecutive semesters, will be refused readmission to the Faculty; candidates are not permitted to repeat level-0 modules.

(4) Notwithstanding the above provisions, Rule R8 is of effect.

(5) On the recommendation of the Board of the Faculty postgraduate candidates who do not perform satisfactorily may not be permitted to continue.

SA18 Completion of Masters degrees

Unless specified otherwise, all Masters degrees (in any area of specialisation), by course-work or dissertation, shall be conferred if the candidate has obtained a credit-weighted average mark of at least 50% in the modules that make up the curriculum for the applicable programme and has obtained a mark of at least 50% in each of the modules specified for the programme. This shall include a research project worth between 32 and 64 credits for a course-work Masters degree and at least 96 credits for a research Masters degree, together with any other modules specified for the programme. Any corequisite modules, specified to meet deficiencies in the candidate's prior training, will not be included in this calculation nor impact the award of distinction.

Degree of Bachelor of Science

SP1 Applicability of other rules

Rules SA1 to SA17 for the Faculty of Science and Agriculture shall be of effect, where applicable, for the degree of Bachelor of Science.

SP2 Structure of the degree

In order to complete the degree, a candidate shall obtain not less than 384 credits and qualify in at least one major subject from list (a) below (see SP3). At least 352 credits, at levels 0 to 3, shall be in subjects chosen from lists (a) and (b), for which the following minimum credits apply: 200 for modules at levels 1 and 2 (including 96 at level 2) and 128 for modules at level 3.

(a) *Major subjects*

Applied Mathematics
Biochemistry
Botany
Chemistry
Computer Science
Economics
Entomology
Ethnobotany
Genetics

Geography
Grassland Science
Hydrology
Mathematics
Microbiology
Physics
Plant Molecular Biology
Plant Pathology
Psychology
Soil Science
Statistics
Zoology

(b) *Other subjects*

Agrometeorology
Biometry
Biosciences
Business Information Systems
Chemical Technology
Computational Physics
Earth Science
Ecology
Ethics Studies
End-user Computing
History and Philosophy of Science
Mechanics

Any other module approved by the Dean

Notes:

1. *Candidates are warned that not all possible combinations of modules at level 3 to make up the required credits beyond those for the major subject may be accepted by the Senate.*
2. *Modules in subjects outside the Faculty, other than those listed above, up to the value of 32 credits, as approved by the Dean, may be included in the curriculum for the degree.*
3. *Credit cannot be obtained for more than one module the contents of which are substantially the same or broadly overlapping.*
   Examples of unacceptable combinations (in addition to larger modules including the syllabus of smaller modules):

AGRI210	and	CSCI101
AGRI210	and	BISS110
BCHM380	and	BCHM313 and/or 320
BISS110[1]	and	CSCI130
CHEM111 and/or 112	and	CHEM121 and/or 122
CSCI101	and	BISS11
CSCI101[1]	and	CSCI130
CSCI140	and	BISS120
ECON110	and	ECON130
ECON120	and	ECON140
ECON150	and	ECON110 and/or 120
ENTO202	and	ENTO204
HYDR311	and	HYDR310
MATH111	and	MATH110
MATH122	and	MATH120
PHYS111	and	PHYS121
PHYS112	and	PHYS122
SSCI212	and	SSCI217
SSCI217	and	SSCI215
STAT110	and	BMET210
STAT101	and	STAT110 or BMET210

[1]Note:

Students may obtain credit for BISS110 (or CSCI101) and CSCI130, provided the former is passed before CSCI130.

SP3 Rules of combination for major subjects

The following rules of combination for major subjects apply (see also SP2)(at least 352 credits (C))*(numbers in parentheses refer to credits)*:

1. **Applied Mathematics:** MATH110 (16), 120 (16); 211 (8), 213 (8); 215 (8), 255 (8), 222 (8), 224 (8), 251 (8) 253 (8); 350 (16), 360 (16), 370 (16), [MATH321 (16) or 330 (16) or STAT322 (16)].
2. **Biochemistry:** BIOS101 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); STAT101 (8). AGRI210 (1), 220 (1); BCHM213 (16), 222 (8), 231 (8); CHEM211 (16), 212 (16). BCHM313 (16), 320 (8), 325 (8), 326 (8), 328 (8), 340 (8); GENE327 (8).
3. **Botany:** BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16); ZOOL102 (16). AGRI210 (1), 220 (1); BMET210 (16); BOTY201 (8), 202 (8), 203 (8), 204 (8); ETHI202 (8).

BOTY301 (16); BIOS302 (8), 306 (8); BIOS304 (8) or PMBP304 (8); ECOL301 (16); PMBP302 (8).

4. **Chemistry**: CHEM111 (16), 112 (16); MATH110 (16), 120 (16) [MATH111 (8), 112 (8); STAT101 (8) and CSCI101 (8) may replace MATH110 and 120]; PHYS111 (16), 112 (16). CHEM211 (16), 212 (16). CHEM311 (16), 321 (16), 312 (16), 322 (16). CTEC212 strongly recommended but not compulsory.
5. **Computer Science**: CSCI130 (16), 140 (16); MATH110 (16), 120 (16). CSCI210 (16), 220 (16); MATH211 (8), 215 (8). CSCI311 (16), 312 (16), 321 (16), 322 (16).
6. **Economics**: [(ECON110 (16), 120 (16] *or* [ECON130 (16), 140 (16] each with a mark of at least 60%; ECON210 (16), 220 (16); *any four* of ECON310 (16), 320 (16), 330 (16), 340 (16), 350 (16), 360 (16).
7. **Ethnobotany**: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16); ZOOL102 (16). AGRI210 (1), 220 (1); BIOS202 (8); BMET210 (16); BOTY202 (8), 203 (8), 204 (8); ECOL201 (8); ETHI202 (8). BIOS302 (8); BOTY301 (16); EBOT301 (16), 302 (8); PMBP302 (8), 304 (8).
8. **Entomology**: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16); ZOOL102 (16). AGRI210 (1), 220 (1); BIOS202 (8); BMET210 (16); ENTO202 (16); ETHI202 (8); ZOOL201 (16). BIOS 302 (8), 306 (8); [BIOS304 (8) or ECOL302 (8)]; ECOL301 (16); ENTO301 (8), 302 (8); ZOOL301 (8).
9. **Genetics**: BIOS101 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16), 122 (8). BCHM213 (16), 222 (8); BMET210 (16); GENE213 (16), 226 (8), 230 (8). BCHM325 (8); GENE325 (8), 327 (8), 332 (8), 334 (8), 342 (8); PMBP301 (8); 8Cs from AGPS306 (16); BIOS306 (8); GENE350 (16), 360 (8).
10. **Geography**: GEOG113 (8), 114 (8), 122 (8), 124 (8). AGRI210 (1), 220 (1); GEOG222 (8); STAT101 (8); 16C from GEOG211 (8), 213 (8), 216 (8), 217 (16). GEOG322 (16), 324 (8), 16C from GEOG311 (16), 316 (16), 317 (16).
11. **Grassland Science**: BIOR118 (8), 128 (8); BIOSI101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8). AGRI210 (1), 220 (1); BMET210 (16), 222 (16), GRAS211 (8), 226 (8), 228 (8), ECOL201 (8); SSCI217 (16). GRAS312 (24), 343 (8); ECOL301 (16).
12. **Hydrology**: at least 32C from first year modules in Mathematics, Physics, Statistics or Computer Science. The student may be required to complete/pass first year modules in Chemistry in order to attempt the Soil Science modules. 96C from any other first year module. AGRI210 (1), 220 (1); HYDR210 (16), 220 (16). HYDR310 (16), 312 (8), 320 (16), 321 (8), 322 (8).
13. **Mathematics**: MATH110 (16), 120 (16). MATH211 (8), 213 (8), 222 (8), 224 (8). MATH310 (16), 340 (16), at least two from MATH321 (16), 330 (16), 350 (16).

14a. **Microbiology (Environmental Microbiology)**: BIOR118 (8) 128 (8); BIOS101 (16); BOTY102 (16) or ZOOL102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8). AGRI210 (1), 220 (1); BACT220 (8), 222 (8); MYCO211 (8), GOEG222 (8). MICR310 (16), 320 (16), 350 (16); VIRO320 (16).

14b. **Microbiology (Industrial Microbiology):** BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16) or ZOOL102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8) 122 (8); PHYS121 (16), 122 (8). AGRI210 (1), 220 (1); BACT220 (8), 222 (8), MYCO211 (8), PPTH222 (8). MICR320 (16), 350 (16), 360 (16); VIRO320 (16).

15. **Plant Molecular Biology:** BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16); ZOOL102 (16). AGRI210 (1), 220 (1); BMET210 (16); BOTY201 (8), 202 (8), 203 (8), 204 (8); ETHI202 (8). BOTY301 (16); GENE327 (8); PMBP301 (8), 302 (8), 304 (8), 306 (8), 308 (8).

16. **Plant Pathology:** BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16) or ZOOL102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8) 122 (8); PHYS121 (16), 122 (8).

    AGRI210 (1), 220 (1); MYCO211 (8); PPTH 242 (8). MICR310 (16); PPTH 310 (8), 320 (8), 330 (8); VIRO320 (16).

    Electives: 112C at level 2; 72C at level 3.

17. **Physics:** MATH110 (16), 120 (16); PHYS111 (16), 112 (16); PHYS211 (16), 212 (16); PHYS311 (16), 321 (16), 312 (16), 322 (16). CPHY211 strongly recommended but not compulsory.

18. **Psychology:** PSYC110 (16), 120 (16); PSYC201 (16), 202 (16); [*any two of* PSYC203 (16), 204 (16), 205 (16), 206 (16)]; PSYC301 (16), [*any three of* PSYC302 (16), 303 (16), 304 (16), 305 (16), 306 (16)].

19. **Soil Science:** CHEM111 (16), 112 (16). AGRI210 (1), 220 (1); SSCI217 (16), 230 (16). SSCI320 (16), 351 (8), 352 (8), 371 (8), 372 (8).

20. **Statistics:** MATH110 (16), 120 (16). MATH 213 (8), 224 (8); STAT210 (16), 220 (16). BMET314 (8), 316 (8); STAT311 (16), 322 (16), 325 (16).

21. **Zoology:** BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16); ZOOL102 (16). AGRI210 (1), 220 (1); BIOS202 (8); BMET210 (16); ETHI202 (8); ZOOL201 (16), 202 (8), 204 (8). BIOS 306 (8); [BIOS302 (8) or 304 (8) or ECOL302 (8)]; ECOL301 (16); ZOOL301 (8), 302 (16), 303 (8).

SP4 Transferability of credits from another institution

A candidate may not include among the 128 credits at level 3 prescribed in terms of Rule SP2, credits for modules in a subject passed at equivalent level towards the requirements of a qualification obtained in another faculty or university.

Degree of Bachelor of Science with Specified Curricula

SQ1 Applicability of other rules

Rules SA1 to SA17 for the Faculty of Science and Agriculture shall be of effect, where applicable, for the degrees of Bachelor of Science with Specified Curricula.

SQ2 Structure of the degree.

In order to complete the degree, a candidate shall obtain not less than 384 credits and shall complete the modules as prescribed for the degree. Except with the approval of the Senate, the following minimum credits apply: 96 for modules at level 3, 224 for modules at levels 2 and 3, and 200 for modules at levels 1 and 2.

SQ3 Rules of combination

Candidates will elect to undertake one of the programmes for which the rules of combination follow (*numbers in parentheses refer to credits*):

1. Applied Environmental Sciences (386C)

Required: BIOR118 (8); BIOR128 (8) or EART124 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); EART122 (8). AGRI210 (1), 220 (1); ALAW110 (8); AMET210 (16); GEOG114 (8), 222 (8); GRAS211 (8); HYDR210 (16); MICR212 (8); SSCI217 (16), 230 (16). AGEC290 (8); BMET210 (16); ESCI390 (16); GEOG323 (8), 324 (8); HYDR322 (8); MICR310 (16), 318 (8); SSCI351 (8), 371 (8), 372 (8).

Electives: at least 16C at levels 2 or 3 from AMET211 (8); BCHM213 (16); BMET222 (16); BOTY201 (8); CHEM211 (16), 212 (16); CTEC212 (16); AGPS303 (8); EBOT301 (16); FORT310 (16); GRAS226 (8); HYDR310 (16).

2. Biomolecular Technology (386C)

Required: BIOS101 (16); CSCI101 (8); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); STAT101 (8). AGRI220 (1); BACT220 (8), 222 (8); BCHM213 (16), 222 (8), 231 (8); CHEM211 (16), 212 (16); GENE213 (16); GENE 226 (8); MICR210 (16); MYCO211 (8). BCHM313 (16), 320 (8), 325 (8), 326 (8), 360 (8), 370 (8); GENE325 (8); 327 (8); 334 (8); 360 (8); MICR350 (16); 360 (16); PMBP301 (8).

Electives: 32C at level 1 chosen selected in consultation with the Programme Director and approved by the Dean.

3. Chemical Technology (384C)

Required: CHEM111 (16), 112 (16); MATH110 (16), 120 (16) [MATH111 (8), 112 (8); STAT101 (8) and CSCI101 (8) may replace MATH110 and 120]; PHYS111 (16), 112 (16). CHEM211 (16), 212 (16); CTEC212 (16). CHEM311 (16), 321 (16), 312 (16), 322 (16); CTEC311 (16), 321 (16), 312 (16) 322 (16).

Electives: at least 32C from level 1 and at least 48C from level 2 selected in consultation with Programme Director and approved by the Dean.

4. Computational Physics (384C)

Required: MATH110 (16), 120 (16); CSCI130 (16), 140 (16); PHYS111 (16), 112 (16); CPHY211 (16), 212 (16); PHYS211 (16), 212 (16); CPHY311 (8), 321 (8), 312 (8), 322 (8); PHYS311 (16), 321 (16), 312 (16), 322 (16).

Electives: 32C at level 1 but consistent with electives chosen at levels 2 and 3; MATH213 (8), 224 (8) or 16C of Mathematics at level 2 and 48C chosen freely at level 2 but consistent with electives chosen at level 3; 32C of Computer Science, Mathematics or Statistics at level 3 selected in consultation with Programme Director and approved by the Dean.

5. Ecological Sciences (386C)

Required: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); [GEOG113 (8) or 114 (8)]; MATH111 (8), 122 (8); PHYS121 (16); [ZOOL102 (16) or {EART122 (8) and PHYS122 (8)}]. AGRI210 (1), 220 (1); BMET210 (16); [BOTY202 (8) or GRAS228 (8)]; ECOL201 (8); ETHI202 (8); GEOG222 (8); GRAS211 (8), 226 (8); SSCI217 (16). ECOL301 (16); GEOG322 (16); GRAS343 (8).

Electives: 136C (at least 56 at level 3 and at least 104C at levels 2 and 3 together) from GEOG122 (8). AGEC210 (16), 220 (16), 270 (16); AMET210 (16), 211 (8); BIOS202 (8); BMET222 (16); BOTY201 (8), 203 (8), 204 (8); ENTO204 (8); GENE213 (16); HYDR210 (16), 220 (16); MATH255 (8); SSCI230 (16); STAT220 (16); WILD220 (8); ZOOL201 (16), 202 (8), 204 (8). BIOS302 (8), 304 (8), 306 (8); ECOL302 (8); GENE350 (16); GEOG324 (16); GRAS312 (24); SOCI380 (8); WILD301 (8); ZOOL301 (8), 302 (16), 303 (8).

Note:

Students wishing to continue to BScHons in Ecology and Conservation Biology, Resource Ecology or Wildlife Science must ensure that they take the appropriate elective modules, specified below:

(1) Ecology and Conservation Biology Stream: GEOG113 (8); ZOOL102 (16). BIOS202 (8); BOTY201 (8), 203 (8); ENTO204 (8); ZOOL201 (16); three of [BOTY204 (8), {BOTY202 (8) or GRAS228 (8)}, ZOOL202 (8), 204 (8)]. BIOS302 (8), 304 (8), 306 (8), ECOL302 (8); ZOOL301 (8), 302 (16).

(2) Resource Ecology Stream: EART122 (8); GEOG114 (8), 122 (8); PHYS122 (8). AMET210 (16), 211 (8); BOTY201 (8); GRAS228 (8); HYDR210 (16); MATH255 (8); SSCI230 (16). ECOL302 (8); GEOG324 (16); GRAS312 (24).

(3) Wildlife Science Stream: GEOG113 (8), ZOOL102 (16). AGEC210 (16); BOTY204 (8); GENE213 (16); GRAS228 (8); WILD220 (8); ZOOL204 (8). GENE350 (16); GRAS343 (8); SOCI380 (8); WILD301 (8); [ZOOL301 (8) or 303 (8)].

6.Geographical Sciences (386C)

(a) Environmental Management and Development Stream

Required: BIOR118 (8), 128 (8); CRMS130 (8); EART122 (8), 124 (8); GEOG113 (8), 114 (8), 122 (8), 124 (8); RRMG121 (16); plus 40C from a language (ENGL111 (16), 112 (16); ZULU110 (16)); RRMG111 (16); ECON110 (16), 120 (16); NUTR114 (16); SOC120 (16), PHIL120 (16). AGRI210 (1), 220 (1); AMET211 (8); ETHI202 (8); GEOG211 (8), 213 (8), 216 (8), 217 (16), 222 (8); SOC221 (16); STAT101 (8); WILD220 (8); plus 32C from ECON110 (16), 120 (16); GRAS211 (8); PHIL220 (8). GEOG311 (16), 316 (16), 317 (16), 322 (16), 324 (8); SOC330 (16), 380 (16); plus 16C from CRMS330 (16), 350 (16); RRMG312 (16); SOC322 (16). BMET210 (16) may replace STAT101 (8).

Electives: appropriate electives selected at levels 1, 2, and 3 with at least 24C at level 3 selected in consultation with Programme Director and approved by the Dean.

(b) Natural Environment Stream

Required: BIOR118 (8), 128 (8); CHEM111 (16); EART122 (8), 124 (8); GEOG113 (8), 114 (8), 122 (8), 124 (8); MATH111 (8), 122 (8); PHYS121 (16). AGRI210 (1), 220 (1); AMET210

(16); BIOS203 (8); GEOG211 (8), 217 (16); plus 16C from [GRAS211 (8); HYDR210 (16); SOC221 (16); SSCI230 (16)]. AMET211 (8); GEOG213 (8), 216 (8), 222 (8); STAT101 (8); WILD220 (16); 24C from HYDR220 (16). GEOG311 (16), 316 (16), 317 (16), 322 (16), 324 (8); SSCI217 (16); 24C from ECOL301 (16); EDEL823 (4); HYDR322 (16); SOC330 (16), 380 (16); SSCI230 (16). BMET210 (16) may replace STAT101 (8).
Electives: appropriate electives selected at levels 1, 2 and 3 with at least 16C at level 3 selected in consultation with Programme Director and approved by the Dean.

Note:
The above programmes include the following early exit levels:

1. **Certificate in Geographical Science** after obtaining at least 128C at level 1.
2. **Diploma in Geographical Science** after obtaining 256C, at least 130C of which are at level 2.

7. Information Technology (384C)
Required: CSCI130 (16), 140 (16); MATH110 (16), 120 (16). BISS210 (16), 220 (16); CSCI210 (16), 220 (16); MATH211 (8), 215 (8). BISS310 (32), 320 (32); CSCI311 (16), 312 (16), 321 (16), 322 (16).
Electives: 64C at level 1; 48C at level 2 selected in consultation with Programme Director and approved by the Dean.

8. Mathematical Sciences (384C)
(a) Applied Mathematics Stream
Required: CSCI130 (16), 140 (16); MATH110 (16), 120 (16); STAT110 (16), 120 (16); [CSCI220 (16) or STAT220 (16)]; MATH211 (8), 213 (8), 215 (8), 222 (8), 224 (8), 251 (8), 253 (8), 255 (8); STAT210 (16). MATH350 (16), 360 (16), 370 (16).

Electives: 32C at level 1; at least 16C at level 2 from; up to 32C at level 2 or 1; at least 16C at level 3 from [MATH330 (16), 321 (16) or STAT322 (16)]; up to 64C at level 3 from BMET314 (8), 316 (8); CSCI311 (16), 312 (16), 321 (16); MATH310 (16), 340 (16); STAT311 (16), 322 (16), 325 (16).

(b) Computer Science Stream
Required: CSCI130 (16), 140 (16); MATH110 (16), 120 (16); STAT110 (16), 120 (16). CSCI210 (16), 220 (16); MATH211 (8), 213 (8), 215 (8), 224 (8), 251 (8), 253 (8); [MATH222 (8) or STAT220 (16)]; STAT210 (16). CSCI311 (16), 312 (16), 321 (16), 322 (16).
Electives: 32C at level 1; at least 8C at level 2 from MATH222 (8); STAT220 (16). up to 24C at level 2 or 1; 64C at level 3 from BMET314 (8), BMET316 (8), MATH310 (16), 321 (16), 330 (16), 340 (16), 350 (16), 360 (16), 370 (16); STAT311 (16), 322 (16), 325 (16).

(c) Mathematics Stream
Required: CSCI130 (16), 140 (16); MATH110 (16), 120 (16); STAT110 (16), 120 (16). MATH211 (8), 213 (8), 215 (8), 222 (8), 224 (8), 251 (8), 253 (8); STAT210 (16). MATH310 (16), 340 (16).
Electives: 32C at level 1; at least 24C at level 2 from CSCI210 (16), CSCI220 (16); MATH255 (8); STAT220 (16); up to 32C at level 2 or 1; at least 32C at level 3 from MATH321 (16), 330 (16), 350 (16); up to 64C at level 3 from BMET314 (8), 316 (8); CSCI311 (16), 312 (16), 321 (16), 322 (16); MATH360 (16); STAT311 (16), STAT322 (16), 325 (16).

(d) Statistics Stream

Required: CSCI130 (16), 140 (16); MATH110 (16), 120 (16); STAT110 (16), 120 (16). MATH211 (8), 213 (8), 215 (8), 224 (8), 251 (8), 253 (8); STAT210 (16), 220 (16). BMET314 (8), 316 (8); STAT311 (16), 322 (16), 325 (16).

Electives: 32C at level 1; at least 16C at level 2 from CSCI210 (16), 220 (16); MATH222 (8), 255 (8); up to 32C at level 1 or 2; 64C at level 3 from CSCI311 (16), 312 (16), 321 (16), 322 (16); MATH310 (16), 321 (16), 330 (16), 340 (16), 350 (16), 360 (16), 370 (16).

Degree of Bachelor of Science Honours

SH1 Eligibility

No candidate may be admitted to any module for the degree of Bachelor of Science Honours until he or she has:

(a) Bachelor of Science of the University or a graduate of another recognized university who has been admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Rule R33 as a candidate for the degree.

SH2 Applicability of other rules

Rules SA1 to SA17 for the Faculty of Science and Agriculture and Common Rules R24(2), R25 and R26 shall be of effect, where applicable, for the degree of Bachelor of Science Honours.

SH3 Structure of the degree

In order to complete the degree, a candidate shall obtain not less than 128 credits, at least 112 of which shall be at level 7, and shall complete the modules as prescribed for the degree.

SH4 Subject of study

(1) A candidate for the degree shall pursue a programme of advanced study in a subject approved by the Senate.

(2) Except with the permission of the Senate, the subject of an Honours programme shall be one in which the candidate has completed, during the BSc curriculum, all prerequisite modules for entry to that Honours programme.

SH5 Rules of combination

Candidates will elect to undertake one of the programmes for which the rules of combination follow (*numbers in parentheses refer to credits*):

1. Applied Environmental Sciences (128C)

Prerequisites: Completion of a major in Applied Environmental Sciences (see SQ3).

Required: ESCI790 (64); special topics selected in consultation with Programme Director and approved by the Dean.

2. Applied Mathematics (128C)

Prerequisites: Completion of a major in Applied Mathematics (see SP3).

Required: AMAT710 (32), 720 (32), 730 (32).

Electives: 32C from AMAT740 (16), 750 (16), 760 (16), other modules selected in consultation with Programme Director and approved by the Dean.

3. Biochemistry (128C)

Prerequisites: Completion of a major in Biochemistry (see SP3).

Required: MCBS707 (32), 709 (8), 720 (64).

Electives: 24C from BCHM701 (8), 703 (8),705 (8); SCED701 (8).

4. Biometry (128C)

Prerequisites: Completion of a major in Statistics (see SP3) or a Bachelor of Science in Agriculture degree (see Ag3) with the following: MATH110 (16), 120 (16). BMET210 (16), 222 (16); MATH213 (8); STAT210 (16). BMET314 (8), 316 (8).

Required: STAT720 (16), 730 (16), 740 (16), 750 (8), 770 (16), 780 (16), 790 (24).

Electives: 16C from STAT710 (16), 760 (16), or other modules selected in consultation with the Programme Director and approved by the Dean.

5. Biomolecular Technology (128C)

Prerequisites: Completion of the BSc(Biomolecular Technology) including applicable elective modules (see SQ3).

Required: MCBS707 (32), 709 (8), 711 (16), 720 (8); [BCHM720 (64) or GENE702 (64)].

Electives: None.

6. Botany (128C)

Prerequisite: Completion of a major in Botany (see SP3).

Required: BIOS701 (16), 702 (8), 704 (8), 705 (8); BOTY703 (8), 790 (64).

Electives: 16C from BOTY702 (8); PMPB701 (8) or other modules selected in consultation with Programme Director and approved by the Dean.

7. Chemistry (128C)

Prerequisites: Completion of a major in Chemistry (see SP3).

Required: CHEM711 (32), 791 (32), 712 (32), 792 (32).

Electives: None.

8. Chemical Technology (128C)

Prerequisites: Completion of the BSc(Chemical Technology) including applicable elective modules (see SQ3).

Required: CTEC711 (16), 721 (16), 731 (16), 712 (16), 722 (24), 790 (40).

Electives: None.

9. Cognitive Science (128C)

See Appendix 1.

10. Computer Science (128C)

Prerequisites: Completion of a major in Computer Science (see SP3).

Required: CSCI710 (32), 720 (32), 730 (32), 740 (32).

Electives: None.

11. Ecology and Conservation Biology (128C)

Prerequisite: Completion of the BSc(Ecological Sciences) including applicable elective modules (see SQ2).

Required: BIOS701 (16), 705 (8); ECOL701 (8), 790 (64), 795 (8).

Electives: 24C from BIOS703 (8); ECOL702 (8), 703 (8), 704 (8); ZOOL701 (8) or other modules selected in consultation with Programme Director and approved by the Dean.

12. Economics (128)

Consult the Head of the *School of Business*.

13. Entomology (128C)

Prerequisite: Completion of a major in Entomology (see SP3).

Required: BIOS701 (16), 702 (8), [703 (8) or 304 (8)]; ENTO701 (16), 790 (64).

Electives: 16C from BIOS705 (8); [ECOL701 (8) or 302 (8)] or other modules selected in consultation with Programme Director and approved by the Dean.

14. Environmental Microbiology (128C).

Prerequisites: Completion of a major in Microbiology (see SQ3).

Required: MICR714 (64), 716 (16), 718 (16).

Electives: AGEC290 (8); AMET211 (8); EDEL821 (4), 829 (4); GEOG222 (8); 322 (16), 326 (8); HYDR322 (8); SSCI710 (8), 760 (8).

15. Ethnobotany (128C)

Prerequisite: Completion of a major in Ethnobotany (see SP3).

Required: BIOS701 (16), 702 (8); EBOT701 (16), 702 (8), 790 (64).

Electives: 16C from EDEL823 (4), 863 (16) or other modules selected in consultation with Programme Director and approved by the Dean.

16. Genetics (128C)

Prerequisites: Completion of a major in Genetics (see SP3).

Required: GENE702 (64), 732 (8); MCBS707 (32), 709 (8), 720 (8).

Electives: 8C selected in consultation with Programme Director and approved by the Dean.

Note:

Students may choose to undertake a programme leading to qualifications in Genetics (General) or (Biocomputing) or (Microbial Genetics), depending on the choice of subject matter for GENE702, as well as the elective modules to selected in consultation with the Programme Director and approved by the Dean.

17. Geography (128C)

Prerequisites: Completion of a major in Geography (see SP3).

Required: GEOG790 (64) and four level 7 modules at 16C each from the following, two per semester (modules offered subject to staff availability and sufficient student registrations): GEOG701 (16), 711 (16), 713 (16), 721 (16), 723 (16), 725 (16), 731 (16), 735 (16); a 16-credit module may be selected from outside the discipline selected in consultation with Programme Director and approved by the Dean.

Electives: 16C selected in consultation with Programme Director and approved by the Dean.

18. Grassland Science (128C)

Prerequisites: Completion of a major in Grassland Science (see SP3).

Required: AGPS710 (16); GRAS791 (8); 753 (24), 791 (8); ECOL707 (8).

Electives: 8C at level 3 or 7 selected in consultation with Programme Director and approved by the Dean.

19. Hydrology (128C)

Prerequisites: Completion of a major in Hydrology (see SP3); BMET210 (16).

Required: HYDR710 (16), 720 (16), 725 (16), 790 (32), 795 (32).

Electives: 16C at levels 3 or 7 selected in consultation with Programme Director and approved by the Dean.

20. Industrial Microbiology (128C)

Prerequisites: Completion of a major in Microbiology (see SQ3).

Required: MICR714 (64), 716 (16), 718 (16), 720 (8).

Electives: 24C from BCHM325 (8), 360 (8), 370 (8); BOTY702 (8); CTEC212 (16); GENE327 (8).

21. Information Technology (128C)

Prerequisites Completion of the BSc (Information Technology) including applicable elective modules (see SQ3).

Required: three of the following: BISS710 (32), 720 (32), 730 (32); CSCI710 (32), 720 (32), 730 (32). [BISS740 (32) or CSCI740 (32)].

Electives: None.

22. Mathematics (128C)

Prerequisites: Completion of a major in Mathematics (see SP3).

Required: MATH710 (24), 760 (16), 770 (24), 790 (16).

Electives: 48C from MATH720 (24), 730 (16), 740 (16), 750 (24), or modules from Statistics, Applied Mathematics and Computer Science selected in consultation with Programme Director and approved by the Dean.

23. Physics (128C)

Prerequisites: Completion of a major in Physics (see SP3).

Required: PHYS711 (32), 721 (16), 731 (16), 712 (32), 722 (16), 732 (16).

Electives: None.

24. Plant Molecular Biology and Physiology (128C)

Prerequisite: Completion of a major in Plant Molecular Biology (see SP3).

Required: BIOS701 (16), 702 (8); BOTY703 (8); PMBP701 (8), 702 (8), 790 (64).

Electives: 16C from BOTY701 (8), 702 (8) or other modules selected in consultation with Programme Director and approved by the Dean.

25. Plant Pathology (128C)

Prerequisites: Completion of a major in Plant Pathology (see SP3).

Required: PPTH710 (16) and/or PPTH 720 (16), PPTH 730 (8), 740 (8), 790 (32), 795 (8).

Electives: 40C or 56C selected in consultation with Programme Director and approved by the Dean.

26. Psychology: (128)

See Appendix 1.

27. Resource Ecology (128C)

Prerequisite: Completion of the BSc(Ecological Sciences) including applicable elective modules (see SQ2).

Required: ECOL732 (8), 753 (16), 791 (64), 795 (8); GRAS728 (8).

Electives: 24C at levels 3 and 7 with at least 16C at level 7 selected in consultation with Programme Director and approved by the Dean.

28. Soil Science (128C)

Prerequisites: Completion of a major in Soil Science (see SP3).

Required: SSCI710 (8); 760 (8), 770 (8), 780 (8), 790 (64), 792 (16).

Electives: 16C at level 3 or 7 selected in consultation with Programme Director and approved by the Dean.

29. Statistics (128C)

Prerequisites: Completion of a major in Statistics (see SP3).

Required: STAT710 (16), 720 (16), 740 (16), 750 (8), 790 (24).

Electives: 48 C from STAT730 (16), 760 (16), 770 (16), 780 (16), or other modules selected in consultation with Programme Director and approved by the Dean.

30. Wildlife Science (128C)

Prerequisite: Completion of the BSc(Ecological Sciences) including applicable elective modules (see SQ2).

Required: [BMET222 (16) or STAT213 (8)]; ECOL795 (8); GEOG324 (8); GRAS728 (8); WILD720 (8), 790 (64), 791 (8).

Electives: 24C at levels 3 and 7 with at least 16C at level 7, selected in consultation with the Programme Director and approved by the Dean.

31. Zoology (128C)

Prerequisite: Completion of a major in Zoology (see SP3).

Required: BIOS701 (16), 702 (8), [703 (8) or 304 (8)], 705 (8); ZOOL790 (64).

Electives: 24C at level 7 from BIOS706 (8); ZOOL701 (8) and/or other modules at levels 3 or 7, selected in consultation with Programme Director and approved by the Dean.

SH6 Additional requirements

The Senate may require a candidate for the degree to complete one or more modules in any prescribed area of specialisation in addition to the modules prescribed for the Honours programme concerned.

SH7 Duration of study

Except with the permission of the Senate, candidates for the degree shall be required to present themselves for all parts of the final examination within two semesters after registration, except that part-time students shall be required to so present themselves within four semesters after registration.

SH8 Repeating the qualification

Except with the permission of the Senate, no candidates for the degree in any subject may present themselves for the final examination in that area of specialisation more than once.

SH9 Completion of the degree

The degree of Bachelor of Science Honours shall be conferred if the candidate has obtained a weighted average mark of at least 50% in the modules that make up the curriculum for the applicable programme and has obtained a mark of at least 50% in each of the modules specified for the programme, which shall include a research project worth at least 16 credits. Where a candidate has failed modules totalling not more than 32 credits, with marks of at least 40% in each such module, such failures may be condoned without affecting the average mark referred to above.

Degree of Master of Science

SM1 Eligibility

The following candidates shall be eligible to register for the degree of Master of Science:

(a) any Bachelor of Science Honours of the University, or a graduate of another recognized university who has been admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

SM2 Applicability of other rules

Rules SA1 to SA18 for the Faculty of Science and Agriculture and Common Rule R30(3) shall be of effect, where applicable, for the degree of Master of Science.

SM3 Supervision

A candidate for the degree shall undertake advanced study, or research, or both, under the guidance of a supervisor or supervisors appointed by the Senate.

SM4 Subject of study

The subject of study and/or research proposed for the degree shall be approved by the Senate.

SM5 Additional requirements

The Senate may require candidates for the degree to take modules in any prescribed subject in addition to those which are prescribed for the degree.

SM6 Duration of study

Candidates shall not be permitted to proceed to the final examination for the degree before the end of the first semester following that in which they are first registered for the degree.

SM7 Requirements

(1) The examination shall consist of a dissertation showing acquaintance with the methods of research, or of such a dissertation together with one or more written papers or projects, or of two or more written papers or projects, provided that there shall be a research component of at least 75% of the overall degree (128 credits), as the Senate may prescribe.

(2) No component may be repeated nor may any supplementary examination be granted.

SM8 Re-examination

Except with the permission of the Senate candidates for the degree may not present themselves for examination in any subject more than once. The Board of the Faculty, on the recommendation of the examiners, may permit a dissertation to be referred to the candidate for revision or extension and subsequent re-examination.

SM9 Notice of submission

At least three months before the dissertation is to be presented for examination, candidates shall give notice thereof, in writing, to the Dean. In the event of the candidate failing to submit the dissertation within six months the notice will lapse, and a further notice shall be submitted.

SM10 Declaration

Every dissertation submitted for the degree must be accompanied by a declaration to the satisfaction of the Senate stating that it has not been submitted for a degree in any other university.

SM11 Number of copies

Five copies of every dissertation shall be submitted. In special cases the Senate may, in respect of material other than the text, allow some relaxation of the rule regarding submission of five copies.

Degree of Master of Science

(Biological Systematics)

SMb1 Eligibility

The following candidates shall be eligible to register for the Master of Science (Biological Systematics):

(a) any holder of a relevant Honours or four-year Bachelors degree of the University, or a graduate of another recognized university who has been admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

Note:

The relevance of the qualifications offered shall be determined by the Board of the Faculty.

SMb2 Applicability of other rules

Rules SA1 to SA18, SM3 to SM11 for the Faculty of Science and Agriculture and Common Rule R30(3) shall be of effect, where applicable, for the Master of Science (Biological Systematics).

SMb3 Curriculum

In order to complete the degree a candidate shall complete the modules prescribed below (128C)*(numbers in parentheses refer to credits)*:

BSYS801 (32), 803 (32), 890 (64).

Advanced Postgraduate Certificate in Environment and Development

Advanced Postgraduate Diploma in Environment and Development

Degree of Master of Environment and Development

Advanced Postgraduate Certificate in Protected-area Management

Advanced Postgraduate Diploma in Protected-area Management

Degree of Master of Protected-area Management

SE1 Eligibility

The following candidates shall be eligible to register for the Advanced Postgraduate Certificate in Environment and Development, the Advanced Postgraduate Diploma in Environment and Development, the Master of Environment and Development, the Advanced Postgraduate Certificate in Protected-area Management, the Advanced Postgraduate Diploma in Protected-area Management or the Master of Protected-area Management:

(a) any holder of a relevant Honours or four-year Bachelors degree of the University, or a graduate of another recognized university who has been admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the qualification.

Note: The relevance of the qualifications offered shall be determined by the Board of the Faculty.

SE2 Applicability of other rules

Rules SA1 to SA18, SM3 to SM5 and SM8 to SM11 for the Faculty of Science and Agriculture and Common Rule R30(3) shall be of effect, where applicable, for these qualifications.

SE3 Examination

(1) For the Advanced Postgraduate Certificates the examination shall consist of two or more written papers and projects; for the Advanced Postgraduate Diplomas the examination shall consist of that for the applicable Advanced Postgraduate Certificate and successful completion of an internship (of equal weight) served at an appropriate organization; for the Masters degrees the examination shall consist of that for the applicable Advanced Postgraduate Certificate and a mini-dissertation (of equal weight) showing acquaintance with the methods of research.

(2) The pass mark for the Advanced Postgraduate Certificates shall be a final mark of 50%; marks of at least 50% shall be obtained for all components separately, provided that failures in modules totalling no more than 16 credits, with marks of at least 40% in each such module, may be condoned without affecting the final mark.

(3) No component may be repeated nor may any supplementary examination be granted should a component be failed.

SE5 Rules of combination.

(1) For qualifications in Environment and Development, candidates shall complete the following components (*numbers in parentheses refer to credits*):

1. Advanced Postgraduate Certificate in Environment and Development (64C)

Required: EDEL801 (16), 803 (16), 825 (4); integrative written examination.

Electives: three of EDEL811 (4), 813 (4), 815 (4), 817 (4), 819 (4), 821 (4), 823 (4), 827 (4), 829 (4), 831 (4); one of EDEL851 (16), 853 (16), 855 (16), 857 (16), 859 (16), 861 (16), 863 (16), 865 (16), 867 (16).

Note:
In determining the final mark, the credit-weighted mean of all course-work modules shall be weighted equally with the mark obtained for the integrative examination.

2. Advanced Postgraduate Diploma in Environment and Development (128C)

Required: As prescribed for the Advanced Postgraduate Certificate (64C) with a final mark of at least 50%; EDEL880 (64).

3. Master of Environment and Development (128C)

Required: As prescribed for the Advanced Postgraduate Certificate (64C) with a final mark of at least 60%; EDEL890 (64).

(2) For qualifications in Protected-area Management, candidates shall complete the following components (*numbers in parentheses refer to credits*):

1. Advanced Postgraduate Certificate in Protected-area Management (64C)

Required: 64C of course-work modules as approved by the Board of the Faculty; integrative written examination.

Note:
In determining the final mark, the credit-weighted mean of all course-work modules shall be weighted equally with the mark obtained for the integrative examination.

2. Advanced Postgraduate Diploma in Protected-area Management (128C)

Required: As prescribed for the Advanced Postgraduate Certificate (64C) with a final mark of at least 50%; PAMT880 (64).

3. Master of Protected-area Management (128C)

Required: As prescribed for the Advanced Postgraduate Certificate (64C) with a final mark of at least 60%; PAMT890 (64).

SE6 Duration

(1) Candidates shall be registered for at least one semester before award of the Advanced Postgraduate Certificates.

(2) Except with the permission of the Board of the Faculty, candidates for the Advanced Postgraduate Diplomas or the Masters degrees shall be required to present themselves

for all parts of the final examination within two semesters after first registering for the qualification, except that part-time students shall be required to present themselves over four semesters.

Degree of Bachelor of Science in Agriculture

Ag1 Applicability of other rules

Rules SA1 to SA17 for the Faculty of Science and Agriculture shall be of effect, where applicable, for the degree of Bachelor of Science in Agriculture.

Ag2 Structure of the degree

In order to complete the degree of Bachelor of Science in Agriculture a candidate shall obtain not less than 512 credits and shall complete the modules as prescribed for the qualification. Except with the approval of the Senate, the following minimum credits apply: 96 for modules at level 7, 224 for modules at levels 3 and 7, and 224 for modules at levels 2 and 3.

Ag3 Admission to senior years

(1) A minimum of 80 credits from the first-year curriculum is required for entry into the senior years.

(2) Candidates who are repeating the first year may register for modules totalling up to 144 credits, including all uncompleted modules from the first year curriculum and candidates re-admitted in terms of Rule SA17 shall be permitted to register only for the uncompleted modules of the first year curriculum.

(3) AGRI210 (1), 220 (1) are compulsory, skills-based, modules in which students are required to obtain a certified level of proficiency in order to qualify for any qualification in Agriculture.

(4) In addition to the provisions of Rules R8(3) and SA17, a candidate (including one who transfers from another faculty or university, or changes options in this Faculty) who does not pass all modules normally prescribed for the chosen programme in the first-year curriculum for that programme within two years of such transfer or change shall be refused readmission to the Faculty.

Ag4 Rules of combination

Candidates will elect to undertake one of the programmes for which the rules of combination follow (*numbers in parentheses refer to credits*):

Note:
Students are warned that the choice of elective modules and their levels is governed by Rule Ag2 above.

1. AGRIBUSINESS

(a) Animal Science Stream (514C)

Foundational modules: ANSI 120 (8); BIOR118 (8), 128 (8); BIOS101 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); ZOOL102 (16); AGRI210 (1), 220 (1).

Core modules: AGEC210 (16), 220 (16), 270 (16), 370 (16), 380 (16), 730 (8), 740 (16); ANSI214 (16), 344 (16), 362 (16), 332 (16), 342 (16); POLT210 (16).

Capstone modules: AGBU790 (40); ANSI780 (32).

Elective modules: 48C at level 2; 32C at level 3; 32C at level 7 selected in consultation with Programme Director and approved by the Dean.

(b) Crop Science Stream (514C)

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGRI210 (1), 220 (1).

Core modules: AGEC210 (16), 220 (16), 270 (16), 370 (16), 380 (16), 730 (8), 740 (16); AGPS200 (16), 302 (16), 305 (16), 306 (16), 701 (8), 711 (8).

Capstone modules: AGBU790 (40).

Elective modules: 32C at level 2; 24C at level 3 and 24C from [AGPS301 (16), 303 (8)]; 16C at level 7 and 32C from [AGPS710 (16), 712 (8) or 730 (16)] selected in consultation with Programme Director and approved by the Dean.

(c) Horticultural Science Stream (514C)

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGRI210 (1), 220 (1).

Core modules: AGEC210 (16), 220 (16), 270 (16), 370 (16), 380 (16), 730 (8), 740 (16); AGPS301 (16), 307 (16), 701 (8).

Capstone modules: AGBU790 (40).

Elective modules: 32C at level 2; 24C at level 3 and 40C from [AGPS304 (8), 306 (16), 320 (16)]; AGPS720 (8), 721 (8), 723 (8), 724 (8), 725 (8), 726 (8), 760 (8) selected in consultation with Programme Director and approved by the Dean.

(d) Food Processing Stream (513C)

Foundational modules: AGRI220 (1); AGPS210 (8); BIOS101 (16); BISS110 (16), 120 (16); CHEM 111 (16), 112(16), MATH111 (8), 122 (8); FPRO310 (24); FSCI120 (16); MGMT110 (16).

Core modules: AGEC210 (16), 220 (16), 270 (16), 370 (16), 380 (16), 730 (8), 740 (16); FSCI210 (16), 220 (16), 310 (32), 320 (32), 710 (32), 720 (32).

Capstone modules: AGBU790 (40).

Elective modules: 48C at level 2; 32C at level 3, selected in consultation with Programme Director and approved by the Dean.

(e) Wildlife Science Stream (514C)

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); ZOOL102 (16); AGRI210 (1), 220 (1); SSCI217 (16); SCOL380 (8); GEOG224 (8).

Core modules: AGEC210 (16), 220 (16), 270 (16), 290 (8), 370 (16), 380 (16), 740 (16); BOTY204 (8); ECOL202 (8), 301 (16); GEOG326 (8); GRAS226 (8), 343 (8), 728 (8); ZOOL204 (8), 303 (8); [ANSI332 (16) or GRAS312 (16)]; WILD300 (8),720 (8).

Capstone modules: AGBU790 (40), WILD790 (8), 791 (32).

Elective modules: 32C at level 2; 16C at level 3; 8C at level 7 selected in consultation with Programme Director and approved by the Dean.

2. AGRICULTURAL ECONOMICS (513C)

Foundational modules: ACCN100 (32); BIOR118 (8), 128 (8); BIOS101 (16); BISS110 (16), 120 (16); [BOTY102 or ZOOL102 (16)]; ECON110 (16), 120 (16); MATH111 (8), 122 (8); AGRI220 (1); ANSI214 (16); BMET210(16).

Core modules: AGEC220 (16), 270 (16), 370 (16), 380 (16), 730 (8), 740 (16); AGPS305 (16); BMET314 (8), 316 (8); ECON210 (16), 220 (16), 330 (16), 340 (16), [32C from ECON320 (16), 350 (16), 360 (16)]; STAT213 (8).

Capstone modules: AGEC790 (40).

Elective modules: 16C at level 3 and 40C at level 7 selected in consultation with Programme Director and approved by the Dean.

3. AGRICULTURAL PLANT PHYSIOLOGY (530C)

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8), MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 302 (8), 306 (16), 307 (16), 320 (16); AGRI210 (1), 220 (1);AMET210 (16); BCHM222 (8), 231(8); BMET210 (16), 222 (16); BOTY201 (16), 301 (16); GENE213 (16); MICR212 (8); PMBP304 (16), 308 (16); PPTH222 (8).

Core modules: AGPS711 (8),720 (8), 760 (8), 712 (8); (BCHM213 (16), 328 (8), 340 (8), 380 (16); EBOT301 (16); PMBP202 (8), 301 (16).

Capstone modules: AGPS790 (32), 701 (8).

Elective modules: 16C from AGPS713 (16), 721 (8), 725 (8); AGEC210 (16); BMET701 (8); SSCI217 (16).

4. AGRICULTURAL PRODUCTION (514C)

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 301 (16), 302 (8), 304 (8), 305 (16); AGRI210 (1), 220 (1); AGEC210 (16); BCHM222 (8), 231(8); BMET210 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); MICR212 (8); PPTH222 (8); SSCI217 (16), 320 (16).

Core modules: AGEC220 (16), 270 (16), 370 (16); AGEN216 (8); AGPS303 (8), 711 (8), 710 (16); SSCI230 (16).

Capstone modules: AGPS790 (32), AGPS701 (8).

Elective modules: 40C at level 7 from AGPS307 (16), 713 (16), 720 (8), 721 (8), 723 (16), 726 (8) selected in consultation with Programme Director and approved by the Dean.

5. ANIMAL and POULTRY SCIENCE (514C)

Foundational modules: BIOR118 (8) 128 (8); BIOS101 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); ZOOL102 (16); AGRI210 (1), AGRI220 (1); AGEC210 (16); BCHM213 (16), 222 (8) 231 (8); BMET210 (16), 222 (16); GENE213 (16).

Core modules: ANSI214 (16), 232 (16), 344 (16), 362 (16), 332 (16), 342 (16), 370 (16), 711

(16), 741 (16), 751 (16); POLT210 (16).

Capstone modules: ANSI 780 (32), 790 (32).

Elective modules: 24C from ALAW110 (8); AGPS200 (16); CSCI101 (8); MICRO210 (16); GRAS211 (8); AGEC220 (16); 16C at levels 3 or 7 selected in consultation with Programme Director and approved by the Dean.

6. BIOCHEMISTRY (516C)

Foundational modules: BIOR118 (8); BIOS101 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16), 122 (8). AGRI210 (1), 220 (1).

Core modules: ANSI232 (16); BCHM213 (16), 222 (8), 231 (8), 313 (16), 320 (8), 325 (8), 326 (8), 328 (8), 340 (8); BMET210 (16); CHEM211 (16), 212 (16); GENE213 (16)327 (8); MCBS707 (32); MICR212 (8).

Capstone modules: BCHM790 (64); MCBS709 (8).

Elective modules: modules at levels 1 and 2 selected in consultation with the Programme Director and approved by the Dean. 64C from ANSI362 (16); BOTY301 (16); GENE 350 (16); MICR350 (16) or 32C from ANSI362 (16); BOTY301 (16); GENE 350 (16); MICR350 (16) and 32C at level 3 selected in consultation with the Programme Director and with approval by the Dean. 24C from BCHM701 (8), 703 (8), 705 (8); SCED701 (8) at level 7.

7. CROP SCIENCE (514C)

(a) Management Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 301 (16) 302 (8), 304 (8), 305 (16), 306 (16), 307 (16); AGRI210 (1), 220 (1); AGEC210 (16); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); MICR212 (8); PPTH222 (8) SSCI212 (8), 320 (16).

Core modules: AGEC220 (16); AGPS710 (16), 711 (8), 713 (16).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 48C from AGEC270 (16), 370 (16); AGEN216 (8); AGPS303 (8), 320(16), 712 (8), 720 (8), 721 (8), 723 (8), 724 (8), 726 (8), 760 (8); BMET222 (16); PPTH320 (8); SSCI230 (16) or other modules selected in consultation with Programme Director and approved by the Dean.

(b) Standard Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 301 (16) , 302 (8), 304 (8), 305 (16), 306 (16), 307 (16) 320 (16); AGEC210 (16); AGRI210 (1), 220 (1); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); MICR212 (8); PPTH222 (8); SSCI212 (8), 320 (16).

Core modules: AGPS710 (16),711 (8), 713 (16); BMET701 (8).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 24C from AGPS712 (8), 720 (8), 721 (8), 723 (8), 724 (8), 726 (8), 760 (8); SSCI230 (16) or other modules selected in consultation with Programme Director and approved by the Dean.

(c) Plant Pathology Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 301 (16), 302 (8), 304 (8), 305 (16), 306 (16); AGEC210 (16); AGRI210 (1), 220 (1); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); MICR212 (8); PPTH222 (8); SSCI212 (8), 320 (16).

Core modules: AGPS710 (16), 711(8), 713 (16); BMET701 (8); PPTH310 (8), 320 (8), 330 (16), 730 (16), 740 (8).

Capstone modules: AGPS701 (8), 790 (32).

Elective module: PPTH710 (16) or other modules selected in consultation with Programme Director and approved by the Dean.

8. CULTIVATED PASTURES (514C)

(a) Management Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), PHYS122 (8); AGPS200 (16), 301 (16), 305 (16); AGEC210 (16); AGRI210 (1), 220 (1); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16); BOTY301 (16); GENE213 (16); SSCI212 (8).

Core modules: ANSI214 (16), 342 (16), [ANSI370 (16) or 751 (16)], 711 (16); AGEC220 (16), 270 (16); AGPS303 (8), 710 (16); GRAS211 (8), 226 (8), 312 (24); SSCI320 (16).

Capstone modules: AGPS790 (32), 701 (8).

Elective modules: 16C (at least 8C at level 3 and 8C at level 7) selected in consultation with Programme Director and approved by the Dean.

(b) Standard Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), PHYS122 (8); AGPS200 (16), 301 (16), 305 (16); AGEC210 (16); AGRI210 (1), 220 (1); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); GENE213 (16); SSCI212 (8).

Core modules: ANSI342 (16), [370 (16) or 751 (16)], 711 (16); AGEC220 (16); AGPS303 (8), 710 (16); GRAS211 (8), 226 (8), 312 (24); SSCI320 (16).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 32C (at least 8C at level 7) from AGPS302 (8); ANSI214 (16); ENTO302 (8); MICRO212 (8); PPTH222 (8); SSCI230 (16).

9. FORESTRY (513C)

(a) Commercial Forestry Option

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); CSCI101 (8); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16);AGRI220 (1).

Core modules: AGEC210 (16) 270 (16), 290 (8), 730 (8); AGPS303 (8), 307 (16), 320 (16) ,760 (8);AGEN216 (8); ALAW110 (8); AMET210 (16); BCHM213 (16), 222 (8), 231 (8); BMET210 (16); FORT310 (16) 320 (16), 350 (16), 710 (16), 720 (16); HYDR210 (16); SSCI217 (16), 320 (16).

Capstone modules: FORT790 (32).

Elective modules: 16C at level 3 and 32C at level 7 selected in consultation with Programme Director and approved by the Dean.

(b) Community Forestry Option

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); CSCI101 (8); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16); AGRI220 (8).

Core modules: AGEC210 (16), 270 (16), 290 (8), 730 (8); AGPS303 (8), 307 (16), 320 (16) ,760 (8);AGEN216 (8); ALAW110 (8); AMET210 (16); BCHM213 (16), 222 (8), 231 (8); BMET210 (16); FORT330 (16), 340 (16), 350 (16) 730 (16), 740 (16); HYDR210 (16); SSCI217 (16), 320 (16).

Capstone modules: FORT790 (32).

Elective modules: 16C at level 3 and 32C at level 7 selected in consultation with Programme Director and approved by the Dean.

10. GENETICS (514C)

(a) Animal Genetics Stream

Foundational modules: BIOS101 (16); CHEM111 (16), 112(16); MATH111 (8), 122 (8); PHYS121 (16), 122 (8).

Core modules: ANSI214 (16), 232 (16)362 (16), 370 (16),751 (16); BCHM213 (16), 230 (8), 328 (8); BIOS203 (8); BMET210 (16); GENE213 (16), 226 (8), 230 (8); 325 (8), 327(8), 332(8), 334 (8), 342 (8), 350 (16), 732 (8); MCBS707 (16).

Capstone modules: GENE702 (64); MCBS711 (8), 720 (8).

Elective modules: modules at levels 1, 2, 3 and 7 selected in consultation with the Programme Director and approved by the Dean.

(b) Plant Genetics Stream

Foundational modules: BIOS101 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); PHYS121 (16), 122 (8).

Core modules: AGPS200 (16),306 (16), 730 (16); BMET210 (16); BOTY201 (8), 202 (8), 203 (8), 204 (8),301 (16); GENE213 (16), 226 (8), 230 (8), 325 (8), 327 (8), 332 (8), 334 (8), 342 (8),732 (8); MCBS707 (16); PMBP301 (8), 302 (8), 304 (8), 306 (8); PPTH310 (8).

Capstone modules: GENE702 (64); MCBS711 (8), 720 (8).

Elective modules: Electives at levels 1, 2, 3 and 7 selected in consultation with the Programme Director and approved by the Dean.

11. GRASSLAND SCIENCE (514C)

Foundational modules: BIOR118 (8), 128 (8); BIOSI101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); GEOG124 (8).

MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGRI210 (1), 220 (1); BCHM213 (16); BMET210 (16), 222 (16); ETHI202 (8); [GENE213 (16) or AMET210 (16)]; SSCI217 (16), 230 (16).

Core modules: AGPS320 (16), 710 (16); ECOL201 (8), 301 (16); GRAS211 (8), 226 (8), 228 (8), 343 (8), 728 (8).

Capstone modules: GRAS 312 (24), 753 (24), 791 (8), 793 (64).

Electives: 40C at level 2 and 24C at level 3 and 8C at level 7 selected in consultation with Programme Director and approved by the Dean.

12. HORTICULTURAL SCIENCE (514C)

(a) Botany Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 301 (16), 302 (8), 304 (8), 305 (16), 306 (16), 307 (16), 320 (16); AGRI210 (1), 220 (1); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16) 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); PPTH222 (8); SSCI212 (8), 320 (16).

Core modules: AGPS721 (8); BOTY201 (8), 202 (8), 203 (8), 204 (8); ECOL301 (16); PMBP701 (8).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 48C from AGEC210 (16);AGPS720 (8), 723 (8), 724 (8), 725 (8), 726 (8), 760 (8); PPTH320 (8) or other modules selected in consultation with Programme Director and approved by the Dean.

(b) Management Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 301 (16), 302 (8), 304 (8), 305 (16), 306 (16), 307 (16); AGRI210 (1), 220 (1); AGEC210 (16); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); MICR212 (8); PPTH222 (8) SSCI212 (8), 320 (16).

Core modules: AGEC220 (16); AGPS720 (8), 721 (8), 723 (8), 724 (8),725 (8), 726 (8).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 40C from AGEC270 (16) 370 (16); AGEN216 (8); AGPS303 (8), 320 (16), 710 (16), 711 (8), 712 (8), 713 (8), 760 (8); BMET222 (16); SSCI230 (16); PPTH320 (8) or other modules selected in consultation with Programme Director and approved by the Dean.

(c) Plant Pathology Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 302 (8), 304 (8), 305 (16), 307 (16); AGRI210 (1), 220 (1); AGEC210 (16); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); MICR212 (8); PPTH222 (8); SSCI212 (8), 320 (16).

Core modules: AGPS306 (16); PPTH310 (8), 320 (8), 330 (16), 730 (16), 740 (8).

Capstone modules: AGPS701 (8), 790(32).

Elective modules: 48C from AGPS720 (8), 721 (8), 723 (8), 724 (8), 725 (8), 726 (8), 760 (8); PPTH710 (16) or other modules selected in consultation with Programme Director and approved by the Dean.

(d) Standard Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 301 (16) 302 (8), 304 (8), 305 (16), 306 (16), 307 (16), 320 (16); AGRI210 (1), 220 (1); AGEC210

(16); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); MICR212 (8); PPTH222 (8) SSCI212 (8), 320 (16).

Core modules: AGPS720 (8), 721 (8), 723 (8), 724 (8), 725 (8), 726 (8); PPTH320 (8).

Capstone modules: AGPS701 (8), 790(32).

Elective modules: 16C from AGEC220 (16), 270 (16);AGEN216 (8); AGPS710 (16), 711 (8), 712 (8), 713 (16), 760 (8); BMET701 (8); SSCI230 (16) or other modules selected in consultation with Programme Director and approved by the Dean.

13. MICROBIOLOGY (514C)

(a) Environmental Microbiology Option (514C)

Foundational modules: BIOR118 (8), 128(8); BIOS101 (16); BOTN102 (16) OR ZOOL102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGEC290 (8); AGRI210 (1), 220 (1); BACT220 (8) 222 (8); BCHM213 (16), 222 (8), 231 (8); BMET210 (16); GENE226 (8); GEOG222 (8); HYDR210 (16); MYCO211 (8); SSCI217 (16), 320 (16); 371 (8) 372 (8); VIRO320 (16).

Core modules: MICR310 (16); 320 (16); 350 (16), 716(16), 718(16).

Capstone modules: MICR714 (64).

Elective modules: 8C at level 2, 16C at level 3 and 32C at level 7 from AMET211 (8); BMET314 (8); BOTY201 (8), 202 (8), 204 (8); CHEM211 (16); 212 (16); EDEL821 (4), 829 (4); GEOG322 (16), 324 (8), 326 (8); HYDR322 (8); SSCI710 (8), 720 (8); 760 (8) or selected in consultation with Program Director and approved by the Dean.

(b) Industrial Microbiology Option (514)

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16) or ZOOL102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGRI210 (1), 220 (1); BACT220 (8), 222 (8); BCHM213 (16), 222 (8), 231 (8); 325 (8), 360 (8), 370 (8), 380 (16); BMET210 (16), 222(16); CTEC212 (16); GENE213 (16), 226 (8), 334 (8); MYCO211 (8); VIRO320 (16).

Core modules: GENE327 (8); MICR320 (16), 350 (16), 360 (16), 716 (16), 718 (16), 720 (8).

Capstone modules: MICR714 (64).

Elective modules: 8C at level 3 and 24C at level 7 from AGEC290 (8); BCHM326 (8); BOTY202 (8), 204 (8), 702 (8); GENE325 (8). or selected in consultation with the Program Director and approved by the Dean.

14. PLANT BREEDING

(a) Plant Pathology Stream (522C)

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGEC210 (16); AGPS200 (16), 305 (16), 306 (16) 307 (16); AGRI210 (1), 220 (1); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16), 230 (8), 332 (8); MICR212 (8); PPTH222 (8); SSCI212 (8).

Core modules: AGPS711 (8), 721 (8), 730 (8); GENE732 (8); PPTH310 (8), 320 (8), 330 (16), 730 (16), 740 (8).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 48C from AGPS301 (16), 302 (8), 304 (8), 320(16), 710 (8), 712 (8), 713 (16) 720 (8),723 (8),724 (8), 726 (8), 760 (8); BMET701 (8); GRAS211 (8); SSCI320 (16) with at least 8C at level 7 selected in consultation with Programme Director and approved by the Dean.

(b) Standard Stream (530C)

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 301 (16) 302 (8), 304 (8), 305 (16), 306 (16), 307 (16); AGRI210 (1), 220 (1); AGEC210 (16); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16) 230 (8), 332 (8); MICR212 (8); PPTH222 (8) SSCI212 (8), 320 (16).

Core modules: AGPS711 (8), 721 (8), 730 (8); BMET701 (8); GENE732 (8); PPTH330 (16).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 24C from AGPS320 (16),710 (8), 712 (8), 713 (16) 720 (8),723 (8),724 (8), 726 (8), 760 (8) or other modules selected in consultation with Programme Director and approved by the Dean.

15. PLANT PATHOLOGY (514C)

(a) Crop Science Stream

Foundational modules: BIOR118 (8),128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8),122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 301 (16), 302 (8), 304 (8), 305 (16), 306 (16); AGRI210 (1), 220 (1); AGEC210 (16); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); MICR212 (8); PPTH222 (8), 310 (8), 320 (8), 330 (16); SSCI212 (8), 320 (16).

Core modules: AGPS701 (8), 711 (8), 713 (16); [PPTH710 (16) or 720 (16)], 730 (16), 740 (8).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 8C from AGPS710 (16), 712 (8), 760 (8); SSCI230 (16).

(b) Horticulture Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 302 (8), 304 (8), 305 (16), 306 (16), 307 (16); AGRI210 (1), 220 (1); AGEC210 (16); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); MICR210 (16); PPTH222 (8), 310 (8), 320 (8), 330 (16); SSCI212 (8), 320 (16).

Core modules: [PPTH710 (16) or 720 (16)], 730 (16).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 40C from AGPS301 (16), 320 (16),720 (8), 721 (8), 723 (8), 724 (8), 725 (8), 726 (8), 760 (8); PPTH740 (8); at least 24C at level 7 selected in consultation with Programme Director and approved by the Dean.

(c) Plant Breeding Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 305 (16), 306 (16), 307 (16); AGRI210 (1), 220 (1); AGEC210 (16); AMET210 (16); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16) 230 (8), 332 (8); MICR212 (816); PPTH222 (8), 330 (16), ; SSCI212 (8), 320 (16).

Core modules: AGPS730 (16); GENE732 (8); PPTH310 (8), 320 (8), 710 (16),730 (16), 740 (8).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 40C from AGPS302 (8), 304 (8), 710 (16), 711 (8), 712 (8), 720 (8), 721 (8), 723 (8), 724 (8), 726 (8), 760 (8); BMET701 (8), GRAS211 (8); at least 16C at level 7 selected in consultation with Programme Director and approved by the Dean.

(d) Standard Stream

Foundational modules: BIOR118 (8), 128 (8); BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16), 302 (8), 304 (8), 305 (16), 306 (16), 307 (16); AGRI210 (1), 220 (1); BCHM222 (8), 231 (8); BMET210 (16), 222 (16); BOTY301 (16); ENTO302 (8); GENE213 (16); MICR210 (16); PPTH211 (8), 222 (8), 310 (8), 320 (8); SSCI212 (16), 320 (16).

Core modules: PPTH330 (16), 710 (16), 720 (16), 730 (16).

Capstone modules: AGPS701 (8), 790 (32).

Elective modules: 48C from AGEC210 (16);AGPS301 (16), 710 (16), 711 (8), 712 (8), 720 (8), 721 (8), 723 (8), 724 (8),725 (8), 730 (16) 726 (8), 760 (8); AMET210 (16); PPTH740 (8); SSCI320 (16); at least 8C at level 7 selected in consultation with Programme Director and approved by the Dean.

16. POULTRY SCIENCE

Not on offer as an undergraduate programme at the present time. Postgraduate studies are offered through the *School of Agricultural Sciences and Agribusiness*.

17. SOIL SCIENCE (514C)

Foundational modules BIOR118 (8); BIOR128 (8) or EART124 (8); BIOS101 (16); BOTY160 (16); CHEM111 (16), 112 (16); EART122 (8); MATH111 (8), 122 (8); PHYS121 (16), 122 (8); AGPS200 (16); AGRI210 (1), 220 (1); BMET210 (16).

Core modules: AGPS301 (16); SSCI217 (16), 230 (16); 320 (16), 351 (8), 352 (8), 371 (8), 372 (8); 710 (8); 760 (8), 770 (8), 780 (8).

Capstone modules: SSCI790 (64), 792 (16).

Elective modules: AGEC210 (16); AGPS302 (8), 303 (8), 304 (8), 305 (16), 306 (16), 307 (8), 320 (16); AMET210 (16); 211 (8); ANSI214 (16); BCHM213 (16), 222 (8), 231 (8); BMET222 (16); CHEM211 (16), 212 (16); CTEC212 (16); ENTO302 (8); FORT310 (16), 320 (16); GEOG114 (8), 222 (8), 324 (8); GRAS211 (8), 226 (8), 324 (16), 343 (8); HYDR210 (16), 310 (16); MICR212 (8), 310 (16); PPTH222 (8) or selected in consultation with Program Director and approved by the Dean.

Ag5 Exemption from modules

(1) Candidates holding the matriculation certificate or its equivalent and a diploma in Agriculture, recognised by the Senate for this purpose, may be exempted by the Senate from such modules as the Board may recommend.

(2) University Diploma in Rural Resource Management module credits passed may be transferable to other programmes in Agriculture leading to degrees as the Board of the Faculty may recommend.

Degree of Master of Science in Agriculture

AgM1 Eligibility

The following candidates shall be eligible to register for the degree of Master of Science in Agriculture:

(a) any Bachelor of Science in Agriculture and/or Bachelor of Science in Agriculture Honours of the University, or a graduate of another recognized university who has been admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

AgM2 Applicability of other rules

Rules SA1 to SA18 and SM3 to SM11, for the Faculty of Science and Agriculture, and Common Rule R30(3) shall be of effect, where applicable, for the degree of Master of Science in Agriculture. In addition to the above, candidates may also be required to complete AGRI210 (1) and AGRI220 (1).

Degree of Master of Science in Agriculture

(Agricultural and Environmental Instrumentation)

AgMa1 Eligibility

The following candidates shall be eligible to register for the Master of Science in Agriculture (Agricultural and Environmental Instrumentation):

(a) any holder of a relevant Honours or four-year Bachelors degree of the University, or a graduate of another recognized university who has been admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

Note:
The relevance of the qualifications offered shall be determined by the Board of the Faculty.

AgMa2 Applicability of other rules

Rules SA1 to SA18, SM3 to SM11 for the Faculty of Science and Agriculture and Common Rule R30(3) shall be of effect, where applicable, for the Master of Science in Agriculture (Agricultural and Environmental Instrumentation).

AgMa3 Curriculum

In order to complete the degree a candidate shall complete the following modules prescribed below (128C)*(numbers in parentheses refer to credits)*:

AMET869 (64) and 64C from AMET861 (8), 862 (8), 863 (8), 864 (8), 865 (8), 866 (8), 867 (8), 868 (8) selected in consultation with Programme Director and approved by the Dean.

Degree of Bachelor of Agricultural Management

AgMb1 Applicability of other rules

Rules SA1 to SA17 for the Faculty of Science and Agriculture shall, be of effect where applicable, for the degree of Bachelor of Agricultural Management.

AgMb2 Structure of the degree

In order to complete the degree a candidate shall obtain not less than 385 credits and shall complete the modules as prescribed in Rule AgMb3.

AgMb3 Curriculum

The curriculum shall consist of the following modules *(numbers in parentheses refer to credits)*:

Foundational modules: ACCN100 (32); BIOR118 (8), 128 (8); BIOS101 (16); ECON110 (16), 120 (16); MATH113 (16); STAT112 (16); AGEN216 (8); ALAW110 (16); AGRI220 (1); ANSI214 (16); CSCI101 (8); GRAS211 (8); SSCI217 (16).

Core modules: AGEC220 (16), 270 (16), 370 (16); AGPS301 (16), 303 (8), 305 (16); BFIN230 (16); MGMT210 (16), 220 (16).

Capstone modules: None.

Elective modules: 16C at level 2 and 32C at level 3 selected in consultation with Programme Director and approved by the Dean.

AgMb4 Practical Work

Before accumulating the credits for AGPS303 towards the degree, candidates must have completed two months' practical work on an approved farm.

Degree of Bachelor of Agricultural Management Honours

AgMh1 Eligibility

The following candidates shall be eligible to register for the degree of Bachelor of Agricultural Management Honours:

(a) a Bachelor of Agricultural Management of the University or a graduate of another recognized university who has been admitted to the status thereof;

or

(b) a person who has been admitted by permission of the Senate in terms of Rule R33 as a candidate for the degree.

AgMh2 Applicability of other rules

Rules SA1 to SA17 and SH2 to SH9 for the Faculty of Science and Agriculture and Common Rule R30(3) shall be of effect, where applicable, for the degree of Bachelor of Agricultural Management Honours.

AgMh3 Curriculum

The curriculum shall consist of one of the following combinations of modules (128C)*(numbers in parentheses refer to credits)*:

(1) Commerce Stream

Prerequisite modules: see AgMh1, AGRI210 (1), 220 (1).

Core modules: AGEC380 (16), 730 (8), 740 (16); and 24C from level 7 in the disciplines in the *School of Business* selected in consultation with Programme Director and approved by the Dean.

Capstone modules: AGEC790 (40).

Elective modules: 24C at level 7 selected in consultation with Programme Director and approved by the Dean.

(b) Production Stream

Prerequisite modules: see AgMh1, AGRI210 (1), 220 (1).

Core modules: AGEC380 (16), 730 (8), 740 (16).

Capstone modules: AGEC791 (32); [AGPS790 (32) or ANSI790 (32)].

Elective modules: 24C at level 7 selected in consultation with Programme Director and approved by the Dean.

AgMh4 Duration

Candidates for the degree shall be required to successfully complete all sections of the final examination over two consecutive semesters.

AgMh5 Supplementary examination

Notwithstanding Rule SH9, a candidate who has failed any module with a mark that is not less than 40% shall be permitted to write a supplementary examination in such a module and failure of such a module shall not be condoned.

Degree of Master of Agricultural Management

AgMm1 Eligibility

The following candidates shall be eligible to register for the degree of Master of Agricultural Management:

(a) a Bachelor of Agricultural Management Honours of the University or a graduate of another recognised university who has been admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Rule R33 as a candidate for the degree.

AgMm2 Applicability of other rules

Rules SA1 to SA18 and SM3 to SM11, for the Faculty of Science and Agriculture and Common Rule R30(3) shall be of effect, where applicable, for the degree of Master of Agricultural Management. In addition to the above, candidates may also be required to complete AGRI210 (1) and 220 (1).

University Diploma in Rural Resource Management

University Diploma in Sports Turf Management

AgR1 Entrance

The following candidates shall be eligible to register for the University Diploma in Rural Resource Management and the University Diploma in Sports Turf Management, provided that they:

(a) have previously obtained a pass of at least an E (40%) in Mathematics at the higher grade (or C (60%) at the standard grade) and a pass of at least an F (33%) at the higher grade (or E (40%) at the standard grade) in a Natural Science or Biology in the matriculation or equivalent examination; or

(b) have obtained the Preparatory Certificate in Mathematics and Science of the University.

Candidates may be subject to selection.

AgR2 Applicability of other rules

Rules SA1 to SA17 for the Faculty of Science and Agriculture shall, where applicable, be of effect for the University Diploma in Rural Resource Management and University Diploma in Sports Turf Management.

AgR3 Duration and structure of curriculum

The curriculum for the diploma shall extend over not less than four semesters. Candidates shall obtain not less than 256 credits and complete the modules prescribed in Rule AgR4.

AgR4 Curriculum

The modules prescribed shall be as set out below (256C)*(numbers in parentheses refer to credits)*:

(a) **University Diploma in Rural Resource Management**

Note:
Students who first registered for the diploma before 2000 should refer to the 1999 Handbook of the Faculty of Science and Agriculture (Volume 2):

Core modules: RRMG111 (16), 121 (16), 212 (16).

Capstone modules: RRMG222 (16).

Elective modules: 96C at level 1 and 96C at level 2 from THREE of the following streams:

1. Small Business Management AGEC110 (16), 120 (16); CRMS230 (16); FPRO220 (16)
2. Nutrition and Health NUTR125 (16), 131 (16), 241 (16), 250 (16)
3. Crops, Horticulture and Forestry BIOR118 (8) 128 (8); BIOS101 (16); CHEM111 (16); AGPS200 (16); SSCI217 (16)
4. Range and Animals BIOR118 (8) 128 (8); MATH111 (8), 113 (16), 122 (8); ANSI214 (16); BMET210 (16); GRAS211 (8), 226 (8); POLT210 (16)
5. Water and Soil Management BIOR118 (8) 128 (8); MATH111 (8), 113 (16), 122 (8); HYDRO220 (16); SSCI217 (16)
6. Regional Planning and GIS BIOR118 (8) 128 (8); GEOG111 (8), 112 (8), 122 (8), 124 (8), 211 (8), 215 (8), 217 (16), 222 (8) (Note: *for this option GEOG222 is compulsory*).

(b) University Diploma in Sports Turf Management

Foundational modules: BIOS101 (16); BOTY102 (16); CHEM111 (16), 112 (16); MATH111 (8), 122 (8); AGRI210 (1), 220 (1); PBSD1BM1 (16); PBSD1BA1 (16); AENG216 (8); SSCI217 (16); AGPS200 (16); MICR212 (8); ENTO302 (8); PPTH222 (8); STMA241 (8).

Core modules: PBSD1HR2 (16); PBSD2BL1 (16); PBSD2HR1 (16).

Capstone modules: STMA242 (8).

Elective modules: 16C from BCHM222 (8), 231 (8); SSCI230 (16); AGPS304 (8) selected in consultation with Programme Director and approved by the Dean.

AgR5 Exclusion

(1) Candidates first registered for the diploma before 1997 who have not completed all the requirements of the diploma within five years may be refused readmission.

(2) Candidates registered after 1996 who have not completed all the requirements of the diploma within four years may be refused readmission.

Degree of Bachelor of Agriculture

AgB1 Entrance

Diplomates who have obtained a credit-weighted average of 60% in the final year of the University Diploma in Rural Resource Management or the University Diploma in Sports Turf Management shall be eligible to register for the Bachelor of Agriculture (Rural Resource Management) or Bachelor of Agriculture (Sports Turf Management) respectively.

AgB2 Applicability of other rules

Rules SA1 to SA17 for the Faculty of Science and Agriculture shall, where applicable, be of effect for the degree of Bachelor of Agriculture (Rural Resource Management) or Bachelor of Agriculture (Sports Turf Management).

AgB3 Structure of the degree

In order to complete the degree a candidate shall obtain not less than 384 credits (including those obtained for the relevant University Diploma) and shall complete the modules as prescribed for the degree in Rule AgB5. Except with the approval of the Senate, the following minimum credits apply: 96 for modules at level 3, 224 for modules at levels 2 and 3.

AgB4 Duration of curriculum

To qualify for the degree candidates shall be registered for a minimum of two semesters after completion of the appropriate University Diploma.

AgB5 Curriculum

The modules prescribed for the degree are listed below (128C)*(numbers in parentheses refer to credits)*:

(a) Rural Resource Management

Note:
Students who first registered before 2000 should refer to the 1999 Handbook of the Faculty of Science and Agriculture (Volume 2).

Prerequisites: see AgB1.
Core modules: RRMG311 (16), 312 (16).
Capstone modules: RRMG350 (32)
Elective modules: 64C at level 3 from THREE of the following streams:

1. **Small business management** CRMS310 (16), 330 (16), 340 (16), 350 (8), 360 (8)
2. **Nutrition and health** NUTR322 (8), 360 (16), 370 (8)
3. **Crops, horticulture and forestry** AGPS301 (16), 302 (8), 303 (8), 305 (16), 306 (16), 307 (16); FORT330 (16), 340 (16); PPTH320 (8).
4. **Range and animals** GRAS312 (24)
5. **Water and soil management** AGPS301 (16); HYDRO312 (16), 322 (16)
6. **Regional planing and GIS** GEOG311 (16), 315 (16), 322 (16), 324 (8) (Note: *for this option GEOG222 is compulsory*).

(b) Sports Turf Management

Prerequisites: see AgB1.
Core modules: AGPS301 (16), 302 (8), 305 (16); SSCI320 (16), 351 (16); STMA342 (16).
Capstone modules: STMA340 (16), 344 (8).
Elective modules: 16C from BOTY301 (16); BMET210 (16).

AgB6 Exclusions

Candidates who have not completed all the requirements for the qualification within four semesters after first registering for the qualification may be refused readmission.

Postgraduate Diploma in Rural Resource Management

AgRp1 Eligibility

The following candidates will be eligible to register for the Postgraduate Diploma in Rural Resource Management:

(a) Bachelor of Agriculture (Rural Resource Management) of the University who has obtained a credit-weighted average of at least 60% in the final year of study for that qualification, or a graduate of another recognised University who has been admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the diploma.

AgRp2 Applicability of other rules

Rules SA1 to SA18 for the Faculty of Science and Agriculture shall be of effect for the Post Graduate Diploma in Rural Resource Management.

AgRp3 Structure of the diploma

In order to complete the diploma, a candidate shall obtain not less than 128 credits, and shall complete all modules prescribed in Rule AgRp4 over two successive semesters. Candidates studying part-time must complete the diploma within four semesters.

AgRp4 Curriculum

The modules prescribed for the diploma are listed below (128C)*(numbers in parentheses refer to credits)*:

Core modules: RRMG700 (16), 711 (16), 712 (16).

Capstone modules: RRMG720 (64).

Elective modules: 16C at level 7 from the Faculty of Science and Agriculture selected in consultation with Programme Director and approved by the Dean.

Degree of Master of Agriculture (Rural Resource Management)

NOT OFFERED IN 2000

AgRm1 Eligibility

The following candidates shall be eligible to register for the Degree of Master of Agriculture (Rural Resource Management):

(a) any holder of the Postgraduate Diploma in Rural Resource Management of the University, or a diplomate or graduate of another recognised University who has been admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

AgRm2 Applicability of other rules

Rules SA1 to SA18 and SM3 to SM11, for the Faculty of Science and Agriculture and Common Rule R30(3) shall be of effect for the degree of Master of Agriculture (Rural Resource Management).

AgRm3 Curriculum

In order to complete the degree a candidate shall complete the modules prescribed below (128C)*(numbers in parentheses refer to credits)*:

Core modules: RRMG800 (16), [811 (32) or 812 (32)].

Capstone modules: RRMG820 (80).

Degree of Bachelor of Science in Human Nutrition

AgN1 Applicability of other rules

Rules SA1 to SA17, for the Faculty of Science and Agriculture shall, where applicable, be of effect for the Bachelor of Science in Human Nutrition.

AgN2 Structure of the qualification

In order to complete the degree a candidate shall obtain not less than 390 credits and shall complete the modules as prescribed in Rule AgN3.

AgN3 Curriculum

The modules prescribed for the degree are listed below (390C)*(numbers in parentheses refer to credits)*:

Foundational modules: AGRI210 (1), 220 (1); BIOS101 (16); CHEM 111 (16), 112 (16).

Core modules: BCHM213 (8), 222 (8); DIET237 (16), 310 (4); FSCI120 (16); FSMT318 (16); HPHY112 (8), 252 (16), 254 (16); MICRO210 (16); NUTR114 (16), 118 (16), 214 (16), 342 (16), 343 (16), 350 (16); STAT101 (8); ZULU110 (16).

*Elective modules:*PSOC1SA1 (16) or CMDV111(16); [GEOG124 (8) and CRMS130 (8)] or PSOC1SB2 (16); [PSOC2SD1 (16) and PSYCH203 (16)] or [CRMS310 (16) and 330 (16)]; 16C at level 3 selected in consultation with Programme Director and approved by the Dean.

Postgraduate Diploma in Community Nutrition

AgNc1 Eligibility

The following candidates shall be eligible to register for the Postgraduate Diploma in Community

Nutrition:

(a) Bachelor of Science in Human Nutrition of the University or a graduate of any other recognised university who has been admitted to the status thereof; or

(b) a person admitted by permission of the Senate under Common Rule R33 to register for the diploma.

AgNc2 Applicability of other rules

Rules SA1 to SA18 for the Faculty of Science and Agriculture shall, where applicable, be of effect for the Postgraduate Diploma in Community Nutrition.

AgNc3 Structure of the qualification

In order to complete the diploma, a candidate shall obtain not less than 132 credits and shall complete all modules prescribed in Rule AgNc4 over two successive semesters. Candidates studying part-time must complete the diploma within four semesters.

AgNc4 Curriculum

The modules described for the diploma are listed below (132C)*(numbers in parentheses refer to credits)*:

Core modules: DIET310 (4); PPSC7PP1 (32).

Capstone modules: NUTR710 (32), 730 (8), 740 (24).

Elective modules: [NUTR343 (16) and 720 (16)] or [CRMS310 (16) and 710 (16)].

Degree of Bachelor of Science in Dietetics

AgDb1 Applicability of other rules.

Rules SA1 to SA17 for the Faculty of Science and Agriculture shall, where applicable, be of effect for the degree of Bachelor of Science in Dietetics.

AgDb2 Structure of the degree

In order to complete the degree a candidate shall obtain not less than 390 credits and shall complete the modules as prescribed in Rule AgDb3.

AgDb3 Curriculum

The modules prescribed for the degree are listed below (390C)*(numbers in parentheses refer to credits)*:

Foundational modules: AGRI210 (1), 220 (1); BIOS101 (16); CHEM 111 (16), 112 (16); PHYS121 (16), 122 (8).

Core modules: BCHM213 (16), 222 (8), 231 (8); DIET237 (16), 310 (4), 320 (16), 321 (8), 322 (16), 323 (8), 351 (8); FSCI120 (16), 210 (16); FSMT318 (16), 322 (16); HPHY112 (8), 252 (16), 254 (16); MICRO210 (16); NUTR114 (16), 118 (16), 214 (16), 342 (16), 343 (16); STAT101 (8).

Capstone modules: None.

Elective modules: None.

Note: Candidates for the degree shall register, in the second year of study, in terms of Section 61(1)(1)(iv A) of the Medical, Dental and Supplementary Health Service Professions Act (Act 56 of 1974), with the South African Medical and Dental Council.

Postgraduate Diploma in Dietetics

AgP1 Eligibility

The following candidates shall be eligible to register for the Postgraduate Diploma in Dietetics:

(a) a Bachelor of Science in Dietetics of the University or a graduate of another recognised university who has been admitted to status thereof; or

(b) a person admitted by permission of the Senate under Common Rule R33 to register for the diploma.

Note:
Candidates shall submit a certificate of registration with the South African Medical and Dental Council when applying for admission into the Postgraduate Diploma in Dietetics.

AgP2 Applicability of other rules

Rules SA1 to SA18 and SH2 to SH9 for the Faculty of Science and Agriculture shall, where applicable, be of effect for the Postgraduate Diploma in Dietetics.

AgP3 Curriculum

To qualify for the diploma, candidates shall complete a programme of training of eleven months duration at accredited institutions and community placements in KwaZulu/Natal recognised by the University and complete the modules listed below (132C)*(numbers in parentheses refer to credits)*:

*Core modules:*DIET310 (4).

*Capstone modules:*DIET710 (48); FSMT710 (24); NUTR710 (32), 740 (24).

AgP4 Repeating of failed modules

A candidate who has attained a mark of at least 40% for all but two modules and marks in excess of 50% for the remaining modules shall be permitted to repeat these modules (each module once only) which must be completed in the following two semesters.

AgP5 Exclusion

Candidates who:

(a) have failed to achieve a subminimum of 40% in any one of the practical modules or field placements, or have failed to achieve a subminimum of 40% in any of the final or supplementary examinations; or

(b) have obtained less than 50% on repeating a practical module or final examination; or

(c) have failed more than two written, practical or field placement modules shall be excluded.

Degree of Bachelor of Science in Consumer Studies Honours

AgCh1 Eligibility

The following candidates shall be eligible to register for the degree of Bachelor of Science in Consumer Studies Honours provided they have:

(a) previously satisfied the requirements for the degree of Bachelor of Science in Home Economics, in the University or been admitted to the status thereof; or

(b) been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

AgCh2 Applicability of other rules

Rules SA1 to SA17 and SH2 to SH9 for the Faculty of Science and Agriculture and Common Rule R30(3) shall be of effect, where applicable, for the degrees of Bachelor of Science in Consumer Studies Honours.

AgCh3 Curriculum

In order to complete the qualifications a candidate shall complete the modules as prescribed below (136C)*(numbers in parentheses refer to credits)*:

Core modules: CRMS720 (8).

Capstone modules: CRMS730 (24).

Elective modules: 32 C from CRMS740 (32), 741 (32), 744 (32), 745 (32), 750 (32); FPRO710 (32), 720 (32), 751 (32); FSMT710 (32); NUTR710 (32), 720 (32) or other modules at level 7 selected in consultation with Programme Director and approved by the Dean.

AgCh4 Supplementary examination

Notwithstanding Rule SH9, a candidate who has failed any module with a mark that is not less than 40% but who has obtained a credit-weighted average mark of at least 50% for the degree shall be permitted to write a supplementary examination in such a module and failure of such a module shall not be condoned.

Degree of Bachelor of Science in Dietetics Honours

Degree of Bachelor of Science in Human Nutrition Honours

AgDh1 Eligibility

The following candidates shall be eligible to register for the degree of Bachelor of Science in Dietetics Honours and Human Nutrition Honours provided they have:

(a) previously satisfied the requirements for the degree of Bachelor of Science in Dietetics and/or Human Nutrition, in the University or been admitted to the status thereof; or

(b) been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

AgDh2 Applicability of other rules

Rules SA1 to SA17 and SH2 to SH9 for the Faculty of Science and Agriculture and Common Rule R30(3) shall be of effect, where applicable, for the degrees of Bachelor of Science in Consumer Studies Honours.

AgDh3 Curriculum

In order to complete the qualifications a candidate shall complete the modules as prescribed below (136C)*(numbers in parentheses refer to credits)*:

(a) Dietetics Honours

*Core modules:*DIET720 (8), 790 (32).

Capstone modules: None.

*Elective modules:*DIET750 (32); FSMT750(32); NUTR750 (32), 760 (32) or other relevant 32C modules at level 7 selected in consultation with the Programme Director and approved by the Dean.

(b) Human Nutrition Honours

*Core modules:*DIET720 (8), NUTR790 (32).

Capstone modules: None.

*Elective modules:*NUTR750 (32), 760 (32); PPSC7PP1 (32) or other relevant 32C modules at level 7 selected in consultation with the Programme Director and approved by the Dean.

Degree of Master of Science in Consumer Studies

AgCM1 Eligibility

The following candidates shall be eligible to register for the degree of Master of Science in Consumer Studies:

(a) a Bachelor of Science in Consumer Studies Honours, of the University or a graduate of another recognised university who has been admitted to status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

AgCM2 Applicability of other rules

Rules SA1 to SA18 and SM3 to SM11, for the Faculty of Science and Agriculture, and Common Rule R30(3) shall be of effect, where applicable, for the degree of Master of Science in Consumer Studies. In addition to the above candidates may also be required to complete AGRI210 (1) and 220 (1).

Degree of Master of Science in Dietetics and

Degree of Master of Science in Human Nutrition

AgDM1 Eligibility

The following candidates shall be eligible to register for the degrees of Master of Science in Dietetics or Human Nutrition:

(a) a Bachelor of Science in Dietetics or Human Nutrition Honours, of the University or a graduate of another recognised university who has been admitted to status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

AgDM2 Applicability of other rules

Rules SA1 to SA18 and SM3 to SM11, for the Faculty of Science and Agriculture, and Common Rule R30(3) shall be of effect, where applicable, for the degrees of Master of Science in Dietetics or Human Nutrition. In addition to the above, candidates may also be required to complete AGRI210 (1) and 220 (1).

Postgraduate Diploma of Food Security

AgF1 Eligibility

The following candidates shall be eligible to register for the Postgraduate Diploma in Food Security:

(a) any holder of a relevant Bachelors Degree of the University or a graduate of another recognised university admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the diploma.

Note:

The relevance of the qualifications offered shall be determined by the Board of the Faculty.

AgF2 Applicability of other rules

Rules SA1 to SA18 and SH2 to SH9 for the Faculty of Science and Agriculture shall, where applicable, be of effect for the Postgraduate Diploma in Food Security.

AgF3 Curriculum

In order to complete the diploma a candidate shall obtain at least 128 credits and complete the modules prescribed below (128C)*(numbers in parentheses refer to credits)*:

Core modules: ENDV811 (4), [ENDV813 (4) or CMRS720 (8)]; FDSC700 (16); POLS703 (32); and 16C from [FDSC720 (8), 724 (8), 730 (8)].

Capstone modules: FDSC701 (40) or 711 (40).

Elective modules: 12 or 16C from any modules in Science and Agriculture selected in consultation with Programme Director and approved by the Dean.

Advanced Postgraduate Diploma in Food Security

AgFa1 Eligibility

The following candidates shall be eligible to register for the Advanced Postgraduate Diploma in Food Security:

(a) any holder of the Postgraduate Diploma in Food Security or a relevant Honours or four-year Bachelors degree of the University or a graduate of a recognised university admitted to the status thereof; or

(b) a person who has been admitted by permission of the Senate in terms of Rule R33 as a candidate for the diploma.

AgFa2 Applicability of other rules

Rules SA1 to SA18 and SM4 to SM7, SM9 and SM11 for the Faculty of Science and Agriculture and Common Rule R30(3) shall, where applicable, be of effect for the Advanced Postgraduate Diploma in Food Security.

AgFa3 Curriculum

In order to complete the diploma a candidate shall complete the modules as prescribed below (128C)*(numbers in parentheses refer to credits)*:

Core modules: FDSC700 (16); 840 (16), 860 (16).

Capstone modules: FDSC801 (64).

Elective modules: 32C from levels 7 or 8 selected in consultation with Programme Director and approved by the Dean.

Degree of Master of Food Security

AgFM1 Eligibility

(1) The following candidates shall be eligible to register for the Degree of Master of Food Security:

(a) any holder of the Postgraduate Diploma in Food Security or a relevant Honours or four-year Bachelors degree of the University or a graduate of another recognised university admitted to the status thereof; or

(b) a candidate who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

AgFM2 Applicability of other rules

Rules SA1 to SA18 and SM4 to SM7, SM9, SM11 and SM11 for the Faculty of Science and Agriculture and Common Rule R30(3) shall, where applicable, be of effect for the Degree of Master of Food Security.

AgFM3 Curriculum

In order to complete the qualification a candidate shall complete the modules prescribed below (128C)*(numbers in parentheses refer to credits)*:

Core modules: FDSC700 (16); 840 (16), 860 (16).

Capstone modules: FDSC811 (64).

Elective modules: 32C from levels 7 or 8 selected in consultation with Programme Director and approved by the Dean.

Ag FM4 Supplementary examinations

A candidate who has failed one course-work module with a mark of at least 40% may write a supplementary examination for the module provided the overall average for the remaining modules is greater than 50% and failure of such a module shall not be condoned.

Degree of Doctor of Philosophy

SD1 Eligibility

The following candidates shall be eligible to register for the degree of Doctor of Philosophy in the Faculty:

(a) any Master graduate in areas of specialisation in the Faculty of Science and Agriculture of the University, or a graduate of another university who has been admitted to the status thereof;

(b) any graduate with an Honours Degree or Bachelor of Science in Agriculture, in areas of specialisation, in the Faculty of Science and Agriculture of the University, or a graduate of another recognized university who has been admitted to the status thereof, and whom the Senate has exempted from the Master's examination; or

(c) a person who has been admitted by permission of the Senate in terms of Common Rule R33 as a candidate for the degree.

SD2 Area of study

A candidate for the degree shall be required to pursue an approved course of special study or research under the guidance of a supervisor or supervisors appointed by the Senate.

SD3 Additional requirements

The Senate may require candidates for the degree to take modules in any prescribed subject in addition to those which are prescribed for the degree.

SD4 Applicability of other rules

A candidate for the degree shall further comply with Common Rules D1 to D14 inclusive, provided that the number of copies of the thesis, referred to in Rule D9, shall be six.

Degree of Doctor of Science

Degree of Doctor of Science in Agriculture

SS1 Eligibility

The following candidates shall be eligible to register for the degree:

(1) Doctor of Science:

(a) any Bachelor of Science Honours of the University of not less than ten years' standing; or

(b) a graduate of another recognised university who has been admitted to the status thereof.

(2) Doctor of Science in Agriculture:

(a) a Doctor of Philosophy in the disciplines of Agriculture of the University of at least two years' standing or a graduate of another recognised university who has been admitted to the status thereof;

(b) a Master of Science in Agriculture of the University of at least four years' standing or a graduate of any other recognised university who has been admitted to the status thereof; or

(c) a Bachelor of Science in Agriculture or a Bachelor of Science in Agriculture Honours of the University of not less than ten years' standing or a graduate of another recognised university who has been admitted to the status thereof.

SS2 Applicability of other rules

Rules SA1 to SA18 for the Faculty of Science and Agriculture, the Common Rules for the degree of Doctor of Philosophy in all Faculties, D2, D3, D7 to D9, D11, D13 and D14 shall also be of effect for the degree of Doctor of Science where applicable.

SS3 Application

An intending candidate for the degree shall first submit in writing, for the approval of the Board of the Faculty, a statement of the subject and scope of the work to be presented for the degree and evidence of their relevant academic qualifications and published research.

SS4 Composition of the thesis

(1) A candidate for the degree shall be required to present six bound copies of a thesis or published work which shall be a record of original and independent research carried out by the candidate on some subject falling within the recognised disciplines of Agriculture or Science, represented in the Faculty of Science and Agriculture.

(2) A thesis may include or consist wholly of copies of publications by the candidate (whether of single or multiple authorship), in which case it should contain a commentary relating the publications to the field of research covered by the thesis.

(3) Candidates may also submit any relevant books of which they are author or co-author, with a statement of which of these, if any, they desire to be examined.

SS5 Standard

No thesis or published work shall be accepted which is not a work of distinction in its field and a substantial contribution to the advancement of learning.

SS6 Recognition of the University

A thesis accepted by the University and subsequently published as a monograph, shall bear the inscription: "*Thesis approved for the degree of Doctor of Science of the University of Natal*".

SYLLABI

Syllabi for modules of the Faculty of Human Sciences are detailed at the end of this section. Students should note that, as a result of restructuring, not all modules in this syllabus section will be on offer in 2000. These are indicated at the end of the syllabus where applicable.

GENERAL

1. The name of each module is followed, in parentheses, by a computer code of seven symbols. This comprises one letter to identify the centre (P= Pietermaritzburg), two letters identifying the discipline or area of specialization, one numeral to indicate the module's level, two letters to describe the module, and one symbol to indicate when the course is normally taught and examined (1 = first semester, 2 = second semester, B = both semesters, M= either semester, W= winter school, Y= year long).
2. In the parentheses after the computer code, the approximate number of *notional study hours* (NSH) allocated to lectures (L), tutorials (T), practicals & field trips (P), seminars (S), own (self) study, resource-based learning & assignments (H), revision (R), internships & field placements (F), Assessment (A), the weeks' duration (W), and the credit points (C) applicable to the module are given **(NSH is the approximate number of hours that it is expected that the average student will need to complete the components of the module. Note that the notional nature of the notional study hours on which credits are based is likely to be intensified for research degrees, where the time spent on research can be very idiosyncratic, depending on the individual concerned. Students should understand that the credits (and therefore notional study hours) indicated here are likely to be the minimum required for research degrees)**.

FOUNDATION COURSES

1. These courses are intended for candidates whose performance in the matriculation or equivalent examination is not of a sufficiently high standard to allow them admission to level-1 courses, but who have been admitted to a special programme leading to completion of the BSc in not less than four years, under the provisions of Rule SA2(2).
2. These are year-long courses which focus particularly on the development of thinking, communication and practical skills within the context of a specific discipline.
3. Details of individual Foundation Courses are to be found under the following subject headings: Biology, Chemistry, Mathematics and Physics.

Agribusiness

Offered in the School of Agricultural Sciences & Agribusiness

AGBU790 — **Research Project & Seminars**
(PBA7ABY) (0L-0T-0P-20S-380H-0R-0F-0A-40C-26W)
Corequisites: [AGEC740 and AGPS701] or [ANSI780 or FPRO710 or WILD791].

Aim: To equip students with the ability and confidence to: (a) Critically review literature, prepare their own written papers, and to formally present and defend their work, and (b) to integrate theory and techniques covered in earlier modules by identifying a relevant research problem, developing models to test hypotheses, collecting and analysing data, interpreting results, making recommendations and preparing a comprehensive research report.

Content: This module integrates topics covered in earlier modules.

Practicals: None.

Assessment: Presentation of two written papers (each weighted 25% of the overall mark) and submission of a research report (weighted 50% of the overall mark).

Agricultural Economics

Offered in the School of Agricultural Sciences & Agribusiness

AGEC110 – Agricultural Financial Management

(PAE1FM1) (39L-0T-39P-0S-56H-20R-0F-6A-16C-13W)

Pre- or Corequisites: None.

Aim: To provide an introduction to accounting and financial planning and it's application to agriculture.

Content: Farm accounting; Analysis of farm records; Budgeting techniques; Evaluation of long-term investment.

Practicals: Problems & case studies in topics listed above.

Assessment: 2 tests; 1 exam.

AGEC120 – Agricultural Marketing

(PAE1AM2) (35L-4T-0P-0S-91H-25R-0F-5A-16C-13W)

Pre- or Corequisites: None.

Aim: To provide an introduction to basic economic theory and it's application to agriculture.

Content: Basic concepts in economics; Theory of demand and supply; Price analysis; Marketing efficiency; Agricultural Cooperatives; Government intervention in agricultural markets.

Practicals: None.

Assessment: 2 tests; 1 exam.

AGEC210 – Introduction to Agricultural Economics

(PAE2IA1) (29L-0T-39P-0S-67H-20R-0F-6A-16C-13W)

Pre- or Corequisites: None.

Aim: (a) To understand the basic economic principles of production, market demand and supply and how these principles can assist farm decision-makers in making improved decisions, and (b) to learn basic accounting principles to develop a sound farm record-keeping system.

Content: Market demand for agricultural products. Market supply of agricultural products. Price movements. The firm (farm) as a decision-making unit. Production functions of the farm business. Determining the optimum level of production. Farm costs of production. Agricultural input substitution. Decisions on the choice of agricultural products.

Practicals: Elementary farm accounting.

Assessment: Examination (weighted 67% of the overall mark) and two class tests (each weighted 16.5% of the overall mark).

AGEC220 – Farm Management
(PAE2MF1) (39L-0T-39P-0S-58H-20R-0F-5A-16C-13W)
Corequisites: [AGEC210 or ECON110, 120].

Aim: To understand the economic and management principles which guide the practice of managing farms.

Content: Farm management - definition. planning environment, managerial functions and management by objectives. Key economic principles and planning concepts. Farm information systems, data analysis and budgeting. Organisation of capital. Farm machinery management. Land economics. Labour management.

Practicals: Application of economic principles to farming, analysis of farm records, budgeting, capital use and machinery decisions.

Assessment: Examination (weighted 67% of the overall mark) and two class tests (each weighted 16.5% of overall mark).

AGEC240 – Applied Farm Financial Management
(PAE2FF2) (20L-0T-39P-0S-8H-10R-0F-4A-8C-13W)
Prerequisites: AGEC220 (Bioresources Engineering students are exempt).
Aim: To learn and apply the principles and tools of finance to managerial problems in agriculture.
Content: Farm financial management objectives. Information flows in farm financial management. Financial leverage, farm firm growth and liquidity. Risk management in agriculture. Impact of time and risk on managerial decisions. Farm land values. Estate duty and the farmer.
Practicals: Risk analysis, information flows, farm firm growth model, capital budgeting and discounted cash flow problems.
Assessment: Examination (weighted 67% of the overall mark) and one class test (weighted 33% of the overall mark).

AGEC270 – Agribusiness Finance & Marketing
(PAE2AM2) (39L-0T-39P-0S-57H-20R-0F-5A-16C-13W)
Corequisites: [AGEC220 or PMAN210, 220].
Aim: (a)To learn and apply the principles and tools of finance to managerial problems in agriculture, (b) to study the appropriate organisation and functioning of food marketing systems, and (c) to study the crafting and implementation of strategy for food and agricultural businesses.
Content: Farm financial management objectives. Information flows in farm financial management. Financial leverage, farm firm growth and liquidity. Risk management in agriculture. Impact of time and risk on managerial decisions. Farm land values. Estate duty and the farmer. Scope of agricultural marketing. Food marketing margins and marketing efficiency. Agricultural and food business strategy. Agricultural cooperatives. International trade in agricultural commodities. Commodity futures markets.
Practicals: Risk analysis, information flows, farm firm growth model, capital budgeting and discounted cash flow problems, agribusiness case studies.
Assessment: Examination (weighted 67% of the overall mark) and two class tests (each weighted 15.5% of the overall mark).

AGEC290 – Applied Environmental Economics
(PAE3AE2) (29L-0T-0P-0S-37H-10R-0F-5A-8C-13W)
Prerequisites: [AGEC210 or ECON110, 120].

Aim: To apply economic principles to examine topical environmental issues. Economic principles are used to promote conservation of environmental resources and promote efficient and equitable use.

Content: Property rights, incentives, information problems, transaction costs and institutions. Markets for environmental resources such as land, water, wildlife, etc.

Practicals: None.

Assessment: Examination (weighted 67% of the overall mark) + two class tests (each weighted 16.5% of the overall mark).

AGEC370 – Production Economics & Price Analysis
(PAE3EP2) (39L-0T-39P-0S-58H-20R-0F-5A-16C-13W)
Corequisites: [AGEC270 or ECON210].

Aim: (a) To understand the principles of production economics and to apply these principles when choosing farm enterprises, and (b) to quantify demand and supply relationships in agricultural markets, and to measure the effects of policies which distort these markets.

Content: Empirical farm-level production functions. Cost minimising and profit maximising criteria. Introduction to linear programming. Farm planning under risk.. Market demand and supply functions in agriculture. Relationships between price, income and cross-price elasticities. Empirical price analysis. Social cost of government intervention in agricultural markets. Policy Analysis Matrix.

Practicals: Application of production and cost functions to agriculture. Farm planning with linear programming. Regression analysis of demand functions.

Assessment: Examination (weighted 67% of the overall mark) and two class tests (each weighted 16.5% of the overall mark).

AGEC380 – Agricultural Development
(PAE3AD1) (39L-0T-8P-0S-89H-20R-0F-5A-16C-13W)
Corequisites: [AGEC220 or ECON210, 220].

Aim: (a) To Identify constraints which limit agricultural and economic growth in less-developed regions, and to (b) distinguishing policies that will alleviate these binding constraints.

Content: Characteristics of developing regions. Role of agriculture in economic development. Theories of economic and agricultural growth. Adoption of technology. Impact of property rights (land tenure), credit, risk and information on technology adoption. Demand for children.

Practicals: None.

Assessment: Examination (weighted 67% of the overall mark) and two class tests (each weighted 16.5% of the overall mark).

AGEC381 – Agricultural Development Policy
(PAE3DP1) (20L-0T-8P-0S-38H-10R-0F-4A-8C-13W)
Corequisites: [AGEC220 or ECON110 or 120].

Aim: (a) To Identify constraints which limit agricultural and economic growth in less developed regions, and to (b) distinguish policies that will alleviate these binding constraints.

Content: Adoption of technology. Impact of property rights (land tenure), credit, risk and information on technology adoption. Demand for children.

Practicals: None.

Assessment: Examination (weighted 67% of the overall mark) and one class test (weighted 33% of the overall mark).

AGEC730 – Applied Linear Programming
(PAE7OR1) (20L-0T-39P-0S-12H-5R-0F-5A-8C-13W)
Prerequisites: [AGEC370 or MATH110, 120].

Aim: (a) To identify and formulate a farm problem as a linear programming problem, and (b) to show the practical use of linear programming in a variety of problem situations, largely drawing on agricultural examples.

Content: Capital (cash) flow. Forage planning. Feeding problems where cost is minimised and profit maximised. Incorporation of negative- sloped product demand. Risk analysis. Integer programming.

Practicals: Using the computer to solve linear programming problems in farm planning and feed ration formulation, transport and processing, subsistence farming and agricultural policy.

Assessment: Examination (weighted 60% in the overall mark), two class tests (each weighted 6.6% in the overall mark) and a project (weighted 26.4% in the overall mark).

AGEC740 – Agricultural Policy Analysis
(PAE7PA2) (39L-0T-0P-0S-97H-20R-0F-5A-16C-13W)
Aim: To provide insight into the application of economic theory to a wide range of policy issues in South African agriculture. This module contributes towards an understanding of the macro-economic situation facing South African agriculture.

Content: Resource market policies. Demand for resources. Agricultural land. Agricultural risk and crop insurance. Private versus collective choice. Recreation, pollution and conservation. Product market policies. Demand and marketing policies. Trade. Policy Analysis Matrix.

Practicals: None.

Assessment: Examination (weighted 67% of the overall mark), two class tests (each weighted 16.5% of the overall mark).

AGEC790 – Research Project & Seminars
(PAE7PRY) (0L-0T-0P-20S-380H-0R-0F-0A-40C-26W)
Pre- or Corequisites: This course is intended for students majoring in Agricultural Economics, and BAgricMgtHons students (Commerce Option).

Aim: To equip students with the ability and confidence to: (a) Critically review literature, prepare their own written papers, and to formally present and defend their work, and (b) to integrate theory and techniques covered in earlier modules by identifying a relevant research problem, developing models to test hypotheses, collecting and analysing data, interpreting results, making recommendations and preparing a comprehensive research report.

Content: This module integrates topics covered in earlier modules.

Practicals: None.

Assessment: Presentation of two written papers (each weighted 25% of the overall mark) and submission of a research report (weighted 50% of the overall mark).

AGEC791 – Management Research Project & Seminar
(PAE7RPY) (0L-0T-0P-20S-300H-0R-0F-0A-32C-26W)

Pre- or Corequisites: This course is available only to BAgricMgtHons students (Agricultural Option).

Aim: To equip students with the ability and confidence to: (a) Critically review literature, prepare their own written paper and to formally present and defend their work, and (b) to integrate theory and techniques covered in earlier modules by identifying a relevant research problem, developing models to test hypotheses, collecting and analysing data, interpreting results, making recommendations and preparing a comprehensive research report.

Content: This module integrates topics covered in earlier modules.

Practicals: None.

Assessment: Presentation of one written paper (weighted 33% of the overall mark) and submission of a research report (weighted 67% of the overall mark).

AGEC801 – Advanced Farm & Agribusiness Management
(PAE8FM1) (0L-20T-0P-0S-30H-27R-0F-3A-8C-13W)

Pre- or Corequisites: Registration for a MScAgric.

Aim: To provide the learner with a thorough insight into the most important issues facing farm and agribusiness managers. This module focuses on micro-economic, macro-economic and strategy issues.

Content: Farm labour, machinery and land economics. Economies of farm size. Efficiency concepts. Risk sources in farming and managerial responses to risk. Inflation and farm financial stress. Information economics. Competitive strategy and competitive advantage in diversified and non-diversified firms. Global strategies. Strategy implementation. Agribusiness case studies.

Practicals: None.

Assessment: One three-hour examination (70%), one case study presentation (30%).

AGEC802 – Advanced Agricultural Price Analysis
(PAE8PA1) (20L-0T-0P-0S-30H-27R-0F-3A-8C-13W)

Pre- or Corequisites: Registration for a MScAgric.

Aim: To provide insight to the application and analysis of price theory in product and resource markets with specific reference to South African Agriculture. This module focusses on macro-economic issues.

Content: Economics of free markets (Hayek, Buchanan, Coase). Water markets. Supply and risk. Demand for resources. Agriculture and the State.

Practicals: None.

Assessment: One three-hour examination (100% of the overall mark).

AGEC803 – Applied Econometrics
(PAE8EC1) (0L-39T-0P-0S-82H-36R-0F-3A-16C-13W)

Pre- or Corequisites: Registration for a MScAgric.

Aim: To enable students to apply econometric models and techniques to a wide range of empirical problems in the fields of economic policy, price analysis, marketing, farm and agribusiness management.

Content: Multicollinearity, autocorrelation and specification bias in linear regression models. Dummy variables and tests of linear restrictions.

Lag and autoregressive models. Simultaneous equations models. Input-Output models. Stochastic dominance. Principal components. Linear discriminant, logit and probit models. Cointegration.

Practicals: Computer applications to econometric data.

Assessment: Examination (weighted 70% in the overall mark). Practical assignments for class mark (weighted 30% of the overall mark).

AGEC804 – Postgraduate Seminars
(PAE8PSY) (0L-0T-0P-40S-200H-0R-0F-0A-24C-26W)
Pre- or Corequisites: Registration for a MScAgric.

Aim: The purpose of the module is to equip students with the ability and confidence to critically review literature, prepare their own written papers, and to formally present and defend their work (three seminars).

Content: This module integrates topics covered in earlier modules.

Practicals: None.
Assessment: Three seminars weighted equally in the overall mark.

Agricultural Engineering

Offered in the School of Bioresources Engineering & Environmental Hydrology

AGEN216 – Agricultural Mechanisation
(PNA2MAI) (20L-7T-7P-0S-30H-12R-0F-4A-8C-13W)
Pre- or Corequisites: None.

Aim: To provide students with knowledge of the principles of operation and management of agricultural machines and their application.

Content: Farm Power: spark ignition and compression ignition internal combustion engines; power transmission; tractors, traction and tractor operation. Agricultural Machinery: implements and machines; principles of operation, adjustments and use. Farm Power and Machinery Management: power, machinery performance; cost analysis; mechanisation planning and equipment selection.

Practicals: Engines, Fuel injection systems, The power train, Ploughing, Implements and Mechanisation Planning.

Assessment: Two tests, Practicals/research project, One tutorial (self assessment), and Exam.

AGEN225 – Soil & Water Conservation Systems
(PNA2SC2) (39L-10T-18P-0S-68H-20R-0F-5A-16C-13W)
Pre- or Corequisites: None.

Aim: To provide students with an understanding of the principles of soil and water conservation and their application for land use development. This module stresses the importance of systems analysis and design in addressing erosion prevention, water control/harvesting and land rehabilitation. The primary mechanism of soil and water conservation is the control and management of water flowing across the land surface.

Content: Soil and Water Conservation Principles and Processes: Water flow, erosion, land degradation and rehabilitation. Surveying and Positioning Systems: Tachiometry, contours, global positioning systems. Design of Soil and Water Conservation Systems: Agricultural field layout, reclamation of a degraded area.

Practicals: Surveying and field trip for illustrating and investigating erosion prevention devices and for analysing degraded land areas.

Assessment: Written examination, two written tests and design project(s).

Agricultural Plant Sciences

Offered in the School of Agricultural Sciences & Agribusiness

AGPS200 – Introduction to Plant Production
(PSA2IP2) (39L-0T-43P-0S-60H-14R-0F-4A-16C-13W)

Pre- or Corequisites: Students are expected to have a basic knowledge of general biology.

Aim: To provide knowledge of the principles of agricultural plant production locally and globally.

Content: Scientific principles pertinent to plant development and management, *inter alia*, plant physiology, plant pathology, plant genetics, plant nutrition , plant taxonomy, micro and macro climates and agricultural development.

Practicals: 1 research project on a plant production related subject, plant identification practice and 1 field trip.

Assessment: 2 theory tests, 2 project write-ups and 1 final exam.

AGPS210 – Sustainable Community Agriculture
(PSA2SA1) (9L-0T-4P-0S-46H-20R-0F-2A-8C-13W)

Corequisites: FPRO310.

Aim: This course introduces students to a plant production orientation, ie. effects of environment on plant growth, effects of cropping practices on plant growth, and effects of such practices on the environment. Sustainable agriculture is discussed with respect to plant growth, production, and effects on the environment so that students will be able to do elementary problem-solving regarding community gardening and subsistence agriculture.

Content: Plant growth in relation to light, air, water, nutrients, soil. Soil and the use of fertilisers. Green revolution in developing countries. Sustainable agriculture.

Practicals: Field trip.

Assessment: Exam question to assess knowledge and understanding of plant production concepts. Writing assignment to assess ability to relate concepts together and express views of sustainability and environment (the latter will give an indication of concern for—but cannot validly test this).

AGPS301 – Irrigation Design & Management
(PSA3DM1) (36L-6T-46P-0S-44H-24R-0F-5A-16C-13W)

Pre- or Corequisites: None.

Aim: To teach students the principles of irrigation design and management.

Content: Criteria for selection of land and water for irrigation; availability of soil water to plants; measurement of soil water; water uptake by plants; crop water requirements and response to water stress; design of flood, sprinkler and micro irrigation systems; pumps and flow of water in pipes and channels; techniques of scheduling irrigation; negative impacts of irrigation on soil and water resources.

Practicals: Field excursions to irrigation schemes; application of theory to designing an irrigation scheme with associated management recommendations; tutorial exercises on irrigation.

Assessment: 2 theory tests; irrigation design report; tutorials; 1 3h theory exam.

AGPS302 – Weed Science

(PSA3WS2) (18L-0T-18P-0S-30H-10R-0F-4A-8C-13W)

Prerequisites: AGPS200, 305 with a minimum mark of 50%.

Aim: To provide a working knowledge of how herbicides work and how to use them.

Content: Mode of action of the main classes of herbicides and plant growth regulators, chemical weed control in field crops and horticulture, impact of herbicides on the environment, management of herbicide resistant weeds, patenting and registration of herbicides and plant growth regulators.

Practicals: Hands on experience in working with herbicides in selected crop/weed situations, calibration of herbicide applicators, evaluation of performance of herbicides and plant growth regulators, assessment of herbicide damage claims and safety procedures in the handling of agrochemicals.

Assessment: Two theory tests, practical skills evaluation and 1 final examination.

AGPS303 – Resource Assessment

(PSA3RA1) (18L-0T-18P-0S-30H-10R-0F-4A-8C-13W)

Pre- or Corequisites: None.

Aim: To provide students with the necessary skills to assess the potential of natural, human, and financial resources pertaining to a farm.

Content: Techniques of assessment, mapping and interpretation of topography, climate soils, water, vegetation, land use, management and financial resources.

Practicals: Air photo interpretation, mapping and resource data interpretation.

Assessment: Two theory tests, practical exercises, one examination.

AGPS304 – Greenhouse Management

(PSA3MG2) (18L-0T-14P-0S-28H-16R-0F-4A-8C-13W)

Pre- or Corequisites: None.

Aim: To provide students with an understanding of how growth and development of crops is influenced by environmental conditions, and how these conditions can be optimized in a controlled environment.

Content: Greenhouse structures, greenhouse covering materials, artificial lighting, climate control, interior greenhouse design, growing systems.

Practicals: Practicls include excursions to commercial greenhouses and the opportunity to grow plants in controlled environments.

Assessment: Two theory tests, practical assessment, one examination.

AGPS305 – Field Crop Management
(PSA3CM1) (39L-0T-43P-0S-60H-14R-0F-4A-16C-13W)
Pre- or Corequisites: None.

Aim: To provide students with knowledge on management practices of intensively and extensively grown field crops.

Content: Soil fertilization and liming, tillage and residue management, mulching, crop improvement techniques, weed and pest control, cropping practices, forage preservation and grain storage.

Practicals: Compulsory practicals with field trips.

Assessment: Two tests, practical evaluations, one examination.

AGPS306 – Principles of Plant Breeding
(PSA3PB2) (36L-3T-33P-0S-53H-30R-0F-5A-16C-13W)
Prerequisite: GENE213 with a minimum mark of 50%.

Aim: To provide students with an understanding of the fundamental principles of and practical skills in classical plant breeding.

Content: Sexual and asexual modes of reproduction in plants; quantitative or polygene inheritance and its measurement; fertility-regulating mechanisms; breeding self-pollinated, cross-pollinated and clonally proPSAated plants; breeding hybrids; utilization of polyploidy and induced mutations in plant breeding.

Practicals: Conducting hand-pollinations of selected plant species, data collection and statistical analysis, and selections from segregating populations.

Assessment: 2 theory tests, 1 mini-seminar presented in both written and verbal form, 1 overall practical report, 1 3h theory exam.

AGPS307 – Orchard Management
(PSA3OM1) (18L-0T-14P-0S-28H-16R-0F-4A-8C-13W)
Pre- or Corequisites: None.

Aim: To provide students with skills and experience in managing intensively produced orchard crops.

Content: Climate and climate modification, modification of the plant environment, managing orchard soils and the orchard floor, plant factors in the orchard, plant manipulation, crop protection, harvesting and postharvest handling.

Practicals: Field trips to commercial orchards, as well as at the University Research farm.

Assessment: Two theory test, practical assessment, one examination.

AGPS320 – Agricultural Plant Physiology
(PSA3PH2) (48L-0T-36P-0S-42H-30R-0F-5A-16C-13W)
Prerequisites: CHEM111, 112; BCHEM213; BOTY301 each with a minimum mark of 50%.

Aim: To develop the skills required for critical appreciation of mechanisms responsible for initiating, controlling, Coordinating and determining plant growth and development and, to facilitate basic chemical, biochemical and physiological analyses of plant growth and development.

Content: Energy and enzymes; gene expression and signal transduction; biophysics and biochemistry of plant growth; tissue sensitivity and hormone action; organ development; metabolic responses to stress; and metabolism in harvested plant products.

Practicals: Class practicals (one per week) are compulsory and cover the following:- units in biochemistry; measurement of growth; extraction and purification of compounds; enzyme assays.

Assessment: Two theory tests; one course essay; practical assignments; one theory examination.

AGPS701 – Principles of Agricultural Research
(PSA7RP1) (22L-6T-9P-0S-31H-10R-0F-3A-8C-13W)

Pre- or Corequisites: None.

Aim: Students will acquire the skills to plan and implement agricultural research and acquire the appropriate communication skills for these tasks.

Content: The presentation of technical information and communication skills. The development, organization and financing of agricultural research; research philosophy and policy. Research methods with emphasis on the scientific method and particular reference to economic plant improvement. Field plot, glasshouse and controlled environment techniques.

Practicals: Critical reviews (oral and written) of published scientific papers; conduct of field and pot experiments; visits to research establishments.

Assessment: 1 theory test, 2 oral and written criticisms, 1 project proposal, 1 final 2hr examination.

AGPS710 – Forage Production & Utilisation
(PSA7FU2) (38L-0T-39P-0S-62H-20R-0F-2A-16C-13W)

Pre- or Corequisites: None.

Aim: To equip students with an understanding of the principles of selection, growth, management and utilization of cultivated forages.

Content: Accumulation and utilization of energy reserves, nitrogen fixation, soil amelioration and fertilization, and uses of forage crops for animal production systems.

Practicals: Demonstrations, visits, exercises and assignments designed to enhance the understanding of the lectures.

Assessment: Two class tests, practical exercises, one examination.

AGPS711 – Field Crop Production
(PSA7CP1) (21L-0T-15P-0S-31H-10R-0F-4A-8C-13W)

Pre- or Corequisites: None.

Aim: Students will acquire an understanding of crop-environment interaction and its management to sustain crop production.

Content: A study of the management and production of selected field crops drawn from the categories of sugar crops, cereal crops, oil and protein crops, and fibre crops. The impact of environmental variables, particularly stress on crop production, and the management of these variables to sustain productivity. The harvesting, grading and storage of crop products.

Practicals: 1 mini project/poster presentation. Visits to research stations and crop producers.

Assessment: 2 theory tests, 1 project, 1 final 2 hr examination.

AGPS712 – Advanced Seed Technology
(PSA7ST2) (36L-0T-37P-0S-65H-15R-0F-7A-16C-13W)
Prerequisite: AGPS200 or coordinators permission.

Aim: To provide skills and experience in seed science and technology.

Content: Physiology, biochemistry and molecular biology of orthodox and recalcitrant seeds in relation to seed production, development, germination, storage and marketing.

Practicals: A project pertinent to the objectives of the course will be undertaken by students as individuals or groups. One trip to a seed related institution. One compulsory field trip on a weekend day to a farming community.

Assessment: 2 theory tests, 1 project, 1 final examination.

AGPS713 – Field Crop Production Self Study
(PSA7CS1) (44L-0T-26P-0S-66H-20R-0F-5A-16C-13W)
Pre- or Corequisites: None.

Aim: Students will through acquisition of an understanding of the basis of crop growth and development be able to improve crop productivity.

Content: A detailed study of the agronomy, crop physiology, nutrition, growth and development in relation to environmental factors of selected field crops. Crop improvement. Harvesting, storage and grading of crop products.

Practicals: A mini-project, visits to research stations, plant breeding enterprises and cropping areas.

Assessment: 1 project, 2 theory tests, 1 field trip report, 1 final 3 hr examination.

AGPS720 – Tropical & Subtropical Fruit Production
(PSA7TF2) (18L-0T-35P-0S-15H-8R-0F-5A-8C-13W)
Prerequisite: AGPS307 with a minimum mark of 50%.

Aim: To enable the student to be proficient in managing a wide variety of tropical and subtropical crops, by the ability to critically analyze the interaction between the environment and the plants and through an understanding thereof, be able to manipulate the crops to the financial advantage of the producer, taking into account the concept of integrated production.

Content: Subtropical and tropical crops will be studied, with emphasis on avocado, banana, mango, papaya, macadamia and to a lesser degree, litchi, pineapple, coffee and tea. The studies will include the origin and distribution, classification, cultivars and rootstocks, fruit and tree morphology, the phenological cycle and techniques of manipulation, orchard design and canopy architecture. The principles of integrated pest and disease management, and the causes and symptoms of physiological disorders will be studied. Maturity indexing techniques and preparation for harvest will be learnt.

Practicals: the course includes practicals to illustrate theoretical concepts and at least two field trips.

Assessment: Two tests, one examination and one self study assignment.

AGPS721 – Vegetable Crop Production
(PSA7VP1) (18L-0T-14P-0S-28H-16R-0F-4A-8C-13W)
Prerequisite: None.

Aim: Students will understand growth and development of vegetable crops as well as learn to apply their knowledge to management practices.

Content: Principles and advanced techniques of management of different root, bulb, leaf and fruit vegetable crops.

Practicals: Compulsory practicals on growth and development of different vegetable crops, project on managing a vegetable plot, field trips.

Assessment: One test, practical evaluations, self study, one examination.

AGPS723 – Citrus Management
(PSA7CM1) (18L-0T-35P-0S-15H-8R-0F-5A-8C-13W)
Prerequisite: AGPS307 with a minimum mark of 50%.

Aim: To enable the student to be proficient in managing citrus as a crop, through an ability to critically analyze the interaction between the environment and the tree, and by an understanding of citrus, be able to manipulate the trees to the financial advantage of the producer, taking into account the concept of integrated production.

Content: The origin and distribution of citrus, classification, rootstocks and cultivars. And Understanding of fruit and tree morphology together with the phenological cycle and management techniques for tree and crop manipulation. Knowledge of integrated pest and disease management, physiological disorders, fruit maturity indexing and preparation for harvest.

Practicals: the course includes practicals to illustrate theoretical concepts and at least two field trips.

Assessment: Two tests, one examination and one self study assignment.

AGPS724 – Post Harvest Technology
(PSA7HT2) (18L-0T-35P-0S-15H-8R-0F-5A-8C-13W)
Prerequisite: AGPS307 with a minimum mark of 50%.

Aim: To enable the student to be proficient in postharvest management of horticultural crops, by understanding the interaction between Pre-and postharvest quality, and making use of available technologies so as to optimize the shelf life in accordance with market requirements.

Content: Physiological attributes of the major groups of Horticultural products, with reference to preharvest physiology, temperature, water loss and humidity and storage atmosphere. Also included will be packhouse design and technologies, fruit coatings, packaging, physiological and pathological disorders, effects and requirements of phytosanitary regulations, product processing for added value and storage life and quality and food safety management systems.

Practicals: The course includes practicals to illustrate theoretical concepts, and includes at least two field trips.

Assessment: Two tests, one examination and one self study assignment.

AGPS725 – Deciduous Fruit Crop Production
(PSA7DF1) (18L-0T-14P-0S-28H-16R-0F-4A-8C-13W)
Prerequisite: None.

Aim: Students will understand the basis of growth and development of deciduous fruit crops as well as their management practices.

Content: Principles of management of small fruit, pome and stone fruit and nut crops, advances in deciduous fruit production.

Practicals: Compulsory practicals on establishing and managing deciduous fruit crops, field trips.

Assessment: One test, practical evaluations, self study, one examination.

AGPS726 – Floriculture
(PSA7FF2) (18L-0T-14P-0S-28H-16R-0F-4A-8C-13W)
Prerequisite: None.

Aim: To provide students with experience in management and an understanding of the growth and development of floricultural crops.

Content: production, management and growth manipulation of: cut flowers, cut foliage, pot plants, bulbs and bedding plants.

Practicals: Practicals include excursions to commercial farms, plant identification and a practical project.

Assessment: Two theory tests, practical assessment and one examination.

AGPS730 – Advanced Plant Breeding
(PSA7PB2) (36L-0T-27P-0S-62H-30R-0F-5A-16C-13W)
Prerequisites: GENE332, 432; BMET210, 222 all with a minimum mark of 50%.

Corequisites: BMET401.

Aim: To expose students to advanced, contemporary concepts in applied plant breeding.

Content: An extensive reading course in advanced topics in plant breeding. Students will read a broad range of primary and secondary literature on specific topics. Students will be expected to critically analyze and vigorously debate the topics. Examples of topics that may be tackled are: current approaches to interpreting genotype x environment interactions; genetics of host x parasite interactions; gene action in plant breeding; marker assisted selection for quantitative traits; ideotype breeding; and alternative approaches to plant breeding such as somatic cell hybridization and cell selection.

Practicals: Analysis and discussion of applied problems in plant breeding. Preparation of a mini-seminar on a selected topic which will be presented in both written and verbal form.

Assessment: 2 theory tests, 1 mini-seminar presented in both written and verbal form, 1 3h theory exam.

AGPS741 – Sports Turf Management
(PSA7TM1) (37L-0T-39P-0S-60H-20R-0F-4A-16C-13W)
Pre- or Corequisites: None.

Aim: To provide students with an understanding of the principles and practice of sports turf management.

Content: Common turf grasses, the growing medium, fertilizer and water requirements, and specialized management practices for summer and winter sports fields.

Practicals: Visits, exercises, demonstrations and assignments to reinforce and supplement the lectures.

Assessment: Two class tests, practical exercises, one examination.

AGPS760 – Crop Biotechnology
(PSA7CB2) (24L-0T-18P-0S-19H-15R-0F-5A-8C-13W)
Pre- or Corequisites: None.

Aim: To develop the principles of, and knowledge for, value-adding in crop production through technology for manipulating plants to improve genetic traits and the production of fine chemicals.

Content: Secondary plant product metabolism; principles and practice of genetic engineering of crops; model systems for crop and plant product manipulation; selected case studies.

Practicals: Mini-project.

Assessment: 1 course essay; 2 theory tests; mini-project; 1 3h theory examination.

AGPS790 – Project & Seminar
(PSA7RPY) (10L-0T-0P-30S-280H-0R-0F-0A-32C-26W)
Prerequisite: This course is intended for fourth year students who have completed first, second and third year modules to the satisfaction of the Head of Discipline.
Aim: To provide students with: written and verbal communication skills; critical and creative thinking; information retrieval, evaluation, comprehension and review skills; comprehensive knowledge and critical understanding of a chosen field of specialization within the applied plant sciences; and hands-on skills in designing and conducting a research project in a chosen field of specialization in the applied plant sciences.
Content: Candidates will be required to undertake and present, in both written and verbal form: (1) a literature review on an approved topic within the agricultural plant sciences; and (2) an appropriate research project within the agricultural plant sciences.
Practicals: To complete the seminar, students will survey relevant literature in the library and prepare the written review on computer. The research project will require students in their own time to review relevant literature, design the experiment/s, obtain the necessary materials, conduct the experiment/s, record and analyze data, and prepare a written report on computer. The verbal presentations of the seminar and project are restricted to 20 minutes each and students are expected to make full use of modern presentation media.
Assessment: Written and verbal presentations of seminar and research project are assessed by internal and external examiners. Students may be required to go on a experiential field trip.

Agrometeorology

Offered in the School of Applied Environmental Sciences

AMET210 – Agrometeorology & Environmental Biophysics
(PAM2AE1) (36L-5T-40P-0S-50H-24R-0F-5A-16C-13W)
Corequisite: At least one module in Mathematics and one in Physics at first year level.
Aim: To provide students taking agriculture and environmental science options with key concepts and applications in the area of applied (physical) environmental, agricultural and ecophysiological sciences.

Content: Introduction: Definition and objectives. Ecosystems - a brief encounter. The international system of units.

Environmental Physics: The composition of the atmosphere. Radiation and radiation laws. Energy and radiation balance at the earth's surface. Photoperiod. Evaporation and condensation, melting, freezing and specific heat capacity of water. The hydrological cycle. Daily and annual variation in soil temperature. Leaf resistance model for the transfer of water vapour and sensible heat energy; the leaf boundary layer, stomatal resistance. Applications of the Penman-Monteith equation for partitioning latent and sensible heat energy.

Hazards and Climate Modifications:Frost and frost protection. Climate in a glasshouse. Windbreaks. The adaptive response of plants to wind. Wind and water stress. Wind and soil erosion. Irrigation. The microclimate before and after irrigation. Evaporative cooling and the prevention of plant water stress. Effect of water stress on photosynthesis; effect of temperature on photosynthesis; energy conversion; osmoregulation. The animal climate and use of evaporative cooling.

Crop Growth Physics: Photosynthesis and radiant energy. Photosynthetically active radiation. The absorption spectra of individual leaves. Respiration. Leaf area index. Models and a brief introduction to modelling crop growth.

Meteorology:The rain processes; artificial stimulation; types of rain. Lapse rates. Weather systems over southern Africa. Remote sensing and its uses.

*Practicals:*Use of instruments of a meteorology site. Calibration and use of sensors for soil, leaf and air temperature measurement. Measurement of surface reflectivity and radiation profiles in a crop canopy; relative humidity; rainfall and class-A pan evaporation. Measurement of leaf resistance to water vapour transfer and leaf water potential. Project equivalent to four practicals.

*Assessment:*Four quizzes, two tests, one three-hour examination.

AMET211 – Environmental Instruments:Life/Earth Sciences
(PAM2IL2) (9L-0T-54P-0S-0H-13R-0F-4A-8C-13W)
*Prerequisite:*Completion of first year Science or Agriculture.

*Aim:*To provide students taking agriculture and environmental science options with the skills to set up an automatic weather station, collect appropriate data, transfer the data to a computer, and graphically display the measurements. Included here is the checking of the electronic components for failure and an understanding of the sensors used. An additional purpose is to expose students to the use of single channel and multiple channel dataloggers for use in the field environment.

*Content:*Datalogging measurement and control techniques using the automatic weather station system as an example. Techniques and methods for supplying power to dataloggers. Identification of datalogger components. Identification and use of basic electronic components. Computer to datalogger communication for data retrieval. Data processing and presentation. Specialized data techniques for model evaluation. Theory and use of the following systems and sensors: automatic weather station (AWS) sensors and their use for measurement and control, for example, of frost protection, reference evaporation, glasshouse microclimate, disease forecasting, fire-danger warning; leaf wetness measurements, radio telemeters, infrared thermometry, AWS sensors, time-domain reflectometry. Internet techniques, information retrieval and storage, scientific graphics display.

Practicals:Identifying and checking of electronic components. Programming and use of a datalogger and an automatic weather station system.

Assessment:One 3 hr practical examination and one one-hour test.

AMET861 – Automatic weather station technologies 1a
(PAM8AWY) (20L-5T-18P-0S-27H-7R-0F-3A-8C-26W)
*Prerequisite:*Any Science or Agriculture degree or acceptance under R33.

Aim: To provide postgraduate students with the skills to set up an automatic weather station, collect appropriate data using datalogger measurement and control techniques, transfer the data to a computer, and graphically display the measurements. Included here is the checking of the electronic components for failure and an understanding of the sensors used. An additional purpose is to expose students to the use of single channel and multiple channel dataloggers.

Content: Datalogging measurement and control techniques using the automatic weather station system as an example. Techniques and methods for supplying power to dataloggers. Identification of datalogger components. Identification and use of basic electronic components. Computer to datalogger communication for data retrieval. Data processing and presentation. Specialized data techniques for model evaluation. Theory and use of the following systems and sensors:

automatic weather station (AWS) sensors and their use for measurement and control, for example, of frost protection, reference evaporation, glasshouse microclimate, disease forecasting, fire-danger warning; leaf wetness measurements, radio telemeters, infrared thermometry, AWS sensors, time-domain reflectometry. Internet techniques, information retrieval and storage, scientific graphics display.

Practicals: Field use of equipment.

Assessment: One one-hour test, one two-hour examination.

AMET862 – Digital data treatment and representation 1b

(PAM8DDY) (20L-5T-18P-0S-27H-7R-0F-3A-8C-26W)

Prerequisite: Any Science or Agriculture degree or acceptance under R33.

Aim: This module (postgraduate certificate course) is designed to provide students with the skills necessary to process and exchange, present, store, retrieve, display and publish data and information.

Content: Data presentation and information. Data exchange. Internet techniques. Data retrieval and information storage. Desk-top publishing. Display of scientific graphics. Speed reading and report writing.

Practicals: Assignments based on generated and other data sets.

Assessment: One one-hour test, one two-hour examination.

AMET863 – AWS measurement and control technologies 1c

(PAM8ACY) (20L-5T-18P-0S-27H-7R-0F-3A-8C-26W)

Prerequisite: Any Science or Agriculture degree or acceptance under R33.

Aim: This module (postgraduate certificate course) is designed to provide students with the theory necessary to understand the use of automatic weather station sensors for the measurement and control of various microclimates.

Content: Theory and use of the following systems and sensors: automatic weather station (AWS) sensors and their use for measurement and control, for example, of frost protection, reference evaporation, glasshouse microclimate.

Practicals: Field use of equipment.

Assessment: One one-hour test, one two-hour examination.

AMET864 – AWS measurement and control technologies 1d
(PAM8WCY) (20L-5T-18P-0S-27H-7R-0F-3A-8C-26W)
Prerequisite: Any Science or Agriculture degree or acceptance under R33.

Aim: This module (postgraduate certificate course) is to provide students with the theory necessary to understand the following AWS systems and measurement systems.

Content: Theory and use of the following systems and sensors: automatic weather station (AWS) sensors and their use for measurement and control, for example, of disease forecasting, fire-danger warning; leaf wetness measurements, radio telemeters, infrared thermometry, AWS sensors, time-domain reflectometry.

Practicals: Field use of equipment and sensors.

Assessment: One one-hour test, one two-hour examination.

AMET865 – Heat pulse measurement in plants and soils 1e
(PAM8HPY) (20L-5T-18P-0S-27H-7R-0F-3A-8C-26W)
Prerequisite: Any Science or Agriculture degree or acceptance under R33.

Aim: This module (postgraduate certificate course) is to provide students with the theory necessary to understand the following heat pulse technologies for use in soils and plants.

Content: Heat pulse technologies for the measurement of sap flow in trees and other non-woody stems and the measurement of the thermal properties of porous materials.

Practicals: Field use of equipment and sensors.

Assessment: One one-hour test, one two-hour examination.

AMET866 – Modeling exchanges in the SPAC system 1f
(PAM8MSY) (20L-5T-18P-0S-27H-7R-0F-3A-8C-26W)
Prerequisite: Any Science or Agriculture degree or acceptance under R33.

Aim: This module (postgraduate certificate course) is to provide students with the theory necessary to understand the principles of modelling energy and water flow in the SPAC.

Content: Principles of modelling: CERES and SWB models; modelling using finite differences; application of models; specialized data techniques for model evaluation.

Practicals: Field use of equipment and sensors.

Assessment: One one-hour test, one two-hour examination.

AMET867 – Environmental temperature and radiation 2b
(PAM8ETY) (20L-5T-18P-0S-27H-7R-0F-3A-8C-26W)
Prerequisite: Any Science or Agriculture degree or acceptance under R33.

Aim: This module (postgraduate certificate course) is to provide students with the theory necessary to understand the principles of temperature measurement and calibration of radiation instrumentation.

Content: Principles of temperature measurement using resistance thermometers, thermocouples and thermistors. Soil temperature and soil heat flux measurement. Net radiation and canopy interception measurement. Calibration of radiation instrumentation. Applications.

Practicals: Field use of equipment and sensors.

Assessment: One one-hour test, one two-hour examination.

AMET868 – Advanced micro-meteorological techniques 2c
(PAM8MTY) (20L-5T-18P-0S-27H-7R-0F-3A-8C-26W)
Prerequisite: Any Science or Agriculture degree or acceptance under R33.

Aim: This module (postgraduate certificate course) is to provide students with the theory necessary to understand the principles of humidity control and humidity sensor calibration and techniques for turbulence measurement.

Content: Humidity control and humidity sensor calibration using a standard dewpoint generator. Measurement of evaporation using Bowen ratio, eddy correlation and empirical techniques. Techniques for turbulence measurement. Applications.

Practicals: Field use of equipment and sensors.

Assessment: One one-hour test, one two-hour examination.

AMET869 – Agric/Environment Instrumentation Research 2a
(PAM8ARY) (0L-0T-390P-0S-250H-0R-0F-0A-64C-26W)
Prerequisite: (a) The equivalent of four years of successful study at a recognized University, with an acceptable overall mark, that offers for example a BScHONS, or BScAgric. (four years) with a major in botany, crop science, ecology, forestry, geography, grassland science, hydrology, physics, plant physiology, soil science, zoology or similar,
OR
(b) recognized diploma and a number of years of research with technical experience and the publication of research articles in recognized journals or equivalent. In this case, each application will be assessed on merit under rule R33.

Aim: This module (postgraduate certificate course) is to allow distance students to undertake a research project at their place of employment.

Content: This module is undertaken by research on a topic agreed upon by the supervisor, the student and the employer(s).

Practicals: This forms the basis of the research project.

Assessment: One project report/thesis (100 %).

Animal Science & Poultry Science

Offered in the School of Agricultural Sciences & Agribusiness

ANSI120 – Fundamentals of Animal Agriculture
(PAS1AA2) (10L-0T-18P-0S-40H-7R-0F-5A-8C-13W)
Pre- or Corequisites: None.

Aim: To introduce students to the science of animal agricultural with a particular emphasis on the practical handling of animals and exposure to husbandry techniques unique to pigs, poultry, sheep and cattle.

Content: Fundamental concepts in the animal sciences. Management and husbandry techniques in poultry, pig, sheep, goat, beef and dairy production.

Practicals: Basic animal husbandry techniques.

Assessment: Theory tests. Written reports and orals. Formal examination.

ANSI214 – Animal Production Systems
(PAS2AS2) (38L-0T-0P-0S-80H-37R-0F-5A-16C-13W)
Pre- or Corequisites: None.

Aim: Students should develop a holistic approach towards the production of beef, sheep and pigs and be capable of identifying and solving production problems associated with these systems.

Content: Beef, sheep and pig production systems.

Practicals: None.

Assessment: Impromptu, unprepared tests. Formal test. Projects. Breed project and test (for Animal Science majors only). Formal examination.

ANSI232 – Aspects of Applied Animal Physiology
(PAS2AP2) (38L-0T-39P-0S-54H-24R-0F-5A-16C-13W)
Pre- or Corequisites: None.

Aim: To encourage students to link animal production potential to underlying biological processes. Students develop an understanding of production measures, such as milk yield, meat quality, reproductive rate and draught power, as reflections of their respective physiologies.
Content: The physiology of muscle contraction. The conversion of muscle to meat. Meat quality. Slaughter techniques and the consequences for meat quality and animal welfare. Anatomy of reproduction. Gametogenesis. Fertilisation.. Anatomy of the mammary gland. Lactational physiology. Hormonal feedback mechanisms and neuroendocrine systems. The milk ejection reflex. Exercise physiology: draught animals.

Practicals: A number of meat science, lactation and reproductive physiology practicals are required.

Assessment: Referenced essays. Case studies. Problem-solving exercises. Impromptu, unprepared tests. Report/evaluation writing. Poster presentation. Formal tests. Formal Examination.

ANSI332 – Animal Growth & Development
(PAS3AD2) (38L-0T-39P-0S-46H-32R-0F-5A-16C-13W)
Pre- or Corequisites: None.

Aim: Students should analyze the relationships between body size and composition over time as a means of predicting the consequences of internal and external stimuli on growth and development of domestic and non-domestic animals.

Content: Basic growth terminology, Analysis of growth curves, Scaling and allometry, Growth modelling, Endocrinology of growth, Manipulation of growth, Environmental physiology and its application.

Practicals: Allometric measurements and analyses.

Assessment: Formal test. Impromptu, unprepared tests. Design and construction of growth model. Essays. Posters and Oral debates. Formal examination.

ANSI342 – Feeds & Feeding
(PAS3FD2) (37L-0T-39P-0S-39H-40R-0F-5A-16C-13W)
Pre- or Corequisites: None.

Aim: Students should develop an understanding of feed attributes and thus match type of feed to type of animals and/or production; Students should develop aptitude in the economic feeding of animals according to their needs.

Content: Nutritive and anti-quality attributes of grains and grain byproducts, roots , tubers and other concentrates. Nutritive and anti-quality attributes of protein-rich grains and oilseed cakes. Non-conventional protein sources. Roughage, systems of harvesting and related problems. Feed additives. Case studies solving problems implicating vitamins and minerals in ruminants. Nutrient requirements of livestock and ration formulation. Feed processing.

Practicals: Feed ingredients, analysis of ingredients, visit feed mill, formulation of feeds

Assessment: Essays. Reports on feed formulation and feed mill procedures. Formal tests. Formal examination.

ANSI344 – Digestive Physiology & Herbivore Nutrition

(PAS3DP1) (38L-0T-39P-0S-54H-24R-0F-5A-16C-13W)

Pre- or Corequisites: None.

Aim: Students should evaluate the digestive, absorptive and metabolic processes in animals and how these influence the nutritive value of feeds and the nutrient requirements of animals.

Content: Functional anatomy of digestive tract of herbivores and non herbivores; absorption mechanisms of nutrients from the digestive tract; importance of physical aspects of the digestive process. Ingestive, digestive and absorptive process in the gut of a Preruminant. Ruminal micro-organisms, hydrolysis of nutrients and the end-products of digestive and synthetic processes in the rumen ecosystem. Manipulation of the feed and the digestive processes in the rumen. Methods of determining digestibility, factors affecting the metabolizable energy of feeds and its utilization. Methods of measuring protein quality for different classes of animals. The metabolizable protein system. The use of metabolizable energy system for rationing livestock. Case studies to solve problems implicating mineral and vitamin nutrition.

Practicals: Different digestive systems, determination of rumen digestibilities, analyses of feed ingredients, case studies.

Assessment: Essays. Report on feed evaluation. Formal tests. Formal examination.

ANSI362 – Animal Health

(PAS3AH1) (38L-0T-39P-0S-38H-40R-0F-5A-16C-13W)

Pre- or Corequisites: None.

Aim: To enable students to appreciate the complexities of maintaining the health and welfare of animals, in such a way that it is based on sound scientific theory and principles, environmentally and economically sustainable, socially, morally and ethically defensible, holistic (based on a multi-disciplinary, systems approach).

Content: Content-related terminology. Context of animal health, welfare and diseases. Disease causation. Recognising health and disease in animals (observation; clinical examination; serological and pathological testing, etc.). Animal defences against disease. Immunology and vaccination. Hygiene and medical prophylaxis. Biosecurity. Epidemiology. Public health and zoonoses. Notifiable diseases and animal disease legislation. Animal disease control strategies and programmes (related to various species and animal production systems). Udder health in milk production. Impacts of animal disease on productivity, welfare, profitability and mankind. Ethics and environmental awareness. Treatment of diseases.

Practicals: Practising animal husbandry skills related to health care and disease control,. Clinical examination of live animals. Post mortem examinations. Biological sampling techniques. Sampling and identification of pest species.

Assessment: Written assignments. Oral presentations. Formal tests. Poster presentations. Formal examination.

ANSI370 – Applied Reproductive Physiology
(PAS3RP2) (38L-0T-39P-0S-54H-24R-0F-5A-16C-13W)
Pre- or Corequisites: None.
Aim: Efficient management of reproduction in farm animals requires the integration of a comprehensive knowledge of animal physiology and endocrinology with an understanding of nutritional, behavioural, health and environmental factors. Students develop and apply this knowledge base in designing and evaluating strategies for improving the efficiency of reproductive performance in farm animals.
Content: Reproductive cycles. Control of ovulation. Follicular growth and recruitment. Sexual behaviour. Oestrus detection. Superovulation. Artificial insemination. Seasonal breeding. Causes of reproductive failure. Improving reproductive efficiency: management and manipulation. Evaluating reproductive performance. Reproduction technology and bioethics.
Practicals: Animal handling. In vitro culture techniques. Superovulation techniques. Ultrasonography. Artificial Insemination Course.
Assessment: Essays. Case studies. Problem-solving exercises. Impromptu, unprepared tests. Poster presentation. Formal tests. Formal examination.

ANSI711 – Dairy Herd Nutrition & Management
(PAS7MP1) (39L-0T-39P-0S-38H-39R-0F-5A-16C-13W)
Pre- or Corequisites: None.
Aim: Students should recognise and find solutions to problems encountered in the nutrition and management of dairy herds.
Content: Dairy breeds. Nutritional requirements of the dairy cow. Feed formulation of dairy rations. Breeding programmes for dairy production. Dairy economics. Milking machine designs.
Practicals: Visit dairy farms, formulate dairy rations, Solve real-life dairy production problems.
Assessment: Formal test. Problem solving exercise. Essays. Projects. Formal examination.

ANSI741 – Quantitative Nutrition
(PAS7QN1) (38L-0T-39P-0S-39H-39R-0F-5A-16C-13W)
Pre- or Corequisites: None.
Aim: The optimisation of feeding strategies for farm animals requires the integration of biological and economic factors, these being associated with the animal, the feed and the environment.
Content: Theories of prediction of voluntary food intake. Amino acid responses in broilers and laying hens. Effective energy system for determining requirements of animals for energy. Determining optimum economic feeding systems for growing and reproducing animals.
Practicals: Feed formulation projects.
Assessment: Problem-solving based tests. Essays. Spreadsheets for simulating a feed intake model. Oral and written presentation of reports.

ANSI751 – Animal Breeding
(PAS7AB2) (38L-0T-39P-0S-54H-24R-0F-5A-16C-13W)
Pre- or Corequisites: None.

Aim: Provide students with the necessary knowledge base to design a genetic improvement programme for a livestock or poultry enterprise. Introduces population and quantitative genetics and enables students to distinguish between the principles involved in monogenic and polygenic inheritance. Evaluate breed improvement programmes used in South Africa and internationally.

Content: Basic principles of population genetics. Polygenic inheritance. The genetic model for quantitative traits. Breeding value and gene combination values. Statistics and their application to quantitative traits. Genetic parameters: heritability and repeatability. Factors affecting the rate of genetic change: the key equation. Prediction of breeding values and genetic evaluation. Correlated response to selection and multiple trait selection. Mating strategies. Hybrid vigour. Crossbreeding systems. Biotechnology and animal breeding.

*Practicals:*Modelling, breeding programme projects.

Assessment: Essays. Case studies. Problem-solving exercises. Impromptu, unprepared tests. Poster presentation. Formal tests. Formal examination.

ANSI780 – Project Planning & Entrepreneurship
(PAS7CMY) (38L-0T-38P-0S-200H-40R-0F-4A-32C-26W)
*Pre- or Corequisites:*None.

*Aim:*Students should be able to apply skills learned in related modules to tackle real life situations, such as problem solving, project planning and entrepreneurship.

*Content:*Operations research. Agribusiness economics. Decision making theories. Systems analysis. Entrepreneurship.

*Practicals:*Develop a business plan for a particular animal production enterprise. Learn to use software package Project 98 for planning projects. Operational research exercise to identify problems and solutions for a farm or business enterprise.

*Assessment:*Spreadsheets. Oral and written presentation of reports. Business plan. Formal examination.

ANSI790 – Research Project & Seminars
(PAS7PRY) (5L-10T-0P-5S-300H-0R-0F-0A-32C-26W)
*Pre- or Corequisites:*None.

*Aim:*This is a capstone module with a heavy focus on integrated assessment of the exit-level outcomes specified for the programme in Animal and Poultry Science. Students should develop a comprehensive knowledge and understanding in a specialised area of study and apply this knowledge in defining and researching a problem in the chosen field. This involves information and data management, analysis and communication, self-evaluating reflection and personal organisation.

*Content:*Seminar/review paper writing. Literature search. Presentation skills. Topical discussions with industrial players. Formulate and present a project proposal. Conduct an experiment, analyze results and present as scientific paper. Interviews on career awareness.

*Practicals:*2 months practical experience (requirement of degree)

*Assessment:*Evidence of practical work. Oral and written presentation of review and scientific paper. Reflective essay.

ANSI810 – Advanced Topics in Animal & Poultry Science
(PAS8ATY) (0L-25T-0P-25S-270H-0R-0F-0A-32C-26W)
Pre- or Corequisites: None.

Aim: To test a range of skills simultaneously, with particular emphasis on problem solving, presentation and group learning skills, and experimental design. The students are expected to successfully and imaginatively integrate the skills and knowledge developed in the module and postgraduate programme to complete a variety of group-learning problems and exercises which reflect real-life challenges in animal and poultry production. Solutions to these problems should be creative, effective and ethical. The module also provides for reflective self-evaluation, and assessment of personal organisation and time-management.

Content: Reviewing a scientific paper. Presentation skills. Modeling of animal systems. Testing hypotheses:experimental design and evaluation.

Practicals: None.

Assessment: Series of presentations, to different audiences. Problem-solving exercises: computer Modeling. Experimental design and evaluation. Review of literature. Reflective essay.

ANSI890 – Management Project & Seminar
(PAS8MPY) (10L-10T-0P-10S-290H-0R-0F-0A-32C-26W)
Pre- or Corequisites: None.

Aim: This module is offered to students on the Agricultural Management programme. Students identify factors influencing the profitability of selected animal enterprises, using principles of management and economics. Students develop a comprehensive knowledge and understanding in a specialised area of study and apply this knowledge in planning or evaluating a selected animal enterprise. The emphasis is on information and data management, analysis and communication, self-evaluating reflection and personal organisation.

Content: A literature search. Seminar/review paper writing. Presentation skills. Enterprise planning.

Practicals: None.

Assessment: Oral and written presentation of a review paper. Report on the enterprise plan/ evaluation. Reflective essay.

Applied Mathematics

Offered in the School of Mathematics, Statistics & Information Technology

AMAT710 – Applied Optimisation
(PAT7AO1) (60L-0T-0P-0S-226H-28R-0F-6A-32C-13W)
Pre-requisites: MATH360, 370.

Aim: To acquire knowledge of the theory underpinning the algorithms used to solve optimisation problems; To acquire the skills to master the computational algorithms required to solve such problems. To acquire skills in formulating optimisation problems and recognising problem types.

Content: Advanced Linear Programming, Mixed Integer Programming, Nonlinear Optimisation, Applied Optimal Control Theory, Heuristics.

Practicals: None.

Assessment: Project (30% of final mark). One 3 hr examination (70% of final mark).

AMAT720 – System Dynamics
(PAT7SD2) (60L-0T-0P-0S-225H-29R-0F-6A-32C-13W)
Pre-requisites: MATH350.

Aim: To acquire knowledge of the underlying mathematical theory needed to analyse dynamic systems including spatial systems; To acquire computational skills for analysing dynamic systems and investigative skills for analysing such systems.

Content: Control Theory, Numerical Methods for Partial Differential Equations, Cellular Automata, Spatial Modeling.

Practicals: None.

Assessment: Project (30% of final mark). One 3 hr examination (70% of final mark).

AMAT730 – Project
(PAT7RPY) (0L-0T-0P-4S-316H-0R-0F-0A-32C-26W)
Prerequisites: BSc degree with a major in one of Applied Mathematics, Statistics or Mathematics.

Aim: To acquire experience and skills in the problem-solving process from problem formulation through to policy formulation.

Content: A substantial problem will be tackled in collaboration with a client.

Practicals: None.

Assessment: The project must be written up and will be examined.

AMAT740 – Financial Mathematics
(PAT7FM2) (30L-0T-0P-0S-113H-14R-0F-3A-16C-13W)
Pre-Corequisites: MATH213, 224.

Aim: To acquire knowledge of Markowitz mean variance portfolio theory and its implementation.

Content: Mean variance portfolio theory; Efficient portfolios; Efficient Frontier, Single and multiple index models. International diversification; Capital asset pricing models; Arbitrage pricing model; Efficient markets; Evaluation of Portfolio performance.

Practicals: None.

Assessment: Two projects (50% of final mark). One 3 hr examination (50% of final mark).

AMAT750 – Recent Topics I
(PAT7RT1) (30L-0T-0P-0S-113H-14R-0F-3A-16C-13W)
Pre- or Corequisites: BSc degree with a major in Applied Mathematics.

Aim: To acquire knowledge of and skills in a recent topic in Applied Mathematics.

Content: Will vary according to the most recent developments in Applied Mathematics.

Assessment: Project (30% of final mark). One 3 hr examination (70% of final mark).

AMAT760 – Recent Topics 2
(PAT7RT2) (30L-0T-0P-0S-113H-14R-0F-3A-16C-13W)

Bacteriology

Offered in the School of Applied Environmental Sciences

BACT220 – Bacterial Structure, Function & Ecology
(PBA2FE1) (18L-0T-36P-0S-15H-6R-0F-5A-8C-13W)
Prerequisite: [CHEM111, 112] and BIOS101 and [BOTY102 or ZOOL102].

Aim: To provide students of microbiology or plant pathology with a strong foundation in the field of bacteriology.

Content: Phenotypic and genotypic classification of bacteria. Gross- and ultrastructural features of bacterial cells and relationship between structure and function. Introduction to microbial ecology, including habitat-specific species. Role of bacteria in food-chains, -webs, trophic levels and energy pyramids. Basic aspects of environmental microbiology. Replication of the bacterial nucleoid. Significance of extracelluar components and endospores of bacteria. Discussion on selected groups of bacteria - spirochaetes, sheathed bacteria, myxobacteria, actinomycetes and rickettsias. Modern approaches to bacterial taxonomy. Genetic transfer mechanisms in bacteria.

Practicals: Exercises in handling bacteria; aseptic technique, cultural practices, staining procedures, microscopy.

Assessment: Two class tests and one class examination. Performance in practical classes and quality of practical write-ups.

BACT222 – Bacterial Physiology, Nutrition & Metabolism
(PBA2BP2) (18L-0T-36P-0S-15H-6R-0F-5A-8C-13W)
Corequisite: BACT220.

Aim: To provide students of microbiology and plant pathology with a strong foundation in bacteriology.

Content: Physiology, nutrition and metabolism of the major groups of bacteria with emphasis on genera and species significant to man as pathogens, biodeteriogens, symbionts, bioremediation agents and industrial microorganisms. Introduction to basic microbiological aspects of immunology. Physiological-nutritional groups among the bacteria. Aerobic vs anaerobic respiratory mechanisms and fermentations. Metabolic pathways of industrial importance. Adaptations of microorganism to unusual environments.

Practicals: Bacteriological laboratory techniques used in identifying prokaryotes; maintenance of pure cultures. Environmental microbiological experimentation.

Assessment: Two theory tests and one class examination. Practical quizzes, tests and write-ups. Short literature review (written and oral presentation).

Biochemistry

Offered in the School of Molecular & Cellular Biosciences

BCHM213 – Introduction to Biochemistry
(PBC2SF1) (36L-9T-40P-0S-45H-24R-0F-6A-16C-13W)
Prerequisites: CHEM111, 112; BIOS101 (Students intending to major in Biochemistry must pass CHEM211, 212. It is recommended that these modules be taken concurrently with BCHM213, 222, 231 to minimize timetable clashes).

*Aim:*To attain an understanding of the language of Biochemistry, the structures of biomolecules, proteins, carbohydrates and nucleic acids. Introduction to laboratory methods - spectrophotometry, pH and buffers and the applicable calculations.

*Content:*The properties of water; pH and buffers; amino-acids and proteins - structure, stereochemistry, ionic properties, bonds and classification; the immune system and immunoglobulins - defences against infection, natural immunity, antibodies in research. Enzymes and enzyme kinetics; carbohydrates - structures, detection and biological importance, introducing a metabolic pathway. The structure of DNA and RNA; DNA replication and protein synthesis; introduction to recombinant DNA technology.

*Practicals:*Practicals.

*Assessment:*3 theory tests, 10 laboratory reports, 10 tutorial quizzes, 1 examination.

BCHM222 – Biological Membranes & Comparative Cell Biology

(PBC2BM2) (18L-6T-22P-0S-25H-9R-0F-0A-8C-13W)

*Prerequisites:*CHEM111, 112; BIOS101. (Students intending to major in Biochemistry must pass CHEM211, 212. It is recommended that these modules be taken concurrently with BCHM213, 222, 231 to minimize timetable clashes).

*Aim:*To introduce students to the basic principles of cell compartmentalization and to lipids, lipid-like molecules and fat-soluble vitamins, their nomenclature and presentation, chemistry, properties and function in energy storage.

*Content:*Characterization and classification of lipids; building blocks of fatty acids; types of lipids/occurrence and function and biological membranes and cell biology.

*Practicals:*Practicals; tutorials.

*Assessment:*Theory tests, practical tests, tutorial quizzes, laboratory reports, 1 examination.

BCHM231 – Integration of Metabolism in Living Organisms

(PBC2MO2) (18L-17T-0P-0S-31H-10R-0F-5A-8C-13W)

*Prerequisites:*CHEM111, 112; BIOS101.

*Aim:*To attain a holistic insight into how metabolic pathways are integrated and controlled within, and between, cells and tissues to enable living organisms to function and survive.

*Content:*The fundamental principles and concepts of metabolism. The chemistry, cellular location, integration, and inter-regulation of: carbohydrate, lipid and amino acid metabolism; photosynthesis and nitrogen metabolism. Bioenergetics and the use of thermodynamics and kinetics principles to explain metabolic regulation. Implications of integrated metabolism for important physiological, nutritional and pathological issues relating to animals, humans, plants, and microbes.

*Assessment:*2 theory tests, 6 quizzes, 1 examination.

BCHM313 – Protein Isolation

(PBC3PI1) (27L-10T-27P-0S-70H-20R-0F-6A-16C-13W)

*Prerequisites:*BCHM213, 222, 231.

*Aim:*To provide insight to the physical principles applicable to methods in the isolation and characterization of proteins.

*Content:*Why proteins are isolated; assay, extraction and sub-cellular fractionation; concentration of the extract; chromatography and electrophoresis.

Practicals: Practicals and tutorials.

Assessment: Assignments, 1 examination.

NOT OFFERED IN 2000

BCHM320 – Immunochemical Laboratory Techniques
(PBC3IL2) (14L-6T-15P-0S-34H-9R-0F-3A-8C-13W)

Prerequisites: BCHM213, 222, 231.

Aim: To become acquainted with the theory and practical applications of immunochemical techniques used in research, analytical and diagnostic laboratories.

Content: Raising antibodies in experimental animals, adjuvants, carrier molecules, ethical considerations, monoclonal antibody production; precipitation techniques; agglutination; complement fixation test; enzyme linked imminoabsorbant assay (ELISA), western blotting, flow cytometry, immunochemistry relating to tissues, and practical isolation, analysis, and charcterisation of antibodies.

Practicals: Practicals.

Assessment: 2 theory tests, 1 poster presentation, 5 laboratory reports, 1 examination.

NOT OFFERED IN 2000

BCHM325 – Biochemistry of Nucleic Acids
(PBC3NA1) (14L-5T-12P-0S-33H-12R-0F-5A-8C-13W)

Pre-requisites: BCHM213, 222, 231.

Aim: To attain insight to purine and pyrimidine synthesis and modification for nucleic acid synthesis; function of anti-cancer and antimicrobial agents designed to block cell division and clinical applications, dideoxy sequencing; protein/DNA interactions in gene expression.

Content: De novo and salvage pathways of purine and pyrimidine synthesis and how these can be blocked with anti-cancer drugs and used for monoclonal antibody production; structure of nucleosides, nucleotides and oloigonucleotides; primary, secondary and tertiary structure of nucleic acids; introns and exons; protein/nucleic acid interactions, zinc fingers, polymerases, restriction endonucleases, transcription factors and repressors; practical analysis of chicken erythrocyte chromatin structure and plasmid manipulation and digestion.

Practicals: Practicals.

Assessment: 2 theory tests, 6 practical written exercises, 1 examination.

NOT OFFERED IN 2000

BCHM326 – Protein Structure & Function
(PBC3PS2) (14L-5T-12P-0S-33H-12R-0F-5A-8C-13W)

Prerequisites: BCHM213, 222, 231.

Aim: To provide insight into the three levels of protein structure, the relationship between the structure and function (and evolution) of proteins.

Content: Concepts and methods in the determination of primary, secondary and tertiary structures of proteins; methods for the representation of the 3-D structure of proteins and the families of proteins which have thus been identified; mapping of enzyme active sites; enzyme reaction mechanisms.

*Practicals:*Computer-based practicals.

*Assessment:*2 theory tests, 1 examination.

NOT OFFERED IN 2000

BCHM328 – Control of Metabolism in Living Organisms
(PBC3RM2) (18L-17T-0P-0S-31H-10R-0F-5A-8C-13W)

Prerequisites:[BCHM231 or 213].

*Aim:*To provide insight into how metabolism is regulated, and can be manipulated, in cells and whole organisms.

*Content:*The integration and regulation of metabolism in animals, humans, plants and microbes under normal, and stressful conditions such as exercise, disease (e.g. heart disease and diabetes), and toxicity (e.g. microbial toxins and drugs). Application of metabolic control analysis to metabolic regulation and the manipulation of genes and metabolic pathways in biotechnology and in the treatment of disease.

*Assessment:*2 theory tests, 2 quizzes, 1 essay, 1 oral presentation, 1 examination.

NOT OFFERED IN 2000

BCHM340 – Immunobiochemistry
(PBC3IM2) (14L-6T-15P-0S-34H-9R-0F-3A-8C-13W)

*Pre-requisites:*BCHM213, 222, 231.

*Aim:*To attain a biochemist's perspective on immunology; principles of immune function in defence against invading pathogens; useful for animal scientists, dietitians, geneticists, microbiologists and zoologists.

*Content:*Innate immunity, phagocytes, complement, C3 pathway and immunity to organisms; acquired immunity, B and T cells; integration of innate and acquired immunity; antigen receptors on B and T cells, Major Histocompatibility complex; antibody/antigen interactions, antigen processing and diversity; immuno-anatomy, lymphoidorgans, spleen, MALT, thymus; lymphocyte activation, cell surface markers, cytokines and immunoregulation. Practical exercises on immune cell identification, antigen/antibody interaction, cross-reactivity, antigen localization and designer antibodies.

*Practicals:*Practicals.

*Assessment:*2 theory tests, 1 essay, 5 laboratory reports, 1 examination.

NOT OFFERED IN 2000

BCHM360 – Molecular Aspects of Microbial Pathogenesis
(PBC3MP2) (14L-4T-8P-21S-29H-3R-0F-2A-8C-13W)

*Prerequisites:*BCHM213, 222, 231.

*Aim:*To provide insight into the host-pathogen and toxin interaction and to give a holistic view of the importance of health and veterinary policies, practices and health regulations with regards to biochemical mechanisms of pathogenesis and the control of disease.

*Content:*Molecular aspects of microorganism cell wall and other components in host colonization and pathogenicity; molecular aspects of innate, physical and chemical barriers of the host and host defence; proteins and toxins produced during invasion and infection, or during growth in food and water supplies, made of action and symptoms of infection; food and water testing.

Practicals: Practicals, tutorials, field trips.

Assessment: Practical reports, assignments, 1 examination.

NOT OFFERED IN 2000

BCHM370 – Protein Toxins in Cell Biology & Pathology
(PBC3PT2) (14L-4T-8P-21S-29H-3R-0F-2A-8C-13W)
Prerequisites: BCHM213, 222, 231.

Aim: To provide insight into cell biological processes at the molecular level and especially into cell-toxin interactions.

Content: Membrane permeabilising toxin; toxins affecting protein synthesis; cytoskeleton - affecting toxins; toxins affecting membrane trafficking; sodium channel targeted toxins; potassium channel targeted toxins; calcium channel targeted toxins.

Practicals: Practicals, tutorials, field trips.

Assessment: 1 test, research seminar/presentation, practical/field trip reports, 1 examination.

NOT OFFERED IN 2000

BCHM380 – Research Techniques in Biochemistry
(PBC3RT1) (27L-11T-20P-0S-73H-25R-0F-5A-16C-13W)
Prerequisites: BCHM213, 222, 231.

Aim: Introduction to techniques applicable to biological, agricultural, and food science investigations. Techniques include those used in routine analysis, isolation and the examination of carbohydrates, proteins, nucleic acids and fats.

Content: Preparation of biological material, centrifugation and safety aspects. Spectrophotometry and fluorescence. Mammalian and bacterial cell culture. Extraction, detection and determination of DNA, lipid, carbohydrate and protein. Electrophoretic techniques, principles, starch, agarose polyacrylamide, 2 dimensional and western blotting. Chromatography: exclusion, ion-exchange, affinity, thin layer, gas and HPLC. Antibodies in research, vaccine strategies, raising antibodies, ELISA. Bio-informatics and biocomputing; analysis of scientific literature, library sources and internet access. Radio-isotopes in biochemical analysis.

Practicals: Practicals.

Assessment: 2 theory tests, practical written reports, 1 examination.

NOT OFFERED IN 2000

BCHM701 – Cell Biology & Methods in Cell Biology
(PBC7CB1) (20L-10T-0P-0S-30H-18R-0F-2A-8C-13W)
Prerequisites: 128C in Biochemistry at level 3 and prerequisites pertaining to these modules *or* modules which in the opinion of the Head of Programme has (have) provided the candidate with adequate knowledge to complete the module.

Aim: To introduce students to theoretical aspects of intracellular trafficking of biomolecules. Introduction to practical aspects for the study of trafficking.

Content: Topological continuity between organelle lumens and extracellular space; glucoprotein synthesis and trafficking; composition and autoassembly of extracellular matrix; structure and function of cytoskeleton; reciprocity between intracellular and extracellular order; relevance to cellular diseases such as cancer. Methods in subcellular fractionation, histochemistry, immunochemistry, various electron microscopy techniques, application of radioisotopes, animal cell culture and lysosome-endosome trafficking.

Practicals: Tutorials.

Assessment: 1 theory test, study assignments, 1 examination.

BCHM703 – Antigens and vaccines
(PBC7AD1) (20L-10T-0P-0S-30H-18R-0F-2A-8C-13W)
Prerequisites: 128C in Biochemistry at level 3 and prerequisites pertaining to these modules *or* modules which in the opinion of the Head of Programme has (have) provided the candidate with adequate knowledge to complete the module.

Aim: To introduce the student to antigen presentation and vaccine design. The steps in antigen presentation and the biochemical techniques used for identifying the steps. Vaccine design, criteria for choosing vaccine molecules, T cell, B cell and CTL epitopes and their use.

Content: Vaccine development - the malaria and HIV models; immunological, parasitological, molecular and metabolic considerations for host and malaria parasite. Preparation, evaluation and analysis of affinity purified antigens. BLAST and FASTA based computational diagnosis of protein and nucleic acid databases relevant to vaccine design. Molecular Modeling. Scientific Journals - dissection and analysis of articles on malaria and malaria vaccine design. Antigen processing and presentation - HIV as a model. Cellular steps to antigen presentation. Appraisal of protein subunit structure and protein structural motifs. Vaccines for the AIDS virus.

Assessment: 1 examination.

BCHM705 – Applied Philosophy for Scientists
(PBC7SE1) (40L-0T-0P-0S-16H-20R-0F-4A-8C-13W)
Aim: To introduce students to some important philosophical and ethical issues pertaining to science and the practice of scientists.

Content: Students select two modules from a range of electives announced at the beginning of each year. Various philosophical issues of importance to scientists are debated in modules such as on: Darwin and Philosophy, Ethics in Science, Issues Affecting Scientific Research, Philosophy of Technology, and Philosophy of Measurement.

Assessment: Written assignments, 1 essay.

BCHM720 – Biochemistry Research Project
(PBC7BPY) (0L-0T-400P-80S-158H-0R-0F-2A-64C-26W)
Prerequisites: 128C in Biochemistry at level 3 and prerequisites pertaining to these modules or 128C in Genetics at level 3 and prerequisites pertaining to these modules *or* course(s) which in the opinion of the Head of Programme has (have) provided the candidate with adequate knowledge to complete the module.

Aim: To introduce the student to a laboratory research and analysis environment where skills appropriate for a research career are assimilated. Skills applicable for a non-research working milieu are acquired and honed. The module has a bimodal outcome. One aspect serves as a bridging between an undergraduate and a post-graduate career while simultaneously preparing the graduate for other career options.

Content: Single Semester Research project. Choice of research project in a number of fields depending on expertise of individual project leaders. Fields currently include - Malaria, Immunodiagnostics, *Trypanosomiasis*, Immunotechnology, Immunocytochemistry, Electron microscopy, Cancer, Mechanisms of metastasis, Research in Biochemical Education, Enzyme analysis, Modeling and purification, Biotechnology.

Practicals: Continuous practical investigation.

Assessment: 1 written report in research paper format, 1 written seminar, 1 written literature review, 2 oral presentations.

BCHM790 – Agricultural Biochemistry Research Project
(PBC7ARY) (0L-0T-400P-80S-158H-0R-0F-2A-64C-26W)

Prerequisites: 128C in Biochemistry at level 3 and prerequisites pertaining to these modules or 128C in Genetics at level 3 and prerequisites pertaining to these modules *or* course(s) which in the opinion of the Head of Programme has (have) provided the candidate with adequate knowledge to complete the module.

Aim: To introduce the student to a laboratory research and analysis environment where skills appropriate for a research career are assimilated. Skills applicable for a non-research working milieu are acquired and honed. The module has a bimodal outcome. One aspect serves as a bridging between an undergraduate and a post-graduate career while simultaneously preparing the graduate for other career options.

Content: Single Semester Research project. Choice of research project in a number of fields depending on expertise of individual project leaders. Fields currently include - Malaria, Immunodiagnostics, *Trypanosomiasis*, Immunotechnology, Immunocytochemistry, Electron microscopy, Cancer, Mechanisms of metastasis, Research in Biochemical Education, Enzyme analysis, modeling and purification, Biotechnology.

Practicals: Continuous practical investigation.

Assessment: 1 Written report in a research paper format, 1 written seminar, 1 written literature review, 2 oral presentations.

Biological Systematics

Offered in the School of Botany & Zoology

BSYS801 – Theory & Philosophy of Biological Systematics
(PSY8TP1) (0L-60T-36P-12S-199H-10R-0F-3A-32C-13W)

Prerequisites: BScHONS or four-year bachelor's degree (512C) in an appropriate biological field, acceptable to the Board of the Faculty.

Aim: To produce in-depth understanding of and expertise in the philosophical and theoretical bases of modern systematic studies, thus enabling informed application of appropriate methods.

Content: The nature of systematics, its philosophical and scientific justification; purposes and properties of classifications; units and properties of the taxonomic hierarchy; relationships and phylogeny; theoretical bases and methods for phenetic, cladistic and eclectic approaches to estimation of relationships at all levels; systematics and biogeography.

Practicals: None.

Assessment: Essay(s) (30%), oral presentations (20%), written examination (3 hrs, 50%).

BSYS803 – Methods in Biological Systematics

(PSY8MT1) (0L-36T-60P-12S-202H-10R-0F-0A-32C-13W)

Prerequisites: Possession of a BSc Hons or four-year bachelor's degree (512C) in an appropriate biological field, acceptable to the Board of the Faculty.

Aim: To produce expertise in the application of different methods and techniques in modern systematic studies.

Content: Derivation and utilization of molecular, morphological and other types of characters in phenetic, cladistic and integrative analyses using appropriate computer programs and interpretation of the results; solving of problems in nomenclature; techniques for production of illustrated systematic publications; specimen handling and curation.

Practicals: Appropriate to the above.

Assessment: Integrative essay (20%), practical reports (60%), oral presentations (20%).

BSYS890 – Biological Systematics Mini-Dissertation

(PSY8RDY) (0L-0T-0P-0S-640H-0R-0F-0A-64C-26W)

Prerequisites: Possession of a BSc Hons or four-year bachelor's degree (512C) in an appropriate biological field, acceptable to the Board of the Faculty; BSYS801 and BSYS803 (both with a minimum mark of 50%).

Aim: To produce expertise in research in modern systematic studies.

Content: Supervised research on the systematics of a chosen group of organisms.

Practicals: None.

Assessment: Mini-dissertation.

Biology

Offered in the School of Botany & Zoology

BIOL010 – Foundation Biology

(PBIOBFY) (48L-0T-104P-0S-52H-20R-0F-16A-24C-26W)

Pre- or Corequisites: None.

Aim: To develop the appropriate science-process, practical and cognitive skills required for undergraduate Life Science courses.

Content: Classification of living organisms - use and construction of keys; cell biology-constraints on maximum size, becoming multicellular; cell tissue and organ-structure and function relationships in selected examples; homeostasis and temp. regulation in mammals; structure and function of a selected ecosystem - an experimental study; flowering plant structure, function and adaptations - selected aspects.

Practicals: Laboratory-based practicals and field excursions to beach and Umgeni Valley.

Assessment: Regular theory and practical assessment; essays; poster presentation; June Theory and Practical tests; November Theory and Practical examinations.

Biometry

Offered in the School of Mathematics, Statistics & Information Technology

BMET210 – Introduction to Biometry
(PBB2BP1) (39L-0T-36P-0S-46H-33R-0F-6A-16C-13W)
Prerequisite: 8C in the Faculty of Science and Agriculture.

Aim: To provide students in Agriculture and the Life Sciences with the skills necessary to adequately analyze and summarize various types of data using appropriate statistical methods.

Content: Types of data. Statistical distributions: normal, binomial, Poisson, negative binomial. Statistical methods for analyzing single, two- and multi- sample problems, including z-tests, t-tests and ANOVA. Correlation and linear regression analysis. Analysis of categorical data by chi-square.

Practicals: None.

Assessment: 3 tests and 1 examination.

BMET222 – Experimental Design & Multiple Regression
(PBB2ID2) (39L-0T-40P-0S-56H-20R-0F-5A-16C-13W)
Prerequisite: [STAT110 or BMET210] with a minimum mark of 50%.

Aim: To introduce students in Agriculture and the Life Sciences to the concepts of efficient experimental design through blocking and treatment selection. To introduce students to statistical Modeling through multiple linear regression methods.

Content: The concept of an experimental unit. Blocking as a means to error reduction, such blocking methods to include randomized complete blocks designs (RCBD), Latin square designs, split-plot and split-block designs. Factorial treatment structures including quantitative and qualitative factors. Covariance analysis. Analysis of data using multiple linear regression methods. Extension of linear regression methods to resolve problems arising from corrupted experiments.

Practicals: None.

Assessment: 2 tests, practical assignments and 1 examination.

BMET314 – Multiple Regression Analysis
(PBB3MR1) (20L-0T-15P-0S-31H-10R-0F-4A-8C-13W)
Prerequisites: [STAT110 or 210 or BMET210] and [MATH111, 122] or equivalent courses, all with a minimum mark of 50%.

Aim: To provide students in Agriculture, the Life Sciences and Statistics with an overview of multivariate regression methods, including logistic regression.

Content: Review of matrix algebra. Mathematical basis for multiple linear regression methods, including the derivation of the least squares estimates, the variance-covariance matrix associated with such regression estimates and the concept of studentized residuals as the basis for residual analysis. Various forms of residual analytic methods. Methods for data transformation including the Box-Cox method. Automatic model selection methods including forward, backward, stepwise and all-subsets selection. Introduction to the analysis of binary data using logistic regression methods and the concept of odds-ratios.

Practicals: None.

Assessment: 2 tests, practical assignments and 1 examination.

BMET316 – Multivariate Analysis
(PBB3MA1) (20L-0T-21P-0S-25H-9R-0F-5A-8C-13W)
Prerequisites: [STAT110 or 210 or BMET210] and [MATH111, 122] or equivalent courses, all with a minimum mark of 50%.
Aim: To teach students to use multivariate analysis.
Content: General principles of multivariate analysis. Specific types of canonical and other techniques. GENSTAT multivariate analysis.
Practicals: None.
Assessment: 2 tests and 1 examination.

BMET701 – Practical Advanced Experimental Design
(PBB7ED1) (19L-0T-18P-0S-30H-10R-0F-3A-8C-13W)
Prerequisite: BMET222.
Aim: To teach students practical design and analysis of complex experiments.
Content: Factorial experiments at 2, 3 and 4 levels. Confounding for incomplete blocks in factorial experiments. Incomplete block designs for non-factorial treatments.
Practicals: None.
Assessment: 2 tests and 2 assignments.

Bio-resources

Offered in the School of Applied Environmental Sciences

BIOR118 – Introduction to the Environment
(PBR1IE1) (18L-5T-15P-0S-27H-10R-0F-5A-8C-13W)
Prerequisite: Matriculation exemption.
Aim: This module is designed to provide students intending to take a wide range of courses in the fields of, mainly but not exclusively, agriculture, science, ecology and environmental science with an introduction to the atmosphere, hydrosphere, lithosphere and pedosphere - i.e. air and energy, water, rocks and soil. Within these areas the course aims to raise the major issues that impact upon environmental management and the sustainable use of natural resources. The module introduces the important environmental issues as they affect, and are affected by the four 'spheres' under consideration and to encourage the students to take a questioning attitude on these issues. The module is designed so that it can provide a broad background for subsequent, more specialized courses, as well as serving as a complete course for the environmentally-minded student.
Content: *Atmosphere:* The sun and our solar system and our past; composition of the atmosphere; radiative processes and energy transfer; the greenhouse effect; ozone controversy; climate change; El Nino; acid rain; pollution.
Hydrosphere: The oceans; ocean currents; atmospheric water; the hydrologic cycle.
Lithosphere: Structure of the Earth; processes within the Earth; plate tectonics and continental drift; earthquakes and vulcanism and their occurrence, effects, and prediction; the rock cycle.
Pedosphere: Soils and pollution as influenced by crop growth (aspects discussed include the nitrate and phosphate leaching problem; eutrophication of water bodies; pesticide residues;

and toxic elements within the food chain); waste disposal (aspects discussed include the soil as a 'sink'; and the pros and cons of land treatment vs landfill); acid rain and its effects on soil and the direct deposition of toxic elements. A comparison of rocks and soils and the rate of soil formation. Soil erosion - amount, causes, and importance. Natural *vs* enhanced erosion. Organic matter in soils - origin, characteristics and conservation. Mineral matter in soils - origin, and importance. The clay minerals - their origin, properties and types. Mineral and organic matter in a wide range of soil types - their interactions and importance. Soil profiles. Soil fertility. Natural *vs* enhanced fertility. The carbon, nitrogen, phosphorus, and sulphur cycles. Comparisons between natural and agroecosystems. The pros and cons of inorganic *vs* organic fertilizers.

Practicals: The aerial environment. An introduction to a weather station. Introduction to world and South African soils; the role of soil science in environmental management; field investigation of soil properties and the interrelationships between soils and land use.
Assessment: Two tests, one three-hour examination.

BIOR128 – Ecology of Natural & Agricultural Ecosystems
(PBI1NA2) (18L-5T-12P-0S-27H-13R-0F-5A-8C-13W)
Prerequisite: Matriculation exemption.

Aim: This single module is an introduction to the major factors influencing modern managed ecosystems. It is designed to provide students taking agriculture and environmental science with the key principles and applications in the sustainability of grassland and forest ecosystems. The student evaluates different land use systems on the basis of sustainability and contribution to human welfare.

Content:Ecosystems - structure and function, energy flows, food chains, succession, biomes and biodiversity, role of agriculture in ecosystem management.

Forestry - forest types and their distribution, importance of forests, evolution of SA forestry industry, forestry career opportunities, practical examples of natural resource management, timber production, research and processing.

Agricultural economics - Property rights to water and land, and their effects on both sustainable and efficient use of natural resources. The time value of money and capital budgeting and cost:benefit analysis.

Practicals: Field practicals: three practicals, one project.

Assessment: Two tests, one three-hour examination.

Biosciences

Offered in the School of Botany & Zoology

BIOS101 – Cellular Biology
(PSB1CB1) (37L-10T-36P-0S-53H-15R-0F-9A-16C-13W)
Pre- or Corequisites: None.

Aim: To develop the basic knowledge and understanding of the interactions between structure and functioning of living organisms at the cell, tissue, organ and whole organism level of organization.

Content: Selected aspects of life at the cellular level of organization including cell chemistry, cell structure and function, biochemistry of selected organelles, principles of Mendelian genetics and inheritance. Diversity survey.

Practicals: Eleven laboratory based practicals.

Assessment: Practical write-ups; 3 Theory Tests; Essay; Practical Test; Theory Exam (3 hr).

BIOS202 – Global Biodiversity
(PSB2GB2) (19L-3T-9P-0S-36H-10R-0F-3A-8C-13W)
Prerequisites: None.
Aim: To introduce the concept of biodiversity; the significance of the current global biodiversity crisis; the importance of biodiversity in the maintenance of healthy ecosystems.
Content: Global Biodiversity - past, present and future; Gaia hypothesis; The need for, and status of, biodiversity conservation in southern Africa.

Practicals: 3 afternoon field excursions to local areas of interest.

Assessment: 3 Field trip reports; 1 Essay; Theory test; Theory exam (2 hr).

BIOS302 – Plant/Animal Interactions
(PSB3PA2) (14L-0T-28P-0S-25H-10R-0F-3A-8C-13W)
Prerequisites: BIOS101 and [BOTY102 or ZOOL102] each with a minimum mark of 50%; at least 8C at level 3.
Aim: To develop a multi-disciplinary approach to both theoretical and applied issues in plant-animal interactions.
Content: Plant-pollinator mutualisms, including visual and scent perception by animals and adaptations of flowers. Seed dispersal and seed predation by animals. Plant-herbivore interactions, including animal feeding and digestion and plant defence strategies. Theory of coevolution.

Practicals: 6 practicals and weekend field trip.

Assessment: Field trip report; Theory Test; Essay; Theory Exam (2 hr).

BIOS304 – Biological Systematics
(PSB3BS2) (14L-3T-18P-0S-32H-10R-0F-3A-8C-13W)
Prerequisites: BIOS101 and [BOTY102 or ZOOL102] each with a minimum mark of 50%; at least 8C at level 3.
Aim: To demonstrate the central importance of biological systematics as the organizing principle for the utilization of all knowledge in the pure and applied biological sciences; and to develop an understanding of the scientific basis and methods of systematics and classification.
Content: Definitions of major terms; functions and forms of classifications; systematics and the nature of science; the fundamental significance of species as real entities; methods of classification, using phenetic, cladistic and eclectic (evolutionary) approaches; interpretation and integration of different types of characters in plants, animals and micro- organisms; uses of systematic studies, classifications and phylogenies; introduction to historical biogeography; rules of nomenclature (botanical, zoological and bacteriological).
Practicals: Derivation and utilization of molecular and morphological characters in phenetic, cladistic and integrative analyses; exercises in nomenclature.
Assessment: Integrative essay; Practical reports; Oral presentations; Theory test; Theory exam (2 hr).

BIOS306 – Evolutionary Biology
(PSB3EB2) (14L-3T-18P-0S-32H-10R-0F-3A-8C-13W)
Prerequisites: BIOS101 and [BOTY102 or ZOOL102] each with a minimum mark of 50%; at least 8C at level 3.

Aim: To understand the process of evolution in biological organisms and some of the important debates in evolutionary biology .

Content: Sources of variation. Development of evolutionary thinking in biology. Modern evolutionary theory. Examples of natural selection in plants and animals. Isolating mechanisms and mate recognition. Species concepts and speciation theory. Convergent evolution and mimicry. Adaptive radiation.

Practicals: 6 Laboratory practicals and afternoon field trips.

Assessment: Review essay; Theory test; Theory exam (2 hr).

BIOS701 – Research Techniques
(PSB7BT1) (24L-36T-36P-0S-52H-8R-0F-4A-16C-13W)
Prerequisites: Acceptance into Honours.

Aim: To develop basic knowledge and understanding of principles and applications of selected practical research techniques.

Content: Compulsory techniques - Communications and Applied Statistics; Elective techniques - Any 3 from the range offered by the School (e.g. Analytical; Chromatography; Microsopy and microtechniques; Photography; Radiochemistry; Ultra-centrifugation). The range of elective techniques offered in any year will depend on staff availability and research interests within the School.

Practicals: A series of practical exercises will provide students with the opportunities to develop the appropriate range of practical skills (e.g. sample/specimen preparation; calibration and measurement) associated with using research equipment safely and competently.

Assessment: Independent practical exercises and short tests (where appropriate) for each of the elective techniques.

BIOS702 – Review Essay
(PSB7ES1) (0L-3T-0P-0S-77H-0R-0F-0A-8C-13W)
Prerequisites: Acceptance into Honours.

Aim: To collect and synthesise relevant scientific literature pertaining to a particular research field/area and to use this information to generate, as an essay, a coherent, cogent and logical synthesis of the literature that realistically assesses past research, current understanding and potential directions for future research.

Content: Students will be provided with a list of supervisors and possible review essay topics at the beginning of their Honours year.

Practicals: None.

Assessment: Review Essay.

BIOS703 – Advanced Systematics
(PSB7SYM) (9L-0T-0P-10S-49H-10R-0F-2A-8C-13W)
Prerequisites: At least 64C in botanical and/or zoological sciences at level 3, including BIOS304.

Aim: To produce understanding of, and expertise in, the derivation and application of different character systems in modern systematic studies.

Content: Systematics, phylogeny and the nature of science; methods of classification, using phenetic, cladistic and eclectic (evolutionary) approaches; interpretation and integration of different types of characters in plants, animals and micro- organisms.

Practicals: Derivation and utilization of molecular, morphological and other types of characters in phenetic, cladistic and integrative analyses using appropriate computer programs; interpretation of the results.

Assessment: Integrative essay; Practical reports; Oral presentations; Theory exam (2 hr).

BIOS704 – Biosystematics
(PSB7BSM) (14L-5T-6P-0S-43H-10R-0F-2A-8C-13W)
Prerequisites: At least 64C in Botanical and/or Zoological Sciences at level 3 and BOTY204.

Aim: To give an advanced understanding of the diversity and evolution of plants and their classification.

Content: This course provides insight into assessing morphology, micromorphology, anatomy, palynology and ontogenetic characters for use in the classification of higher plants using phenetic and cladistic methodology.

Practicals: None.

Assessment: Theory exam (2 hr).

BIOS705 – Biogeography
(PSB7BGM) (9L-0T-0P-10S-49H-10R-0F-2A-8C-13W)
Prerequisites:

Aim: To provide a general understanding of the patterns and origins of plant and animal distributions.

Content: Geographical variation and speciation. Patterns of species richness in South Africa. The biome concept versus the chorion. Climate change and continental drift. Dispersal versus vicariance biogeography. Island biography and the design of nature reserves.

Practicals: None.

Assessment: Mini-seminar; Essay; Theory Exam (2 hr).

BIOS706 – Comparative Method
(PSB7EMM) (6L-4T-20P-0S-38H-10R-0F-2A-8C-13W)
Prerequisites: At least 64C in Botanical and/or Ecological and/or Zoological sciences at level 3.

Aim: To provide students entering a research career with the awareness of the problems and limitations of conventional statistical analysis of interspecific continuous and discrete data. To expose students to the latest and most contemporary methods for the comparative analysis of behavioural, morphological and physiological traits in animals. To emphasise the importance of phylogeny. To provide students with the knowledge and analysis tools to be able to infer adaptation.

Content: The value of interspecific comparison; the history of interspecific comparison; the assumptions of conventional statistical procedures; the problem of data independence; the importance of phylogeny; the phylogenetically-independent (PI) analysis of continuous and discrete data (PI ANOVA, PI ANCOVA, independent linear contrast analysis; analysis of higher nodes; Stearn's phylogenetic subtraction method; maximum likelihood approach); the Phylogenetic Diversity Analysis Programme (PDAP).

Practicals: Students will undertake two practical assignments that require considerable manipulation of computer-based PI models and statistical procedures.

Assessment: Two practical assignments; Theory Exam (2 hr).

Botany

Offered in the School of Botany & Zoology

BOTY102 – Plant Diversity & Ecology

(PBO1PD2) (37L-5T-36P-0S-59H-15R-0F-8A-16C-13W)

Pre- or Corequisites: None.

Aim: To provide a foundation for any student intending to major in the Botanical Sciences.

Content: The concept of the life cycle; algae; lichens; bryophytes; seedless vascular plants; seed bearing plants, with an emphasis on the structure of roots, stems and leaves; physical and geographic factors controlling plant distribution; herbivory; competition; ecosystem functioning.

Practicals: 12 Practicals - vegetative and reproductive features of different members of the Plant Kingdom.

Assessment: Practical reports; 2 Theory tests; Essay; Practical Test; Theory Exam (3 hr).

BOTY201 – Plant Ecophysiology

(PBO2PE1) (19L-0T-18P-0S-30H-10R-0F-3A-8C-13W)

Prerequisites: BIOS101 with a minimum mark of 50%.

Aim: This module reviews the interaction of plants with their environment. The emphasis is on how plants acquire the resources they need from the environment, namely water (Plant Water Relations), nutrients (Plant Nutrition) and energy from the sun (Photosynthesis).

Content: Plants and water: concept of water potential; water movement through the soil-plant-air continuum; drought tolerance in plants. Plant nutrition: the essential elements; nutrient movement through soil, across the root; through the xylem and into leaves; the N and P cycles. Photosynthesis: pathways and driving forces for carbon dioxide entry into leaves; C3, C4 and CAM photosynthesis.

Practicals: 6 Practicals - plant water relations, nutrition and photosynthesis.

Assessment: Practical reports; Essay; Theory Test; Theory Exam (2 hr).

BOTY202 – Plant Use & Diversity: Lower Plants

(PBO2DL2) (19L-0T-28P-0S-20H-10R-0F-3A-8C-13W)

Prerequisites: BOTY102 with a minimum mark of 50%.

Aim: Provide an overview of evolution, morphological and reproductive diversity in algae and seedless vascular land plants.

Content: Structure and reproduction of: major algal classes(Cyanophyceae, Chlorophyceae, Phaeophyceae and Rhodophyceae); spore-bearing vascular land plants(Psilopsida, Lycopsida, Sphenopsida and Pteropsida). Evolutionary trends and relationships.

Practicals: 6 practicals - characteristic features of major groups of algae and primitive land plants. Weekend field trip.

Assessment: Practical reports; 2 Theory tests; Essay; Oral presentation; Theory exam (2 hr).

BOTY203 – Plant Structure & Function
(PBO2PF1) (19L-0T-18P-0S-30H-10R-0F-3A-8C-13W)
Prerequisites: BOTY102 with a minimum mark of 50%.

Aim: Provide skills to interpret and understand the structure and function of plant cells and tissues.

Content: Nature and growth of the plant cell wall, and cambial activity. The development of secretory and storage cells and tissues.

Practicals: 6 Practicals - Microscopic and histochemical examination of cell and tissue types; preparation protocols for microscopy.

Assessment: Theory tests; Essay; Oral presentation; Theory exam (2 hr).

BOTY204 – Plant Use & Diversity: Higher Plants
(PBO2DH2) (19L-0T-28P-0S-20H-10R-0F-3A-8C-13W)
Prerequisites: BOTY102 with a minimum mark of 50%.

Aim: To give an overview of plant diversity in South Africa paying special attention to diverse and economically important families.

Content: This course deals with diversity, evolution and identification of dominant families of plants in South Africa. Students will be introduced plant collection, specimen preparation and the range of available identification keys. The course also covers the economic, biological and cultural importance of these families.

Practicals: 6 Practicals and a weekend field trip.

Assessment: Plant collection; Essay; Practical test; Theory exam (2 hr).

BOTY301 – Plant Physiology
(PBO3PP1) (28L-5T-36P-0S-69H-15R-0F-7A-16C-13W)
Prerequisites: BIOS101 and BOTY102 with a minimum mark of 50%.

Aim: To provide students with an understanding how plants function at the cellular, tissue and organ levels.

Content: Scientific principles with respect to growth regulators in correlative processes such as germination, rooting, apical dominance, flowering, senescence and plant movements.

Practicals: 12 experimental practicals to gain an understanding of plant growth using tissue culture, bioassays and chemical analysis.

Assessment: Practical reports; Essay; Practical test; Theory test; Theory exam (3 hr).

BOTY701 – Plant Stress Physiology
(PBO7PSM) (12L-0T-0P-0S-56H-10R-0F-2A-8C-13W)
Pre- or Corequisites: BIOS101; BOTY201; 301 each with a minimum mark of 50%.

Aim: This module is concerned with the response of plants to environmental conditions that deviate significantly from those that are optimal. Adaptations at the biochemical, physiological, anatomical and morphological levels that enable plants to survive in stressed environments will be discussed.

Content: The concept of stress; oxidative stress as a possible unifying consequence of many stresses; drought and desiccation stress; salinity, high temperature and high light stresses; man-made stresses including ozone pollution, the greenhouse effect, acid rain and metal pollution.

Practicals: None.

Assessment: Theory test; Theory exam (2 hr).

BOTY702 – Secondary Plant Products & Bioprospecting
(PBO7SPM) (13L-17T-0P-0S-38H-10R-0F-2A-8C-13W)

Prerequisites: At least 64C at level 3 including BOTY301.

Aim: To provide an explanation of the role secondary metabolites play in plants.

Content: Secondary metabolites: Biochemical origin and biosynthesis. Classes and categories. The economics of metabolite production. Biotechnological manipulation of secondary plant products.

Practicals: None.

Assessment: Essay; Tutorial participation; Theory exam (2 hr).

BOTY703 – Seed Biology
(PBO7SBM) (12L-0T-0P-0S-56H-10R-0F-2A-8C-13W)

Prerequisites: At least 64C at level 3 in botany, plant physiology, ecology, ethnobotany, or agricultural discipline.

Aim: Provide an understanding of aspects of seed development, germination and dormancy and their importance in human nutrition and agriculture. The use of seeds as systems for research in biochemistry and molecular biology.

Content: Seed structure and development; biochemical and hormonal aspects. Dormancy, germination, and reserve utilization. Storage and longevity of seeds.

Practicals: None.

Assessment: Essay; Theory exam (2 hr).

BOTY790 – Botany Research Project
(PBO7RPY) (0L-20T-0P-30S-590H-0R-0F-0A-64C-26W)

Prerequisite: Acceptance into Honours in Botany.

Aim: To provide learners with the opportunity, under supervision, to gain first-hand experience in the formulation, planning, execution, analysis, and reporting on, their Honours research project(s).

Content: Students will be provided with a list of supervisors and possible research topics at the beginning of their Honours year. The final choice and number (1 or 2) of research projects will be decided by discussion and negotiation between the student and supervisor.

Practicals: No formal practicals. Students will be expected to execute a research plan and, where necessary, demonstrate competence in the use of sophisticated research equipment to collect data for their project.

Assessment: 2 Oral presentations (project proposal and research findings); Research report.

Business Information Systems

Offered in the School of Mathematics, Statistics & Information Technology

BISS110 – End User Computing

(PIB1BEB) (29L-9T-26P-0S-65H-24R-0F-7A-16C-13W)

Prerequisites: None.

Aim: The purpose of this module is to provide students with knowledge about principles of computer hardware and software, the use of common packages and issues related to the use of computers as a personal productivity tool. The course is practical in nature and oriented towards using computers to solve problems which students are likely to encounter in their future places of work rather than the design or programming of computing systems.

Content: Computer and operating systems, word processing, spreadsheets, database. Information retrieval and world wide web concepts, graphical user interfaces, desk top publishing, social and ethical issues. The relationship between MIS and the organisation: focus on business functions; integrated MIS.

Practicals: None.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

BISS120 – Business Information Systems Concepts

(PIB1BS2) (29L-9T-26P-0S-66H-23R-0F-7A-16C-13W)

Prerequisites: at least 50% in BISS110.

Aim: An understanding of the nature of business computing and the necessary controls.

Content: Systems thinking - business organisations and systems, problem solving; Introduction to programming; Business algorithms; Electronic spreadsheets for business uses; Introduction to Systems Analysis; From Data Processing Systems to MIS, typical subsystems in MIS; Control mechanisms in the management of computer resources; Economics of computing, information resource management.

Practicals: None.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

BISS210 – Business Information Systems Tools

(PIB2BS1) (29L-9T-39P-0S-53H-23R-0F-7A-16C-13W)

Prerequisites: at least 50% in [MATH113 and STAT112 and BISS120] or [MATH110 and CSCI140].

Aim: To develop programmers who can solve problems efficiently either in a non imperative or imperative environment. To develop learners who will understand and know how to use data communication technologies.

Content: Imperative programming: Programming constructs for sequence, definite loops, indefinite loops, selection and function calls. Variable types. Functions, control structures, arrays, file input/output and program development which includes: coding, robustness and testing and correctness. Standard algorithms. Alternately functional programming: syntax and use of a suitable functional programming environment eg. LISP or Mathematica. Functions, symbolic computing, recursive programming techniques. (Only for students who have mastered conventional programming.) Data communications: historical development of computer-based data communications systems, the ISO OSI model, data communications media, data link protocols, network topologies, network protocols, error detection and correction, data compression and coding techniques. Local and wide area networks.

Practicals: None.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

BISS220 – Business Information Systems Applications
(PIB2BS2) (29L-9T-39P-0S-53H-23R-0F-7A-16C-13W)
Prerequisites: at least 50% in [MATH113 and STAT112 and BISS120] or [MATH110 and CSCS140]. An ability to program will be assumed and BISS210 is very strongly advised.

Aim: To develop programmers who can solve advanced problems efficiently either in a non imperative or imperative environment. To develop learners who will understand and apply IS theory and practice.

Content: Imperative programming: Pointers, dynamic memory, data structures, introduction to object orientation. Alternately advanced topics, functional programming and symbolic computing. (Only for students who have mastered conventional programming.) Systems theory and concepts; information systems and organizational systems; decision theory and how it is implemented by IT; quality, TQM and reengineering; level of systems: strategic, tactical and operational; system components and relationships; information system strategies; roles of information and information technology; roles of people using, developing and managing systems; IS planning; management; electronic commerce; implementation and evaluation of system performance; societal and ethical issues related to information systems design and use.

Practicals: None.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

BISS310 – Business Information Systems Management
(PIB3BS1) (45L-9T-39P-0S-180H-40R-0F-7A-32C-13W)
Prerequisites: BISS210, 220.

Aim: The ability to manage information technology systems and analyse the requirements for such systems.

Content: Systems Analysis and Design. Overview of Information Systems development, Data, Process and Network Modeling, Systems architecture and process design, Object oriented design. Project Management and Practice. Managing the system life cycle: requirements determination, logical design, physical design testing, implementation; system and database integration issues; network and client-server management; metrics for project management and system performance evaluation; managing expectations: superiors, users, team members and others related to the project; determining skill requirements and staffing the project; cost-effectiveness analysis; reporting and presentation techniques; effective management of both behavioral and technical aspects of the project; change management.

Practicals: None.

Assessment: Examinations (50%), Tests (17%), Tutorials, practicals and term papers (16%), Project (17%).

BISS320 – Business Information Systems Database
(PIB3BS2) (45L-9T-39P-0S-180H-40R-0F-7A-32C-13W)
Prerequisites: BISS210, 220.

Aim: To provide the student with the ability to effectively store, manage and access the information resource.

Content: Database theory and design. The role of data Modeling, entity relationship Modeling, semantic object Modeling, structured query language, design of a database. Management of data and of the database design process. User interface development. Conceptual models, task flow, dialog design, detailed design, database programming (UI issues), evaluation of user interfaces.

Practicals: None.

Assessment: Examinations (50%), Tests (17%), Tutorials, practicals and term papers (16%), Project (17%).

BISS710 – Decision support theory
(PIB7DT1) (60L-0T-0P-0S-226H-28R-0F-6A-32C-13W)
Prerequisites: [BISS310, 320] or [CSCI311, 321, CSCI322, 312].

Aim: To enable students to apply within the context of IS development the principles of building and using Decision Support Systems and Intelligent Decision Support Systems, including Systems Thinking, Problem Structuring Techniques and Business Process Reengineering.

Content: The content of the module is flexible and can cover topics from the following (not comprehensive) list: Systems Thinking, Systems Modeling Techniques, Soft Systems Methodology, Decision Making, Decision Support Systems Foundations, Decision Support Systems, Design, Intelligent DSS, Group Decision Support Systems, Multicriteria Decision Support Systems, Business Systems Modeling Techniques, Business Process Reengineering, Recent topics.

Assessment: Course work (50%), Exam (50%).

BISS720 – Information Systems development
(PIB7IS2) (60L-0T-0P-0S-226H-28R-0F-6A-32C-13W)
Prerequisites: [BISS310, 320] or [CSCI311, 321, 322, 312].

Aim: To enable students to build and manage large software systems projects using appropriate development methodologies.

Content: The content of the module is flexible and can cover topics from the following (not comprehensive) list: The nature of software engineering, requirements specification, software specification using structured techniques and OO techniques, formal methods in software engineering, software reliability and testing, software quality, software measurement and productivity, software development management, overview of information systems development methodologies and their comparative analysis. Recent topics.

Practicals: None.

Assessment: Course work (50%), Exam (50%).

BISS730 – Information Systems theory
(PIB7IT1) (60L-0T-0P-0S-226H-28R-0F-6A-32C-13W)
Prerequisites: [BISS310, 320] or [CSCI311, 321, 322, 312].

Aim: To enable students to understand the fundamentals of Information Systems Research, Human Computer Interaction and Information Systems strategic management.

Content: The content of the module is flexible and can cover topics from the following (not comprehensive) list: Research methods in Information Systems and Software Engineering, design of empirical research, presentation and writing skills, current trends in IS and SE research, Human Computer Interaction (HCI) principles, roles in HCI, design of HCI, strategy planning for Information Systems, frameworks for integrating of IS strategies with business strategies, strategy implementation. Recent topics.

Practicals: None.

Assessment: Course work (50%) Exam (50%).

BISS740 – Research Project
(PIB7RPY) (0L-0T-0P-4S-316H-0R-0F-0A-32C-26W)
Prerequisites: BISS310, 320.
Aim: To enable students to understand the application of fundamentals of Information Systems and Technology or Computer Science to a research or design of a solution to a problem of moderate magnitude.
Content: Individual research work on a topic approved by the Director of the Programme
Assessment: Continuous assessment on presentations (30%), Project dissertation mark (70%).

Chemical Technology

Offered in the School of Chemical & Physical Sciences

CTEC212 – Analytical & Environmental Chemistry
(PTC2AE2) (27L-9T-36P-0S-73H-10R-0F-5A-16C-13W)
Prerequisites: CHEM111, 112 both with a mark of at least 55%.

Corequisites: None.

Aim: To extend students' chemical experience into the field of applied chemistry and to raise their awareness of environmental issues.

Content: Equilibria - acid/base, solubility, complexes, electron transfer; statistics in environmental analytical chemistry - measurements and errors, precision and accuracy, data analysis; industrial chemistry and the environment - introduction to the holistic approach required by industry.

Practicals: The practicals are designed to engender a professional attitude in the students towards measurement, recording data, calculation and report writing. Topics include - redox, complexometric and acid/base titrations, gravimetry, spectroscopy and electrochemistry.

Assessment: 1 theory test (open book); 1 exam; laboratory performance.

CTEC311 – Materials
(PTC3MM1) (27L-5T-37P-0S-71H-16R-0F-5A-16C-13W)
Prerequisites: CHEM211, 212 and **either** [MATH111, 112; STAT101; CSCI101] or [MATH110, 120].

Corequisites: CHEM311, 321; PHYS111, 112.

Aim: To introduce students to the industrial growth areas of metals and polymers.

Content: Metals - terminology, extraction, processing and applications, properties and characterisation; organic polymers - terminology, synthesis, stereochemistry, copolymers, biodegradability, physical properties and industrial uses.

Practicals:X-ray powder diffraction techniques; synthesis of alloys; synthesis and characterisation of organic polymers.

Assessment:1 theory test; 1 exam; laboratory and report-writing performance.

CTEC312 – Industrial Chemistry
(PTC3IC2) (27L-6T-36P-0S-68H-15R-0F-8A-16C-13W)
Prerequisites:CHEM211, 212, 311, 321 and either [MATH111, 112; STAT101; CSCI101] or [MATH110, 120].

Corequisites:CHEM312, 322; PHYS111, 112.

Aim:To introduce students to the field of industrial process analysis and to build an academic bridge between chemical engineering and chemistry.

Content:Mass and energy balances - unit operations and unit processes, qualitative and quantitative flow diagrams, batch and continuous processes, recycle, purge and bypass, types of heat, heat exchange, steam tables; phase chemistry - the phase rule, two- and three-component phase diagrams; separation processes - distillation, solvent extraction and crystallisation.

Practicals:Experimental and computational phase chemistry; problem-solving workshops; industrial project.

Assessment:2 theory tests; 1 exam; laboratory and report-writing performance; oral and poster presentation.

CTEC321 – Environmental & Bioorganic Chemistry
(PTC3EB1) (27L-9T-44P-0S-59H-16R-0F-5A-16C-13W)
Prerequisites:CHEM211, 212; CTEC212 and either [MATH111, 112; STAT101; CSCI101] or [MATH110, 120].

Corequisites:CHEM311, 321; PHYS111, 112.

Aim: To introduce students to the global growth area of industrial biotechnology and to explain the chemical and physical behaviour of anthropogenic and natural chemicals in the environment.

Content:Reservoirs, fluxes and residence times; atmospheric, hydrospheric and geospheric chemistry; integrative aspects of pollution cycling and pollution control; water and wastewater - the scientific, technological and legal framework of the industry; enzymes and supramolecular chemistry; industrial fermentation processes.

Practicals:Small project incorporating aspects of environmental sampling, analysis and interpretation of data; important aspects of calibration of analytical instruments; beer, wine and cheese making.

Assessment:2 theory tests; 1 exam; laboratory and report-writing performance.

CTEC322 – Analysis & Catalysis
(PTC3AC2) (27L-11T-30P-0S-70H-18R-0F-5A-16C-13W)
Prerequisites:CHEM211, 212 311, 321; CTEC212; and either [MATH111, 112; STAT101; CSCI101] or [MATH110, 120].

Corequisites:CHEM312, 322; PHYS111, 112.

Aim:To introduce students to the wide range of instrumental techniques available to the modern analyst and to the analytical process; to introduce the subject of catalysis and its wide application in industry.

Content:Sample types and preparation; chromatographic, spectroscopic and electrochemical techniques; surface analysis; thermal analysis; hyphenated techniques and automation; catalytic kinetics; homogeneous catalysis; heterogeneous catalysis; enzymatic catalysis.

Practicals:Sampling of heterogeneous systems; use of advanced analytical instrumentation; statistical interpretation; heterogeneous and homogeneous catalysis.

Assessment:2 tests; 1 exam; laboratory performance and report writing.

CTEC711 – Plant & Process Design
(PTC7PD1) (40L-24T-0P-0S-60H-30R-0F-6A-16C-13W)
Prerequisites:CHEM311, 312, 321, 322; CTEC311, 312, 321, 322.
*Corequisites:*None.

Aim:To introduce students to fundamental chemical engineering principles thus allowing them to communicate effectively with their engineering counterparts in industry.

Content:Overall design strategy; energy balances in industrial plant; fluid flow; heat and mass transfer; mixing and agitation of fluids; further unit operations; reaction kinetics and reactor design; reactor choice; separator choice; health and safety considerations; waste minimisation; effluent treatment; scale-up; pilot plant design; case studies.

Assessment:1 test; 1 exam.

CTEC712 – Analysis, Process Control & Occupational Hygiene
(PTC7AP2) (40L-24T-0P-0S-60H-30R-0F-6A-16C-13W)
Prerequisites:CTEC711, 721, 731 two modules each with a mark of at least 50%, the other module with a mark of at least 40%.
*Corequisites:*None.

Aim:To introduce students to the role of analytical chemistry in the control of industrial processes; to educate students on the identification, measurement and assessment of risk in the workplace and on how to control environmental factors contributing to risk.

Content: Total quality assurance; process analytical chemistry - survey of techniques used and the reasons behind the choice of a particular technique, the special problems which are encountered when an analytical instrument is put into the plant environment; toxicity and classification of health hazards; hazard entry into the body; monitoring hazards; hierarchy of control; legislation; undertaking an occupational hygiene survey; case studies.

Assessment:2 tests, 1 exam.

CTEC721 – Chemical Operations Management
(PTC7OM1) (40L-24T-0P-0S-60H-30R-0F-6A-16C-13W)
Prerequisites:CHEM311, 312, 321, 322; CTEC311, 312, 321, 322.
*Corequisites:*None.

Aim:To endow students with a sense of the differences between academic rigour and direct industrial applications; to educate students on corporate management and corporate structure and to impart the necessary management skills for working effectively in such an environment.

Content:Fundamentals of management - business and management, managers and organisations, SMMEs, planning organising and staffing, leadership and motivation, decision making, strategic and operations planning. special topics in management (ethics, entrepreneurship and intrapreneurship); product, plant, process, programme, people - location, layout, jobbing, production planning scheduling and loading, MRP2, JIT, lean production, PRISM, supply chain management concepts; quality and the environment - ISO 9000 and 14000, TQM; project management - planning projects, Gantt charts, critical path method, economic evaluation, balance sheets, profit and loss, budgeting, ROI, DCF.

Assessment:Assignment; 1 exam.

CTEC722 – Special Topics in Chemical Technology

(PTC7ST2) (60L-36T-0P-0S-90H-45R-0F-9A-24C-13W)

Prerequisites:CTEC711, 721, 731 two modules each with a mark of at least 50%, the other module with a mark of at least 40%.

*Corequisites:*None.

Aim:To allow students to specialise in their chosen areas of advanced applied chemistry.

Content:Topics selected from (amongst others): pollution - causes, effects and prevention; drug design; industrial biotechnology; advanced instrumental techniques; environmental Modeling; agrochemicals; applied electrochemistry.

Assessment:3 tests; 3 exams.

CTEC731 – SA Chemical Industry & Applied Phys Chem

(PTC7SA1) (40L-24T-0P-0S-60H-30R-0F-6A-16C-13W)

Prerequisites:CHEM311, 312, 321, 322; CTEC311, 312, 321, 322.

*Corequisites:*None.

Aim:To ensure students have a firm foundation in the principles of the physical chemistry most often encountered in industry and to introduce students to the products and processes of the South African chemical industry.

Content:Thermodynamics of non-ideal systems; electrochemical kinetics; invited lectures from a visiting senior industrial chemist.

Assessment:Assignment; 1 test; 2 exams.

CTEC790 – Project

(PTC7CPY) (0L-0T-300P-50S-50H-0R-0F-0A-40C-26W)

Prerequisites:CHEM311, 312, 321, 322; CTEC311, CTEC312, 321, 322.

*Corequisites:*None.

Aim:To introduce students to the process of applied chemical research to solve a particular environmental or industrial problem.

Content:Workshops on the use of computers for the sophisticated treatment of scientific data and for molecular Modeling; liaising with industrial sector; appropriately focused literature search; laboratory work; preparation of scientific report.

Assessment:2 assignments; oral presentation; project assessment.

Chemistry

Offered in the School of Chemical & Physical Sciences

CHEM010 – Introductory Chemical Concepts & Techniques

(PCH0ICY) (49L-20T-77P-0S-34H-48R-0F-12A-24C-26W)

Prerequisites:None.

Corequisites:MATH010; BIOL010; PHYS010; ACS101.

Aim:To ensure that students with an inadequate grounding in chemistry develop a level of theoretical knowledge and practical and problem-solving skills to enable them to succeed in a BSc programme.

Content:Energy and matter; substances - elements, compounds and mixtures; chemical reactions; solutions - solubility and concentration; separation of mixtures; atomic structure - electronic configuration and the Periodic Table; compounds - bonding and nomenclature; the mole; reactions in aqueous solution; introduction to organic chemistry; reactions and energy.

Practicals:Measurement and observation.

Assessment:8 theory tests; 1 mid-year exam; 1 end-of-year exam; 6 assignments; 2 practical tests; laboratory performance.

CHEM111 – Introductory Chemistry

(PCH1IC1) (36L-9T-36P-0S-50H-24R-0F-5A-16C-13W)

Prerequisites:None.

*Corequisites:*None.

Aim:To familiarize students with the basic principles of general and physical chemistry.

Content:Structure of the atom and introduction to atomic spectroscopy; stoichiometric calculations; Periodic Table; bonding; gases; phase transitions and equilibrium; molecular mixtures; kinetics and equilibria; acids and bases; thermochemistry; electrochemistry.

Practicals:Volumetric analysis; measurement of physical constants; chemical synthesis.

Assessment:2 theory tests; 1 theory examination; 1 practical test; laboratory performance.

CHEM112 – Chemistry of the Elements

(PCH1CE2) (36L-9T-36P-0S-50H-24R-0F-5A-16C-13W)

Prerequisites:CHEM111 with a mark of at least 40%.

*Corequisites:*None.

Aim:To introduce students to the inorganic chemistry of the Main Group elements and fundamental organic chemistry.

Content:Trends in the Periodic Table; classification of the elements; solid state structures; chemical properties of main group element oxides, peroxides and halides; introduction to industrial chemistry; naming of simple organic compounds; hybridisation; stereochemistry; isomerism; common functional groups; standard organic reactions and their mechanisms.

Practicals:Qualitative analysis for common cations and anions; introduction to basic organic laboratory techniques; qualitative analysis of organic functional groups; synthesis of simple organic compounds.

Assessment:2 theory tests; 1 theory examination; 2 practical tests; laboratory performance.

CHEM121 – Chemistry & Society 1

(PCH1CS1) (18L-9T-18P-0S-26H-6R-0F-3A-8C-13W)

Prerequisites:None.

*Corequisites:*None.

Aim:To provide students with an overview of the role chemistry plays in everyday life.

Content:The Periodic Table - elements, trends and classification; recap on the mole; bonding - covalent, ionic and metallic; chemical and physical properties arising from bonding - some specific examples; polymers - PVC, Teflon, Nylon-6,6, silicones, polyethylene, additives, physical properties.

Practicals:Measurement of physical constants; chemical synthesis.

Assessment:1 test; 1 exam; laboratory performance.

CHEM122 – Chemistry & Society 2

(PCH1CS2) (18L-9T-18P-0S-24H-8R-0F-3A-8C-13W)

Prerequisites:None.

*Corequisites:*None.

Aim:To provide students with an overview of the role chemistry plays in everyday life.

Content:Energy in chemical reactions; explosives; kinetics; equilibrium; gas laws; solubility; acids and bases; redox chemistry; electrochemical processes.

Practicals:Qualitative analysis for common cations and anions

Assessment:1 test; 1 exam; laboratory performance.

CHEM211 – Inorganic & Organic Chemistry

(PCH2IO1) (36L-9T-36P-0S-62H-12R-0F-5A-16C-13W)

Prerequisites:CHEM111, 112 both with a mark of at least 55%.

*Corequisites:*None.

Aim:To impart a deeper understanding and knowledge of inorganic and organic chemistry and to develop skills in the synthesis of inorganic and organic compounds.

Content:Solid state inorganic chemistry - structure, bonding and thermodynamics; introduction to Coordination chemistry - ligand denticity, stability constants and isomerism; chemistry of hydrogen - isotopes, hydrides and industrial processes; introduction to spectroscopic techniques in organic chemistry; stereochemistry in organic compounds; aromatic chemistry; nucleophilic substitution and electrophilic addition reactions; carbonyl chemistry; alkene and alkyne chemistry; alkyl halides, alcohols and amine chemistry.

Practicals:Synthesis and characterisation of Main Group compounds and Transition Metal complexes; synthesis, separation, and identification of organic heteroatom compounds; spectroscopic problem-solving workshops.

Assessment:2 theory tests; 2 practical tests; 1 exam; laboratory performance.

CHEM212 – Physical Chemistry & Spectroscopic Methods

(PCH2PS2) (36L-9T-36P-0S-56H-18R-0F-5A-16C-13W)

Prerequisites:CHEM111, both with a mark of at least 55%.

Corequisites:**either** [MATH111, 112] **or** [MATH110, 120].

Aim:To introduce students to the physicochemical principles upon which the science of chemistry is based.

Content:Fundamentals of spectroscopy; molecular orbital theory; chemical thermodynamics; electrolyte solutions; reaction kinetics and statistical thermodynamics.

Practicals:Measurement and calculation of thermodynamic, kinetic and spectroscopic data.

Assessment:2 theory tests; 1 exam; laboratory performance.

CHEM311 – Physical Chemistry
(PCH3PC1) (27L-9T-36P-0S-70H-13R-0F-5A-16C-13W)

Prerequisites:[CHEM211, 212] and either [MATH111, 112; STAT101; CSCI101] or [MATH110, 120].

Corequisites:PHYS111, 112.

Aim:To deepen the students' knowledge of the underlying principles of physical chemistry and their application to non-ideal systems.

Content:Chemical thermodynamics of non-ideal solutions; chemical and electrochemical equilibrium; advanced reaction kinetics; quantum mechanics; molecular spectroscopy of diatomics.

Practicals:Measurement of physiCochemical properties; recording, calculation, manipulation and interpretation of data; proper methodology in scientific report writing.

Assessment:1 theory test; 1 exam; laboratory and report-writing performance.

CHEM312 – Inorganic Chemistry
(PCH3IC2) (27L-9T-36P-0S-70H-13R-0F-5A-16C-13W)

Prerequisites:CHEM211, 212 and **either** [MATH111, 112; STAT101; CSCI101] **or** [MATH110, 120].

Corequisites:PHYS111, 112.

Aim:To extend the understanding and knowledge of the student in the area of Transition Metal chemistry and to develop experimental synthetic skills.

Content:Crystal field theory; MO theory; electronic spectra of transition metal complexes; Frost diagrams; introduction to bio-inorganic chemistry; carbonyl complexes; solid state chemistry of Transition Metal oxides; magnetism.

Practicals:Synthesis and characterisation of Transition Metal complexes.

Assessment:1 theory test; 1 exam; laboratory and report-writing performance.

CHEM321 – Applied Physical Chemistry
(PCH3AP1) (27L-9T-36P-0S-65H-18R-0F-5A-16C-13W)

Prerequisites:CHEM211, 212 and either [MATH111, 112; STAT101; CSCI101] or [MATH110, 120).

Corequisites:PHYS111, 112.

Aim:To give students an appreciation of the applications of physical chemistry to chemical analysis.

Content:Separations and chromatography; atomic spectroscopy; electroanalytical techniques.

Practicals:Use of modern instrumentation to study analytical and environmental problems.

Assessment:1 theory test; 1 exam; laboratory and report-writing performance.

CHEM322 – Organic Chemistry
(PCH3OC2) (27L-9T-36P-0S-60H-24R-0F-5A-16C-13W)

Prerequisites:CHEM211, 212 and **either** [MATH111, 112) **or** [MATH110, 120].

*Corequisites:*None.

Aim:To introduce the theoretical principles behind the synthesis and design of organic molecules and to enable students to attain competency in the organic chemistry laboratory.

Content:Polar, radical and pericyclic reactions; design strategy; heterocyclic chemistry; conformational analysis; further spectroscopy of organic compounds - NMR, IR and MS.
Practicals:Experimental design; vacuum distillation, recrystallisation, anhydrous synthesis; product workup; extraction of natural products; characterisation of products.
Assessment:1 theory test; 1 exam; laboratory and report-writing performance.

CHEM711 – Advanced Chemistry
(PCH7AC1) (105L-18T-0P-0S-120H-65R-0F-12A-32C-13W)
Prerequisites:CHEM311, 312, 321,322.
*Corequisites:*None.
Aim:To impart the academic rigour of the traditional disciplines of chemistry viz. inorganic, organic and physical chemistry.
Content: Mechanisms and rates of inorganic reactions; electronic spectroscopy and photochemistry of transition metal complexes; organometallic chemistry and homogeneous catalysis; modern spectroscopic methods in organic chemistry; pericyclic reactions; stereocontrol in organic synthesis; advanced synthetic organic chemistry; advanced chemical thermodynamics; surface chemistry; electrochemical kinetics; molecular symmetry and group theory applied to small molecules.
Assessment:3 tests; 3 exams.

CHEM712 – Special Topics in Chemistry
(PCH7ST2) (105L-18T-0P-0S-120H-65R-0F-12A-32C-13W)
Prerequisites:CHEM711, 791 one module with a mark of at least 50%, the other module with a mark of at least 40%.
*Corequisites:*None.
Aim:To allow students to specialise in their chosen areas of advanced chemistry.
Content:Topics selected from (amongst others) - symmetry in the solid state; bioinorganic chemistry; advanced organic synthetic methods; drug design; natural products, isolation and characterisation; quantum chemistry; advanced kinetic theory; organometallic chemistry and homogeneous catalysis; photochemistry and its applications.
Assessment:4 tests; 4 exams.

CHEM791 – Project I
(PCH7CP1) (0L-0T-220P-5S-95H-0R-0F-0A-32C-13W)
Prerequisites:CHEM311, 312, 321, 322.
*Corequisites:*None.
Aim:To introduce students to the process of scientific research and the communication of scientific data.
Content:Workshop on the use of computers for the sophisticated treatment of scientific data; literature search; laboratory work; preparation of scientific report.
Assessment:1 assignment; oral presentation; project assessment.

CHEM792 – Project II
(PCH7CP2) (0L-0T-220P-5S-95H-0R-0F-0A-32C-13W)
Pre-requisites:CHEM711, 791 one module with a mark of at least 50%, the other module with a mark of at least 40%.

Corequisites: None.

Aim: To continue the process of developing research methodology.

Content: Workshop on computational molecular Modeling; literature search; laboratory work; preparation of scientific report.

Assessment: 1 assignment; oral presentation; project assessment.

Community Resources

Offered in the School of Agricultural Sciences & Agribusiness

CRMS120 – Communities: changes & challenges
(PCR1CC2) (20L-0T-12P-0S-28H-15R-0F-5A-8C-13W)

Pre- or Corequisites: None.

Aim: The main purpose of this module is to introduce students to various ways of studying communities, development, management and systems of interaction; and to become aware of factors influencing development, community organisation and their outcomes, particularly cultural factors.

Content: Definition of concepts: community, resources, development, management, participation. Selected development issues; eg environment, population, government, food, health, education. Theoretical approaches to studying households, communities and environments. Conceptual frameworks in the study of communities; Family forms, structures and functions. Cross cultural comparisons relating to growth and change. Conflict and leadership in communities.

Practicals: Group discussions, guest speakers.

Assessment: 2 assignments, 1 test, 1.5 hr examination.

CRMS130 – Community Development
(PCR1CD1) (20L-3T-15P-0S-24H-15R-0F-3A-8C-13W)

Pre- or Corequisites: None.

Aim: Students should be able to understand the concept of development, and the factors influencing the outcomes of development initiatives intended to improve the quality of life in developing countries.

Content: Historical, South African and international development issues and theories, Social justice and human rights, Indicators and outcomes of development, Interventions for improving quality of life: appropriate technology, income generation, transformation of societal institutions.

Practicals: Field trip, guest speaker, group discussions.

Assessment: 2 assignments or reports, 1 test, 1.5 hr exam.

CRMS211 – Clothing Construction & Design
(PCR2CC1) (39L-0T-36P-0S-57H-24R-0F-4A-16C-13W)

Prerequisites: 64C.

Aim: To equip students with the knowledge and skills for quality clothing construction and design for small business applications.

Content: Clothing design theory. Principles and elements of design. Clothing construction principles for constructing a skirt/trousers. Quality criteria for a skirt/trousers. Clothing design methods. Construction principles for shirts. Quality criteria for shirts.

Practicals: Weekly practicals.

Assessment: 2 tests, 5 assignments and a 3 hr examination.

CRMS230 – Housing
(PCR2HH1) (40L-2T-33P-0S-56H-24R-0F-5A-16C-13W)
Pre- or Corequisites: 64C.

Aim: Students should have a knowledge of factors influencing housing and understand the available and potential means with which to improve the quality of residential environments.

Content: Ecology, the role of macro and micro environmental factors on housing. Systemic theories and development. Human needs in housing, constraints and gender issues. Housing forms: indigenous, conventional, high density, hi-tech, low cost. Current situation in South Africa: afford ability, design, delivery systems, policy, economics. Housing provision: planning, evaluation of plans and buildings, financial and legal factors, small construction businesses. Potential solutions to housing problems.

Practicals: Field trips, design project.

Assessment: 2 tests, 2 mini- seminars, project report, 3 hr examination.

CRMS231 – Textiles
(PCR2TP2) (19L-0T-18P-0S-22H-17R-0F-4A-8C-13W)
Prerequisites: 64C.

Aim: To equip students with the knowledge and skills for the selection and decoration of textiles for small business applications.

Content: Introduction to the study of textiles. Textile characteristics. Textile selection. Wool, silk, cotton, linen, viscose, nylon, polyester, acrylic, elastic fibres.
Practicals: Weekly laboratory practicals.
Assessment: 1 test, 2 assignments and a 3 hr examination.

CRMS310 – Household Resource Management
(PCR3HM3) (20L-0T-0P-23S-90H-24R-0F-4A-16C-13W)
Pre- or corequisites: CRMS230.

Aim: The primary purpose of the module is to develop a base of sound resource management theory for students majoring in Community Resource Management. The theory is explored in the context of household resource management in South African households with special reference to rural farm households. The subject is explored in the context of related development issues which impair the management of resources in developing communities such as poverty, unemployment, women's time constraints, AIDS and HIV, domestic violence and health issues.

Content: Management systems as a vehicle for change. Household resource management functions. Household structures. Values, goals and standards. Resources. Decision making. Management communication. Feedback. Planning. Implementing plans. Outcomes of management. Time and energy management for development applications. Financial management as an application of planning and implementing.

Practicals: Practical assignments and literature reviews.

Assessment: 2 tests, 4 biweekly assignments (essays, seminar, interview and summary), project assignment, 2.5 hr examination.

CRMS330 – Community Participation
(PCR3CP1) (26L-0T-0P-0S-114H-16R-0F-4A-16C-13W)
Corequisites: CRMS310.

Aim: Students should be able to understand the role of the macro-environment on community development, apply the various approaches and models to community development and know the value of, and how to, encourage participation, capacity building and empowerment within communities.

Content: Community development structures and functioning; development philosophies, theories, desirable outcomes, indicators. Community Development as a process: needs assessment, resource identification. Management of community projects, project cycle, planning and implementation, PRA techniques, community work roles and skills. Community Development models: Needs based, asset based, social action, community organisation, social planning, social animation, community education.

Practicals: Organising community workshops, computerised financial management.

Assessment: 1 seminar, 1 test, practical assignments, 2.5 hr exam.

CRMS340 – Programme Evaluation
(PCR3PE2) (20L-0T-0P-34S-85H-17R-0F-4A-16C-13W)
Corequisites: CRMS330.

Aim: On completion of the module, students should be able to design, assess and formally evaluate development related projects and programmes according to sound scientific principles of both quantitative and qualitative methodologies.

Content: Evaluation, research: definitions, historical perspectives, philosophies. Types, structures and functions of evaluation in projects and programmes. Critical analysis of evaluation designs, setting objectives, identifying indicators. Organisational processes, practical problems, contextual influences.

Practicals: Community based experiential project evaluation.

Assessment: Project report, 1 seminar, 1 test, 2.5 hr examination.

CRMS350 – Food Security
(PCR3FS2) (10L-0T-0P-10S-37H-20R-0F-3A-8C-13W)
Pre- or Corequisites: None.

Aim: To introduce students in Community Resources to the concept of food security, the policy making process in South Africa and program interventions.

Content: Conceptual framework for nutrition and development. Food Security (access, availability, delivery). Food Security measurement. Policy context in SA. Policy making. Nutrition policies, strategies and programs in SA with reference to Food Security.

Practicals: Bi-weekly practical assignments.

Assessment: 2 tests, 4 biweekly assignments (essays, seminar, interview and summary), final assignment, 2.5 hr examination.

CRMS360 – Small Business Enterprises
(PCR3SB2) (10L-0T-0P-10S-37H-20R-0F-3A-8C-13W)
Pre- or Corequisites: FPRO220.

Aim: To equip students with the theory and skills necessary to promote the development of small business enterprises in communities.

Content: Entrepreneurship. SMME' in SA. Types of business in SA (service, retailing, manufacturing, Informal Sector). Business formation (companies, closed corporations, sole proprietors, partnerships, franchises) Assessing business opportunities. Markets (segmentation, targeting). Market research. Feasibility Studies. Operating expenses and cash flow. Sources of finance. Credit. Regulations. Location. Sales forecasts and budgets. Pricing and profit. Delivery mechanisms and options. Marketing and promotion. Tax and VAT. Are informal sector businesses feasible? Are women's business ventures profitable?

Practicals: Bi-weekly practical assignments.

Assessment: 2 tests, 4 biweekly assignments (essays, seminar, interview and summary), feasibility study, 2.5 hr examination.

CRMS710 – Community Participation
(PCR7CP1) (20L-0T-0P-34S-85H-17R-0F-4A-16C-13W)
Corequisites: CRMS310.

Aim: Students should be able to understand the role of the macro-environment on community development, apply the various approaches and models to community development and know the value of, and how to, encourage participation, capacity building and empowerment within communities.

Content: Community development structures and functioning; development philosophies, theories, desirable outcomes, indicators. Community Development as a process: needs assessment, resource identification. Management of community projects, project cycle, planning and implementation, PRA techniques, community work roles and skills. Community Development models: Needs based, asset based, social action, community organisation, social planning, social animation, community education.

Practicals: Organising community workshops, computerised financial management.

Assessment: 2 seminars, 1 test, practical assignments, 2.5 hr exam.

CRMS720 – Research Methods
(PCR7RM1) (20L-20T-6P-0S-24H-0R-0F-10A-8C-13W)
Pre- or Corequisites: None.

Aim: The main purpose of this module is to ensure that students are able to understand and use the theoretical knowledge gained at undergraduate levels in the analysis and synthesis of appropriate research designs, articles and reports in their research field.

Content: The post graduate program expectations; The research question -relating theory to research, scientific method. Research tools and Research design. Literature review. Sampling. Types of methodologies and data collection techniques. Data analysis -Elementary social statistics. Presentation of results, conclusions, recommendations - criteria for evaluation of research reports.

Practicals: Assignments, library search, computer statistical analysis.

Assessment: Open book assignment.

CRMS730 – Community Resources Research Project
(PCR7RPY) (0L-0T-0P-3S-237H-0R-0F-0A-24C-26W)
Corequisites: CRMS720.

Aim: Students should be able to plan, implement and analyse data in a research project and produce a report of an acceptable standard.

Content: investigate a research question related to community development, community or normal nutrition, extension, housing, household resource management or small business or income generation.

Practicals: None.

Assessment: Research report, oral defence of research.

CRMS740 – Community Development
(PCR7CMY) (0L-0T-0P-22S-250H-45R-0F-4A-32C-26W)
Pre- or Corequisites: None.
Aim: The main purpose of this module is that students will understand the concept of development from a number of perspectives, develop process skills for community development and be able to debate issues so that they will be competent research, policy and managers in the development arena.
Content: Understanding community; Theories and philosophies of development. Role players in community development-government, NGOs, CBOs, Donors, International Aid. Principles and processes of community development. Project management in development - the project cycle, roles and functions. Community Development project (programme) evaluation and research. Community work roles and skills.

Practicals: None.
Assessment: 6 papers, oral presentations, 3.5 hr examination

CRMS741 – Communication in Extension
(PCR7CEY) (2L-0T-5P-29S-250H-31R-0F-4A-32C-26W)
Pre- or Corequisites: None.

Aim: The main purpose of this module is to equip students with the necessary insight, skills and analytical ability to review agricultural extension and rural development work (and similar work environments) so as to determine the optimal intervention for a particular community of what and how community education and technology transfer should best occur.

Content: Structures, roles and purposes of extension services, Philosophy of adult education. Communication and networking, Adult education technology. Role of adult education in rural development. Policy for agricultural and rural development.

Practicals: Application project.

Assessment: 6 papers, oral presentations, 3.5 hr examination.

CRMS744 – Housing
(PCR7HOY) (0L-0T-0P-22S-245H-50R-0F-4A-32C-26W)
Pre- or Corequisites: None.

Aim: The main purpose of this module is to provide the student with a theoretical framework within which the housing problems of developing countries can be placed, understanding the functions of role players in the housing delivery process. Data collection requirements to inform policy and research are also required for a housing specialist in management.

Content: Historical dimensions of housing; SA building styles; urbanisation, cultural housing differences. Theoretical approaches to the study of housing, micro-macro environmental influences. Housing technology and functional design. People's experience of place. City living and urban renewal. SA housing problems and potential solutions. Comparative housing policies. Housing research - topics and technologies.

Practicals: None.

Assessment: 6 papers, oral presentations, 3.5 hr examination.

CRMS745 – Household Resource Management
(PCR7HRY) (18L-0T-0P-20S-262H-16R-0F-4A-32C-26W)
Pre- or Corequisites: None.

Aim: To develop an appreciation of the complexity of household resource management in a development context and explore the impact of household resource management systems on the role of women in development projects.

Content: Household structures. Values, goals and standards. Resources. Decision making. Management communication. Feedback. Planning. Implementing plans. Outcomes of management.

Practicals: None.

Assessment: 6 papers, oral presentations, 3.5 hr examination.

CRMS750 – Independent Study in Community Resources
(PCR7CRY) (0L-0T-0P-0S-320H-0R-0F-0A-32C-26W)
Pre- or Corequisites: None.

Aim: The main purpose of this module is that students will have the opportunity to have an individually designed curriculum based upon individual requirements to build further knowledge and experience in the development arena.

Content: Topics and assignments and their assessment to be decided on for each specific case. Modules may include seminars, literature reviews, or parts of modules from various disciplines.

Assessment: 6 papers, oral presentations, 3.5 hr examination.

CRMS790 – Small Business Enterprises
(PCR7SBY) (18L-0T-0P-20S-262H-16R-0F-4A-32C-26W)
Pre- or Corequisites: None.

Aim: To expose students to issues in small business development in the South African development context.

Content: Entrepreneurship, SMME' in SA and the contribution of the informal sector. Markets. Market research. Feasibility Studies. Credit as a barrier to enterprise development. Regulations and government interventions. Pricing and profitability of enterprises. Are informal sector businesses feasible? Are women's business ventures profitable?

Assessment: 6 papers, oral presentations, 3.5 hr examination.

CRMS820 – Advanced Research Methods
(PCR8ARY) (18L-20T-6P-0S-26H-0R-0F-10A-8C-26W)
Pre- or Corequisites: None.

Aim: The main purpose of this module is to ensure that students are able to understand and use theoretical knowledge in the analysis and synthesis of appropriate research designs, articles and reports in their research field.

Content: Analysing, critiquing and evaluating a variety of research projects reflecting disperse research questions, theories, methodologies.

Practicals: Assignments.

Assessment: Open book assignment.

CRMS830 – Research Project
(PCR8RPY) (0L-0T-0P-200S-360H-0R-0F-0A-56C-26W)
Corequisites: CRMS820.

Aim: Students should be able to independently plan, implement and analyse data in a research project and produce a report of an acceptable standard that contributes to the body of knowledge in the discipline.

Content: Student selected research project.

Assessment: Thesis presentation and oral defense.

Computational Physics

Offered in the School of Chemical & Physical Sciences

CPHY211 – Computational Physics Techniques
(PPC2PT1) (36L-12T-60P-0S-40H-9R-0F-3A-16C-13W)
Prerequisites: PHYS111, 112; MATH110, 120 (concession to complete MATH110, 120 concurrently with CPHY211, 212 may be granted in special cases to students who have performed well in MATH111, 122.)

Aim: To introduce programming in Fortran90 and general computational techniques for physical scientists. The emphasis is on analytic, numeric and symbolic manipulation techniques, with applications to physical problems.

Content: Introduction to the algorithmic language Fortran90: language elements, specifications, expressions, control statements, arrays, procedures, inputs-outputs; Introduction to Numerical Methods: numerical integration, differentiation, least-squares fits, roots of equations, solutions of simultaneous equations, precision and round-off errors; Introduction to symbolic manipulation using MACSYMA: the basics (creating expressions, numbers, variables, defined constants, equations, functions), performing algebraic and calculus manipulations (expanding, simplifying, factoring, substitutions), solving equations, graph plotting; Introduction to GNUPLOT: a program for graphics and curve fitting; Plotting of Mandlebrot sets; Review of calculus: Taylor series expansions, Partial differentiation; Vectors; The vector operator nabla and some of its applications in physics; Coordinate transformations; Complex numbers and their use in physics.

Practicals: Students are required to attend weekly practicals.

Assessment: The assessment is based on the practical work, as well as 2 tests and 1 exam.

CPHY212 – Comp Mech of Discrete & Continuous Systems
(PPC2DC1) (36L-9T-36P-0S-49H-25R-0F-5A-16C-13W)
Prerequisites: PHYS211; CPHY211.

Aim: To model the behaviour of mechanical systems using computational techniques.

Content: Conservation of momentum in laboratory and centre-of-mass frames; two-body problem; orbits in an inverse square force field; Rutherford scattering; non-inertial reference frames. Project work chosen from : Kinematics in two dimensions; motion in the presence of friction; non-uniform circular motion; simple pendulum; coupled oscillations; gravitation; systems of variable mass; collisions in two dimensions; damped driven simple harmonic motion; rigid-body dynamics; wave motion; reflection and transmission at interfaces; wave packets and dispersion; non-inertial forces.

Practicals:Students are required to attend weekly practicals and to submit a mini project.

Assessment:The assessment is based on the practical work, the mini project as well as 2 tests and 1 exam.

CPHY311 – Computational Quantum Mechanics
(PCP3QM1) (14L-5T-30P-0S-0H-29R-0F-3A-8C-13W)
Prerequisites:CPHY211.
Corequisites:PHYS311.

Aim:This module introduces the field of quantum mechanics in a practical, problem-solving manner using the computer as a tool.

Content:Hamiltonians, Operators, Eigenvalues and Eigenfunctions; Orthonormality of energy eigenfunctions; Expectation values of operators; Forms of wave equations for a range of simple systems; Quantum mechanics of the H_2 molecule; Evaluation of overlap integrals; Simple molecular orbital theory; Computational techniques in Molecular Orbital theory; Variational Methods; The WKB approximation.

Practicals:Students are required to attend weekly practicals and to submit a mini project.

Assessment:The assessment is based on the practical work, the mini project as well as 1 test and 1 exam.

CPHY312 – Advanced Symbolic Programming
(PPC3AM2) (14L-5T-40P-0S-0H-22R-0F-0A-8C-13W)
Prerequisites:CPHY211.
Corequisites:None.

Aim:This module introduces the student to the Macsyma symbolic manipulation package, and allows the student to become proficient in applying the package to the solution of scientific problems.

Content:The fundamentals of Macsyma (the front end, creating expressions, numbers, variables, defined constants, equations functions); Algebra (expanding, simplifying, factoring, substitution); Solving equations (single and multiple); Vectors; Tensors; Matrices; Calculus; Ordinary differential equations; Graph plotting in two and three dimensions; C and Fortran translation.

Practicals:Students are required to attend weekly practicals and to submit a mini project.

*Assessment:*The assessment for this module is based entirely on tutorial and project work.

CPHY321 – Comp Statistical Physics & Thermodynamics
(PPC3ST1) (14L-5T-30P-0S-0H-29R-0F-3A-8C-13W)
Prerequisites:CPHY211.
Corequisites:PHYS321.

Aim:To apply computational techniques and the basic notions of statitistical physics and thermodynamics to study practical problems of interest.

Content:Paramagnetic solid (classical and quantum mechanical); Thermodynamics of negative temperatures; Phase space of classical systems; Liouville's theorem; Equipartition and Virial theorems; Energy fluctuations in the canonical ensemble, and correspondence with the microcanonical ensemble; system of independent, distinguishable harmonic oscillators (classical and quantum mechanical, Einstein and Debye models); Defects in solids; Ideal gas of point particles; Kinetic theory of gases; Theory of simple gases consisting of monoatomic, diatomic and polyatomic molecules.

Practicals:Students are required to attend weekly practicals and to submit a mini project.

Assessment:Practical work, mini project, 1 test and 1 exam.

CPHY322 – Computational Solid State Physics
(PPC3SS2) (14L-5T-30P-0S-0H-28R-0F-3A-8C-13W)

*Prerequisites:*CPHY211.

*Corequisites:*PHYS322.

Aim:To study solid state systems using computational techniques. The emphasis is on graphical visualization of computational results.

Content:The core of the course will be based on: Crystal structure and X-ray diffraction, Laue diffraction in perfect and imperfect crystals, Lattice dynamics in one dimension, Lattice dynamics and heat capacity; Dynamics of the classical free electron gas, Dynamics of the quantum free electrons, Electron energy bands and states; Project work in (choose single option): Dynamics of a single-band electron, Transport in a partially full electron band, Carrier densities in semiconductors, Band binding in semiconductors, Antiferromagnetism and magnetic domains, Dislocation and plastic flow.

Practicals:Students are required to attend weekly practicals and to submit a mini project.

Assessment:Practical work, mini project, 1 test and 1 exam.

Computer Science

Offered in the School of Mathematics, Statistics & Information Technology

CSCI101 – Computer Literacy
(PCS1CL1) (19L-0T-26P-0S-22H-8R-0F-5A-8C-13W)

*Prerequisites:*None.

*Aim:*To teach students to use information technology effectively. To introduce the students to computer systems in their own right as systems comprising hardware, software and the interacting users.

*Content:*The Internet and the world wide web. Information technology, computer systems, input and output, memory, secondary storage. Software, work processing and desk top publishing. Spreadsheets and database, multimedia.

*Assessment:*Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

CSCI130 – Computers & Computing
(PCS1CC1) (39L-9T-39P-0S-43H-23R-0F-7A-16C-13W)

*Prerequisites:*Matric mathematics higher grade E/standard grade C.

*Aim:*To teach students to use information technology effectively, to program and to introduce students to computer systems in their own right as systems comprising hardware, software and the interacting users.

Content: The Internet and the world wide web; Information Technology, computer systems, input and output, memory, secondary storage. Software, word processing and desk top publishing. Spreadsheets and database, multimedia. Computer programming. Variables, input and output, selection, functions, program design.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

CSCI140 – Programming & Theory
(PCS1PT2) (39L-9T-39P-0S-43H-23R-0F-7A-16C-13W)

Prerequisites: Must have passed CSCI130 at 50% and MATHS110 at 50%

Aim: To develop programmers that can solve problems efficiently.

Content: Computer programming: control structures, arrays, file input/output, classes, data structures and program development which includes: coding, robustness, testing and correctness. Formal structures in computer science: logic design (switching algebra, logic gates, synthesis of logic circuits), finite automata and circuits with memory, typical circuits, memory array. Binary representation. Structure of a computer. Turing model of computation (tape machines). Low level programming.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

CSCI210 – Data Structures
(PCS2DS1) (29L-9T-39P-0S-53H-23R-0F-7A-16C-13W)

Prerequisites: A pass at 50% in CSCI140 and a pass at 50% in MATH110 (and a pass in the discrete maths component of the course).

Aim: To provide students with an effective understanding of the organization of a computer and the related issues of program organization and implementation.

Content: Programming structures: review of the programming concepts, review of recursion, pointers, dynamic memory, linked lists, list algorithms. Computer organization and architecture: components of a computer system, bus structures, memory organization, input output devices, central processing unit (arithmetic unit, control unit, addressing modes). Modern architectures.

Practicals: None.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

CSCI220 – Algorithms
(PCS2AA2) (29L-9T-39P-0S-53H-23R-0F-7A-16C-13W)

Prerequisites: Must have passed CSCI140 at 50%. Must have passed MATH215 at 50%. Students are warned that a facility in programming developed in CSCI210 will be assumed.

Aim: The study of algorithms, their efficiency, their correctness and the associated data structures.

Content: Abstract data types. Data structures: arrays, lists, stacks, queues, heaps, binary trees, sorting, tables, graphs. Algorithms from:- sorting, searching, divide and conquer, dynamic programming, parallel and probabilistic approaches. Computational complexity.

Practicals: None.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

CSCI311 – Operating Systems & Artificial Intelligence
(PCS3AI1) (22L-9T-39P-0S-60H-23R-0F-7A-16C-13W)

Prerequisites: A pass at 50% in CSCI210 and CSCI220.

Aim: Development of distributed and heuristic computing concepts.

Content: Operating System: process and thread management, concurrent programming, memory management, file systems, protection and security, case studies. Practical aspects of artificial intelligence: Prolog or other AI programming tools, search, game playing, expert systems.

Practicals: None.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

CSCI312 – Theory of Computation

(PCS3TC1) (29L-9T-0P-0S-91H-24R-0F-7A-16C-13W)

Prerequisites: A pass at 50% in CSCI210 and CSCI220. A pass at 50% in MATH211.

Aim: Development of theory of computation and artificial intelligence concepts.

Content: Theory of Computation. Effective processes: computation, derivation, generation; Computable objects: functions and sets; Undecidable problems; Finite Automata; Turing machines. Introduction to AI. AI problems and AI techniques. Production systems and state space search. Issues in the design of search programs. Heuristic search techniques. Issues in knowledge representation game playing.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

CSCI321 – Distributed Systems & Object Oriented Programming

(PCS3DS2) (22L-9T-39P-0S-60H-23R-0F-7A-16C-13W)

Prerequisites: A pass at 50% in CSCI210 and CSCI220.

Aim: Development of distributed and concurrent computing concepts. Object oriented programming.

Content: Distributed systems: characterization of distributed systems, design goals, networking and internetworking, interprocess communication, remote procedure calling, distributed operating systems, file service - a model and case studies, name services. Object Oriented Programming: topics from recent changes such as templates, name spaces, booleans, strings, run-time typing, differences between Java and C++, metaclasses, delegation, design patterns, application frameworks, and techniques used in the implementation of object- oriented languages. Standard template library.

Practicals: None.

Assessment: Examinations (50%), Tests (17%), Tutorials and practicals (16%), Mini project in OOP (17%).

CSCI322 – Computer Language & Object Oriented Design

(PCS3OP2) (29L-9T-0P-0S-91H-24R-0F-7A-16C-13W)

Prerequisites: A pass at 50% in CSCI210 and CSCI220. A pass in MATH211.

Aim: Development of theory of programming languages and their application in design.

Content: Theory of programming languages, formal grammars, phrase structure grammars, hierarchy of Chomsky. Regular languages and finite state acceptors. Context-free grammars and stack-machine acceptors, parsing algorithms. Object oriented design. Unified Modeling language. Patterns.

Practicals: None.

Assessment: Examinations (50%), Tests (25%), Tutorials, practicals and term papers (25%).

CSCI710 – Software and Hardware architectures

(PCS7SH1) (60L-0T-0P-0S-226H-28R-0F-6A-32C-13W)

Prerequisites:(CSCI311, CSCI321, CSCI322 and CSCI312) or (BISS310 and BISS320)

*Aim:*To enable students to build Distributed Systems.

*Content:*The content of the module is flexible and can cover topics from the following (not comprehensive) list: Client server systems, architectures for client server systems, distributed data bases, distributed and parallel systems, web development, advanced architectures, platform independent systems. Software architectures and frameworks. Research methods. Recent topics.

*Practicals:*None.

*Assessment:*Course work 50% Exam 50%.

CSCI720 – Algorithms

(PCS7AA2) (60L-0T-0P-0S-226H-28R-0F-6A-32C-13W)

*Prerequisites:*CSCI311, CSCI321, CSCI322 and CSCI312.

*Aim:*To enable students to understand and work in areas of computer graphics and neural networks including the typical algorithms for these fields.

*Content:*The content of the module is flexible and can cover topics from the following (not comprehensive) list: Geometric Modeling in two dimensional and three dimensional space, basic algorithms for visualisation in scientific computing, design and implementation of GUI and HCI issues, neural networks, algorithmic aspects of AI, analysis and design of algorithms, parallel algorithms, software engineering, functional and logic programming, self organising networks, applications of neural networks. Research methods. Recent topics.

*Practicals:*None.

*Assessment:*Course work 50% Exam 50%.

CSCI730 – Computational theory

(PCS7CT1) (60L-0T-0P-0S-226H-28R-0F-6A-32C-13W)

*Prerequisites:*CSCI311, CSCI321, CSCI322 and CSCI312.

*Aim:*Computer Science is a discipline, which can be characterised by the presence of an influential theoretical component which is strongly connected with its practical aspects. This makes the theoretical aspects of computer science an essential part of any curriculum. The purpose of the module is to organise the knowledge of the students in the field and to develop it further on a higher level.

*Content:*The content of the module is flexible and can cover topics from the following (not comprehensive) list: Syntax and semantics of programming languages, functional programming, automata theory, formal grammars, compilation, artificial intelligence, neural networks, theoretical aspects of computer graphics. Informatics. Recent topics. Research methods.

*Practicals:*None.

*Assessment:*Course work 50% Exam 50%.

CSCI740 – Research Project

(PCS7RPY) (0L-0T-0P-4S-296H-18R-0F-2A-32C-26W)

*Prerequisites:*CSCI311, CSCI321, CSCI322 and CSCI312.

*Aim:*To enable students to understand the application of fundamentals of Information

Technology or Computer Science to a research or design of a solution to a problem of moderate magnitude.

Content: Individual research work on a topic approved by the director of the Programme.

Practicals: None.

Assessment: Continuous assessment on presentations 30%, Project dissertation mark 70%.

Dietetics & Human Nutrition

Offered in the School of Agricultural Sciences & Agribusiness

DIET237 – Diet Therapy 1 (Lifestyle diseases)
(PDI2LD2) (39L-0T-35P-0S-60H-20R-0F-6A-16C-13W)

Corequisites: DIET252, DIET254, NUTR214, BCHM210, BCHM220.

Aim: To develop an in depth understanding of the causes, treatment and prevention of the major lifestyle diseases.

Content: Obesity, underweight/eating disorders, diabetes, hypoglycaemia, coronary heart disease.

Practicals: Problem-based practicals.

Assessment: Tests, practical evaluation, examination.

DIET310 – Research Methods
(PDI3RM1) (10L-0T-10P-0S-20H-0R-0F-0A-4C-13W)

Aim: This module gives students a further understanding of research methodology used in nutrition and dietetic research, and enables them to evaluate the literature and present seminars.

Content:: Reviewing the literature; The research process; Methodology available to determine dietary intakes; Qualitative research methods in nutrition and dietetics; How to write analytical seminars; Planning seminars – Abstract, Introduction, Body, Conclusion, References.

Practicals: Research methods.

Assessment: Module attendance and participation in group exercises (100%).

DIET320 – Diet Therapy 2 (Surgical)
(PDI3SU1) (39L-0T-72P-0S-27H-20R-0F-3A-16C-13W)

Corequisites: DIET237, NUTR214.

Aim: To develop an in depth understanding and to be able to safely and effectively treat the hypermetabolic medical conditions and food allergies.

Content: Hypermetabolism, Intensive care, Food allergies.

Practicals: Problem-based practicals, visits to hospitals.

Assessment: Assignment, tests, examination.

DIET321 – Diet Therapy 3 (Pharmacology & Infection)
(PDI3PH1) (20L-0T-36P-0S-13H-10R-0F-2A-8C-13W)

Corequisites: DIET237, NUTR214.

Aim: To develop an in depth understanding of pharmacology in relation to drug nutrient interactions and to have an in depth understanding of the causes and treatment of infections and fevers.

Content: Pharmacology, infections.

Practicals: Problem-based practicals.

Assessment: Orals, tests, practical evaluation, examination.

DIET322 – Diet Therapy 4 (Medical)
(PDI3ME2) (39L-0T-72P-0S-27H-20R-0F-3A-16C-13W)
Corequisites: DIET237, 320, 321; NUTR214.

Aim: To develop an in depth understanding of medical conditions and to be able to safely and effectively treat conditions relating to renal, liver, pancreas and gallbladder disease.

Content: Renal disease, liver disease, gall bladder disease, pancreatic disease, inborn metabolic errors.

Practicals: Problem-based case studies, visits to hospitals.

Assessment: Assignment, orals, tests, examination.

DIET323 – Diet Therapy 5 (Diseases of GET)
(PDI3GI2) (20L-0T-36P-0S-13H-10R-0F-2A-8C-13W)
Corequisites: DIET237, 320, 321; NUTR214.

Aim: To develop an in depth understanding of diseases of the GIT and to be able to safely and effectively treat conditions relating to the gastrointestinal tract and cancer.

Content: Diseases of the GIT, cancer.

Practicals: Problem-based case studies.

Assessment: Evaluation of practicals, tests, examination.

DIET351 – Behavioural Science for Dietetics
(PDI3BD2) (19L-0T-9P-0S-39H-10R-0F-4A-8C-13W)
Corequisites: DIET237, 317.

Aim: Behavioral Science for Dietetics is intended to introduce students to basic aspects of human science from the perspective of the discipline of psychology. These aspects, combined with the development of basic counseling skills, are intended to enhance the ability of the Dietetics graduate to function effectively across a range of professional settings.

Content: Paradigms and their application to health and health care practice; health, illness and behaviour ; Human development; Human behaviour and behaviour change; Psychiatric disorders; Professional development(e.g. dealing with death and dying, self care)

Practicals: Basic Counseling Skills. Group Facilitation. Basic assessment skills.

Assessment: Tests(40%); Exam (50%); Practical assessment of counseling skills (10%).

DIET710 – Therapeutic Dietetics Internship
(PDI7TNY) (40L-0T-0P-0S-20H-30R-387F-3A-48C-26W)
Pre- or corequisites: BSc (Dietetics)

Aim: The purpose of the module is for the students to become competent in the therapeutic nutritional care of patients in a hospital setting.

Content: Medical, surgical and Paediatric diseases and complications requiring dietary intervention.

Practicals: Students work in a hospital for duration of the module.

Assessment: Evaluation of student's professional competence during placement, assignments, seminars, tests and exam.

DIET720 – Advanced Research Methods
(PDI7RM1) (20L-20T-6P-0S-24H-0R-0F-10A-8C-13W)
Prerequisites: DIET310.

Corequisites: None.

Aim: The main purpose of this module is to ensure that students are able to apply the theoretical knowledge regarding research gained at undergraduate levels in the formulation of research questions, synthesis of appropriate research designs, and analysis of articles and reports in the field of dietetics and nutrition research.

Content: Introduction - the post graduate program expectations; PERT charting ; The research question - relating theory to research; Research tools - library, statistics, computers; Research design - variables, scales, indexes, operationalisation; Literature review; Sampling; Methodologies - quantitative, qualitative; field studies, case studies, historical, experimental; Data collection techniques - questionnaire, interview, observation, records, recall; Data analysis - social statistics; levels of data; quantifying data; Elementary social statistics - central tendency; distribution; standard scores; parametric and non-parametric data; analysis of variance, linear regressions, correlation; differences between two groups; Presentation of results, conclusions, recommendations - criteria; Evaluation of research reports; Ethics and dissemination of findings.

Practicals: Groupwork.

Assessment: Participation and assignments 33% ; Take home examination 67%.

DIET750 – Therapeutic Dietetics level 7
(PDI7DTY) (0L-3T-10P-3S-240H-60R-0F-4A-32C-26W)
Pre-requisite : BScDietetics degree.

Corequisites: None.

Aim: To critically explore topical therapeutic dietetic issues.

Content: Decided on in conjunction with the student.

Practicals: None.

Assessment: Seminars, Literature reviews and a 3.5 hr examination.

DIET790 – Dietetics Honours Dissertation
(PDI7DDY) (0L-6T-0P-5S-309H-0R-0F-0A-32C-26W)
Prerequisite DIET720.

Corequisites: None.

Aim: This module enables students to select, plan, implement, analyse and write up a relevant research project to honours level.

Content:: A research question in the area of dietetics proposed by the student and agreed with the research supervisor. Appropriate methods.

Practicals: Project related.

Assessment: Dissertation (100%)

Earth Science

Offered in the School of Applied Environmental Sciences

EART122 – Rock Minerals & the Environment

(PEA1RM2) (18L-0T-21P-0S-23H-13R-0F-5A-8C-13W)

Prerequisite: Matriculation exemption.

Aim: To provide an understanding of the genesis and classification of rocks and minerals as they occur in southern Africa.

Content: Sedimentation and the formation of sedimentary rocks; processes involved in igneous rock formation; metamorphic rock formation; rocks as a soil forming factor; rocks and ground water.

Practicals: Laboratory and field identification of common rocks and minerals.

Assessment: One 1.5-hour theory examination, one 1.5-hour practical examination, two theory tests and laboratory practical reports.

EART124 – Structural Geology/South African Stratigraphy

(PEA1SG2) (18L-0T-26P-0S-18H-13R-0F-5A-8C-13W)

Aim: To provide an understanding of the geological history of southern Africa and an introduction to structural geology.

Content: Introduction to the geological history (stratigraphy) of southern Africa; introduction to southern African rocks including some economic deposits; evolution and palaeontology of southern Africa; principles and practices of structural geology.

Practicals: Exercises in geological mapping and a one day field trip to observe selected South African strata.

Assessment: One 1.5-hour theory examination, one 1.5-hour practical examination, two theory tests and laboratory practical reports.

Ecology

Offered in the Schools of Applied Environmental Sciences

and

Botany & Zoology

ECOL201 – Biomes of southern Africa

(PEL2BA1) (18L-0T-24P-0S-15H-16R-0F-7A-8C-13W)

Prerequisite: None.

Aim: This single module is designed to provide students taking any programme in the agricultural, environmental, geographical, life sciences or appropriate human sciences with a basic understanding of the principal features and distribution of the major biomes and other major vegetation types which occur within the southern African region.

Content: The classification and driving variables of the biota of Southern Africa inter alia treatments by:Pentz, Acocks, White, Werger , Rutherford and Westfall, Lowe and Rebelo, Cowling e*t al.*, Skinner and Smithers etc.

Practicals: Field visits of the major Biomes represented in Kwa Zulu/Natal.

Assessment: 1 test, 1 assignment, 1 practical examination and 1 3 hr theory examination.

ECOL301 – Population & Community Ecology

(PEL3PC1) (28L-5T-46P-0S-59H-15R-0F-7A-16C-13W)

Prerequisites: BIOR118; BIOR128; ECOL201 each with a minimum mark of 50%.

Aim: To develop contextual ecological knowledge and skills relevant to scientific understanding of the major theoretic principles of structural, functional, and temporal diversity and interactions of organisms, populations, communities, and complex ecosystems.

Content: Conditions, resources and biotic/abiotic interactions; Species distributions and the ecological niche; Demography; population growth and its natural limits - carrying capacity and competition, predation, disease; Competitive and predatory interactions and their ecological and evolutionary consequences; Multi-species assemblages; spatial and temporal structure, and community 'assembly' - disturbance, succession; functional and structural diversity and interaction - food webs, feeding guilds, niche overlap and separation; Ecosystem processes - energy and nutrient flows, biogeochemical nutrient recycling; Ecological diversity, stability, resilience and change - dynamics and non-equilibrium status; Life-support systems and function.

Practicals: 12 Practicals; Mini-project; Day/weekend field trip.

Assessment: Mini-project report; Theory & Practical test; Theory & Practical exam (4 hr).

ECOL302 – Biodiversity Conservation

(PEL3BC2) (14L-3T-18P-0S-32H-10R-0F-3A-8C-13W)

Prerequisites: ECOL301 with a minimum mark of 50%.

Aim: An introductory course dealing to provide the basic knowledge and understanding needed to make informed management decisions related to biodiversity and conservation biology issues.

Content: What is Biodiversity (Species-, Ecosystem-, and, Genetic-diversity; Threats to biodiversity (Extinction processes, Landscape degradation and Habitat loss, Over-exploitation); Managing ecosystems, populations and individuals and setting management priorities.

Practicals: No formal practicals but students will need to collect the necessary data to solve a real conservation problem at a specific location.

Assessment: Project report; Class Test; Theory Exam (2 hr).

ECOL701 – Conservation Biology

(PEL7CBM) (10L-5T-15P-0S-38H-10R-0F-2A-8C-13W)

Pre-requisite: ECOL301, 302 each with a minimum mark of 50%.

Aim: An advanced course dealing with major, contemporary, regional conservation principles and issues.

Content: Conservation issues at the level of landscapes, communities, populations and species. Conservation options and Ecosystem health.

*Practicals:*No formal practicals, field excursions to local sites to collect data for a landscape management project and gain first-hand experience related to conservation management will be organised.

Assessment: Landscape management project report; Theory Exam (2hr).

ECOL702 – African Mammalogy and Wildlife Conservation
(PEL7AMM) (14L-8T-18P-0S-27H-10R-0F-3A-8C-13W)
Prerequisites ZOOL204; ECOL301 each with a minimum mark of 50%.

Corequisites:None.

Aim: To develop and understanding of aspects of the ecology of African wildlife.

Content: Scientific principles pertinent to the conservation and management of African wildlife resources *inter alia* biogeography, status and distribution, origins and affinities, diversity and emnicity, breeding biology and life history theory, use of space, and social organisation.

*Practicals:*Practical skills relevant to the field *inter alia* game capture, radio-telemetry, abundance estimation, evaluation of reproductive and physiological condition, determination of home range, territory, core areas.

*Assessment:*Seminar; Essay/Literature review; Mini-project report; Test; Theory exam (2 hr).

ECOL703 – Ecology & Management of African Inland Waters
(PEL7EWM) (4L-4T-21P-0S-39H-10R-0F-2A-8C-13W)
*Prerequisites:*ECOL301 with a minimum mark of 50%.

*Aim:*To develop theoretical and practical scientific knowledge and operational understanding of the structural and functional nature of African inland waters and their importance, their sustainable utilization, and conservation, and scientific principles underlying their rational management.

*Content:*Physical, chemical, and biological features, structures, and fundamental functioning of lake, river, and other wetland ecosystems - case studies; importance and threats - some regional perspectives; anthropogenic impacts (pollution, eutrophication, hydrological modification, over-exploitation) - causes, ecological consequences, and corrective management options.

*Practicals:*Field excursions to determine selected physiCochemical and biological features of lakes and/or river, and subsequent laboratory analyses.

*Assessment:*Mini-project report; Seminar; Test; Theory exam (2 hr).

ECOL704 – Current Issues in Conservation Biology
(PEL7ICM) (0L-6T-24P-0S-38H-10R-0F-2A-8C-13W)
*Corequisite:*ECOL701.

*Aim:*A specialist course designed to provide a detailed understanding of the current status and issues related to a specific conservation aspect currently being researched within the School.

*Content:*Students will select from topics such as: Coral reef biodiversity and health; Forest biodiversity and conservation; African mammal, Avian/Parrot, or Insect conservation; Conservation of inland waters; and, Pollination ecology.

*Practicals:*No formal practicals, field excursions to local sites of interest will be organised.

*Assessment:*Essay; Report/seminar; Theory Exam (2 hr).

ECOL705 – Conservation Genetics
(PEL7MCM) (0L-6T-24P-0S-38H-10R-0F-2A-8C-13W)
Prerequisites: BIOS304, 304 each with a minimum mark of 50%.

Aim: To generate an understanding of the underlying molecular basis of variability in the living world, its importance for the continuity of animal populations and the means of research that allow for analysis of genetic status and evaluation of corrective measures of affected species.

Content: Biochemical methods in conservation, population genetic, and evolutionary research. Process of mutation and selection. Importance of heterozygosity in natural populations. Scope and limits of molecular and interpretive tools and software. Research applications on the group, species and phylogenetic level (micro and macro evolution).Human impact on nature and legal aspects of conservation issues.
Practicals: 6 Practicals.
Assessment: Tutorial participation; Research report ; Oral presentation; Theory exam (2 hr).

ECOL732 – Rehabilitation Ecology
(PEL7RE1) (0L-6T-24P-0S-38H-10R-0F-2A-8C-13W)
Aim: To provide specialist knowledge for the rehabilitation of degraded vegetation.

Content: Principles and applications pertaining to environments drastically fertilized by humans that require rehabilitation.

Assessment: Written review paper, peer review, leading of discussion.

ECOL753 – Contemporary Issues in Resource Ecology
(PEL7CI1) (0L-6T-24P-0S-38H-10R-0F-2A-8C-13W)
Aim: To expose the important issues concerning rangelands worldwide.

Content: Not fixed, but concentrates on the multiple demands of society on renewable resources.

Assessment: Written review paper, leading of discussion.

ECOL763 – Case Studies in Resource Ecology
(PEL7CSM) (0L-6T-24P-0S-38H-10R-0F-2A-8C-13W)
Aim: To expose the complexity ecological, economic and social real world issues and their resolution of resource problems.

Content: Not fixed. Cases that provide the vehicle for achieving the aim.

Assessment: Written review paper, leading of discussion.

ECOL790 – Ecology/Conservation Biology Research Project
(PEL7RPY) (0L-20T-0P-30S-590H-0R-0F-0A-64C-26W)
Prerequisite: Acceptance into Honours in Ecology/Conservation Biology.

Aim: To provide learners with the opportunity, under supervision, to gain first-hand experience in the formulation, planning, execution, analysis, and reporting on, their research project(s)
Content: Students will be provided with a list of supervisors and possible research topics at the beginning of their Honours year. The final choice and number (1 or 2) of research projects will be decided by discussion and negotiation between the student and supervisor.
Practicals: No formal practicals. Students will be expected to execute a research plan and, where necessary, demonstrate competence in the use of sophisticated research equipment to collect data for their project.

Assessment: 2 Oral presentations (project proposal and research findings); Research report.

ECOL791 – Resource Ecology Research Project
(PEL7EPY) (0L-20T-0P-30S-588H-0R-0F-2A-64C-26W)
Prerequisite: Admission to BSc Hons majoring in Resource Ecology.

Aim: To provide experience in conducting research and the preparation of a scientific paper.

Content: Conduct a research project, prepare and present a scientific paper on the results.

Assessment: 2 Oral presentations (project proposal and research findings); Research report.

ECOL795 – Ecology Literature Review
(PEl7LR1) (0L-3T-0P-0S-77H-0R-0F-0A-8C-13W)
Prerequisites: Acceptance into Honours.

Aim: To collect and synthesize relevant scientific literature pertaining to a particular research field relevant to the ecological programme undertaken, and to use this information to generate, as an essay or other report, a coherent, cogent and logical analysis of the literature that realistically assesses past research, current understanding and potential directions for research.

Content: Students will be provided with a list of supervisors and possible review essay topics at the beginning of their Honours year.

Assessment: Essay or other appropriate report.

Entomology

Offered in the School of Botany & Zoology

ENTO202 – Functional Diversity of Insects
(PET2FD2) (38L-5T-36P-0S-58H-15R-0F-8A-16C-13W)
Prerequisites: BIOS101; ZOOL102, 201 each with a minimum mark of 50%.

Aim: To develop knowledge and understanding of the diversity, classification, biology and economic or other significance of the commonest families of insects in all orders through application of appropriate cognitive and practical skills in the laboratory and the field, while promoting independent learning.

Content: Review of functional morphology and ontogenetic systems of insects; life histories, ecological interactions, biological requirements, biotic significance and classification of families of the modern orders of insects; survey of orders known only from fossils.

Practicals: Dissection to elucidate basic insect morphology and anatomy; identification of specimens in the laboratory and the field using keys; basic collecting techniques and compilation of a collection of insects.

Assessment: Essay; Practical reports; Theory and Practical tests; Insect collection; Theory & Practical exam (4 hr).

ENTO204 – Functional Diversity of Major Insect Groups
(PET2DG2) (19L-3T-18P-0S-25H-10R-0F-5A-8C-13W)
Prerequisites: BIOS101; ZOOL102, 201 each with a minimum mark of 50%.

Aim: To develop knowledge and understanding of the diversity, classification, biology and economic or other significance of the most important orders of insects, through application of appropriate cognitive and practical skills in the laboratory and the field, while promoting independent learning.

Content: Review of functional morphology and ontogenetic systems of insects; life histories, ecological interactions, biological requirements, biotic significance and classification of important families of Collembola, Odonata, Orthoptera, Blattodea, Isoptera, Hemiptera, Coleoptera, Diptera, Lepidoptera and Hymenoptera.

Practicals: Dissection to elucidate basic insect morphology and anatomy; identification of specimens in the laboratory and the field using keys; basic collecting techniques and compilation of a collection of insects.

Assessment: Essay; Practical reports; Theory and Practical test; Insect collection; Theory and practical exam (3 hr).

ENTO301 – Medical & Veterinary Entomology
(PET3VE1) (15L-3T-23P-0S-24H-10R-0F-5A-8C-13W)
Prerequisites: BIOS101; ZOOL102 each with a minimum mark of 50%.

Aim: To enable students to recognize insects and arachnids that attack humans and domestic livestock in order to understand and manage these problems.

Content: Scope of the field of study, biting and non-biting flies as major vectors and pathogens and parasites, medical arachnology and venomation, and other inflictions to animals including poisoning, allergies and entomphobia.

Practicals: 6 Practicals - Laboratory identification of specimens, 2 local field trips.

Assessment: Review paper & seminar; Theory and Practical test; Practical reports; Theory & Practical exam (3 hr).

ENTO302 – Agricultural Entomology
(PET3EA2) (14L-3T-18P-0S-32H-10R-0F-3A-8C-13W)
Prerequisites: BIOS101; ZOOL102 each with a minimum mark of 50%.

Aim: To enable students to recognize agricultural pest insects and mites and know how to control them in an integrated pest management programme.

Content: Definite and kinds of pests, their recognition, damage and diseases induced, control methodologies, and implementation of management programmes.

Practicals: 6 Practicals - local visits.

Assessment: Field trip reports; Test; Theory exam (2 hr).

ENTO701 – Applied Entomology
(PET7EEM) (0L-18T-24P-0S-100H-15R-0F-3A-16C-13W)
Prerequisites: ENTO202, 301, 302 each with a minimum mark of 50%.

Aim: To enable students to specialize in topics of their choice from the broad field of economic entomology in order to gain the most recent information and approaches.

Content: Choice of a relevant topic in two of the following fields: systematics, landscape ecology, alien invasives, cultural control, biocontrol, integrated pest management and medical or veterinary insects.

Practicals: None.

Assessment: Seminar; Review Essay; Theory exam (3 hr).

ENTO790 – Entomology Research Project
(PET7RPY) (0L-20T-0P-30S-590H-0R-0F-0A-64C-26W)
Prerequisite: Acceptance into Honours in Entomology.

Aim: To provide learners with the opportunity, under supervision, to gain first-hand experience in the formulation, planning, execution, analysis, and reporting on, their Honours research project(s)

Content: Students will be provided with a list of supervisors and possible research topics at the beginning of their Honours year. The final choice and number (1 or 2) of research projects will be decided by discussion and negotiation between the student and supervisor.

Practicals: No formal practicals. Students will be expected to execute a research plan and, where necessary, demonstrate competence in the use of sophisticated research equipment to collect data for their project.

Assessment: 2 Oral presentations (project proposal and research findings); Research report.

Environment & Development

Offered in the School of Applied Environmental Sciences

EDEL801 – Melting Pot

(PED8MP1) (3L-2T-80P-10S-65H-0R-0F-0A-16C-6W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To introduce the course-work programme in Environment & Development and provide an understanding of social and belief systems that have directed the way in which people have managed and allocated resources in the past and present, and to link a range of disciplines from the natural and human sciences.

Content: Introduction to inter-relationships between human, social, cultural and economic systems and the environment. Interpretation of present-day landscape, of people and biota. Reconstruction of Prehuman landscape and subsequent changes, both natural and human, and the implications for present-day issues.

Practicals: A nine-day field trip which focuses on an area where the above issues can be debated and contextualized.

Assessment: Individual reports and a group report and presentation to key stakeholders involved in environment and development policy formulation and management.

EDEL803 – Contemporary Issues

(PED8TI1) (5L-120T-0P-0S-35H-0R-0F-0A-16C-17W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: Students address contemporary issues that are transdisciplinary, controversial and high-profile. The challenge is to grapple with such issues to produce potential solutions that reflect a balanced understanding of their environmental and development components.

Content: Themes are introduced by recognized experts. Thereafter, team work takes over to identify the dimensions of the problem, to develop a process for learning about it, and to produce appropriate end products such as published newspaper features or public presentations. Approaches depend on the ingenuity of students and include interviewing, library and internet research and video/tele-conferencing with recognized national and international figures. Students are responsible for field work, media coverage and similar practicalities.

Practicals: As required by the nature of the particular contemporary issue.

Assessment: Continuous assessment with a focus on group reports and presentations (50%) and individual reports (50%).

EDEL811 – Environmental Politics & Policy Analysis
(PED8EPB) (0L-20T-2P-2S-16H-0R-0F-0A-4C-1W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To understand various methods of public policy analysis and to be able to apply them to specific environmental policy areas and case studies.

Content: Power and organization; intergovernmental relations; elements of public policy analysis; approaches to public policy analysis; environmental policy issues through case studies.

Practicals: Linked to case-study work.

Assessment: Six assignments which are written, involve roleplaying and policy design.

EDEL813 – Environmental Ethics
(PED8TEB) (8L-12T-0P-0S-20H-0R-0F-0A-4C-1W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: Environment and development are very important issues raising ethical problems of a complex, contested nature. This module provides students with the skills needed for ethically sensitive work in these fields, in a culturally plural context where not all values are shared by all.

Content: Introduction to basic ethics; human nature and its setting; typology and evolution of value systems; African ethics and environment; Judeo-Christian ethics and environment; Hindu, Islamic and Chinese ethics and environment; philosophical approaches to environmental ethics; ethics, poverty and wealth; issues in human development.

Practicals: None.

Assessment: Through individual course project(s) or completion of a learning journal; participation in class discussion.

EDEL815 – Resource & Environmental Economics
(PED8TRB) (4L-20T-0P-2S-14H-0R-0F-0A-4C-1W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To introduce learners to the use of economic analysis in understanding and attempting to solve environmental problems, by providing them with a basic knowledge of the relevant economic concepts and techniques.

Content: The contribution of economics to understanding environmental problems; public and private goods, externalities, social welfare and the environment; economic techniques for environmental impact assessment; the role of government; sustainable economic development.

Practicals: None.

Assessment: Assignments in the form of group reaction papers and individual problem sets.

EDEL817 – Project Planning & Evaluation
(PED8TPB) (5L-20T-2P-2S-11H-0R-0F-0A-4C-1W)
Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To provide students with the theoretical knowledge of project planning and management as a basis for practice.

Content: Project planning and the determination of feasibility; use of project management tools; project budgeting; dealing with contractors; purchasing functions and materials planning; management by objectives; importance of quality; closure of projects and project evaluation.

Practicals: Related to project-planning practice.

Assessment: Group assignments (20%) and individual assignments (80%).

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EDEL819 – Quantitative & Computer Techniques
(PED8TQB) (5L-15T-8P-0S-12H-0R-0F-0A-4C-1W)
Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To equip students with basic skills for research design and methodology, and data analysis.

Content: Sampling schemes (simple random sampling; stratified random sampling, cluster sampling); questionnaire design, descriptive statistics and graphical summaries, relationships between variables, hypothesis testing, simple linear regression, multiple and polynomial regression, analysis of variance, multivariate techniques and analysis of time series. Introduction to spatial information and its analysis; introduction and background to Geographical Information Systems (GIS), aerial photography and remote sensing. Concepts, models and data quality and input, global positioning systems, data analysis and applications, desktop GIS practical session, demonstration of spatial and 3-d analysis. GIS - the way ahead.

Practicals: Related to content, specifically to gain proficiency in using techniques and analysis in an environmental and development context.

Assessment: Group discussion (10%); short tasks (20%); individual and group assignments involving data analysis an presentation of a report (70%).

EDEL821 – Integrated Environmental Management
(PED8TMB) (5L-15T-2P-2S-16H-0R-0F-0A-4C-1W)
Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To provide an introduction to environmental and social impact assessment, reinforcing interrelationships between ecology, economics and equity.

Content: Legislative framework and guidelines; methodologies, survey options, techniques and applications in the context of both industrialized and developing communities. Management of the process, including reinforcement of communication skills (public participation, negotiation, conflict resolution and facilitation). Environmental protocols, audits and standards. Environmental reporting, rehabilitation.

Practicals: Related to case study work, as required.

Assessment: Via group discussion and written work and individual assignments.

EDEL823 – Environmental Law

(PED8TLB) (6L-20T-0P-3S-11H-0R-0F-0A-4C-1W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To introduce learners without a legal grounding to the basic principles of law which are relevant in the sphere of the environment; to provide learners with a basic understanding of environmental law and how it operates within South Africa, and familiarity with the most important legislation applicable in South Africa.

Content: Common-law principles relevant to environmental law; the nature and scope of environmental law; enforcement of environmental law; international environmental law; environmental law and the Constitution; National Environmental Management Act 107 of 1998; Pollution Control Law; National Resources Law; Land Use and Planning Law.

Practicals: None.

Assessment: Written assignments based on prescribed reading and lectures.

EDEL825 – Communication Skills

(PED8TCB) (5L-20T-5P-5S-5H-0R-0F-0A-4C-1W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To provide learners with skills required by professionals dealing with issues in environment and development and interacting with a diverse range of people.

Content: Public speaking and report writing; language skills; facilitation; mediation, negotiation, conflict resolution, public participation and public relations; developing organizational skills to enhance the effectiveness of meetings, workshops and conferences.

Practicals: Related to acquisition of relevant skills, as required.

Assessment: Through varied individual (50%) and group work (50%), including assignments.

EDEL827 – Decision Making & Systems Modeling

(PED8TDB) (15L-0T-5P-0S-20H-0R-0F-0A-4C-1W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To provide learners with the skills necessary to analyze complex environmental management problems and the ability to identify better courses of action through recognition of multiple objectives and stakeholders and the complexities of their interactions.

Content: The nature of complex 'messy' problems; the decision-making process; multiple-criteria decision making and the Analytic Hierarchy Process; introduction to systems thinking; systems-Modeling techniques; techniques supporting creativity in decision making; stakeholder analysis; soft-systems methodology and its application to environmental management; how to choose techniques for problem solving - applying pluralist ideas to environmental problem solving; integration of problem structuring and decision-support techniques in environmental management and development.

Practicals: Group work and practical work within a computer laboratory context.

Assessment: Assignments (60%) and mini-projects (40%).

EDEL829 – Environmental Auditing
(PED8TAB) (15L-5T-8P-0S-12H-0R-0F-0A-4C-1W)
Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To provide learners with an introduction to environmental auditing, with special reference to techniques and methods.

Content: Techniques and methods of environmental auditing; environmental auditing tools (observations, protocols, photography etc); psychology and people skills involved in environmental auditing; environmental auditing and the ISO 14 000 series and EMAS; policy and legislation issues and environmental auditing; undertaking an environmental audit.

Practicals: An actual environmental audit.

Assessment: Through varied individual (50%) and group (50%) work, including assignments.

EDEL831 – Wilderness Concepts & Practice
(PED8TWB) (15L-5T-8P-0S-12H-0R-0F-0A-4C-1W)
Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To introduce learners to the concepts and practice of wilderness.

Content: Concepts, definitions, the need for and the legal aspects of wilderness; introduction to management principles; role of wilderness as a protected-area category in relation to other categories; planning processes and the setting of limits for acceptable change for management purposes.

Practicals: Real-world wilderness management encounters.

Assessment: Group (50%) and individual (50%) project assignments.

EDEL851 – Biodiversity & Conservation Biology
(PED8SB1) (23L-0T-20P-15S-102H-0R-0F-0A-16C-17W)
Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean; an intermediate-level course in population biology, community ecology or genetics is desirable.

Aim: To provide learners with a transdisciplinary perspective on biodiversity conservation and the pivotal role it plays in environmental and development work.

Content: Biodiversity: genetic, species and habitat components; importance of diverse species assemblages; threats to biodiversity; *in situ* and *ex situ* conservation; species recovery programmes; restoration ecology and habitat creation.

Practicals: Field work.

Assessment: Continuous assessment via written work, oral presentations and overall contribution and participation in the course; group work (50%), individual work (50%).

EDEL853 – Environmental Economics
(PED8SE1) (27L-0T-36P-0S-97H-0R-0F-0A-16C-17W)
Prerequisites: An intermediate-level course in microeconomics and an introductory course in macroeconomics, or appropriate Agricultural Economics courses. Exceptions may be made by the Dean for students who have quantitative and mathematical knowledge.

Aim: To develop a thorough understanding of the economic aspects of environmental issues, by enabling learners to extend the application of their economic knowledge and skills gained in undergraduate training to the analysis and solution of environmental problems.

Content: Overview of environmental economics; sustainable development - concepts and debates; property rights and the environment; externalities, the environment, private and social efficiency; policies for pollution control; global environmental problems; management of renewable and non-renewable resources; cost-benefit analysis and techniques of environmental valuation.

Practicals: None.

Assessment: seminar papers (30%), written examination (70%).

EDEL855 – Quantitative & Environmental Management
(PED8SQ1) (27L-0T-33P-0S-100H-0R-0F-0A-16C-17W)
Prerequisites: First degree with a major in mathematical sciences.

Aim: To introduce learners to environmental-management approaches which rely on Modeling and decision support.

Content: Any three of the following (not all topics available in any one year): ecosystems Modeling; stochastic Modeling; intelligent decision support for environmental management; knowledge-based systems support for environmental management; spatial decision-support systems and Geographic Information Systems (GIS)

Practicals: Application of Modeling and decision-support systems covered in the theoretical component.

Assessment: Continuous assessment via written work, oral presentations and overall contribution and participation in the course; group work (50%), individual work (50%).

EDEL857 – Socio-Economic Development & Environment
(PED8SD1) (0L-6T-16P-24S-114H-0R-0F-0A-16C-17W)
Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To introduce learners to issues related to development in a third world context and the environmental effects of efforts to address inequality, or at least mover towards equity, in access to environmental resources.

Content: Development, economic development and human needs; demography and questions of over-population; employment and unemployment in a global economy; disease and hunger; concepts of sustainability; gender and development; technology transfer.

Practicals: Field work.

Assessment: Continuous assessment via written work, oral presentations and overall contribution and participation in the course; group work (50%), individual work (50%).

EDEL859 – Soil Conservation & Land-use Management
(PED8SC1) (20L-0T-47P-0S-90H-0R-0F-3A-16C-17W)
Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To explore the links between soil conservation and sustainable land-use management strategies.

Content: Erosion as a natural phenomenon; land degradation; people-environment interdependencies; conservation practices; soil conservation strategies. A limited number of topics relevant to members of the class.

Practicals: Field work related to making the link between theory and practice.

Assessment: Continuous assessment via written work, oral presentations and overall contribution and participation in the course; group work (50%), individual work (50%).

EDEL861 – Spatial Decision Support
(PED8SS1) (12L-40T-12P-6S-90H-0R-0F-0A-16C-17W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To provide learners with advanced instruction in GIS as a spatial decision-support system in environmental management and planning.

Content: GIS concepts; data models; data structures; database design, data capture and spatial analysis; GIS applications in environmental planning and management; data quality; map projections, scale and resolution; introduction to spatial statistics; GIS implementation; GIS as a spatial decision support system; GIS and remote sensing; GIS in natural resource studies; GIS in land reform; the future of GIS.

Practicals: Individual work in developing practical capabilities with GIS.

Assessment: Seminar presentation (20%); Practical reports (30%); Project (50%).

EDEL863 – Sustainable Tourism
(PED8ST1) (0L-0T-40P-20S-100H-0R-0F-0A-16C-17W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To provide learners with an in-depth introduction to the field of tourism with a specific focus on the environmental dimensions of tourism and the tourism industry.

Content: Leisure, recreation and tourism; history of tourism; conceptualizing tourism - critical issues; tourism and the less developed countries; production of tourism services; enterprise promotion; 'green' and other forms of tourism; tourism development and planning.

Practicals: Field work related to making the link between theory and practice.

Assessment: Continuous assessment via written work, oral presentations and overall contribution and participation in the course; group work (50%), individual work (50%).

EDEL865 – Themes in African Environmental History
(PED8SH1) (0L-32T-16P-22S-90H-0R-0F-0A-16C-17W)

Prerequisites: Admission to the programme in Environment & Development or relevant background acceptable to the Dean.

Aim: To enable learners to understand the great phases in human evolution and development from the origins of human beings in Africa, through hunting-gathering, pastoralism, settled agriculture, industrialization to conserving the African environment today. Students will engage in the debates surrounding these issues which will equip them better to understand current dilemmas relating to environment and development issues in Africa today.

Content: The debate about human origins in Africa; the hunter-gatherer phase; the emergence of pastoralism; the emergence of agriculture; the advent of imperialism, colonialism; industrialization in Africa; conservation in Africa today.

Practicals: Field trips linking theory and practice.

Assessment: Seminars (80%); field exercises (20%).

EDEL867 – Water-Resource Management
(PED8SW1) (24L-0T-22P-24S-90H-0R-0F-0A-16C-17W)
Prerequisites: Four-year degree in a natural, physical mathematical or agricultural science; or four-year degree in civil or agricultural engineering; or three-year degree in an appropriate natural, physical or mathematical science and at least two years' appropriate experience (with permission of the Dean).

Aim: To provide learners with an overview of the southern African water scene and the challenges facing the management of scarce water resources within this context.

Content: Overview of the water resources scene: problems, foci and approaches; the physical environment of water supply and demand; studies in the physical agrohydrological system; the social/institutional environment of water supply and demand; case study of Umgeni Water and its operations; environmental water quality; hydrological simulation Modeling.

Practicals: Exercises and field trips linking theory and practice.

Assessment: Continuous assessment via written work, oral presentations and overall contribution and participation in the course; group work (50%), individual work (50%).

EDEL880 – Environment & Development Internship
(PED8PI2) (0L-0T-0P-0S-0H-0R-640F-0A-64C-17W)
Prerequisites: Successful completion of all prescribed modules (with a minimum weighted mean mark of 50%) and the capstone examination (minimum mark of 50%) for the course-work component of the programme in Environment & Development.

Aim: To provide relevant experience in an organization, whether public or private, which deals with appropriate environmental and development issues for those learners who do not want to pursue a research dissertation.

Content: Location within host organization for a period, usually August through October, performing duties as required by the organizational supervisor.

Practicals: None.

Assessment: Two written reports and at least two formal verbal reports by the intern on progress made during the period of the internship; written reports by the organizational and internal supervisors.

EDEL890 – Environment & Development Mini-Dissertation
(PED8RD2) (0L-0T-0P-0S-640H-0R-0F-0A-64C-0W)
Prerequisites: Successful completion of all prescribed modules (with a minimum weighted mean mark of 50%) and the capstone examination (minimum mark of 60%) for the course-work component of the programme in Environment & Development.

Aim: To undertake supervised research on an interdisciplinary theme of the student's choice.

Content: Decided upon by the student in consultation with his/her supervisor(s) and the related research panel.

Practicals: None.

Assessment: Internal and external examination of the mini-dissertation.

Environmental Science

Offered in the School of Applied Environmental Sciences

ESCI390 – Environmental Science Seminar

(PES7LRY) (0L-0T-0P-160S-0H-0R-0F-0A-16C-26W)

Aim: To provide experience in researching and synthesizing specific scientific literature.

Content: Search for information in the scientific literature on an approved topic, prepare a scientific review paper, present the paper orally.

Assessment: Written review paper and its oral presentation.

ESCI790 – Environmental Science Research Project

(PES7RPY) (0L-0T-430P-0S-210H-0R-0F-0A-64C-26W)

Prerequisite: Admission to BSc (Hons) majoring in Applied Environmental Science.

Aim: To provide experience in conductance of a research project and preparation of a scientific paper.

Content: Conduct an approved research project, prepare a scientific paper on the results, present the results orally.

Assessment: Written scientific paper and its oral presentation.

Ethics Studies

Offered in the School of Unilever Centre for Applied Ethics

ETHI202 – Ethics Studies

(PEH2ES2) (40L-0T-0P-0S-16H-20R-0F-4A-8C-13W)

Pre- or Corequisites: None.

Aim: To enable students in the sciences to understand and use concepts, arguments and skills in applied ethics in connection with selected contemporary issues involving the various sciences in a culturally plural society.

Content: An introduction to ethics and to contemporary value-systems in relation to the sciences, followed by applied ethics in the sciences, involving issues such as genetics, animal experimentation, cosmology, agriculture and the environment.

Practicals: None.

Assessment: One assignment in the form of an essay-report (15% of final mark), one class test (15%) and a final 2-hour examination (60%).

Ethnobotany

Offered in the School of Botany & Zoology

EBOT301 – Ethnobotany

(PEB3EB1) (27L-0T-39P-0S-74H-15R-0F-5A-16C-13W)

Prerequisites: BIOS203; BOTY203, 202, 204 each with a minimum mark of 50%.

Corequisites: BOTY301.

Aim: To provide a well-grounded knowledge of indigenous plants that traditionally are or have been, used for various aspects of live.

Content: Historical overview of plant domestication. Overview of plants that are used by indigenous African peoples and their potential for domestication and development as (alternative) crops: Dietary staple and protein crops; plants as a source of vitamins; vegetable oils, fats and vaxes; beverages; timber, basket weaving and ornamentals. Zulu nomenclature, ritual uses of plants. Indigenous "taxonomy", sustainable usage and traditional farming methods.

Practicals: 13 Practicals - Plant identification, development of monographs, traditional foods and beverages, properties of timber and Zulu lexicographical practice.

Assessment: Practical reports; Assignment; Theory test; Theory exam (3 hr).

EBOT302 – Economic Botany
(PEB3EC2) (14L-0T-18P-0S-35H-10R-0F-3A-8C-13W)
Prerequisites: BOTY102 (at a mark of 50%), or alternative courses with Dean's permission.
Aim: To familiarize students with plants that have economic value as crops.
Content: Staple and protein crops, beverages, oils and fats, gums, fibres, timber and ornamentals: sources, origins, harvesting, storage, processing and utilization. The morphology of selected families and plants regarded as weeds.

Practicals: 6 Practicals - Observations of vegetative and floral morphology; classification of fruits and seeds; plant identification using keys.

Assessment: Theory test; Assignment; Practicals reports; Theory exam (2 hr).

EBOT701 – Ethnomedicine
(PEB7EMM) (27L-0T-33P-0S-81H-15R-0F-4A-16C-13W)
Prerequisites: At least 64C at level 3.
Aim: To familiarise student with various aspects of traditional medicine - Phytochemistry, screening for secondary metabolites, principles and use of bioassays; Plant -derived drugs and the use of plants in traditional medicine; Trade in medicinal plants and Conservation of these natural resources.

Content: The module will deal with the chemistry and pharmacological activities of secondary metabolites as well as which plants they occur in. As far as possible examples of Southern African plant species will be used. Examples of secondary metabolites as chemotaxonomic markers. Tests to detect classès of secondary metabolites. Spectroscopic methods for identification of secondary metabolites. Ethnobotanical approach to drug discovery, bioprospecting, standardization of traditional medicine and what it takes to register a new drug. The module further deals with the principles of bioassays and illustrates this with practical examples of drug discovery using bioassay-guided isolation of compounds from plants with various pharmacological activities. Uses of South African medicinal plants. Traditional healers, traditional medicine in South Africa and the world. Muti markets, sources of medicinal plants, small scale farming and nature conservation.

Practicals: 11 Practicals- visits to muti-markets and medicinal plant nursery, testing for pharmacological activities, screening for secondary metabolites.

Assessment: Theory test; Practical reports: Assignment; Theory exam (3 hr).

EBOT702 – Ethnobotany Community Project
(PEB7CPM) (0L-8T-0P-0S-67H-4R-0F-1A-8C-13W)
Corequisites: EBOT701.

Aim: The purpose of this module is to expose the student to the community, so he/she becomes aware of the complexity of problems and culturally sensitive issues. The module will also teach the student to work accountable in a group of 5-6 members.

Content: The topic of the community project will change from year to year. The module concentrates on the process rather than on the content. Examples could be: help a community with the establishment of a nursery or medicinal plant garden or creating an activity in a tourist centre like the Izintaba Cultural Village.

Practicals: None.

Assessment: Assessment of progress at tutorial meetings (10%), Written report (70 %), Oral (group) examination - with discussion of how the project was undertaken (20 %).

EBOT790 – Ethnobotany Research Project
(PEB7RPY) (0L-20T-0P-30S-590H-0R-0F-0A-64C-26W)
Prerequisite: Acceptance into Honours in Ethnobotany.

Aim: To provide learners with the opportunity, under supervision, to gain first-hand experience in the formulation, planning, execution, analysis, and reporting on, their Honours research project(s).

Content: Students will be provided with a list of supervisors and possible research topics at the beginning of their Honours year. The final choice and number (1 or 2) of research projects will be decided by discussion and negotiation between the student and supervisor.

Practicals: No formal practicals. Students will be expected to execute a research plan and, where necessary, demonstrate competence in the use of sophisticated research equipment to collect data for their project.

Assessment: 2 Oral presentations (project proposal and research findings); Research report.

Food Processing

Offered in the School of Agricultural Sciences & Agribusiness

FPRO110 – Food Theory
(PFP1FP1) (40L-0T-43P-0S-55H-15R-0F-7A-16C-13W)
See the Handbook for the Faculty of Human Sciences

FPRO220 – Introductory Consumer Behaviour & Marketing
(PFP2CB2) (39L-0T-36P-0S-61H-20R-0F-4A-16C-13W)
Pre- or corequisites: None.

Aim: To equip students with an understanding of the role of consumers, marketers, suppliers and governments in the economy, specifically applied to the development of small businesses.

Content: Introduction to consumer behaviour and marketing. Introduction to basic economics concepts which influence consumer behaviour. The South African consumer. Segmentation of the market. Consumer decision making. Internal influencing variables in consumer behaviour: perception and motivation, attitudes and learning and personality and psycho graphics. External influencing variables: reference groups, price and economic factors. Communication and diffusion of new ideas. The process of marketing: targeting and positioning, market analysis and research, sales forecasting, pricing, sales strategies, service strategies, advertising and promotion. Consumerism and social responsibility. Banking and banking technologies. Household income and expenditure.

Practicals: Weekly practical assignments involving a variety of tasks.

Assessment: Practical assignments, 2 tests and a 3 hr examination.

FPRO310 – Food Preservation
(PFP3FC1) (29L-0T-0P-0S-175H-30R-0F-6A-24C-13W)

Prerequisites: FSCI210.

Corequisites: None.

Aim: Identify and practice basic principles of food preparation. Recognise factors affecting quality. Identify and resolve food preparation problems. Be able to function in small business, develop quality control measures and ensure food safety.

Content: Preservation, sugar cookery, frozen desserts, crystallisation, food labeling, food packaging,, small scale food processing with support systems, Food safety, Value adding to farm products and meal management.

Practicals: Complex food preparation, including dishes made of meat, fish, yeast, vegetables, desserts.

Assessment: Tests , mark for practical work, seminar.

FPRO320 – Product development
(PFP3PE2) (60L-0T-39P-0S-185H-30R-0F-6A-32C-13W)

Pre-requisites: FSCI310.

Corequisites: None.

Aim: Develop a knowledge of food consumption trends and processes for foods for sale. Able to deal with complex food preparation. Develop knowledge of food industry large and small. Product development. Develop skills to market products.

Content: Cookery demonstrations, techniques, planning and practical skills. Promotional printed aids, creating advertisements, written and design copy. Quality control. Food additives, risk/benefit concept. Sensory evaluation. Foods for small businesses, saleability.

Practicals: Development of dishes for demonstration purposes and for sale in small businesses.

Assessment: Tests, Practical work, seminar, demonstration and promotional work.

FPRO710 – Advanced Food Processing
(PFP7FPY) (0L-12T-0P-0S-255H-50R-0F-4A-32C-26W)

Pre-requisites: FPRO310, 320.

Corequisites: None.

Aim: To further the knowledge of food consumption trends and processes by which food products are prepared for consumption and sale. Quality assurance. To obtain a knowledge of food related legislation. To develop a knowledge of the food industry.

Content: International food laws. Food additives, modified starches and hydrocolloids. Modern methods of food preservation.

Practicals: Recipe development for research project.

Assessment: Seminars, research project is done in food processing, examination.

FPRO720 – Food Product Development
(PFP7PDY) (0L-12T-0P-0S-255H-50R-0F-4A-32C-26W)

Pre-requisites: FPRO310, 320.

*Corequisites:*None.

*Aim:*To further the knowledge of food preparation processes to develop foods for consumption and for sale. Develop an understanding of the principles of quality control. Be able to plan and organise the production of new and improved products for small and large business.

Content:Product development. Marketing strategy. Production concepts. Sensory evaluation. Generating new food ideas. Sales concepts.

*Practicals:*Food preparation for product development if chosen as research project.

Assessment:Seminars, examination.

FPRO751 – Consumer Behaviour & Marketing
(PFP7CBY) (18L-0T-0P-6S-276H-16R-0F-4A-32C-26W)
*Aim:*To pursue advanced studies in consumer behaviour and marketing as related to small and medium enterprise (SMME) development in the South African context.

*Content:*Introduction to CB and Marketing: marketing process, consumer behaviour, consumerism. Market segmentation and targeting: the South African consumer, the informal market. Promotion: media, perception and motivation, attitudes and learning. Consumer decision making: product life cycle, adoption and diffusion. Pricing: marketing economics, supply and demand, pricing strategies. Distribution, sales and service: store layout, service quality, distribution methods, store types. Packaging: branding, labelling. Social responsibility. Banking and banking technologies. Credit and investments.

Practicals: None.

*Assessment:*6 discussion papers or 3 seminars, oral presentations. 3.5 hr examination.

Food Science

Offered in the School of Agricultural Sciences & Agribusiness

FSCI120 – Introductory Food Science
(PFS1FP2) (39L-0T-36P-0S-50H-30R-0F-5A-16C-13W)
Prerequisites :FPRO110 or CHEM110.

*Corequisites:*None.

Aim:To develop a base of sound food science theory. To introduce students to basic cooking skills and experimental work. To introduce student to recipe development.

Content:Measuring techniques, chemical composition, types and origins of beverages,milk, milk products, cereals eggs, vegetable and fruit, alternative protein foods and herbs and spices. Preservation and storage of foods. Types of flour, formation of doughs, leavening agents and gelatinisation of starch.

Practicals:Practicals: Basic preparation of foods as listed above. Experimental work to illustrate effects of temperature and manipulation.

Assessment:Tests , Practical write ups, examination.

FSCI210 – Food Science
(PFS2FP1) (39L-0T-36P-0S-60H-20R-0F-5A-16C-13W)
Prerequisites: FSCI120.

Corequisites: None.

Aim: To develop a knowledge of food science theory. To further the students cooking skills and develop a higher standard of food preparation. To develop a further knowledge of experimental study of foods.

Content: Water, structure, properties and functions. Water activity. Colloid chemistry. Properties of carbohydrates, proteins and lipids. Enzymes, artificial sweeteners, hydrocolloids, anti-oxidants. Low fat spreads. Milk as a food system, milk foams cheese. Meat structure, grading and cooking. Poultry and fish. Browning. Microwave ovens. Menus and menu terms.

Practicals: Practicals: Advanced food preparation. Experimental study of effect of all processes on food.

Assessment: Test, Practical write-ups, Seminar, Examination.

Food Security

Offered in the School of Agricultural Sciences & Agribusiness

FDSC700 – Food Security Studies

(PFD7SF1) (0L-0T-0P-80S-80H-0R-0F-0A-16C-13W)

Pre- or Corequisites: None.

Aim: To introduce students to the multi disciplinary study of food security issues and develop a fundamental understanding of the inter relationships of the many factors which affect food security at national and household levels.

Content: Definitions of Food Security Systems approach to food security, analysis of the current food security situation, the 'money -go-round' (a practical explanation of basic economic functions). An introduction to food production (animal and plants), management, ecological perspectives, value of production and food security. Consumerism: consumer behaviour, pricing, distribution, policy; Income and income distribution. Factors influencing nutrition (disease, education, basic services, food intake, healthcare). Food storage and post harvest technologies. Entitlement: power relations, decision making, gender. Interventions as a way of integrating previous material (perhaps using case studies).

Practicals: None.

Assessment: Group assignments and presentations. One written assignment in which the participants will analyse a case study and develop a framework to depict the inter relationships of the food security issues for this case.

FDSC701 – Food Security Internship

(PFD7FIY) (0L-0T-10P-0S-390H-0R-0F-0A-40C-26W)

Pre- or Corequisites: FDSC700 and Policy & Development 701.

Aim: The purpose of this module is to give postgraduate certificate students a practical experience dealing with food security issues in a community setting. The internship will emphasise the identification of real and potential food security problems, the collection and analysis of data (the use of relevant tools), and the communication of findings in oral and report to the community, colleagues and supervisors. The internship will give students a deeper understanding of community dynamics, policy and politics, cultural issues, and environmental factors that impact food security in a community.

Content: An individual internship for which the student will prepare at several levels. The primary foci will be integration of disciplines, particularly the student's own discipline with food security, identification of food security issues and collection of data, evaluation of collected information and communication of results to others. This final step will include positive suggestions for dealing with food security issues in the community.

Practicals: None.

Assessment: Externally examined written report, oral presentation and a seminar.

FDSC710 – Independent Study in Food Security 701
(PFD7FSY) (0L-0T-0P-0S-80H-0R-0F-0A-8C-26W)
Pre- or Corequisites: None.

Aim: Individually designed curricula based on individual student requirements to build further knowledge and experience in a food security related issue.

Content: Topics and assignments and their assessment to be decided on for each specific case. Modules may include seminars, literature reviews or parts of modules from various disciplines.

Practicals: None.

Assessment: A set number of seminars but assessment may vary depending on the type of activities required for a specific case.

FDSC711 – Food Security Dissertation 701
(PFD7RDY) (0L-0T-0P-2S-398H-0R-0F-0A-40C-26W)
Pre- or Corequisites: Policy & Development 701 and CRMS720 or ENVD813.

Aim: For students to independently investigate a food security related issue and contribute to the knowledge in any areas/aspect of food security.

Content: Independent investigation of any food security related problem using qualitative or quantitative methodologies. Preparation of a project report and presentation of the findings.

Practicals: None.

Assessment: Externally examined dissertation.

FDSC720 – Food Storage for Food Security
(PFD7SF2) (16L-8T-20P-0S-25H-10R-0F-1A-8C-13W)
Pre- or Corequisites: None.

Aim: The purpose of this module is to introduce non-agricultural science students to some of the foundational concepts of post-harvest crop storage, food preservation and food safety which impact on food security and to build a foundation for later discussion of food security issues. The module content will include causes of primary crop and product losses, pathological effects of contaminated food and food safety testing, and food preservation. The module will be presented by a multi-disciplinary team and consist of lectures and practicals and site visits. It will be presented in a contiguous (block) format over two to three weeks.

Content: Causes of primary crop and product losses. Microorganisms in water/plant/animal tissue foods responsible for food loss, food contamination, toxin production. Pathological effects of contaminated water/food (by selected organisms). Testing for water and food contamination (colony counts, identification of selected organisms). Preservation methods for food storage: freezing, bottling, salt, sugar, acid, dehydration, pasteurisation, sterilisation, UHT, sanitation, UV radiation.

Practicals: Demonstrations and hands-on participation in exercises, visits to local (university) sites.

Assessment: Written assignments for group work, practicals, interactive oral testing. Externally assessed written assignment.

FDSC724 – Food Production for Food Security

(PFD7FP2) (16L-8T-25P-0S-30H-0R-0F-1A-8C-13W)

Pre- or Corequisites: None.

Aim: The purpose of this module is to introduce non-agricultural science students to some of the key concepts of crop and animal production which impact food security and to build a foundation for later discussion of issues. The module content will include an introduction on food production choices, a section on land use and integration of plant and animal systems, a section on crop production and a section on animal production.

Content: Crop and animal selection/choices (cultivars/varieties, relative productivity, cash crop/ food crop conflicts, nutritional issues). Scale and relative productivity (efficiency issues). Tenure and land security, land use systems (range, mixed, crop, peri-urban, community gardens), land size, economically viable unit. Crop and animal systems (interactions of crops and animals, plant to animal conversion efficiencies). Crop plant requirements-soil, water, temperature, light. Soil fertility. Management practices (planting/cropping methods, tillage/ erosion/ conservation, irrigation, field crop protection, harvest. Classification of common farm animals based on digestive system, classification of feeds and feed quality. Animal production systems, animal nutrients for production functions (egg, milk, beef and poultry).

Practicals: Demonstration and hands-on activities and field trips.

Assessment: Written assignments for group work, practicals, 1 written test. Externally assessed written assignment.

FDSC730 – Food Access for Food Security

(PFD7FA2) (16L-8T-25P-0S-30H-0R-0F-1A-8C-13W)

Pre- or Corequisites: None.

Aim: The purpose of this module is to introduce non-social science and nutrition students to some of the basic concepts of sociology, consumer economics and nutrition which impact on people's ability to access food and thus on their food security. The complex interactions of some of the factors which impact on access to food in relation to food security will be explored by a multi-disciplinary teaching team. This module will prepare students for further studies in the areas which impact on access to food.

Content: The following content areas are all specifically related to access to food. Gender related issues and power within households. Culture (beliefs and values). Governance and structures within communities. Consumer economics (factors affecting prices of food and other consumer items). Opportunities for income generation (informal and formal sectors, wages, social welfare, bartering and exchange, unemployment). Distribution of food and other resources such as care within households. Choice/personal preference for certain types of foods. Factors impacting on the physiological need for nutrients (age, pregnancy, lactation, disease), the type of impact that they have and their effects. Diseases/ill health (eg. diarrhoea, HIV/AIDS). Food preparation and impact on food quality including hygiene and sanitation, bioavailability of nutrients within foods.

Practicals: Participatory exercises and field trips.

Assessment: Written assignments for group work, practicals, 1 written test. Externally assessed written assignment.

FDSC801 – Food Security Internship
(PFD8FIY) (0L-10T-0P-40S-590H-0R-0F-0A-64C-26W)
Pre- or Corequisites: FDSC701 and CRMS720 or ENVD813.

Aim: The purpose of this module is to give students an opportunity to assess the feasibility and analyse the impact of programmes and policies on community food security situations. In addition, the community based internship will give students a deeper understanding of community dynamics, policy and politics, cultural issues, and environmental factors that impact food security in a community.

Content: This is an individual internship for which the student will prepare at several levels. The primary foci will be integration of disciplines, particularly the student's own discipline with food security, identification of food security issues and collection of data, evaluation of collected information in regard to the feasibility and impact of programmes and policies on community Food Security.

Practicals: None.

Assessment: Externally examined report, oral report and a seminar.

FDSC810 – Independent Study in Food Security
(PFD8FSY) (0L-0T-0P-0S-320H-0R-0F-0A-32C-26W)
Pre- or Corequisites: None.

Aim: Individually designed curricula based on individual student requirements to build further knowledge and experience in a food security related issue.

Content: Topics and assignments and their assessment to be decided on for each specific case. Modules may include seminars, literature reviews or parts of modules from various disciplines.

Practicals: None.

Assessment: 3 externally examined seminars.

FDSC811 – Food Security Dissertation
(PFD8RDY) (0L-0T-0P-2S-638H-0R-0F-0A-64C-26W)
Pre- or Corequisites: FDSC840.

Aim: For students to independently investigate a food security related issue and contribute to the knowledge in this area.

Content: Independent investigation of any food security related problem using qualitative or quantitative methodologies. Preparation of a project report and presentation of the findings and preparation of article/s for publication.

Practicals: None.

Assessment: Externally examined dissertation.

FDSC840 – Research Methods for Food Security
(PFD8RM1) (45L-0T-9P-0S-106H-0R-0F-0A-16C-13W)
Pre- or Corequisites: FDSC700.

Aim: To equip students with knowledge and skills to: plan and implement qualitative and quantitative research related to food security; analyze data and interpret analytical results; and report and disseminate research results via appropriate communication channels.

Content: The scientific method of research. Types of research (disciplinary/reductionist; systematic/holistic; basic/fundamental; applied/developmental; qualitative and quantitative). Populations vs Samples in research. Data collection techniques for qualitative research (Sampling; RRA; PRA; RAAKS; Questionnaire Surveys; Structured Interviews; Unstructured Interviews). Data collection techniques for quantitative research (Sampling; Measurement; Analysis). Data capture on spreadsheets. Systems/techniques of information retrieval. Experimental designs. Basic statistical parameters. Statistical analysis tools for quantitative and qualitative analysis. Scientific writing and reporting. Popular dissemination of research results. Socio-economic, cultural, religious and gender issues in food security research. Moral-ethical aspects of research and publication. Food security indicators (response variables in food security research).

Practicals: 3 practicals involving computer work and practice examples of research problems, methodologies etc.

Assessment: Applied assignments on different aspects of the module (including computerised work) and a written assignment (proposal) based on the work covered and externally examined.

FDSC860 – Food Security Modeling Systems
(PFD8FM2) (0L-10T-0P-10S-140H-0R-0F-0A-16C-13W)
Pre- or Corequisites: FDSC701.

Aim: To develop an integrated, multi disciplinary approach to food security studies.

Content: Spreadsheet programming. System analysis. Statistics of demographics. Literature reviews. Least cost feed formulation.

Practicals: Problem-solving exercises (pairs) : simulation modeling using spreadsheet programming. Experimental design and evaluation (groups). *Assessment:* Tutor and externally examined practical assignments and reflective essay. Oral presentation.

Food Service Management

Offered in the School of Agricultural Sciences & Agribusiness

FSMT318 – Management Theory & Practice
(PFM3TP2) (39L-0T-39P-0S-42H-30R-4F-6A-16C-13W)
Prerequisite : None.

Corequisite: FSMT332.

Aim: To provide the student with the knowledge and the basic skills needed for managerial effectiveness in the Dietetics profession.

Content: Managers and the managerial environment; The work of management : Managing work and organizations; Managing people; Managing production and operations; Entrepreneurship; Ethics in the workplace.

Practicals: Managing a large scale catering event (laboratory work).

Assessment: Assignment; lunch evaluation; tests; examination.

FSMT332 – Food Production, Systems & Plans
(PFM3FP1) (39L-0T-24P-0S-58H-25R-8F-6A-16C-13W)
Pre-requisites: None.

Corequisite: None.

Aim: To provide the student with knowledge and insight required of a competent Food service manager.

Content: Food service systems; Quantity food production and service; facilities planning and design; Sanitation and hygiene (HACCP concept); Financial management.

Practicals: Planning, producing and serving a lunch (laboratory work).

Assessment: Assignment; tests, examination.

FSMT710 – Food Service Management Internship
(PFM7FS1) (20L-0T-0P-0S-17H-20R-180F-3A-24C-13W)
Pre-requisites: BScDiet degree.

Corequisite: None.

Aim: To enable the student to expand the ability to manage a Food Service unit and to develop communication skills further.

Content:

Practicals: Students work in a Food service unit for the duration of the module.

Assessment: Professional evaluation; FSMT assignments; seminar; examination.

FSMT750 – Food Service Management level 7
(PFM7HHY) (0L-0T-0P-21S-236H-60R-0F-4A-32C-26W)
Pre-requisites: Provided students have satisfied the requirements for the degree of BSc Dietetics at UNP and have obtained a credit weighted average of at least 60% based on the final two years of undergraduate study. An entrance examination or additional work may be required from students from other universities who do not conform to above requirements).

Corequisites : None.

Aim: To expand the comprehension of scientific methodology in the study of Food service management (in order to emphasize the continuing importance of nutrition and management) in meeting customers demands and to manage a financially sound operation.

Content: Topics to be decided in collaboration with student.

Practicals: None.

Assessment: Seminars, Literature reviews, presentations and discussions; examination.

Forestry

Offered in the School of Agricultural Sciences & Agribusiness

FORT310 – Principles of Forestry
(PFO3FI1) (39L-0T-87P-0S-0H-29R-0F-5A-16C-13W)
Prerequisites: BIOR128; BOTY102.

Corequisites: None.

Aim: To teach principles on distribution and function of forests, forestry techniques, management objectives, and forest function and uses.

Content: Types of forests and their distribution, biological environment, forest functions and management by objectives. Forestry terminology, fundamental definitions, basic techniques in forestry. Collection of primary data and data analysis. Land classification, yield and growth Modeling. Forest products and multiple forest use. Harvesting, transport and logistics of forestry operations. Elements of marketing. Forest valuation, economics and financial management.

Practicals: The course includes six days of field trips over weekends or holidays. Students may be required to contribute to the cost of trips.

Assessment: 2 theory tests, 1 written report, final examination.

FORT320 – Silviculture
(PFO3FS2) (39L-0T-87P-0S-0H-29R-0F-5A-16C-13W)
Prerequisites: FORT310.

Corequisites: None.

Aim: To teach sound methods of cultivating forest crops in the context of their ecological functioning and cost effective technical means.

Content: Elements of site, site definition and classification. Forest stand and its characterisation. Taxonomy, morphology and biology of major commercial species of trees. Tree selection, propagation and biotechnology. Silvicultural systems. Site preparation and stand establishment. Nutrition. Stand tending and maintenance. Hazards associated with biotic and abiotic harmful factors.

Practicals: The course includes six days of field trips over weekends or holidays. Students may be required to contribute to the cost of trips.

Assessment: 2 theory tests, 1 written report, final examination.

FORT330 – Community Forestry: principles
(PFO3CP1) (39L-0T-87P-0S-0H-29R-0F-5A-16C-13W)
Prerequisites: BIOR128; BOTY102.

Corequisites: None.

Aim: To teach the principles of community forestry, define community forestry and to outline its role in the development of previously disadvantaged group in rural and peri-urban situations.

Content: Development theory supporting community forestry. Government policy and the importance of community forestry. Community forestry systems. Agroforestry. Community forestry interventions. Multipurpose trees. Participatory extension methods and community forestry. Community economics. The role of women in community forestry.

Practicals: The course includes 5 days of field trips over weekends or holidays. Students may be required to contribute to the cost of trips.

Assessment: 1 theory tests, 1 written report, final examination.

FORT340 – Community Forestry: SA Developments
(PFO3CD2) (39L-0T-87P-0S-0H-29R-0F-5A-16C-13W)
Prerequisites: FORT330.

Corequisites: None.

*Aim:*Critical evaluation of community forestry farming systems in South Africa and how they integrate into existing forestry and agriculture in the rural and peri-urban land use practices in the upliftment of resource-poor communities.

*Content:*Diagnosis and Design, history and practice. Application of community forestry systems and interventions into D&D. The role of corporate outreach community forestry programmes. Examples of community forestry based on fruit trees. Community forestry nutrition and health in community forestry. Joint forest management and indigenous forest use. Woodlots. Reclamation forestry. Urban Forestry.

*Practicals:*The course includes 5 days of field trips over weekends or holidays. Students may be required to contribute to the cost of trips.

*Assessment:*1 theory tests, 1 written report, final examination.

FORT350 – Forest Protection

(PFO3FB2) (39L-0T-44P-0S-48H-24R-0F-5A-16C-13W)

*Prerequisites:*FORT310.

*Corequisites:*None.

*Aim:*To identify harmful agents having an impact on forest functioning, health, and quality and quantity of timber production.

*Content:*Physiological state of trees and stands. Fundamentals of pathology and most common harmful fungi. Insect pests associated with exotic species of trees. Damage by mammals and its prevention. Abiotic harmful factors. Fire hazard, fire prevention and fire fighting. Integrated forest protection.

*Practicals:*The course includes six days of field trips over weekends or holidays. Students may be required to contribute to the cost of trips.

*Assessment:*2 theory tests, 1 written report, final examination.

FORT710 – Forest Management

(PFO7FM1) (39L-0T-87P-0S-0H-29R-0F-5A-16C-13W)

*Prerequisites:*FORT320, 350.

*Corequisites:*None.

Aim: To optimise forestry operations through improved decision making based on combined knowledge of tree growth manipulation, engineering, logistics, economics, ergonomics, information management and decision making techniques.

*Content:*Spatial organization of land and plantations. Growth Modeling and yield optimisation. Forest inventory. Regime selection. Planning in forestry. Harvesting and logistics of timber supply. Decision making and artificial intelligence systems.

*Practicals:*The course includes six days of field trips over weekends or holidays. Students may be required to contribute to the cost of trips.

*Assessment:*2 theory tests, 1 written report, final examination.

FORT720 – Forest Products & Processing

(PFO7FT2) (39L-0T-55P-0S-31H-30R-0F-5A-16C-13W)

*Prerequisites:*FORT710

*Corequisites:*None.

Aim: To optimise forestry products through knowledge on types of products and associated norms, product quality, and understanding of processing and market requirements.

Content: Wood growth, anatomy and identification. Chemistry of wood. PhysiCochemical wood properties. Abnormal wood and wood deterioration. Timber treatment, wood drying and preservation. Major processing technologies and their requirements. Specifications of timber and standardisation. Non-timber forest products and uses.

Practicals: The course includes two days of field trips over weekends or holidays. Students may be required to contribute to the cost of trips.

Assessment: 2 theory tests, 1 written report, final examination.

FORT730 – Community Forestry: Planning & Implementation
(PFO7CP2) (39L-0T-87P-0S-0H-29R-0F-5A-16C-13W)

Prerequisites: FORT340, 350.

Corequisites: None.

Aim: The development of the student through engaging them in the planning and implementing of small-scale community project with a local interest group.

Content: Principles of project planning, design and management, budgeting and costing of projects, report writing, evaluation and monitoring techniques, extension methodologies, and participatory approaches to community empowerment.

Practicals: The course includes 5 days of field trips over weekends or holidays. Students may be required to contribute to the cost of trips.

Assessment: 1 theory tests, 1 written report, final examination.

FORT740 – Community Forestry: policy & development
(PFO7AC2) (9L-30T-63P-0S-30H-23R-0F-5A-16C-13W)

Prerequisites: FORT730.

Corequisites: None.

Aim: The development of the students by encouraging them to utilise their learned and practised skills in the development of potential new policies and supporting curricula to enhance the promotion of community forestry in South Africa.

Content: Study of current South African forest policy with special reference to community forestry. Evaluation of development strategies, the role of State, non-government organizations, and donor funded projects in achieving policy aims and objectives. Critical review of current training initiatives in community forestry and practice in the development of policy orientated curricula.

Practicals: The course includes 3 days of field trips over weekends or holidays. Students may be required to contribute to the cost of trips.

Assessment: 1 theory tests, 1 written report, final examination.

FORT790 – Forestry Research Projects & Seminars
(PFO7RSY) (0L-0T-0P-40S-280H-0R-0F-0A-32C-26W)

Prerequisites: FORT320 or 340.

Corequisites: None.

Aim: To provide each student with an opportunity to: (i) integrate his/her knowledge by identifying a relevant project; (ii) critically review specific professional literature; (iii) synthesise the knowledge, present and defend a project proposal; (iv) demonstrate the ability to conduct a project through practical data collection, analysis, interpretation, making recommendations, reporting and scientific writing.

*Content:*Problem identification. Access and evaluation of relevant information. Critical evaluation of information and presentation of a project proposal. Proposal writing. Project management and implementation. Report writing. Presentation of results and/or practical implementation.

*Practicals:*None.

*Assessment:*2 written reports, 2 verbal presentations, final research report.

Genetics

Offered in the School of Molecular & Cellular Biosciences

GENE213 – Introductory Genetics

(PGN2GI1) (36L-33T-0P-0S-60H-25R-0F-6A-16C-13W)

*Aim:*To attain an understanding of basic inheritance patterns and solve relevant problems.

*Content:*The rules of inheritance in cells, individuals, and populations and the molecular mechanisms by which genes control the growth, development and appearance of an organism. Provides a grounding in the areas of Mendelian genetics, cytogenetics and population genetics linking basic concepts to applied examples in agriculture, medicine, breeding and other fields of interest.

*Practicals:*Tutorials.

*Assessment:*Mini theory and tutorial tests, 1 examination.

GENE226 – Foundational Prokaryotic Genetics

(PGN2FP2) (18L-0T-18P-0S-27H-13R-0F-4A-8C-13W)

*Pre-requisites:*GENE213.

*Aim:*To attain a foundational knowledge of the genetics of prokaryotes at a molecular level, including structure and function of prokaryotic genomes.

*Content:*Theory of prokaryotic DNA organisation, understanding DNA function with relation to replication, restriction and repair, gene expression, genetic variation and the enzymology that control these processes.

*Practicals:*Hands on experience in transposons, transposon mutagenesis, bacterial antibiotic resistance, conjugation and bateriophage cultivars.

*Assessment:*1 or more theory or practical tests, 1 examination.

GENE230 – Population Genetics

(PGN2PO2) (20L-18T-0P-0S-25H-15R-0F-3A-8C-13W)

*Pre-requisites:*GENE213.

*Corequisites:*MATH111, 122.

*Aim:*To attain insight into the principles of Mendelian Genetics applied to entire populations.

*Content:*Genetic variation within natural populations; including: random mating; multiple alleles, sex-linked genes, linkage and likage disequilibrium; assortative mating and inbreeding;

nature and effect of evolutionary phenomena such as random genetic drift, mutation, migration and selection; molecular population genetics.

Practicals: Tutorials.

Assessment: 2 theory tests, 1 examination.

GENE325 – Foundational Eukaryotic Genetics
(PGN3FE1) (24L-0T-18P-0S-24H-10R-0F-4A-8C-13W)

Prerequisites: GENE226.

Aim: To attain an in depth knowledge of the genetics of eukaryotes including structure and function of eukaryotic genomes in cells, individuals and populations.

Content: Theory of eukaryotic DNA organization, chromosome structure and function as well as an understanding of DNA recombination, mutation and repair mechanisms.

Practicals: Hands on experience on cyto-molecular procedures.

Assessment: 1 or more theory or practical tests, 1 examination.

NOT OFFERED IN 2000

GENE327 – Principles of Genetic Engineering
(PGN3GE1) (24L-0T-18P-0S-24H-10R-0F-4A-8C-13W)
Prerequisites: GENE226.

Aim: To attain insight, skills and experience in recombinant DNA technology and *in vitro* manipulation of cells.

Content: Theory of cloning, manipulation and analysis of genes and the expression of their protein products will be mastered. This includes providing a working knowledge of enzymology and recombinant DNA technology used in genetic engineering.

Practicals: Hands on experience with basic recombinant DNA technology.

Assessment: 1 theory test, 1 or 2 assignments, 4 practical reports, 1 examination.

NOT OFFERED IN 2000

GENE332 – Introduction to Quantitative Genetics
(PGN3QG2) (20L-15T-0P-0S-25H-15R-0F-5A-8C-13W)
Pre-requisites: GENE230.
Corequisites: BMET210.

Aim: To attain insight into the consequences of Mendelian inheritance when extended to the properties of populations and to the simultaneous segregation of genes at many loci.

Content: Components of genetic variation, heritability, artificial selection, genotype-environment interaction, genetic correlation, threshold traits.

Practicals: Tutorials.

Assessment: 2 Theory tests, 1 examination.

NOT OFFERED IN 2000

GENE334 – Molecular Diagnostics & Biocomputing
(PGN3DB2) (24L-0T-18P-0S-24H-10R-0F-4A-8C-13W)
Prerequisites: GENE226.

Corequisites: GENE325.

Aim: To attain an understanding of molecular diversity in individuals, populations and species through practical molecular procedures and bio-computational analysis.

Content: The principles underlying the analysis of genes and genomes - isozymes, amplified refractory mutations, restriction fragment length polymorphisms, single-stranded conformational polymorphisms, chemical cleavage of mistakes, randomly amplified polymorphic DNA, microsatellites, single stranded repeats, variable number of tandem repeats and amplified fragment length polymorphisms. The principles underlying algorithms used in molecular computational biological analysis.

Practicals: Hands-on experience of molecular procedures, hands-on experience of computer based sequence analysis.

Assessment: 1 theory test, 1 or more practical/tutorial tests, 1 examination.

NOT OFFERED IN 2000

GENE342 – Eukaryotic Cyto-molecular Systems

(PGN3EC2) (24L-0T-18P-0S-24H-10R-0F-4A-8C-13W)

Prerequisites: GENE213.

Aim: To attain an understanding of the principles underlying genetic diversity, mechanisms of control of genetic diversity, gene and chromosomal evolution and speciation.

Content: Principles pertinent to cyto-molecular systems - chromosome evolution, karyotype evolution and speciation. The principles of determining phylogenetic relationships and the construction of phylogenetic trees.

Practicals: Cytogenetic preparations and analysis, computer based phylogenetic analysis including the use of the internet.

Assessment: 1 theory test, 1 practical/tutorial test, 1 examination.

NOT OFFERED IN 2000

GENE350 – Animal Genetics

(PGN3AG2) (40L-25T-10P-0S-50H-30R-0F-5A-16C-13W)

Prerequisites: GENE213.

Aim: To attain insight into how genetic principles may be used to predict the genetic merit of breeding animals and how the potential for the productive efficiency of animals may be improved by selection and different systems of mating.

Content: Chromosomes and karyotypes; genetic markers and polymorphisms; gene frequencies; parentage determination; mutations and genetic defects; genome characterisation and manipulation; differentiation and development; genotype-environment interaction; immunogenetics and disease resistance; inbreeding; heritability; selection and genetic gain; breeding value and breeding systems; applications in animal breeding.

Practicals: Tutorials, field trips.

Assessment: 2 theory tests, 1 seminar and 1 examination.

NOT OFFERED IN 2000

GENE360 – Human Genetics

(PGN3HG2) (24L-0T-18P-0S-24H-10R-0F-4A-8C-13W)

Prerequisites: GENE213.

Aim: To attain an understanding of the diverse nature of human genetic studies, apply principles to the solution of genetic problems through cyto-molecular and quantitative assessment of data.

Content: The organization of the human genome and mapping; somatic cell genetics; identifying the genetic basis of disease; dominance, penetrance and imprinting; genetic screening and prenatal diagnosis; treatment of genetic disease; genetic basis of cancer and the immune system; mitochondrial pathology and the human genome project.

Practicals: Human cytogenetic preparations, tutorials and problem solving debates.

Assessment: 1 theory test, 1 practical/tutorial test, 1 examination.

NOT OFFERED IN 2000

GENE702 – Research Project in Genetics

(PGN7HGY) (20L-10T-50P-0S-560H-0R-0F-0A-64C-26W)

Prerequisites: 128C in the disciplines of genetics, biochemistry and/or molecular biology at level 6 (3rd year) *or* modules which in the opinion of the Head of Programme has (have) provided the candidate with adequate knowledge to complete the module.

Aim: To provide insight to the principles of conducting research through laboratory based and/or computer based research and developing the skills to analyse, interpret and present results.

Content: Research project which falls within the thrust of the school's research area. This includes a relevant literature survey and the execution of research.

Practicals: Hands-on practical and/or computer based research.

Assessment: Written and oral presentation.

GENE732 – Quantitative Genetics

(PGN7QG1) (20L-15T-0P-0S-25H-15R-0F-5A-8C-13W)

Prerequisites: GENE332, BMET210 *or* modules which in the opinion of the Head of Programme has (have) provided the candidate with adequate knowledge to complete the module.

Aim: To attain insight into the consequences of Mendelian inheritance when extended to the properties of populations and to the simultaneous segregation of genes at many loci.

Content: Artificial selection, genotype - environment interaction, genetic correlation, inbreeding and crossbreeding, evolutionary quantitative genetics, mapping of QTL's and aspects of experimental design.

Practicals: Tutorials.

Assessment: 2 theory tests, 1 examination

Geography

Offered in the School of Applied Environmental Sciences

GEOG113 – SA Weather & Climate

(PGE1WC1) (18L-4T-18P-0S-25H-12R-0F-3A-8C-13W)

Prerequisite: Entry into the Faculty.

Aim: To provide an introduction to the diversity of weather patterns found in southern Africa, and to introduce the causative atmospheric processes responsible for these patterns within a regional and global context.

Content: The structure of the earth's atmosphere. Weather forming processes in the southern African context. The principal climatic regions of southern Africa and reasons for their existence. A brief introduction to the global context of southern African climates.

Practicals: The course includes six afternoon practical sessions and an assignment.

Assessment: one 2 hr examination (50%); theory test (15%); practical test (15%); tutorial work sheets (10%); assignment (10%).

GEOG114 – SA Landscapes & Process
(PGE1LP1) (18L-4T-18P-0S-25H-12R-0F-3A-8C-13W)

Prerequisite: Entry into the Faculty.

Aim: To provide an introduction to the range of landscape types found in southern Africa, and to introduce the geomorphological and geological processes operating within these environments.

Content: The earth's crustal system; endo- and exogenic processes in the southern African context. The dominant processes and characteristics of rivers, slopes/mass movement systems, and semi-arid environments in South Africa. Introduction to landscape systems and the principles of the southern African Land type classification.

Practicals: The course includes six afternoon practical sessions and an assignment.

Assessment: one 2 hr examination (50%), theory test (15%), practical test (15%), tutorial work sheets (10%), assignment (10%).

GEOG122 – Spatial Representation & Cartography
(PGE1SC2) (18L-4T-18P-0S-24H-12R-0F-4A-8C-13W)

Prerequisite: Entry into the Faculty.

Aim: To provide a service course in the geographical sciences, agriculture, environmental science and life sciences with key concepts and skills relating to the representation of geographic and spatial data.

Content: Spatial representation concepts and applications. Map projections; the use of globes *vs* maps. Location: geographic grid system (latitude and longitude) and military grids. Direction and bearings: compass bearings, azimuths, grid bearings, magnetic declination. Symbolic representation of points, lines and areas. Representation of relief: spot heights, contours, oblique shading, altitude tints, hachures. Gradients, slopes and profiles. Scale considerations. Maps as historical records and maps as reflections of dominant ideologies. Introduction to aerial photography, photogrammetry, stereo scope use Spatial data capture, land use surveys and mapping.

Practicals: The course includes six afternoon practical sessions and an assignment.

Assessment: one 3 hr examination (50%), theory tests (20%), practical tests (10%), practicals (10%), assignment (10%).

GEOG124 – Human Environments & Development
(PGE1ED2) (18L-4T-18P-0S-25H-12R-0F-3A-8C-13W)

Prerequisite: Entry into the Faculty.

Aim: To introduce concepts of development in comparative socio-economic, cultural and political contexts dealing with basic principles of spatial location, population dynamics, rural and urban systems and city forms.

Content: Introduction to various concepts of environment and development including: rural urban environments, explanation/derivatives of terms, developed vs less developed, spatial location theory, demographics, distribution patterns (resources; transport; leisure etc)

Practicals: The course includes five afternoon practicals and exposure to city forms in Pietermaritzburg during an afternoon field trip; and an assignment.

Assessment: one 2 hr examination (50%); theory test (15%); practical test (15%); tutorial work sheets (10%); assignment (10%).

GEOG211 – Biogeography

(PGE2BG1) (18L-0T-18P-0S-25H-16R-0F-3A-8C-13W)

Prerequisite: Candidates must have obtained a minimum of 64C.

Aim: To introduce biogeographical processes through an analysis of the ecosystem concept, the interrelationship between the organic and inorganic elements of the earth's environment and the reciprocal relationship between humans and the biosphere.

Content: Biogeography and ecosystem concept. Concepts of distribution patterns. The biosphere. Defining biomes and ecosystems of the world. Introduction to and discussion of South African Biomes. Biotic resources: use and misuse. Theories of succession. Island biogeography and dispersal. Global environmental change - nature and impact. Palaeo-environments. Environmental changes: past; present and future. Ecosystem stability and disturbance. Human impact: ecosystem exploitation. Managed ecosystems. Conservation of ecological principles. The role of biogeographers in the environmental struggle.

Practicals: The course includes five afternoon practicals and exposure to biomes in the greater Pietermaritzburg area during an afternoon field trip; and an assignment.

Assessment: one 2 hr examination (50%), theory tests (20%), practicals (20%), assignments/ project (10%).

GEOG213 – Cultural Environments & the City

(PGE2CS2) (18L-0T-18P-0S-25H-16R-0F-3A-8C-13W)

Prerequisite: Candidates must have obtained a minimum of 50% in GEOG124 or have 64C of which at least 32C must be in development related modules.

Aim: To introduce the concepts of urbanization and the theory explaining the spatial dynamics of towns and cities.

Content: Introduction to cultural environment concepts, sustainability and urbanisation. History of cities and built environments; Urban infrastructure and resources. Institutional structures and functions. Sustainable cities. Urbanisation problems: water, waste, crime. Formal *vs* informal development. Less developed *vs* developed cities : forms and functions. Core/periphery tensions. Counter urbanization, intra-urban and inter urban flows. Population mobility and migration (rural-urban; urban rural). Urban sprawl; Urban blight and decay; Gentrification. Greening the city and urban agriculture. Cities of the future.

Practicals: Practical sessions will include seminar discussions and workshops as well as afternoon field excursions and project write ups.

Assessment: one 2 hr examination (50%), theory tests (20%), practical tests and field work (10%), five practicals (10%), field work report/ project (10%).

GEOG216 – Development Theory & Practice
(PGE2DT2) (18L-0T-18P-0S-25H-16R-0F-3A-8C-13W)
Prerequisite: Candidates must have obtained a minimum of 50% in GEOG124 or have 64C of which at least 32C must be in development related modules

Aim: To introduce students to an historical and holistic perspective on development debates and models.

Content: Derivative of development nomenclature. Historical context of development theory. Classical development theory. Modernisation theory. Marx/ Capitalist theory. Dependency theory. Mixed approach to development.

Practicals: Practical sessions will include seminar discussions and workshops as well as afternoon field excursions and project write ups.

Assessment: one 2 hr examination (50%), theory tests (20%), practical tests and field work (10%), five practicals (10%), field work report/project (10%).

GEOG217 – SA Land-form Processes and Change
(PGE2PC1) (18L-4T-40P-6S-69H-20R-0F-3A-16C-13W)
Prerequisite: Candidates must have obtained a minimum of 50% in GEOG114 or have 64C of which 32 must be in the earth science disciplines.
Aim: To provide an understanding of the dominant processes governing the range and variability of landscape types found in southern Africa and the manner in which these processes modify environments in time and space.

Content: Energy and water transfer mechanisms within the regolith on both rock and soil dominated slopes. The strength of geomorphic materials; physical processes of entrainment and transport in a fluid medium. Denudational systems and an introduction to process measurement Geomorphic change within context of southern African landscape assemblanges The field based identification and measurement of geomorphic processes.

Practicals: The course is based on the same number of lectures as an 8 credit course, but includes a four day compulsory field excursion, the costs of which students are expected to contribute to. There are five afternoon practicals and an assignment.

Assessment: one 2 hr examination (50%), field report (25%), practical work (10%), tutorial style work sheets (5%), assignments (10%).

GEOG222 – Remote Sensing & GIS
(PGE2RS2) (18L-0T-18P-0S-25H-16R-0F-3A-8C-13W)
Prerequisite: Candidates must have obtained a minimum of 50% in GEOG122 (students registered for specific programs listing this module as a *core course* will be granted exemption from this prerequisite)

Aim: To provide students with an introduction to the theoretical framework underlying remote sensing and geographic information systems (GIS) and their application to environmental problems.

Content: Concepts and functionality of remote sensing; interpretation of aerial photography; distortions and projections; satellite remote sensing techniques, applications; introduction to GIS, data structures, capabilities, limitations.

Practicals: The course consists of six practical afternoon sessions and an assignment.

Assessment: one 2 hr examination (50%), theory tests (20%), project/assignments (10%), practicals (20%).

GEOG230 – South African Biophysical Environments Field Course
(PGE2BEW) (8L-4T-40P-15S-68H-20R-0F-5A-5W-16C)
Please note: This is a Winter semester field course.

Prerequisite: Candidates must have obtained a minimum of 50% in GEOG114; GEOG113 and GEOG217 or have 180C of which 64 must be in the earth science related disciplines.

Aim: To provide students with a 'hands on' understanding of the processes underlying the range and variability of South African landscapes and biomes through the study of selected field sites.

Content: Energy and water transfer mechanisms in the regolith within denudational systems; an introduction to the measurement of biophysical parameters in time and space, geomorphic and ecological change within the context of southern African landscape assemblages. Biomes, ecosystems and succession of afro-montane and fluvio-marine environments in South Africa as illustrated by specific field areas. Introduction to the palaeo-environments of South Africa. Environmental management issues in South Africa in a biophysical and socio-economic/ socio-political context.

Practicals: The course is based on a limited number of lectures during the winter semester, but includes an assessed four week compulsory field course, the costs of which students are expected to contribute to.

Assessment: two 2 hr exams (40%), field report * (25%), seminar work (10%), major assignment * (25%).

*** both will be available to the external examiner for scrutiny together with the examination scripts.**

Preparation *prior* to embarking on the course is essential.

GEOG311 – Biogeography & Climatic Change
(PGE3CC1) . (18L-4T-40P-6S-64H-24R-0F-4A-16C-13W)

Prerequisite: Candidates must have obtained a minimum of 50% in GEOG211; GEOG113 and GEOG114.

Aim: This course deals with the non-random distribution of organisms in terms of processes through pattern definition and process identification, principally from systematics, ecology and palaeontology.

Content: Process, pattern and scale in biogeography. Biogeographical processes: a perceptual overview. Distributional patterns and the role of climate. Distributional patterns and the role of evolution and plate tectonics. Palaeo-climatic change. Palaeo-reconstruction techniques. Dating techniques. Palaeo-climates of South Africa: -sources of evidence; Ecozone descriptions. Palaeoenvironmental patterns. Biological processes in biogeography: adaptation; speciation; extinction; ecological interactions. Biogeographical reconstruction: refugia, phylogentic biogeography, cladistic biogeography. Endemism.

Practicals: Practical sessions will be used to expand upon the taught concepts and include sessions dealing with distributional patterns; and species diversity. The course includes a four day compulsory field excursion; the costs of which students are expected to contribute to. There are five practical sessions and an assignment.

Assessment: one 3 hr examination (50%), theory tests (10%), practicals (5%), field work report (20%), assignment (15%).

GEOG316 – Environmental Geomorphology
(PGE3EG1) (18L-4T-40P-6S-64H-24R-0F-4A-16C-13W)

Prerequisite: at least 50% in GEOG217.

Aim: To provide students with an understanding of the role of geomorphology as an applied environmental discipline within the southern African and global contexts and to show, using case studies from selected geomorphic environments, how environmental mishaps and disasters could have been avoided.

Content: The principles underlying the application of geomorphology to solving problems in natural and urban environments. Professional ethics; social and economic consideration pertinent to applied work. Use of selected case studies to illustrate the application of geomorphology to the solution of environmental problems. The field based identification and remediation of degraded systems through careful process intervention.

Practicals: Practical sessions will be used to expand upon the taught concepts and include sessions dealing with South African case studies pertinent to applications in Environmental Geomorphology. The course includes a four day compulsory field excursion; to the costs of which students are expected to contribute. There are five practical sessions and an assignment.

Assessment: one 3 hr examination (50%), field report (20%), practical work (10%), tutorial style work sheets (5%), assignment (15%).

GEOG317 – Urban & Regional Planning & Development
(PGE3UR2) (18L-4T-26P-4S-80H-24R-0F-4A-16C-13W)

Prerequisite: at least 50% in GEOG216.

Aim: To appraise national, regional and local planning and development policies and practice through a range of South African case studies.

Content: Implications of Postmodernism and contemporary environmentalism on development theory; South Africa's small town development policy; South Africa's spatial development initiatives; An overview of Durban's Agenda 21 policy; Environmental policies for NGO's; Local Economic development initiatives.

Practicals: Practical sessions will include seminar discussions and workshops as well as afternoon field excursions and project write ups.

Assessment: one 3 hr examination (60%), theory tests (20%), practical tests (5%), practicals (5%), field work report/projects (10%).

GEOG322 – Environmental Management & EIAs
(PGE3ME2) (18L-4T-30P-4S-76H-24R-0F-4A-16C-13W)

Prerequisite: Candidates must have completed 224C.

Aim: To introduce the principles of integrated environmental management, impact assessments and environmental audits through theory, case studies and applied practical work including 'hands on' fieldwork covering a range of environmental and resource management issues. The course aims to provide the foundations of an integrated, holistic understanding of the complexity of physical and human environmental issues and interactions in development contexts.

Content: Introduction to environmental and resource management principles and concepts; renewable *vs* non-renewable, exploitation *vs* sustainability;.World environmental and conservation strategies and policies including Agenda 21 and ISO issues;.Integrated Catchment Management: catchment land use and natural environments, development of cultural and socio-economic environments, degradation and soil erosion, grasslands, forestry, agricultural land-use and water management, alien vegetation and rehabilitation of riparian zones;.Urban environmental management issues formal and informal settlements;.Resource economics, cultural heritage and socioeconomic values, environmental ethics and sustainable development;.Integrated environmental management (IEM);.Environmental law and Environmental Impact Assessments (EIAs) and audits;.Atmospheric and water pollution and other elements and the perception of environmental pollution such as noise and visual aesthetics;.Waste management, separation, collection, recycling and disposal;.Tourism and the management of ecologically sensitive areas.

Practicals: Practical sessions will include workshops, field-trips and an extended field excursion requiring a written report to be submitted for 'capstone' course-work assessment. The course includes a four day compulsory field excursion; to the costs of which students are expected to contribute.

Assessment: one 3 hr examination (50%), assignment (10%), seminars (10%), practicals (10%), field work report (20%).

GEOG324 – GIS
(PGE3GS2) (18L-0T-18P-0S-25H-12R-0F-7A-8C-13W)

Prerequisite: at least 50% in GEOG222.

Aim: To provide an insight into Geographic Information Systems (GIS) as an important spatial analysis tool.

Content: GIS capabilities; Spatial data concepts; Data sources, structures, capture, quality and analysis; Error assessment and management; Geo-referencing; GIS applications, organizational concepts; Spatial decision support systems and expert GIS; Introduction to GPS and applications; The future of GIS.

Practicals: The course consists of six practical afternoon sessions and an assignment. The practical/application of GIS will be examined in a formal examination.

Assessment: one 3 hr examination (40%), One 3 hr practical examination (20%), theory tests (20%), project/assignment (10%), practicals (10%).

GEOG326 – Environmental Impact Assessments
(PGE3EI2) (18L-0T-19P-0S-28H-12R-0F-3A-8C-13W)

Prerequisite: As for GEOG322: Candidates must have completed 224C. This course is ***only*** available to students in ***specified*** programs, and is **not** available in the 'general studies' programs.

Aim: To introduce the principles of integrated environmental management, impact assessments and environmental audits through theory, case studies and applied practical work including limited fieldwork covering environmental and resource management issues.

Content: Introduction to environmental and resource management principles and concepts;

renewable *vs* non-renewable, exploitation *vs* sustainability;.World environmental and conservation strategies and policies including Agenda 21 and ISO issues;.Integrated Catchment Management: catchment land use and natural environments, development of cultural and socio-economic environments, degradation and soil erosion, grasslands, forestry, agricultural land-use and water management, alien vegetation and rehabilitation of riparian zones;.Urban environmental management issues formal and informal settlements;.Resource economics, cultural heritage and socio-economic values, environmental ethics and sustainable development;.Integrated environmental management (IEM);.Environmental law and Environmental Impact Assessments (EIAs) and audits.

*Practicals:*Practical sessions will include workshops, and limited field-work to the costs of which students are expected to contribute.

*Assessment:*one 2 hr examination (50%), assignment (20%), practicals (10%), field work report (20%).

GEOG702 – Contemporary Environmental Issues

(PGE7CE2) (20L-0T-25P-10S-72H-30R-0F-3A-16C-13W)

*Prerequisite:*Candidates must normally have obtained a minimum of 60% in GEOG322, and have completed the primary degree with a minimum of 40C in Geography at level 3. Under exceptional circumstances candidates from other Earth- and Environmental Science disciplines will be considered after suitable motivation to the Head of Discipline and the relevant Dean of Faculty.

*Aim:*To provide students with an understanding of the complexity of contemporary environmental issues both within the context of the applied environmental sciences, and within the broader southern African and global social and biophysical contexts.

*Content:*Disasters and risk/hazard assessment in an environmental context; The people - environment dependence;.Sustainability and biodiversity; Energy, fuel, pollution and despoilation; World environmental and conservation strategies and policies including Agenda 21 and ISO issues; Resource economics, cultural heritage and socio-economic values, environmental ethics and sustainable development; Environmental consequences of population displacements.

*Practicals:*Practical sessions will include workshops, a major assignment and limited field-work, to the costs of which students are expected to contribute.

*Assessment:*one 3 hr examination (60%), seminar work (20%), major assignment (20%).

GEOG711 – Advanced GIS

(PGE7AS1) (20L-0T-22P-10S-72H-30R-0F-6A-16C-13W)

*Prerequisite:*Candidates must normally have obtained a minimum of 60% in GEOG324, and have completed the primary degree with a minimum of 40C in Geography at level 3. Under exceptional circumstances candidates from other Earth- and Environmental Science disciplines will be considered after suitable motivation to the Head of Discipline and the relevant Dean of Faculty.

*Aim:*To provide a more advanced instruction in Geographic Information Systems (GIS) and their use in data analysis and interpretation than is possible at the undergraduate level.

*Content:*Advanced GIS and spatial analyses concepts; Spatial database design, manipulations; Organizational GIS; Distance and network analysis; Error management; Spatial decision support systems and knowledge based GIS; Recent GIS developments; Tomlin map algebra, Boolean logic; Network applications; GIS for business.

Practicals: Practical work is an integral part of this course and will relate to the topics as above. The techniques dealt with in this course are examined in a 3 hr practical examination. One major assignment has to be completed.

Assessment: one 3 hr examination * (40%), One 3 hr prac Exam* (20%), practicals (10%), assignments* (20%), seminars (10%), * ***available to the external examiner for scrutiny***.

GEOG713 – Applied GIS

(PGE7PE2) (20L-0T-25P-10S-72H-30R-0F-3A-16C-13W)

Prerequisite: Candidates must normally have obtained a minimum of 60% in GEOG711.

Aim: To provide insight into the application of Geographic Information Systems (GIS) as a support for decision making in environmental management. Emphasis is on project work from inception to completion.

Content: Spatial data standards; Map projections; Vegetation indices; Image classification; Radar imaging and analysis. GPS technology for GIS; Spatial data preparation; Introduction to spatial statistics; Environmental Modeling using GIS; Change and time series analyses in GIS; Spatial data visualization; Output techniques.

Practicals: Practical work is an integral part of this course and will relate to the topics as above. One major assignment has to be completed.

Assessment: one 3 hr examination (60%), practicals (10%), assignments (20%), seminars (10%).

GEOG721 – Applied Geomorphology

(PGE7AG2) (20L-0T-32P-15S-60H-30R-0F-3A-16C-13W)

Prerequisite: Candidates must normally have obtained a minimum of 60% in GEOG316 and have completed the primary degree with a minimum of 40C in Geography at level 3. Under exceptional circumstances candidates from other Earth- and Environmental Science disciplines will be considered after suitable motivation to the Head of Discipline and the relevant Dean of Faculty.

Aim: To provide students with an understanding of the role of Applied Geomorphology as an applied environmental science within the southern African and global contexts and, based on the field analysis of case studies, to understand how environmental mishaps and disasters could have been avoided through adequate insights into the operation of geomorphic process.

Content: The application of Geomorphology to solving problems in natural and urban environments;.

Professional ethics; social and economic consideration pertinent to applied work;.

Risk assessment and hazard mitigation in Geomorphic systems;.

Use of selected case studies to investigate the application of Geomorphology in the solution of environmental problems;.

The field based identification and remediation of degraded systems through careful process intervention.

Practicals: The course includes two field excursions (to the costs of which students are expected to contribute) to investigate case studies involving applied geomorphology and one major assignment.

Assessment: one 3 hr examination (50%), field investigation (subject to external review) (20%), seminar work (15%), major assignment (15%).

GEOG723 – Biogeography
(PGE7BG1) (20L-0T-32P-15S-60H-30R-0F-3A-16C-13W)

Prerequisite: Candidates must normally have obtained a minimum of 60% in GEOG311 and have completed the primary degree with a minimum of 40C in Geography at level 3. Under exceptional circumstances candidates from other Earth- and Environmental Science disciplines will be considered after suitable motivation to the Head of School and the relevant Dean of Faculty.

Aim: To draw attention to the major topics of current controversy, highlighting areas of possible agreement, synthesising and integrating the various approaches to modern biogeography. Particular attention is paid to different scales of space, time and form.

Content: Vicariance biogeography; Centres of origin; Pan-biogeography; Applied historical biogeography; Techniques of historical biogeography – retrospection; Experimental island biogeography; The man/land paradox and the depletion/conservation of resources; Issues of biodiversity; Species diversity; Conservation of ecological principles. Ethics of environmental conservation; Environmentalism and Gaia Hypothesis; Modern environmentalism.

Practicals: The course includes a major field excursion to the costs of which students are expected to contribute and one major assignment.

Assessment: Performance in the course is evaluated on the basis of achievement in the following:.

One 3 hr examination (50%), practicals (20%), field work report (/project/assignments (30%).

GEOG725 – Soil Erosion & Land Degradation
(PGE7SE1) (20L-0T-32P-15S-60H-30R-0F-3A-16C-13W)

Prerequisite: Candidates must normally have obtained a minimum of 60% in GEOG316 or GEOG322, and have completed the primary degree with a minimum of 40C in Geography at level 3. Under exceptional circumstances candidates from other Earth- and Environmental Science disciplines will be considered after suitable motivation to the Head of Discipline and the relevant Dean of Faculty.

Aim: To provide an understanding of the complexity of soil erosion and land degradation issues both within the context of the applied environmental sciences, and within the southern African and global social and biophysical contexts.

Content: Land degradation and sustainability: Causes and consequences of degradation; Risk assessment in relation to the sustainability of the soil; Food security and degradation.

The People - Environment dependence: Political and socio-economic aspects of soil erosion; Population pressure and stocking rates.

Erosion Processes Resulting in Land Degradation: Physical erosion processes; Chemical erosion processes; Human - environmental processes and influences.

Conservation Practices: What constitutes soil conservation? Magnitude - frequency considerations;.

Desertification - natural oscillation or anthropogenically induced? Land use systems within an historical context; Soil Conservation Strategies; Principles, planning and policy issues.

Practicals: The course includes one major field excursion (to the costs of which students are expected to contribute) to investigate case studies involving soil erosion/conservation issues, and one major assignment.

Assessment: Performance in the course is evaluated on the basis of achievement in the following:.
one 3 hr examination (50%), field investigation (20%), seminar work (15%), major assignment (subject to external review) (15%).

GEOG731 – Environmental Politics
(PGE7EP1) (20L-0T-25P-10S-72H-30R-0F-3A-16C-13W)

Prerequisite: Candidates must normally have obtained a minimum of 60% in GEOG317 or GEOG322, and have completed the primary degree with a minimum of 40C in Geography at level 3. Under exceptional circumstances candidates from other Earth- and Environmental Science disciplines will be considered after suitable motivation to the Head of Discipline and the relevant Dean of Faculty.

Aim: To cover key aspects of debates on politics and the environment and on environmental ethics. It aims to introduce concepts and issues surrounding environmental problems and their associated political solutions.

Content: Environmental philosophy; Green ideology; The environmental movement; Collective action and decision making; Valuation of the environment; Choosing the means.; Environmental policy: international dimensions, European integration, national responses, local democracy and local authorities; Environmental politics in South Africa.

Practicals: Practical sessions will include workshops, a major assignment and limited field-work, to the costs of which students are expected to contribute.

Assessment: one 3 hr examination (60%), assignments (20%), seminars (20%).

GEOG735 – Rural Development & Land Reform
(PGE7LR1) (20L-0T-25P-10S-72H-30R-0F-3A-16C-13W)

Prerequisite: Candidates must normally have obtained a minimum of 60% in GEOG317 and have completed the primary degree with a minimum of 40C in Geography at level 3. Under exceptional circumstances candidates from other Earth- and Environmental Science disciplines will be considered after suitable motivation to the Head of Discipline and the relevant Dean of Faculty.

Aim: To consider the principles, concepts and practical realities of rural development in South African, African and other third world contexts. The purpose is to give students an understanding of the complexity and dynamic processes of rural development and to contextualize the challenges facing third world governments and development agencies to address the issues of quality of life in developing rural areas.

Content: Traditional systems of rural occupance and indigenous knowledge; Rural underdevelopment, poverty and development constraints; Land tenure systems; Land reform programmes; Gender issues in rural development; Rural housing and quality of life issues; Population migration issues; Degradation, conversion and loss of arable land; Rural resource development for recreation and tourism; Appropriate technology in rural development; Sustainable, integrated rural development; Rural-urban fringe dynamics.

Practicals: Practical sessions will include workshops, a major assignment and limited field-work, to the costs of which students are expected to contribute.

Assessment: one 3 hr examination (60%), seminar executive summaries (20%), project/ assignment reports (20%).

GEOG790 – Research Techniques & Projects
(PGE7RTY) (30L-10T-20P-10S-500H-60R-0F-10A-64C-26W)
Prerequisite: Candidates must normally have completed the primary degree, have a minimum of 40C in Geography at level 3, and have obtained a minimum of 60% on aggregate for their level 3 courses. Under exceptional circumstances candidates from other Earth- and Environmental Science disciplines will be considered after suitable motivation to the Head of Discipline and the relevant Dean of Faculty.

Aim: To consolidate knowledge of the principles, philosophy and methodology of Geography as an holistic, applied environmental science, to provide an integrated approach to physical and human environmental issues within spatial and temporal geographical contexts.

Content: The development of geographical thought; Geographical paradigms, technology and scientific thought;.

Current debates concerning the philosophy and methodology of geography and other environmental disciplines;.

The role of geography in a technocratic society; Human behavioural and environmental research; Sources of geographical data; The collection of data in the field (urban, rural and conservation areas) subjectivity and objectivity; Analysis of geographical data and its representation and presentation.

Practicals: Practical sessions will include workshops, and the presentation of two major seminars, a scientific poster, a field/research report, assignments; a major research paper and an examination on '*Contemporary Geographical Issues*'. Several of the practical sessions will be used in preparation for this.

Assessment: one 3 hr exam* (25 %), major research paper * (50 %), formal seminars (10 %), assignments and field work (7,5%), scientific poster paper * (7,5%), * *Subject to scrutiny by external examiners*.

The examination together with the major research paper serve as a 'capstone' component and carry 50% sub-minima requirements.

Geology

Offered in the School of Applied Environmental Sciences

A major in geology is not offered on the Pietermartizburg campus but Geology is offered as a major on the Durban campus. Students may therefore start their studies in Pietermaritzburg, however, they will be required to transfer to the Durban campus, in their second and subsequent years of study.

Geology can be taken at level 1in Pietermaritzburg by completion of the following four modules:.

BIOR118 (8); EART122 (8), 124 (8); GEOG114 (8)

Entrance to Geology 2 level courses can be gained by obtaining a 60 % average in the four modules noted above or by discretion of the Head of School.

Grassland Science

Offered in the School of Applied Environmental Sciences

GRAS211 – Introduction to Grassland Management
(PGR2GM1) (18L-0T-18P-0S-30H-11R-0F-3A-13W-8C)

Prerequisite: BIOS101 and [BOTY102 *or* ZOOL102] *or* [8C in any appropriate biological subject].

Aim: This course focuses on aspects of the Grassland Science 210 grassland management course that are relevant to wildlife systems. This includes the development of an understanding of aspects of grassland management including the grazing potential of rangeland, appropriate grazing systems, carrying capacity, bush encroachment and burning programmes.

Content: Key principles and applications in range and wildlife management.

Practicals: The course includes the use of field techniques to assess veld condition and available browse for animals; collection and identification of grass species; application of laboratory techniques to assess forage quality of plants; visits to veld experiments.

Assessment: Two theory tests, one project and essay, three practicals.

GRAS226 – Plant Field Methods
(PGR2FM2) (18L-0T-18P-0S-30H-11R-0F-3A-13W-8C)

Prerequisite: BIOS101 and [BOTY102 *or* ZOOL102], MATH111, 122 and [STAT110 or BIOM210] or equivalent courses approved by the Head of the School.

Aim: To introduce the student to the four commonly used measures of vegetation: frequency, cover, biomass and density. Introduction to the concepts of variation in vegetation, units of measurement, sampling and monitoring. The module introduces basic statistical concepts of field sampling.

Content: Key principles and techniques for measuring vegetation.

Practicals: Application of different field techniques for measuring grassland and savanna systems. Collection of data, data reduction, presentation and interpretation.

Assessment: Two theory tests, practical write ups, one three-hour examination.

GRAS228 – Plant Identification
(PGR2PI2) (18L-0T-18P-0S-30H-11R-0F-3A-13W-8C)

Prerequisite: BIOS101 and [BOTY102 *or* ZOOL102].

Aim: This is a practical course that will give students expertise in the use of plant identification keys and recognition of diagnostic features of grasses and trees.

Content: Key principles and skills to identify the most important grasses and trees of South Africa.

Practicals: Use of microscope techniques and keys to identify plants. Field identification of grass and tree species.

Assessment: One test, practical write-ups, one three-hour theory examination, one three-hour practical examination.

GRAS312 – Advanced Range Management
(PGR3GM1) (18L-18T-50P-20S-110H-20R-0F-4A-24C-13W)

Prerequisite: GRAS211, 226 with a minimum mark of 50%.

Aim: To provide students with skills and experience in planning systems & solving problems in range management.

Content: Scientific principles pertinent to management of forage resources *inter alia*; stocking rates, communal and commercial grazing strategies, foraging theory, forage quality, supplementation and the animal factor. Principles for applied rangeland problems including erosion, reclamation and the use of fire, game management.

Practical Work: The course includes two compulsory field trips over weekends. Students may be required to contribute to the cost of trips. Mini-project.

Assessment: 2 theory tests, 2 verbal deliveries, 1 literature review, 1 project plan, 1 3 hr examination.

GRAS343 – Range Ecology

(PGR3RE1) (11L-0T-18P-0S-35H-12R-0F-4A-8C-13W)

*Prerequisite:*GRAS211, 226, 324 with a minimum mark of 50 %.

Aim: To provide students with a conceptual foundation of rangeland ecology such that they can address applied issues.

*Content:*Vegetation-environment relations; applied plant population and community ecology; ecosystem functioning including production and biogeochemical cycling; role of fire and herbivory in rangelands; degradation and desertification. Work from Africa is emphasized.

*Practicals:*Field sampling of vegetation in response to treatments and environment; pot-based experiments on plant growth.

Assessments: Two theory tests, literature review (written), practical exercise devised and executed by student.

GRAS728 – Multivariate Analysis: Landscape/Community Ecology

(PGR7MA1) (11L-0T-24P-0S-20H-21R-0F-4A-8C-13W)

Pre- or Corequisite: BIOM210 *or* STAT110.

*Aim:*To provide students with the skill required for the planning, sampling and analysis of community (plant or animal) data using computer packages of multivariate statistics.

*Content:*Historical background of the development of plant community ecology. Current concepts in community ecology. Direct gradient analysis. Ordination, including linear (Principal Components Analysis) and unimodal (Correspondence Analysis, Detrended Correspondence Analysis) models. Constrained forms of ordination, using CANOCO. Approaches to classification, including Braun-Blanquet and TWINSPAN. Vegetation science in southern Africa: past, present and future. Additional multivariate statistical techniques of value to community ecology, including Discriminant Functions Analysis and Multidimensional Scaling.

*Practicals:*Field collection of a data set by the class that is subsequently analysed by a range of ordination and classification procedures in computer-based laboratory sessions.

Assessments: Two theory tests, literature review (written), paper (written) on practical exercise.

GRAS753 – Contemporary Issues in Range Science

(PGR7CI2) (0L-39T-0P-0S-198H-0R-0F-3A-24C-13W)

*Prerequisite:*Admission to BSc (Hons) majoring in Grassland Science or to level 7 of BSc (Agric) majoring in Grassland Science.

Aim: To consolidate the knowledge of important specialist topics in Range and Pasture Science, of which four are chosen.

Content: Dependent on choice of specialist topics made in consultation with Head of Discipline.

Assessments: Paper (written) for each topic, and an exercise involving synthesis of quantitative information obtained from the literature for two of the topics.

GRAS791 – Grassland Science Seminar
(PGR7GS1) (0L-0T-0P-1S-79H-0R-0F-0A-8C-13W)
Prerequisite: Admission to BSc (Hons) majoring in Grassland Science or to level 7 of BSc (Agric) majoring in Grassland Science.

Aim: To provide experience in researching and synthesizing scientific literature on a specific topic.

Content: Search for information in the scientific literature on an approved topic, prepare a scientific review paper, present the paper orally.

Assessment: Written review paper, oral presentation.

GRAS793 – Grassland Science Research Project
(PGR7RPY) (0L-0T-0P-1S-639H-0R-0F-0A-64C-26W)
Prerequisite: Admission to BSc (Hons) majoring in Grassland Science or to level 7 of BSc (Agric) majoring in Grassland Science.
Aim: To provide experience in conducting of a research project and preparation of a scientific paper.
Content: Conduct an approved research project, prepare a scientific paper on the results, present the results orally.
Assessment: Written scientific paper and its oral presentation.

Human Physiology
Offered in the School of Agricultural Sciences & Agribusiness

HPHY112 – Human Physiology 1
(PHP1IH2) (20L-6T-10P-0S-29H-10R-0F-5A-8C-13W)
Aim: To give the student an overview of human anatomy and a thorough knowledge of the physiology of the various systems covered in order to provide a background to therapeutic nutrition courses.

Content: Epithelial Tissue, Connective Tissue, Membrane Transport, Blood and Liver.

Practicals: Histological studies, practical exposure.

Assessment: Tests % , Assignments %, Practicals, class participation % , Exams %.

HPHY252 – Human Physiology 2
(PHP2HP1) (39L-0T-25P-0S-75H-15R-0F-6A-16C-13W)
Prerequisites: None.
Corequisites: Biosciences 110 HPHY 112.
Aim: To give the student an overview of human anatomy and a thorough knowledge of the physiology of the various systems covered in order to provide a background to therapeutic nutrition courses.

Content: Organization of the Human Body, Support and Movement Systems, Nervous and Chemical Integration and Control Systems, Metabolic Processes: Digestion and Respiration.

Practicals: Histological studies, practical exposure.

Assessment: Tests (25 %), Assignments (15 %), Practicals, class participation (10 %), Exams (50 %).

HPHY254 – Human Physiology 3
(PHP2HF2) (39L-0T-25P-0S-75H-15R-0F-6A-16C-13W)
Prerequisites: None.

Corequisites: HPHY252.

Aim: To give the student an overview of human anatomy and a thorough knowledge of the physiology of the various systems covered in order to provide a background to therapeutic nutrition courses.

Content: The Heart, Circulation, Renal System and Fluid Balance, Reproductive System.

Practicals: Histological studies, practical exposure.

Assessment: Tests (25 %), Assignments (15 %), Practicals, class participation (10 %), Exams (50%)

Hydrology

Offered in the School of Applied Environmental Sciences

HYDR210 – Introduction to Physical Hydrology
(PHY2PH1) (26L-7T-40P-0S-65H-15R-0F-7A-16C-13W)
Prerequisite: At least 32C from level 1 courses in Mathematics, Physics, Statistics or Computer Science.

Aim: To develop an understanding of the fundamentals of major components making up the hydrological cycle and man's interaction with it.

Content: This course is designed to provide students taking agriculture and environmental science options with key concepts underlying the science of hydrology.

Practicals: One field trip to a nearby research catchment as well ten practicals covering various basic hydrological concepts.

Assessment: Two class tests, one practical examination, one two-hour examination as well as assessment of class tutorials and practicals.

HYDR220 – Environmental Aspects of Hydrology
(PHY2EA2) (26L-7T-40P-0S-65H-15R-0F-7A-16C-13W)
Prerequisite: HYDR210.

Aim: This double module is designed to provide students taking agriculture and environmental science options with an understanding of current topics in Environmental Hydrology and anthropogenic impacts on the hydrological cycle.

Content: The study of the physical and environmental basics of the following important hydrological aspects: groundwater; the Water Budget; soil Loss; morphometry; as well as an introduction to hydrological models.

Practicals: One field trip to a nearby research catchment as well ten practicals covering the subjects above.

Assessment: Two class tests, one Practical examination, one two-hour examination as well as assessment of class tutorials and practicals.

HYDR310 – Modeling for Hydrological Design
(PHY3MD1) (24L-8T-40P-0S-65H-15R-0F-8A-16C-13W)
Prerequisite: HYDR210, HYDR220.

Aim: This course is designed to provide students who have completed HYDR210 and 220 with an understanding and appreciation of hydrological simulation models commonly used in South Africa and their application to hydrological design and water conflict problems.

Content: The application of hydrological models to sustainable integrated water resources management and planning, under varying environmental conditions. Specific outcomes are: an understanding of the theoretical concepts of hydrological simulation; the ability to select appropriate models for particular problems; application of hydrological models to obtain water resources design and planning information; the ability to set up and run the ACRU Agrohydrological model.

Practicals: One field trip to a nearby research catchment as well twelve practicals covering the subjects above.

Assessment: Two class tests, one Practical examination, one 3-hour examination as well as assessment of class tutorials and practicals.

HYDR311 – Agrohydrological Simulation Modeling
(PHY3AS1) (16L-6T-20P-0S-24H-8R-0F-6A-8C-13W)
Prerequisite: HYDR210.

Aim: This course is designed to provide students outside of the Programme in Environmental Hydrology or not majoring in Hydrology with an understanding and appreciation of the role of models in hydrological science.

Content: To provide students with an understanding of the development philosophies of a number of hydrological Modeling systems and the ability to operate the most important of these. Specific outcomes are: an understanding of the theoretical concepts of hydrological simulation; the ability to select appropriate models for particular problems; the ability to configure and run the ACRU Agrohydrological model.

Practicals: One field trip to a nearby research catchment as well six practicals covering the subjects above.

Assessment: Two class tests, one Practical examination, one 2-hour examination as well as assessment of class tutorials and practicals.

HYDR312 – Dam Design
(PHY3DD1) (6L-0T-9P-3S-62H-0R-0F-0A-8C-13W)
Prerequisite: HYDR210, 220.
Corequisite: HYDR310.

Aim: This course is designed to provide students who have completed HYDR210 and 220 with the ability to apply their hydrological design knowledge to practical application by designing a small dam.

Content: Design of a small dam using the SCS methodology.

Practicals: Practical application of the SCS design methodology by the student assisted by class tutors.

Assessment: Dam designs are written up as projects and assessed. The student is also required to present a verbal summary of design criteria to a peer group.

HYDR320 – Applied Hydrology
(PHY3AH2) (24L-8T-40P-0S-65H-15R-0F-8A-16C-13W)
Prerequisite: HYDR310 with a minimum of 50%.

Aim: This double module is designed to provide students who have completed HYDR210, 220 and 310 with an integrated understanding of hydrological sciences and the ability to solve applied hydrological problems.

Content: Focus on the interrelationships between principles and theories learned in preceding courses and applied hydrological issues and problem solving. These include: prediction of soil loss at different scales; application of basic hydraulic principles; an understanding of the significance of variability and uncertainty in water resources planning and the anthropogenic factors affecting water resources management such as forestry, environmental water requirements, climate change, etc.

Practicals: One compulsory 3-day field trip to local water resources projects. Students are expected to contribute to costs. 12 practicals covering the subjects above.

Assessment: Two class tests, one practical examination, one 3-hour examination as well as assessment of class tutorials and practicals.

HYDR321 – Hydrology Project
(PHY3HP2) (2L-1T-3P-9S-65H-0R-0F-0A-8C-13W)
Prerequisite: HYDR310.
Corequisite: HYDR320.

Aim: To provide the ability to study in some detail a particular topic of contemporary hydrological concern, by way of literature review and practical application of hydrological knowledge learned in preceding courses and to present this as a formal document to laid down specifications.

Content: Detailed self-study by way of literature review, interview, etc regarding a particular topic of contemporary hydrological concern.

Practicals: Application of a document to formal scientific specifications.

Assessment: Assessment of completed document in terms of content, adherence to specifications. Assessment of verbal presentation of topic as well as participation in peer presentations.

HYDR322 – Environmental Water Quality
(PHY3WQ2) (15L-4T-18P-0S-30H-8R-0F-5A-8C-13W)
Prerequisite: HYDR210 with a minimum of 50%.

Aim: To provide an intermediate level understanding and appreciation of the environmental aspects water quality issues in hydrology especially those relevant to southern African conditions, such as eutrophication and e coli problems.

Content: The causes and effects of water quality problems and the potential for simulation Modeling thereof, with particular reference to South African conditions.

Practicals: Practicals covering the subjects above; hands-on monitoring of a local river.

Assessment: Two class tests, one 2-hour examination as well as assessment of class tutorials and practicals.

HYDR710 – Current Issues in Hydrology
(PHY7CI2) (16L-16T-0P-8S-95H-20R-0F-5A-16C-13W)
Prerequisite: HYDR310 and HYDR320 with a minimum of 60%.

Aim: To provide an understanding of the current and topical issues of importance in hydrological sciences. Specific outcomes will include: the ability to understand and synthesis particular topics from scientific literature; an understanding of the philosophy of hydrological science; an understanding of the dynamic nature of the science of hydrology; an awareness of the external forces driving the science.

Content: The study of topical and relevant issues pertaining to the science of hydrology.

Practical Work: Practicals covering the subjects above as well as hands-on monitoring of a local river.

Assessment: Five assignments, one examination.

HYDR720 – Integrated Water Resources Management
(PHY7WM2) (24L-18T-80P-0S-85H-20R-0F-5A-16C-13W)
Prerequisite: HYDR310 and HYDR320 with a minimum of 60%.

Aim: This double module is designed to provide honours level students with an integrated understanding of hydrological sciences and an ability to solve applied hydrological problems in an interdisciplinary environment.

Content: After successful completion this module students should have an in-depth understanding of the interrelationships between principles and theories learned in preceding courses and the processes they represent. In particular, they should be aware of the integrating nature of the hydrological catchment. Topics of study include: environmental impact assessment; integrated catchment management; environmental water requirements; water quality issues .

Practical Work: Practicals covering the subjects above as well as visits to sites of relevance.

Assessment: Five assignments, one three-hour examination.

HYDR725 – Advanced Hydrological Processes
(PHY7AH1) (16L-16T-8P-8S-87H-20R-0F-5A-16C-13W)
Prerequisite: HYDR310 and HYDR320 with a minimum of 60%.

Aim: This double module is designed to provide honours level students with an in depth understanding of fundamental hydrological processes.

Content: After successful completion this module students should have an in-depth understanding of specific hydrological processes. These include: design flood estimation; soil water and hillslope processes; groundwater modelling; forest hydrology.

Practical Work: Practicals covering the subjects above as well as visits to sites of relevance.

Assessment: Five assignments, one three-hour examination.

HYDR790 – Hydrology Honours Project
(PHY7RPY) (0L-4T-0P-0S-311H-0R-0F-5A-32C-26W)
Prerequisite: HYDR310 and HYDR320 with a minimum of 60%.

Aim: This module is designed to train hydrology honours students to conduct an approved research project and prepare and present a scientific report on the results.

Content: Access and assess scientific documentation. Conduct a small research project, analyse results. Report by way of written report to specified scientific format as well as orally to a group of academic staff and peers.

*Practical Work:*All work is conducted under supervision and will be assessed by three reviewers from the School. Written project 66%, Oral presentation 25%, Contribution to peer assessment 9%.

*Assessment:*Five assignments, one three-hour examination.

HYDR795 – Advanced Hydrological Modelling Skills
(PHY7HMY) (30L-12T-40P-0S-203H-30R-0F-5A-32C-26W)
*Prerequisite:*HYDR310 and HYDR320 with a minimum of 60%.

*Aim:*This capstone module is designed to provide honours level students with the ability to apply advanced hydrological skills to water resources problems by way of simulation Modeling and to report on progress and results of the exercise. The configuration and operation of a hydrological model and its application to specific hydrological problems forms a year-long core application of the Hydrology honours course.

*Content:*The collection of data, configuration and application of a model to a specific water resources problem will provide skills in: GIS applications in hydrological Modelling: Catchment delineation; rainfall surfaces; evaporation surfaces; land-use information; soils information; hydrological simulation of a topical catchment; problem areas; land-use; irrigation; crop yield; results analysis; assessment of planning scenarios. The student is expected to hand in progress reports on the model application during the year, and finally report in full on the project, as if to a client.

*Practical Work:*Site visits to the study area, as well analysis of filed data. The use of GIS to obtain catchment information.

*Assessment:*All work is conducted under supervision and will be assessed by three reviewers from the School. The final report as well as the progress reports will be assessed. One three-hour examination.

Information Retrieval & Computer Literacy

Offered in the School of Applied Environmental Sciences

AGRI210 – Computer Literacy Skills
(PAG2CL1) (8L-0T-0P-0S-2H-0R-0F-0A-1C-13W)
Prerequisite:None.

*Aim:*This module is designed to provide students taking agriculture, science and environmental science options with the skills to independently use a computer. The module is designed to impart computer literacy skills to second year students in a short space of time, making efficient use of available resources. The crash-like nature of the course ensures that students get to use a computer frequently within the first four weeks of their second year.

*Content:*Word processing, use of a spreadsheet, E-mail and the Internet. Following successful completion of this course the student should be able to: use a computer to generate a practical report or summaries of their lecture notes; type their data into a spreadsheet program and graphically display the data; send and receive E-mail, with and without attachments; use the Internet as a tool for locating information as well as retrieving such information.

Practicals: Use of a computer.

Assessment: The student is required to hand in a completed practical assignment and one comprehension exercise to demonstrate that they are reasonably proficient in the use of the library and its resources.

AGRI220 – Information Retrieval Skills

(PAG2IR1) (3L-0T-5P-0S-2H-0R-0F-0A-1C-13W)

Prerequisite: None.

Aim: To provide students taking agriculture, science and environmental science options with the skills necessary to retrieve information from the substantial resources at the disposal of the university library and elsewhere, independently and efficiently. Years of experience in user education have shown that the optimum time to offer the module is in the second year of study. Knowledge of the principles, process and tools involved in the advanced, systematic retrieval of information provide the student with a lifelong, research skill.

Content: 1. **Orientation** of student in terms of worldwide organization of information, bringing it down to the local library level.

2. **Sources** of information: books (different types of books); journals (different types of journals); videos and audiotapes; maps, CDROMs, computer disks, online databases.

3. **Tools** to access information sources in different formats, and instruction in how to use the different tools: books - OPAC, printed catalogue, subject guides; journals - OPAC, printed list, subject guides, abstracting and indexing tools (hardcopy and CDROM format); online database (SABINET); videos, audiotapes -OPAC; and CDROMs and computer disks - OPAC.

4. **Steps** in systematic retrieval of information: topic formulation; reference selection and recording, including the function of the review paper and *Science Citation Index* in this context; document acquisition; and information retrieval from documents.

Practicals: Information retrieval exercises.

Assessment: The student is required to hand in a total of two completed practical assignments and one comprehension exercise to demonstrate that they are reasonably proficient in the use of the library and its resources.

Mathematics

Offered in the School of Mathematics, Statistics & Information Technology

MATH010 – Foundation Mathematics

(PMA0MFY) (72L-60T-0P-0S-71H-25R-0F-12A-24C-26W)

Pre-requisites: Any symbol on standard or higher grade matric mathematics.

Aim: Mathematics 010 forms part of a package of courses (the Science Foundation Programme). It provides mathematical support for all three of the other foundation science courses namely Biology 010, Chemistry 010 and Physics 010. It also provides a foundation for all first year mathematics courses. In so doing it replaces the matric mathematics requirement for certain first year courses and the B.Sc. degree.

Content: Numerical skills; Ratio and proportion; Data collection; Equations and inequalities; Perimeter, area and volume; Trigonometry; Open-ended investigation of a mathematical problem; Numbers; Relations and functions; Graphs; Absolute value; 3-D coordinates and polar coordinates; Limits and continuity; the Derivative and rules of differential; rates of change; Curve sketching; Max/min problems; Integration.

Practicals: None.

Assessment: 8 tests (3 hr each); 2 Examinations (3 hr each); Investigation report (2 hrs); Homework assignments (to be used to influence borderline mark decisions)

MATH110 – Differential Calculus & Discrete Mathematics
(PMA1DC1) (36L-32T-4P-0S-55H-28R-0F-5A-16C-13W)

Prerequisites: Higher Grade E or Standard Grade C for Matric Mathematics.

Aim: To introduce and develop the Differential Calculus as well as the fundamentals of proof technique, rudimentary logic and Discrete Mathematics.

Content: Differential Calculus: radian measure, trigonometric and inverse trigonometric functions, exponential and logarithmic functions, limits, continuity, derivatives and differentiation rules, implicit differentiation, shapes of curves, optimization problems and other applications.

Discrete Mathematics: logic, proof techniques and elementary Number Theory, mathematical induction, basics of naive Set Theory, counting principles and the Binomial Theorem.

Practicals: 4 hrs.

Assessment: Two 1 hr tests and three computer assignments [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH111 – Differential Calculus for Life Sciences
(PMA1DL1) (18L-18T-0P-0S-34H-6R-0F-4A-8C-13W)

Pre-requisites: Higher Grade E or Standard Grade C for Matric Mathematics.

Aim: To equip students with basic mathematical tools needed especially in the life sciences.

Content: Logarithms, exponential and trigonometric functions; differentiation with application to graphs, maxima/minima and rates of change; elementary indefinite integrals and elementary differential equations.

Practicals: None.

Assessment: Two 1 hr written tests [one-third of final mark]. One 2 hr examination at the end of semester [two-thirds of final mark].

MATH112 – Calculus & Discrete Mathematics (Engineers)
(PMA1CD1) (36L-32T-4P-0S-55H-28R-0F-5A-16C-13W)

Prerequisites: Higher Grade E or Standard Grade C for Matric Mathematics.

Aim: To introduce and develop the Differential Calculus as well as the fundamentals of proof technique, rudimentary logic and Discrete Mathematics.

Content: Differential Calculus: radian measure, trigonometric and inverse trigonometric functions, exponential and logarithmic functions, limits, continuity, derivatives and differentiation rules, implicit differentiation, shapes of curves, optimization problems and other applications. Discrete Mathematics: Logic, proof techniques and elementary Number

Theory, mathematical induction, basics of naive Set Theory, counting principles and the Binomial Theorem.

Practicals: 4 hrs.

Assessment: Two 1 hr tests and three computer assignments [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH113 – Quantitative Methods for Management Sciences
(PMA1MQ1) (36L-18T-9P-0S-64H-27R-0F-6A-16C-13W)

Pre-requisites: Higher Grade E or Standard Grade C for Matric Mathematics.

Aim: To equip students with basic quantitative reasoning skills derived from linear algebra, financial mathematics and calculus as needed in business management.

Content: Demand and supply functions, systems of linear equations, matrices, linear programming including the simplex algorithm, applications to constrained optimization problems. Arithmetic and geometric progressions, simple and compound interest, annuities, ammortization, sinking funds, perpetuities. Meaning and techniques of differentiation, exponential and logarithmic functions, rates of change, maxima and minima, meaning and techniques of integration and applications. Use of technology in teaching above topics.

Practicals: 9 hrs.

Assessment: Three 1 hr written tests per semester [one-third of final mark]. One 3 hr examination at the end of semester [two-thirds of final mark].

MATH115 – Vectors & Matrices
(PMA1MV1) (36L-36T-0P-0S-55H-28R-0F-5A-16C-13W)

Pre-requisites: Higher Grade E or Standard Grade C for Matric Mathematics.

Corequisite: MATH112.

Aim: To introduce and develop basic principles of Mechanics using differential calculus and the study of Vectors and Matrices in preparation for a more advanced treatment of Mechanics.

Content: Motion of a particle in a straight line; Displacement, velocity and acceleration in 2-D and 3-D space; Relative velocity, acceleration; Newtons laws of motion; Projectiles; Statics of particles; Vectors and analytic geometry.

Practicals: None.

Assessment: Two 1 hr tests [counts to 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH116 – Mechanics
(PMA1EM2) (36L-36T-0P-0S-55H-28R-0F-5A-16C-13W)

Pre-requisites: Vectors and Matrices or permission from head of Mathematics.

Corequisites: MATH120 or MATH121.

Aim: A more advanced study of Mechanics exploiting differential and integral calculus and vector cross product with an introduction to motion of a body in 3-D space.

Content: Simple harmonic motion; Work, energy and power; Motion in a circle; Centre of gravity; Impulsive forces; Variable acceleration of a body; Moments and angular momentum; Moments of inertia; Motion of a body in 3-D space.

Practicals: None.

Assessment: Two 1 hr tests [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH120 – Integral Calculus & Linear Algebra
(PMA1IC2) (36L-32T-4P-0S-55H-28R-0F-5A-16C-13W)
Pre-requisites: MATH110.
Aim: To introduce and develop the Integral Calculus and elementary Linear Algebra.
Content: Integral Calculus: Definite and indefinite integrals, the Fundamental Theorem of Calculus, techniques of integration, approximate integration, areas, volumes and other applications of the Integral Calculus, simple ordinary differential equations and applications of differential equations to Modeling, infinite sequences, convergence of sequences, infinite series and tests for convergence of series. Linear Algebra: Systems of linear equations, linear combinations in R^n, matrices and matrix algebra, determinants, vectors, the scalar and vector product, lines and planes in R^3, curves in polar coordinates, areas and lengths in polar coordinates, complex numbers.
Practicals: 4 hrs.
Assessment: Two 1 hr tests and three computer assignments [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH121 – Integral Calculus for Engineers
(PMA1CE2) (36L-32T-4P-0S-55H-28R-0F-5A-16C-13W)
Prerequisites: MATH112.
Aim: To introduce and develop the Integral Calculus and introduce the calculus of functions of several variables.
Content: Definite and indefinite integrals, the Fundamental Theorem of Calculus, techniques of integration, approximate integration, areas, volumes and other applications of the Integral Calculus, simple ordinary differential equations and applications of differential equations to Modeling, infinite sequences, convergence of sequences, infinite series and tests for convergence of series, curves in polar coordinates, areas and lengths in polar coordinates, complex numbers, hyperbolic functions, improper integrals, vector functions and curves in space, derivatives and integrals of vector functions, arc length and curvature, motion in space, functions of several variables, limits and continuity, partial derivatives.
Practicals: 4 hrs.
Assessment: Two 1 hr tests and three computer assignments [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH122 – Integral Calculus for Life Sciences
(PMA1CL2) (18L-18T-0P-0S-34H-6R-0F-4A-8C-13W)
Prerequisites: Higher Grade E or Standard Grade C for Matric Mathematics; MATH111.
Aim: To equip students with basic mathematical tools needed especially in the life sciences.
Content: Definite integrals; areas and numerical integration; partial derivatives; linear equations, matrices; linear programming.
Assessment: Two 1 hr written tests [one-third of final mark]. One 2 hr examination at the end of semester [two-thirds of final mark].

MATH211 – Introduction to Algebra & Number Theory
(PMA2AN1) (15L-18T-0P-0S-32H-12R-0F-3A-8C-13W)

Prerequisites: MATH110 and MATH120, each course with a minimum final mark of 50%.

Aim: This module discusses basic theories from Modern Algebra and Number Theory which are fundamental in various parts of mathematics and Computer Science. This module has a coherence that is well worth the attention of every serious undergraduate mathematics students, not only future secondary school teachers and graduate students, but also computer science students and others who use discrete mathematics.

Content: Sets, mappings, equivalence relations, equivalence classes, partitions. Integers, prime factorisation, integers modulo n, Euler function. Binary operations, symmetric differences, algebraic systems, semi-groups, monoids, groups and examples of groups, permutations, symmetric and alternating groups.

Practicals: None.

Assessment: Two 1/2 hr tests written during the semester [33% of final mark]. One 2 hr examination written at the end of the semester [67% of final mark].

MATH213 – Advanced Calculus
(PMA2AC1) (15L-14T-6P-0S-31H-11R-0F-4A-8C-13W)

Pre-requisites: MATH110 and MATH120, each with minimum final marks of 50%.

Aim: This module gives a coherent treatment of basic theories and problem solving techniques from Calculus which is fundamental to Mathematics and Applied Sciences.

Content: Power Series and Taylor's Theorem; Cylindrical and Spherical Coordinates; Functions of Several Variables; Partial Derivatives; Chain Rules; Implicit Function Theorem; Extrema and Lagrange Multipliers; Multiple Integrals; Change of Variables; Differential Equations; Vector Functions and Vector Fields; Line Integrals; Green's Theorem; Surface Integrals and Divergence Theorem.

Practicals: 6 hrs.

Assessment: Two 1 hr tests written during the semester [33% of final mark]. One 2 hrexamination written at the end of the semester [67% of final mark].

MATH215 – Discrete Mathematics
(PMA2DN1) (15L-18T-0P-0S-32H-12R-0F-3A-8C-13W)

Pre-requisites: MATH110 and MATH120, each with a minimum final mark of 50%.

Aim: This module is the continuation of the discrete mathematics section of MATH110. Continues the study of basic theories from Discrete Mathematics, such as combinatorics, algorithms and their analysis, and discrete structures, which are fundamental in various parts of Mathematics and Computer Science.

Content: Basic counting principles, arrangements and selections with repetition, distributions, binomial identities, inclusion-exclusion principle, counting using generating functions. Functions defined on general sets, pigeonhole principle. Recursively defined sequences, solving recurrence relations by iteration, homogeneous and nonhomogeneous recurrence relations. O-notation and the efficiency of.

algorithms.

Practicals: None.

*Assessment:*Two 1/2 hr tests written during the semester [33% of final mark]. One 2 hr examination written at the end of the semester [67% of final mark].

MATH222 – Introduction to Real Analysis
(PMA2RA2) (15L-18T-0P-0S-32H-12R-0F-3A-8C-13W)
*Pre-requisites:*MATH110, 120, with a minimum final mark of 50% and MATH213.

*Aim:*This is an introductory single module on Real Analysis. Basic topics which are fundamental in further real analysis and in other parts of Mathematics are discussed.

*Content:*The completeness axiom of the real numbers, the natural numbers, limits, real valued functions, monotonic functions, inverse of functions, limits of functions, properties of continuous functions, mean value and intermediate value theorems.
*Practicals:*None.

*Assessment:*Two 1/2 hr tests written during the semester [33% of final mark]. One 2 hr examination written at the end of the semester [67% of final mark].

MATH224 – Applied Linear Algebra
(PMA2AL2) (15L-14T-6P-0S-31H-11R-0F-4A-8C-13W)
*Prerequisites:*MATH213.

*Aim:*This module gives a coherent treatment of basic theories and problem solving techniques from Linear Algebra and its applications which are fundamental to Mathematics and the Applied Sciences.

*Content:*Axioms of Vector Spaces; Linear Independence; Bases; Dimensions; Matrices and Linear Transformations; Eigenvectors and Eigenvalues; Diagonal Matrices; Inner Product Spaces; Gram-Schmidt Process; Orthogonal Matrices; Linear Differential Equations and Quadratic Surfaces.

*Practicals:*6 hrs.

*Assessment:*Two 1 hr written tests [one-third of final mark]. One 2 hr examination at the end of semester [two-thirds of final mark].

MATH251 – Numerical Equation Solving
(PMA2NE2) (18L-11T-2P-0S-32H-14R-0F-3A-8C-13W)
*Prerequisites:*MATH110 and MATH120, each with minimum final marks of 50%.
*Aim:*To give students: A solid foundation in the theory and techniques of numerical methods for solving systems of both linear and nonlinear equations; Skills in solving mathematical problems numerically.*Content:* Computer arithmetic, roots of nonlinear equations, systems of linear equations, systems of nonlinear equations.

*Practicals:*2 hrs.

*Assessment:*One 1.5 hr tests written during the semester [33% of final mark]. One 1.5 hr examination written at the end of the semester [67% of final mark].

MATH253 – Numerical Calculus
(PMA2NC2) (18L-11T-2P-0S-32H-14R-0F-3A-8C-13W)
*Prerequisites:*MATH110 and MATH120, each with minimum final marks of 50%.

*Aim:*To give students: A solid foundation in the theory and techniques of numerical methods in calculus; Skills in solving. mathematical problems numerically.

Content: Curve fitting, numerical differentiation and integration, numerical methods for ordinary differential equations.

Practicals: None.

Assessment: One 1.5 hr tests written during the semester [33% of final mark]. One 1.5 hrexamination written at the end of the.
semester [67% of final mark].

MATH255 – Operations Research Modeling
(PMA2RM1) (20L-12T-12P-0S-28H-6R-0F-2A-8C-13W)
Pre-requisites: Any 8C in Mathematics at NQF level 5b.

Aim: To teach students: To formulate real problems as mathematical models; To interpret the solution in terms of the real world; To formulate and test policies for managing dynamic systems; To communicate results through report-writing.

Content: Modeling complex nonlinear dynamic systems, policy formulation and policy testing. Techniques will be illustrated with examples from population dynamics, ecology and business systems.

Practicals: 12 hrs.

Assessment: Students will undertake three projects for assessment purposes. The average mark for these three projects will determine the project mark. The final mark will be determined by the average of the project mark and the exam mark. The two assessment methods will have equal weighting.

MATH310 – Real Analysis
(PMA3RA1) (27L-27T-0P-0S-74H-27R-0F-5A-16C-13W)
Prerequisites: MATH211, MATH222, MATH213, MATH224, each course with a minimum final mark of 50%.

Aim: To introduce and develop in a mathematically rigorous manner, the Riemann integral, sequences and series of functions, and metric spaces.

Content: Upper and Lower Riemann integrals, Riemann integrability, properties of the Riemann integral, the Fundamental Theorem of Integral Calculus, improper integrals, sequences and series of functions, uniform convergence, the interchange of limiting processes, power series, Taylor's Theorem, sets, functions and countability, metric spaces, continuity and convergence, completions, fixed point theorems and applications.

Assessment: Two 1 hr tests [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH321 – Graph Theory
(PMA3GT2) (27L-27T-0P-0S-74H-27R-0F-5A-16C-13W)
Pre-requisites: MATH110 and MATH120, each with a minimum final mark of 50%.

Aim: This module investigates basic properties of Graphs and will cover various topics in Graph theory. It is suitable for students registered in Mathematics, Applied Mathematics, Statistics or Computer Science programmes.

Content: Introductory concepts, isomorphic graphs, connectivity, the shortest path algorithm, distance in graphs, trees and their properties, Eulerian graphs, Hamiltonian graphs, Matchings.

Practicals: None.

Assessment: Two 1 hr tests [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH330 – Complex Analysis
(PMA3AC2) (27L-27T-0P-0S-73H-28R-0F-5A-16C-13W)
Prerequisites: MATH213 and MATH224, each with a minimum final mark of 50%.

Aim: This module discusses basic theories and techniques from Complex Analysis, including methods of solving classical problems relevant to Applied Sciences.

Content: Complex Plane and Riemann Sphere; Elementary Complex Functions; Complex Differentiation; Cauchy-Riemann Equations; Contour Integral and Cauchy Theorem for Analytic Functions; Cauchy Integral Formula; Harmonic Functions; Taylor's Theorem; Laurent Series; Isolated Singularities and Residues; Conformal Mappings; Linear Fractional Transformation; either Riemann Surfaces of Elementary Functions or Application to Laplace Equations.

Practicals: None.

Assessment: Two 2 hr tests [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH340 – Algebraic Structures
(PMA3AS2) (27L-27T-0P-0S-74H-27R-0F-5A-16C-13W)
Prerequisites: MATH211, MATH213, MATH224, each course with a minimum final mark of 50%.

Aim: This module investigates properties of Groups, Rings, Polynomial Rings and Fields. These structures are fundamental in understanding the foundation of Modern Algebra which has been playing significant and crucial roles in Mathematics since the beginning of the current century. The module cultivates the ability to handle abstract ideas. It is suitable for every serious undergraduate mathematics student, particularly future graduate students and secondary school teachers.

Content: Subgroups, cyclic groups, normal subgroups, quotient groups, isomorphism theorems for groups, permutation groups. Rings, polynomial rings, ideals, prime and maximal ideals. Fields, field of fractions, finite fields, extension fields. Vector spaces over arbitrary fields, linear transformations, linear functionals and dual spaces, matrices of linear transformations.

Assessment: Two 1 hr tests [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH350 – Differential Equations
(PMA3DE1) (27L-27T-0P-0S-74H-27R-0F-5A-16C-13W)
Pre-requisites: MATH213 and MATH214, each course with a minimum final mark of 50%.

Aim: To acquire knowledge of the underlying mathematical theory needed to analyse. differential equations; To acquire the skills to master the solution techniques used to solve differential equations.

Content: Linear differential equations, Laplace Transforms, Series Methods, Systems of. differential equations, Introduction to Partial Differential Equations.

Assessment: Two 1 hr tests [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH360 – Operations Research Methods

(PMA3RM1) (27L-27T-0P-0S-75H-26R-0F-5A-16C-13W)

Prerequisites: MATH213 and MATH214, each course with a minimum final mark of 50%.

Aim: To acquire knowledge of the theory underpinning the algorithms used to solve linear programming problems; to acquire the skills to master the computational algorithms required to solve linear programming problems.

Content: The simplex method and duality. Transportation and network problems. Integer problems.

Practicals: None.

Assessment: Tutorial and project work [10% of final mark]. Two 1 hr tests written during the semester [30% of final mark]. One 3 hr examination written at the end of the semester [60% of final mark].

MATH370 – Optimisation

(PMA3OP2) (27L-27T-0P-0S-74H-27R-0F-5A-16C-13W)

Pre-requisites: MATH213 and MATH214, each course passed with a minimum final mark of 50%.

Aim: To acquire knowledge of the theory underpinning the algorithms used to solve nonlinear programming problems; To acquire the skills to master the computational algorithms required to solve nonlinear programming problems.

Content: Unconstrained optimisation: one variable; several variables. Constrained optimisation: Lagrange multipliers; Kuhn-Tucker conditions; numerical algorithms.

Practicals: None.

Assessment: Two 1.5 hr tests written during the semester [33% of final mark]. One 3 hr examination written at the end of the semester [67% of final mark].

MATH710 — Set Theory & Logic

(PMA7SL1) (27L-14T-0P-0S-167H-28R-0F-5A-24C-13W)

Pre-requisites: MATH213 and MATH224 and a third year course in Mathematics, with a final mark of at least 50%.

Aim: This module provides mathematical treatment of the basic ideas and results of Sets and Logic. It places emphasis on Axiomatic Approach to Set Theory, the Semantic and Syntactic interaction in Mathematical Languages. It is suitable for students registered in Mathematics Honours programmes as well as students from Computer Sciences.

Content: Propositional Logic; First Order Logic; Zermelo-Fraenkel Set Theory with Axiom of Choice; Cardinal Arithmetic; Gödel's Completeness and Incompleteness Theorem; Compactness Theorem; Undecidability; beginning Model Theory; Nonstandard Analysis.

Practicals: None.

Assessment: Two 2 hr tests written during the semester [50% of final mark]. One 3 hr examination written at the end of the semester [50% of final mark].

MATH720 – Functional Analysis

(PMA7FA1) (27L-14T-0P-0S-166H-28R-0F-5A-24C-13W)

Pre-requisites: MATH310 with a minimum final mark of 50%.

Aim: This module provides knowledge in basic Lebesgue Measure Theory and beginning Functional Analysis. It is a natural sequence to either Real Analysis or Complex Analysis.

Content: Lebesgue Integral and Measure; Abstract Integration and Measure Spaces; Fubini's Theorem; Radon-Nikodým Derivative; Hilbert Spaces; Lp-spaces; Banach Spaces; Dual Spaces; Open Mapping Theorem; Hahn-Banach Theorem; and some selections from the following topics: Riesz Representation Theorem; Fourier Transforms; Distribution Theory;

weak and weak[1] convergence; operator theory.

Practicals: None.

Assessment: Two 2 hr tests written during the semester [50% of final mark]. One 3 hr examination written at the end of the semester [50% of final mark].

MATH730 – Computability Theory

(PMA7CT1) (27L-0T-0P-0S-103H-25R-0F-5A-16C-13W)

Pre-requisites: MATH213 and MATH224 with a final mark of at least 50%. MATH710 (Sets & Logic) is recommended.

Aim: This module gives an up-to-date introduction to the mathematical theory of Computable Functions and Computability. The primary aim of this course is to provide mathematics students some knowledge of an applied area of Mathematical Logic, although this course can be taken independent of "Sets and Logic." Students in computer science who wish to be initiated into the rigorous approach to computation will also find this a very useful course.

Content: Basic logic; Turing machines; Church's Thesis; Computability; Universal Machines; Lambda Calculus; the Halting Problem; Gödel's Incompleteness Theorem; Undefinability of Truth; Recursion Theorem; Recursively Enumerable Sets; Simple Sets; and two of the following topics: Turing Degree and Jump Operator; Arithmetical Hierarchy; Recursive Ordinals; Hilbert's Tenth Problem.

Practicals: None.

Assessment: Two 2 hr tests written during the semester [50% of final mark]. One 3 hr examination written at the end of the semester [50% of final mark].

MATH740 – Further Graph Theory

(PMA7GT2) (27L-0T-0P-0S-108H-22R-0F-3A-16C-13W)

Pre-Requisites: MATH321 with a minimum final mark of 50%.

Aim: To further develop Graph Theory.

Content: Colourings, Vertex colouring, Edge colouring. Connectivity, n-Connectivity and n-Edge Connectivity. Domination in Graphs, Frame work for domination, Domination chain, Domination in planar graphs. External Graph Theory, Turan numbers, Framing numbers, Zarankiewicz numbers, Cliques and independent sets. Graph Algorithms and Complexity Theory. Hamiltonicity, Hamiltonian connected, Pan connected, Pancyclic. Matchings, Maximum Matchings, Vertex covers. Planar Graphs and a characterization, Planarity algorithms, Graphs of higher genus. Probabilistic Methods in Graph Theory. Classical Ramsey numbers, Graph Ramsey theory, Bipartite Ramsey theory, Graph Bipartite Ramsey theory .

Practicals: None.

Assessment: Assignments [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH750 – Further Group Theory & Representation Theory

(PMA7GR2) (36L-0T-0P-0S-177H-24R-0F-3A-24C-13W)

Prerequisites: MATH340 with a minimum final mark of 50%.

Aim: To further develop the Theory of Groups and introduce and develop the Theory of Group Representations.

Content: Permutation groups, simplicity of An, groups of small order, permutation representations, p-groups, Sylow theorems, finite direct products, basis theorem, fundamental theorem of finite abelian groups, general linear group, basic concepts of representation theory, characters, Maschke's theorem, Schur's lemma, ordinary characters of finite groups, regular representation, algebraic integers, group algebras, orthogonality relations, character tables, tensor products and product of characters, restriction and induction of representations and characters, the Frobenius reciprocity law, normal subgroups and lifted characters, Clifford theorem.

Practicals: None.

Assessment: Assignments [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH760 – General Topology
(PMA7TP2) (27L-0T-0P-0S-103H-25R-0F-5A-16C-13W)

Pre-requisites: MATH310 with a minimum final mark of 50%. MATH720 (Functional Analysis) is recommended.

Aim: This module is intended as an introduction to General Topology in its own right and to lay the foundations for future study in analysis. It is most suitable for students who want to specialise in Analysis or Mathematical Logic.

Content: Basic Set Theory; Topological Spaces and their constructions; Continuous Functions; Connectedness; Compactness; Separation Axioms; Urysohn Lemma; Tychonoff Theorem; Stone-Ech Compactification; Metrizable Spaces.

Practicals: None.

Assessment: Two 2 hr tests written during the semester [50% of final mark]. One 3 hr examination written at the end of the semester [50% of final mark].

MATH770 – Rings & Modules
(PMA7RM1) (36L-0T-0P-0S-177H-24R-0F-3A-24C-13W)

Pre-requisites: MATH340 with a minimum final mark of 50%.

Aim: To introduce and develop the Theory of Rings and Modules.

Content: Ordered structures, one-sided and two-sided ideals, modules and submodules, Isomorphism Theorems, composition series and chain conditions, simple primitive and prime rings, the prime and Jacobson radicals, semisimple modules and the Wedderburn-Artin Theorem, artinian and noetherian rings, injective and projective modules, localization and rings of quotients.

Practicals: None.

Assessment: Assignments [counts 33% of final mark]. One 3 hr examination [counts 67% of final mark].

MATH790 – Project in Maths Honours
(PMA7PR2) (0L-0T-0P-0S-160H-0R-0F-0A-16C-13W)

Pre-requisites: None.

Aim: To gain ability to read and understand modern mathematical texts; to study in depth a topic in Pure Mathematics.

Content: In consultation with the Head of the Mathematics Programme and a supervisor, students choose a topic in Pure Mathematics. Their study may include reading mathematical works, using advanced mathematical methods to solve a given problem, explore new topics. The project will be carried out under the regular supervision of the supervisor.

Assessment: 100% based on work during the project. Students will present their achievements both in a brief oral presentation and in a report, preferably word-processed.

Microbiology

Offered in the School of Applied Environmental Sciences

MICR210 – Introductory Microbiology

(PMI2MI2) (36L-6T-36P-0S-48H-24R-0F-10A-16C-13W)

Prerequisite: CHEM111, 112.

Corequisite: [BCHM213, 222 and 231] or [BCHM213, MYCO211] or [BOTY201, 202, 203 and 204] or [ZOOL201, 202, 204].

Aim: To provide students in dietetics, food processing, agriculture and environmental science with key concepts and applications in the areas of bacteriology, mycology, protozoology and virology.

Content: Introduction to the morphology, physiology and classification of microorganisms. Concepts in microbial growth and nutrition. Energy production, reproduction and dissemination in microorganisms. Elementary soil, water, rumen, dairy, food and industrial microbiology. Parasitism and symbiosis; microbiological aspects of organic and inorganic pollution of soil, water and air. (See syllabuses for PMI2AM2 and PMI2FM2 for additional information)

Practicals: Laboratory exercises in the above.

Assessment: Two theory tests, one class examination, practical test.

MICR212 – Agricultural Microbiology

(PMI2MA2) (18L-6T-18P-0S-21H-12R-0F-5A-8C-13W)

Prerequisite(s): None.

Aim: To provide students of agriculture and environmental sciences with key concepts and application in the areas of bacteriology, mycology, protozoology and virology.

Content: Introduction to the morphology, physiology and classification of microorganisms. Parasitism and symbiosis; applied aspects of soil-rumen-dairy-water- and industrial-microbiology. Role of microorganisms in agriculture: rhizobia and legumes; microorganisms and the rumen; microorganisms in the cycling of the elements N,C,S and P. Microbiological aspects of composting, silage making -microorganisms, materials and conditions required; role of microbial associations in bioremediation of polluted agricultural soils; microbiological treatment of heavy metal- and pesticide-contaminated water. Selected topics in agricultural industrial microbiology.

Practicals: Laboratory exercises in selected topics from the above.

Assessment: Two theory tests and one class examination. Practicals tests and practical write-ups.

MICR214 – Introductory Food Microbiology
(PMI2FM2) (18L-6T-18P-0S-21H-12R-0F-5A-8C-13W)
Prerequisite: None.

Aim: To provide students in dietetics and food processing with key concepts and applications in the areas of bacteriology, mycology, protozoology and virology.

Content: Introduction to the morphology, physiology and classification of microorganisms. This course emphasises aspects of food, dairy and water microbiology, including food safety and preservation, use of microorganisms in the production of selected fermented food- and dairy-products, and the importance of creating and maintaining safe sources of water. Basic methods of preventing post harvest food spoilage and food poisoning are discussed. Principles of food safety including destruction of undesirable microbes. Nutritional enhancement of foodstuffs by microorganisms. Selected topics in food- orientated industrial microbiology applications.

Practicals: Laboratory exercises in selected topics from the above.

Assessment: Two class theory tests, class examination, practical quizzes and tests and practical write-ups.

MICR310 – Soil Microbiology
(PMI3SM2) (29L-7T-48P-0S-47H-24R-0F-5A-16C-13W)
Prerequisite: [BACT220 and 222] and [MYCO211 and PPTH242] each with a minimum mark of 50%.

Aim: To provide students taking the BSc, BSc Agric (Microbiology and Plant Pathology) and the BSc Environmental Science options with an applied knowledge of the role of microorganisms in agricultural and other soils, i.e. role of soil microorganisms in soil fertility, degradation of xenobiotic components, soil structure, weathering, cycling of elements.

Content: Microbiota found in soil - range and scope. Physical and chemical aspects of soil structure and its influence in microorganisms - the microhabitat concept. Environmental variables influencing microbial activity - redox potential, water potential etc. Introduction to microbial interactions - habitat and activity domains. Structure and development of microbial communities and ecosystems. Microbe-microbe interactions; plant-microbe interactions. Soil fungi and mycorrhizal associations. Introduction to biogeochemical cycling - significance of microorganisms. Microbial participation in the C, N, S and P cycles in nature. Introduction to environmental biotechnology -microorganisms and xenobiotic compounds in soils.

Assessment: Two theory class tests and one class examination. Research project write-up and presentation. Essay and class assignments. Group and individual discussion sessions.

MICR320 – Advanced Microbial Metabolism & Ecophysiology
(PMI3ME2) (29L-7T-40P-0S-55H-24R-0F-5A-16C-13W)
Prerequisite: [BACT220 and 222], each course with a minimum mark of 50%.

Corequisite: [BCHM213, 222, and 231] or [CHEM211 and 212].

Aim: To provide life sciences/microbiology students with a knowledge and understanding of microbial physiology and metabolism in natural ecosystems and industrial environments. To give students an insight into how environmental (external) factors impact on metabolic diversity and adaptability within the microbial world.

Content: Review of basic mechanisms in metabolism and energy generation/conversion in microorganisms. Nature and role of e^--donors and e^--acceptors in aerobic and anaerobic respiration and in fermentations. Consequences of redox potential in bacterial e⁻-transport systems. Energy sources for chemolithotrophs, photoautotrophs and chemoorganotrophs of biotechnological or environmental significance. Solute uptake and cellular transport systems. Metabolic regulatory systems in bacteria including enzyme-synthesis -induction and repression, feed-back inhibition. Biotechnological aspects of process control - manipulation of branch/split metabolic pathways. Environmental impacts of microbial activity : degradation of xenobiotic compounds; metabolic interactions in microbial associations.

Practicals: Laboratory experiments on e^--donors, e^--acceptors and redox potential in microbial metabolism. Laboratory-scale industrial microbiology processes i.e. amino acid, organic acid and solvent production, synthesis of antibiotics and industrial enzymes. Excursions to factories/plants employing microbiological process-technology.

Assessment: Two theory tests, tutorial performance, class examination, practical write-ups and written reports on excursions.

MICR350 – Growth & Nutrition of Micro-organisms
(PMI3NM1) (29L-7T-42P-0S-53H-24R-0F-5A-16C-13W)

Prerequisite: [BACT220 and 222] and [MYCO211 and PPTH242] each course with a minimum mark of 50%.

Aim: To provide students taking the microbiology option with an understanding of microbial growth and nutrition under batch, fed-batch and continuous culture conditions. To familiarise students with the concepts and applications of microbial growth kinetics under different culture conditions. To teach students methods used for monitoring microbial growth and to introduce them to the field of industrial microbiology including substrate pretreatment, fermentation processes, product recovery/downstream processing and waste disposal.

Content: Nutrition and cultivation of microorganisms; requirements for growth (growth factors, micronutrients, macronutrients). Methods of monitoring microbial growth, screening for, isolation and maintenance of microorganisms. Growth in batch culture (growth cycle, introduction to growth kinetics); growth in continuous culture (kinetics; chemostat, turbidostat); environmental factors influencing growth (temperature, pH, osmotic pressure). Introduction to industrial microbiology (range and scope, pretreatment, fermentation process control, product recovery)

Practicals: Use of selective, differential and enrichment media; evaluation of bacterial growth in batch culture; effect of temperature, pH on bacterial growth in batch culture. Excursions to factories/plants employing microbiological process - technology.

Assessment: Two theory class tests; one class examination; performance in tutorials; practical write-ups and reports on excursions.

MICR360 – Death & Control of Micro-organisms
(PMI3DM2) (29L-7T-36P-0S-59H-24R-0F-5A-16C-13W)

Prerequisite: [BACT220 and 222] and [MYCO211 and PPTH242] each course with a minimum mark of 50%.

Aim: To provide students of microbiology with a knowledge of the methods/procedures available to kill or control harmful/undesirable microbes and microbial populations and to assess conditions under which these treatments are applicable.

Content: Historical aspects in the field of antimicrobial agents and processes. Death and decline in microbial populations in nature. Role of constitutive and inducible enzymes in cellular defence mechanisms in microorganisms. Structural/compositional characteristics of cells in relation to resistance. Mode of action of selected physical means of killing/removing undesirable microorganisms. Mode of action and application of chemical antimicrobial agents including chemotherapeutic compounds, disinfectants and germicides. Role of plasmids in microbial resistance to drugs. Role of *rec* and S.O.S. systems in recovery of chemically- and UV-damaged bacteria.

Practicals: Laboratory exercises aimed at assessing the efficacy of various physical and chemical antimicrobial agents. Experiments designed to test the effects of environmental factors on the killing/inhibitory activity of selected antimicrobials.

Assessment: Two theory class tests and one class examination. Evaluation of the practical reports and performance in tutorials.

MICR714 – Research Project, Paper & Literature Review
(PMI7RPY) (0L-63T-0P-3S-574H-0R-0F-0A-64C-26W)
Prerequisite: Completion of the major programme in Environmental or Industrial Microbiology.

Aim: To provide students taking agriculture, life sciences or environmental science options (microbiology direction) with a sound training in environmental microbiology, microbial ecology or industrial microbiology research techniques/procedures. To introduce students to independent research or to function properly in a research team. To teach students how to retrieve, synthesise and present scientific information in an acceptable form - written and oral.

Content: Writing literature reviews (seminars); research project design and implementation; data generation and analysis. Thesis writing; research paper writing; oral presentation of research results.

Assessment: All work is conducted under supervision and will be assessed by the supervisor and an examiner external to the University. Thesis (65%); research paper (10%); one congress oral presentation (10%); and a literature review (15%).

MICR716 – Applied Environmental Microbiology
(PMI7EM2) (0L-36T-0P-0S-121H-0R-0F-3A-16C-13W)
Prerequisite: BACT220, 222 or MICR210.

Corequisite: CHEM211 and 212 or SSCI212; MYCO211 if prerequisite is BACT220, 222.

Aim: The module is designed to provide students taking agriculture, life sciences or environmental science options (microbiology direction) with a sound training in environmental microbiology and microbial ecology at a relatively advanced level. To train the students to think laterally by relating the microbiology of selected natural (clean and polluted) environments to other biotic and abiotic factors in the environment. This course also exposes students to many of the microbiological sampling and analytical techniques employed in the field of environmental microbiology.

Content: Survival, growth, activity and death of microorganisms in healthy and polluted aquatic, terrestrial and atmospheric environments. Role of microorganisms in biodeterioration and biodegradation processes (timber, fuels, lubricants, foodstuffs etc), metal corrosion; defacing of buildings, monuments and other man-made structures; microbiological mining; treatment of acidic mine wastewaters; removal of toxic heavy metals from industrial effluents and metal-polluted natural water sources.

Assessment: One written examination.

MICR718 – Environmental Microbiology
(PMI7EM1) (0L-36T-0P-0S-121H-0R-0F-3A-16C-13W)
Prerequisite: BACT220, 222 or MICR210.

Corequisite: CHEM211 and 212 or SSCI212; MYCO211 if prerequisite is BACT220, 222.

Aim: To provide students taking agriculture, life sciences or environmental science options (microbiology direction) with a sound training in environmental microbiology and waste technology at a relatively advanced level. To expose students to many of the microbiological sampling and analytical techniques used in the field of environmental microbiology and waste technology. To introduce students to independent research.

Content: Role of microorganisms in bioremediation processes: microorganism-microorganism, microorganism-environmental variable and environmental variable-environmental variable interactions underpinning selected environmental biotechnologies. Landfill microbiology, solid waste treatment, composting, land reclamation, industrial wastewater treatment, soil bioremediation, gas biofiltration.

Assessment: One written examination.

MICR720 – Fermentation Microbiology
(PMI7FM1) (30L-6T-10P-0S-23H-6R-0F-5A-8C-13W)
Prerequisite: GENE212, 226 and(i) [MICR320, 350 and 360] and (BCHM213, 222 and 231)] or (ii) [(BCHM325, 326, 328 and 380) and MYCO211 and (BACT220 and 222)].

Aim: To provide students in life sciences, agriculture and environmental sciences with the skills required of an industrial microbiologist - to train students in the art of establishing and maintaining an industrial microbiological process.

Content: Microbial strain selection and improvement - mutagenisation, hybridization and protoplasting. Screening procedures for - isolating industrially useful strains. Microbial aspects of scale-up; maintenance of sterility and foam control. Bioreactor design and use - production methods in industrial microbiology including batch, fed-batch and continuous culture processes. Immobilisation techniques as applied to whole microbial cells. Selection and preparation of feedstocks: liquid, solid and gaseous. Pretreatment of recalcitrant substrates. Product recovery and aspects of downstream processing and waste treatment.

Assessment: Two theory class tests; one class examination on theory and practical work; practical and mini-project reports. Tutorial participation and other class assignments.

Molecular & Cellular Biosciences

Offered in the School of Molecular & Cellular Biosciences

MCBS707 – Advanced Techniques Molecular & Cell Biosciences
(PMC7AT1) (6L-40T-100P-0S-159H-10R-0F-5A-32C-13W)
Prerequisites: 128C in the disciplines of genetics, biochemistry and/or molecular biology at level 6 (3rd year) *or* modules which in the opinion of the Head of Programme has (have) provided the candidate with adequate knowledge to complete the module.

Aim: To introduce the student to a laboratory research and analysis environment where advanced skills for a research career are assimilated.

Content: Molecular biology techniques relating to cloning, expression and isolation of recombinant proteins, biochemistry techniques relating protein and enzyme characterization and analysis, immunochemical techniques involved in antibody recognition and testing and microscopy.

Practicals: Advanced techniques in genetics and cloning, expression and isolation of recombinant proteins. Advanced techniques in biochemistry relating to protein and enzyme characterization as well as immunochemical techniques.

Assessment: Written presentation, oral and written examination.

MCBS709 – Seminars/Discussions Molecular & Cell Biosciences
(PMC7SM1) (0L-0T-0P-22S-56H-0R-0F-2A-8C-13W)

Pre—requisites: 128C in the disciplines of genetics, biochemistry and/or molecular biology at level 6 (3rd year) *or* modules which in the opinion of the Head of Programme has (have) provided the candidate with adequate knowledge to complete the module.

Aim: Laboratory and computer based research on an aspect of biochemistry, genetics or molecular biology leading to a synopsis and verbal presentation of important findings.

Content: Seminar on a research topic - chosen from the disciplines of biochemistry, genetics or molecular biology of which a written and oral overview are prepared by identifying, reading and interpreting relevant literature.

Assessment: Oral presentation, seminar.

MCBS711 – Advanced Topics in Molecular & Cell Biosciences
(PMC7TM1) (44L-0T-0P-0S-112H-0R-0F-4A-16C-13W)

Prerequisites: 128C in Biochemistry at level 6 (3rd year) and prerequisites pertaining to these modules or 128C in Genetics at level 6 (3rd year) and prerequisites pertaining to these modules. *Or* modules which in the opinion of the Head of Programme has (have) provided the candidate with adequate knowledge to complete the module.

Aim: To introduce the student to antigen presentation and vaccine design. The steps in antigen presentation and the biochemical techniques used for identifying the steps. Vaccine design, criteria for choosing vaccine molecules, T cell, B cell and CTL epitopes and their use. To introduce immunocytochemistry and enzyme kinetic analysis.

Content: Vaccine development - the malaria and HIV models Immunological, parasitological, molecular and metabolic considerations for host and malaria parasite. Preparation, evaluation and analysis of affinity purified antigens. BLAST and FASTA based computational diagnosis of protein and nucleic acid databases relevant to vaccine design. Molecular Modeling. Scientific Journals - dissection and analysis of articles on malaria and malaria vaccine design. Antigen processing and presentation - HIV as a model.Cellular steps to antigen presentation. Appraisal of protein subunit structure and protein structural motifs. Vaccines for the AIDS virus.

Cell biology:organelles, glycoprotein synthesis and trafficking, composition and assembly of extracellular basis and relevance to cancer. Methods in cellular Biology: Subcellular fractionation, histochemistry, immunochemistry and electron microscopy; manipulations of cell culture to study specific aspects of cell trafficking. Lysosome-endosome trafficking: marker enzymes, monitoring phagocytic and constitutive endocytosis; mechanisms of receptor and membrane recycling.

Assessment: 2 written reports, 2 theory examinations.

MCBS720 – Literature studies & research design
(PMC7LR2) (4L-20T-0P-0S-56H-0R-0F-0A-8C-13W)
Prerequisites: 128C in Biochemistry at level 6 (3rd year) and prerequisites pertaining to these modules or 128C in Genetics at level 6 (3rd year) and prerequisites pertaining to these modules. *Or* modules which in the opinion of the Head of Programme has (have) provided the candidate with adequate knowledge to complete the module.

Aim: Development of skills necessary to obtain, understand, summarise, analyse and prioritise appropriate literature for the initiation of a research project. Indicate understanding of a research project and identify means to tackle a research project.

Content: Seminar on a topic in preparation for a research project. One of several topics available. An overview of current Biochemical, Molecular Biological and Genetical literature relevant to the topic to be identified, read, interpreted and prepared in a Seminar format. Outline of the research approach to be identified and presented for evaluation.

Assessment: 1 oral presentation and 1 written report.

Mycology

Offered in the School of Applied Environmental Sciences

MYCO211 – Mushrooms, Moulds & Man
(PMY2MM1) (11L-0T-40P-9S-4H-12R-0F-4A-8C-13W)
Prerequisite: BIOS101, [BOTY102 *or* ZOOL102]; CHEM111, 112.

Aim: To introduce students to basic taxonomy, key concepts and applications in mycology.

Content: An introduction to the structure, function and diversity of the Kingdom: Fungi. Relationships of fungi with higher plants, algae and insects. Industrial and agricultural applications of fungi and their role in human health.

Practicals: Use of the microscope, beer-making, experimental techniques in the isolation, inoculation, germination and infection of various fungi; a compulsory Saturday morning field trip.

Assessment: Two short tests, one class test, weekly practical assignments, a written literature survey and a two-hour examination.

Nutrition

Offered in the School of Agricultural Sciences & Agribusiness

NUTR114 – Nutrition and Community Resources
(PNU1SN1) (36L-13T-28P-0S-60H-20R-0F-3A-16C-13W)
Prerequisite: None.

Corequisites: None.

Aim: To enable students to develop and understanding regarding the links between health and nutrition, eating habits, eating patterns which satisfy nutritional requirements, the best use of resources in promoting nutritional skills.

Content: Introduction to nutrition, factors influencing eating behavior, conceptual framework, nutrients, planning an adequate diet, procuring and using food.

Practicals: Practical exercises.

Assessment: Assignments (15%), Practicals (25%), Tests (10%), Examination (50%).

NUTR118 – Human Nutrition 1
(PNU1NH2) (25L-14T-15P-0S-70H-25R-6F-5A-16C-13W)
Prerequisite: None.

Corequisites: NUTR 114.

Aim: To give an understanding of the planning, implementation and evaluation of nutritional care plans for the individual and nutritional interventions for the community. To give an understanding of energy, macro nutrients and fibre. To give an understanding of the roles of the Dietitians and Nutritionists.

Content: Nutrition status of South Africans, Nutritional Assessment, Energy, Protein, Carbohydrates, Fibre, Fats, Role of the Dietitian and Nutritionist.

Practicals: Nutritional Assessment.

Assessment: Tests (30%), Practicals (20%), Examination (50%).

NUTR125 – Introduction to Nutrition
(PNU1NF1) (39L-0T-39P-0S-57H-20R-0F-5A-16C-13W)
Aim: To enable students to develop and understanding regarding the links between health and nutrition, eating habits, eating patterns which satisfy nutritional requirements, the best use of resources in promoting nutritional skills.

Content: Introduction to nutrition, factors influencing eating behaviour, conceptual framework, nutrients, planning an adequate diet, procuring and using food.

Practicals: Practical exercises.

Assessment: Assignments (15%), Practicals (25%), Tests (10%), Examination (50%).

NUTR131 – Nutrition in the Food Chain
(PNU1NF2) (39L-0T-39P-0S-57H-20R-0F-5A-16C-13W)
Prerequisite: NUTR125.
Corequisites: None.

Aim: To equip students with the knowledge to assess nutritional situations and to make recommendations for food chain and health related interventions to improve nutritional status.

Content: UNICEF Conceptual framework; major nutritional disorders in South Africa; Nutritional assessment and monitoring; The Food Chain from a nutritional perspective; Nutrition related diseases in South Africa.

Practicals: Laboratory Practicals, Case studies.

Assessment: Assignments (10%), Practicals (20%), Tests (20%), Examination (50%).

NUTR214 – Human Nutrition 2
(PNU2HN1) (39L-0T-72P-0S-27H-20R-0F-3A-16C-13W)
Prerequisites : None.

Corequisites: NUTR118; BCHM210; DIET252.

Aim: To teach the students the specific nutritional requirements during the entire life cycle beginning at pregnancy and finishing at old age as well as an in depth knowledge of the nature of the relationship and dependencies of both macro nutrients and micro nutrients throughout life. Students are also introduced to the concepts of research and its importance in nutrition and dietetics.

*Content:*Pregnancy, lactation, nutrition during infancy, childhood, adolescence, in aging, fat soluble vitamins, water soluble vitamins, the minerals; concepts and importance of research.

*Practicals:*Case studies.

*Assessment:*Assignments, 3-hour examination.

NUTR241 – Nutrition in Agriculture
(PNU2NA1) (36L-9T-26P-0S-62H-22R-0F-5A-16C-13W)
*Prerequisite:*NUTR131.
*Corequisites:*None.
*Aim:*To enable students to develop an understanding of the interrelationship between nutrition and agriculture and particularly how agriculture and nutrition programmes may be used to improve nutrition status.

*Content:*Gender and nutrition; nutrition problems in the world; agriculture problems in the world; agriculture and related factors which affect nutritional status; government nutrition policy in South Africa; The role of agriculture in solving nutritional problems; Policy development.

*Practicals:*Case studies and field trips.

*Assessment:*Assignments (20%), Practicals (20%), Tests (10%), Examination (50%).

NUTR250 – Normal Nutrition L2
(PNU2NN2) (34L-10T-40P-0S-62H-10R-0F-4A-16C-13W)
*Prerequisite:*For rural resource management students - 60% average for first year subjects.
*Corequisites:*None.
*Aim:*To build on introductory nutrition concepts previously introduced within the programme. The module will enable students to understand the roles of the major nutrients in the human body, the effects of deficiencies and excesses and interventions which can prevent these. Students will also become familiar with the stages of the lifecycle and the nutritional implications of the different stages in this module.

*Content:*Major nutrients (requirements, physiological roles, assessment and measurement, signs and symptoms of deficiencies and excesses); Interventions to prevent and manage deficiencies and excesses of the nutrients studied; The lifecycle (stages, physiological changes and the nutritional implications of these, nutritional requirements, nutritionally vulnerable groups); Feeding during illness; Physiological factors which impact on nutrition within a sociological context.

*Practicals:*Visual and hands-on participation in exercises and case-studies.

*Assessment:*Practicals, assignments, tests and examination, participation and presentation in class.

NUTR322 – Nutrition & Health
(PNU3NH2) (12L-0T-9P-9S-30H-14R-0F-6A-8C-13W)
*Prerequisite:*NUTR250.
*Corequisites:*None.

Aim: The aim of this module is to enable students to understand nutrition related problems in South Africa with particular reference to the promotion of health and the prevention of public health problems.

Content: A selection of problems of public health significance such as Diabetes, Obesity, Hypertension, Coronary Heart Disease, Cancer, Alcoholism, Disability, HIV Aids, TB.

Practicals: Case studies.

Assessment: Assignment (50%), Practicals (formative – no weighting), Tests (15%), Seen Examination (35%).

NUTR342 – Nutrition & Communication

(PNU3NC2) (30L-0T-41P-0S-69H-15R-0F-5A-16C-13W)

Prerequisites: DIET315; NUTR214.

Corequisites: None.

Aim: To equip students to plan, conduct and evaluate effective nutrition education programmes to groups of people.

Content: What is nutrition and nutrition education; Why educate in food and nutrition; What can nutrition education achieve; Learning and influences on the learning process; Defining needs; Setting goals and objectives; Defining the destination; Who is the communicator/ educator; Selecting the code and formats; Using teaching aids; Programme evaluation; Communication problems; Adult and continuing education.

Practicals: Visual and hands-on participation in exercises and preparation for a nutrition education episode.

Assessment: Assignments, tests and examination.

NUTR343 – Community Nutrition Level3

(PNU3CN1) (20L-18T-6P-0S-80H-16R-16F-4A-16C-13W)

Prerequisite: NUTR118, 214 or NUTR250.

Corequisites: None.

Aim: This module gives students an understanding of the nutrition security of people in South Africa, Africa and internationally, and of national and international initiatives to improve nutritional security.

Content: Epidemiological concepts, methods and applications to nutrition; Factors influencing nutritional status; Food Security, Care Security and Health Security; Development Policies and Nutrition; Policies and Programmes to improve nutrition; Principles of successful nutrition programmes; Nutrition Interventions in South Africa.

Practicals: Case Studies.

Assessment: Test (15%), 2 Assignments (35%), Examination (50%).

NUTR350 – Applied Nutrition Science

(PNU3NS1) (10L-10T-12P-0S-100H-14R-10F-4A-16C-13W)

Prerequisite: NUTR118&214.

Corequisites: None.

Aim: This module gives students an understanding of the scientific basis of nutrient requirements, the use of epidemiology to prioritise nutrition related problems, to determine their causes and to evaluate the effectiveness of specific nutrition interventions.

*Content:*Scientific basis of nutritional requirements; Nutritional assessment and nutritional surveillance; Basic epidemiological concepts and methods; Prevalence, causes , consequences and prioritisation of nutrition related problems of public health significance. Specific nutrition and other interventions. Sources of data. Community involvement in nutrition security.

*Practicals:*Case studies and field trips.

*Assessment:*3 Assignments (70%), Examination (30%).

NUTR360 – Community Nutrition Case Study

(PNU3CS1) (10L-10T-0P-0S-140H-0R-0F-0A-16C-13W)

*Prerequisite:*NUTR250.

*Aim:*To enable students to carry out a nutritional situational analysis and propose suitable interventions in the community.

*Content:*Exact content will depend on community selected.

*Practicals:*Case study.

*Assessment:*Case Study Report (100%).

NUTR370 — Application of Nutrition Education

(PNU3NE2) (15L-0T-18P-0S-40H-4R-0F-3A-8C-13W)

Corequisite:Nutrition 322 - Nutrition and Health.

Aim:To enable students to be able to develop and deliver effective nutrition education to a group of people.

Content:Nutrition education basic concepts (how people learn, relevance of nutrition education); Methods for nutrition education needs assessment; Tools and methods for nutrition education; Assessment of nutrition education.

Practicals:Visual and hands-on participation in exercises and preparation for a nutrition education episode.

Assessment:Practicals, assignments, tests and examination.

NUTR380 – Sports Nutrition

(PNU3SNW) (20L-0T-39P-0S-0H-20R-0F-2A-8C-6W)

Corequisites:BCHM210, 220.

*Aim:*To develop a broad base of knowledge of sports nutrition and be able to apply this practically to non-elite and individual athletes in various sporting disciplines to attain optimal performance and optimal health.

*Content:*Energy metabolism, assessment of nutritional status, kinanthropometry, protein, fat and carbohydrate and fluid requirements, iron deficiency anaemia in athletes, sport amennorhoea, stress fractures, calcium requirements, dietary supplements.

*Practicals:*Problem-based case studies.

Assessment:Tests, practicals, examination.

NUTR710 – Community Nutrition Internship

(PNU7CIY) (31L-0T-0P-0S-59H-10R-217F-3A-32C-26W)

Prerequisites:Bsc Diet Degree.

Corequisites:None.

Aim:To enable students to have practical experience in working with community members and/or clients and developing appropriate intervention strategies.

Content:Needs assessment, options for intervention; growth monitoring and promotion; nutrition requirements for vulnerable groups; communication and education strategies; community based prevention and management of nutrition related problems; HIV/AIDS and nutrition; students select their own area of interest for final report and book review.

Practicals:Students work in a community based setting for the duration of the module.

Assessment:Professional evaluation, final report, seminar, examination.

NUTR720 – Independent Study Nutrition
(PNU7ISY) (0L-6T-0P-3S-151H-0R-0F-0A-16C-26W)
*Prerequisite:*NUTR118, NUTR214 & NUTR343 or NUTR350.
*Corequisites:*None.
*Aim:*To enable the student to select a topic of interest in the field of nutrition and carry out an in depth investigation and analysis using literature and other resources as agreed with the supervisor.
*Content:*A topic in the field of nutrition selected by the student and agreed by the supervisor.
Practicals:As appropriate for topic choice.
*Assessment:*Asignment report (100%).

NUTR730 – Com Nutrition Case Study level 7
(PNU7IN1) (2L-8T-0P-3S-67H-0R-0F-0A-8C-13W)
*Prerequisite:*NUTR343.
*Corequisites:*None.
*Aim:*To enable students to carry out a nutritional situational analysis and propose suitable interventions in the community, with reference to the literature. The student should also propose the methods of evaluating the intervention.
*Content:*Exact content will depend on community selected.
*Practicals:*Case study.
*Assessment:*Case Study Report (100%).

NUTR740 – Research Project
(PNU7PRY) (0L-6T-0P-0S-234H-0R-0F-0A-24C-26W)
*Prerequisite:*DIET310.
*Aim:*This module enables students to plan, implement, analyse and write up a relevant research project as part of a research group.
*Content:*A research question in the area of nutrition and dietetics as agreed with the research supervisor.
*Practicals:*Project related.
*Assessment:*Research project report (95%); Group participation (peer assessment) (5%).

NUTR750 – Normal Nutrition level 7
(PNU7HNY) (0L-0T-0P-21S-266H-30R-0F-4A-32C-26W)
Prerequisites:Provided students have satisfied the requirements for the degree of BSc Dietetics at UNP and have obtained a credit weighted average of at least 60% based on the final two

years of undergraduate study. An entrance examination or additional work may be required in nutrition (students from other institutions)

Aim: To expand the comprehension of scientific methodology in the study of Normal Nutrition in order to emphasize the continuing importance of nutrition in achieving and maintaining health and fitness as a component of appropriate and effective health care. To stimulate the student to work independently in order to become academically and professionally better equipped.

Content: Topics are decided in collaboration with student Examples include Antioxidants, Cancer and diet; Vitamin A and HIV/AIDS.

Practicals: None.

Assessment: Seminars, literature reviews, presentations, discussions, 3,5 hr examination.

NUTR760 – Community Nutrition level 7
(PNU7CNY) (0L-18T-0P-0S-284H-15R-0F-3A-32C-26W)

Prerequisites: Entrance examination pass of 60% in community nutrition. Second year basic nutrition courses.

Aim: To generate further dimensions of comprehension regarding scientific methodology and contents, and its application in community nutrition. Emphasis is placed on self study and thus facilitates the continued development of independent learning and critical analysis of available literature.

Content: Dependent on the selection made by the students but could include the following: Aetiology and epidemiology of nutrition related problems in South Africa; Strategies to prevent and manage nutrition related problems at a community level; Components of successful community nutrition programmes; HIV/AIDS and nutrition; Strategies to improve food security; Growth monitoring and promotion; Public health measures to improve nutrition; Effective nutrition education; Government policies and impact on nutrition.

Assessment: Written seminars and literature reviews, Presentation and discussion of seminars and literature reviews, examination.

NUTR790 – Nutrition Honours Dissertation
(PNU7RPY) (0L-6T-0P-5S-309H-0R-0F-0A-32C-26W)

Prerequisite: DIET720.

Aim: This module enables students to select, plan, implement, analyse and write up a relevant research project to honours level.

Content: A research question in the area of nutrition proposed by the student and agreed with the research supervisor. Appropriate methods.

Practicals: Project related.

Assessment: Dissertation (100%).

Physics

Offered in the School of Chemical & Physical Sciences

PHYS010 – Foundation Physics
(PPY0FPY) (30L-9T-99P-0S-63H-31R-0F-9A-24C-26W)

Corequisites: MATH010, BIOL010, CHEM010, ACS101.

Aim:To provide students from disadvantaged educational backgrounds with scientific reasoning and foundational skills to enable them to successfully pursue a BSc degree, and in particular the Physics first-year course.

Content:Experimental investigations of mass, volume, density and Archimedes' principle. Temperature, heat transfers in water and other materials due to a change of temperature; heat transfers due to changes of phase; forms of heat transfer. Brief introduction to the structure of our solar system, galaxy and the broader universe. Current, voltage, resistance, Ohm's law, Kirchhoff's laws for DC circuits, internal resistance. Newton's gravitational law. Reflection, refraction, converging and diverging thin lenses. Newton's laws of motion; position, velocity, acceleration; graphs of each of these against time; equations of motion for constant acceleration.

Practicals:The course has a strong hands-on experimental bias with 99 hrset aside for practical work in the laboratory.

Assessment:Class mark derived from tests, quizzes, homework and laboratory reports; written theory examination; practical examination.

PHYS111 – Mechanics, Optics & Thermal Physics
(PPY1MO1) (36L-9T-36P-0S-41H-30R-0F-8A-16C-13W)

Prerequisites:None.

Corequisites:None (but students are reminded that MATH110 and MATH120 are a Prerequisite for entry into second-year Physics)

Aim:To introduce some of the basic laws of mechanics, optics and thermal physics. The course is heavily biased towards developing proficiency in applying new knowledge in problem solving. The laboratory component aims to teach the fundamental principles of report writing, the proper presentation of experimental results, and skills to make the best use of measuring apparatus.

Content:Vectors and scalars; adding and subtracting vectors; resolving vectors into components. Kinematics; motion with constant acceleration. Circular motion. Newton's laws of motion and the law of universal gravitation. Kinetic energy and the work-energy theorem; potential energy; conservation of energy. Momentum and impulse; conservation of momentum; elastic and inelastic collisions. Rotational kinematics and dynamics; conservation of angular momentum. Conditions for equilibrium. Hooke's law, elasticity and simple harmonic motion. Archimedes' principle and some basic facts of hydrostatics. The electromagnetic spectrum and the wave nature of light. The laws of reflection and refraction; application to plane and spherical mirrors; thin lenses and prisms. Interference effects; Young's double slit; Newton's rings; thin films. Diffraction effects: Single slit; diffraction grating. Temperature, heat and calorimetry. Thermal expansion of solids, liquids and gases. Conduction and radiation of heat. Elementary kinetic theory. Work and internal energy; the first law of thermodynamics.

Practicals:Experimental work includes: use of basic measuring instruments; measurements of the acceleration due to gravity; measurements of relative density; ray tracing experiments with lenses and prisms; experiments on interference and diffraction; measurement of the focal lengths of lenses: experimental test of Boyle's law and Charles' law.

Assessment:A class record based on 2 theory tests, 1 practical test and practical reports; written theory examination; practical examination.

PHYS112 – Waves, Electromagnetism & Modern Physics
(PPY1WE2) (36L-9T-38P-0S-39H-30R-0F-8A-16C-13W)
Pre-requisites:None.
*Corequisites:*PHYS111.

Aim:To provide a general introduction to modern physics, in particular electricity and magnetism, atomic and nuclear physics, astronomy and cosmology.

Content:Harmonic waves: superposition of waves, standing waves, beats. Sound waves: decibel scale, the Doppler effect. Coulomb's law. Definition of electric field and electric potential. Gauss' law of electrostatics. Resistivity; resistance; current; emf; Ohm's law. Capacitance. Kirchhoff's rules and multiloop dc circuits. Impedance and elementary ac theory. Magnetic forces and field; Ampere's law, Faraday's law of electromagnetic induction. The nuclear atom. Atomic spectra. Bohr's model of the hydrogen atom. X-rays. Properties of nuclei; nuclear binding energy and stability, nuclear fission, fusion and nuclear reactors; radioactivity; radioactive series and carbon dating. Wave-particle duality. Millikan's oil-drop experiment. Photo-electric effect. Atomic and nuclear physics instrumentation. Fundamental particles and forces. Basic astronomy and cosmology.

Practicals:The class attends one 3-hour practical per week. The student uses a variety of instruments for making electrical measurements and learns many of the associated principles. Experiments on atomic physics and radioactivity are included. Throughout there is an emphasis on the graphical presentation of experimental results.

Assessment:Class record based on 2 theory tests, 1 practical test and practical reports; written examination; practical examination.

PHYS121 – Intro Physics for Agriculture & Life Sciences
(PPY1PB1) (36L-9T-36P-0S-41H-30R-0F-8A-16C-13W)

Aim: To provide students taking Agriculture, Dietetics, or the Life Sciences with a general overview of introductory physics presented in a practical and applied way which is stimulating and useful to students. Problem-solving skills are fostered. In the practical laboratory we aim to teach measurement skills together with establishing principles of report writing and the proper presentation of experimental results.

Content:Scalars and vectors, vector addition, resolving vectors into components. Kinematics; motion in one dimension with constant acceleration, forces and Newton's laws of motion, static and kinetic friction, work and energy, conservation of mechanical energy. Moment of force and equilibrium, levers, simple machines. Archimedes' principle and some basic facts of hydrostatics. Laws of reflection and refraction; real and virtual images and objects; dispersion of light; deviation of light through triangular prisms; the rainbow; real and apparent depth; the compound microscope; the simple telescope; the eye. Interference; Young's double slit experiment; thin film interference; Newton's rings; single slit diffraction; the diffraction grating. Polarization. Principles of the measurement of temperature. Coefficients of linear and cubical expansion of solids, liquids and gases. The gas laws; simple kinetic model of gases. Heat as a form of energy; law of conservation of energy; heat measurement by calorimetry; heat and work; thermodynamics. Conduction of heat (with practical applications). Black body radiation.

Practicals:Students attend one 3-hour practical per week. Experimental work includes: use of basic measuring instruments, measurements of the acceleration due to gravity, measurements of relative density, ray tracing, experiments with lenses and prisms, experiments on interference and diffraction, measurement of the focal lengths of lenses, experimental test of Boyle's law and Charles' law.

Assessment:Class record based on two 20-minute and two 40-minute theory tests, one 120-minute practical test and practical reports; written theory examination; practical examination.

PHYS122 – Modern Physics for Agriculture & Life Science
(PPY1PB2) (18L-5T-18P-0S-20H-15R-0F-4A-8C-13W)
Corequisites:PHYS121 or 111.

Aim:To provide students taking Agriculture, Dietetics, or the Life Sciences with an introduction to Modern Physics, presented in an applied and practical manner which is stimulating and useful. Problem solving skills are fostered. The laboratory component introduces a variety of instruments and skills used in electrical measurements, and experiments in radioactivity are included.

Content:Coulomb's law; electric field and electric potential. Resistivity; resistance; current; emf; Ohm's law; dc circuits; energy dissipation in circuits. Capacitance and dielectrics. Magnetic forces and fields; transformers; alternating current waveforms and devices. Applications include: scanning electron microscope; cathode ray oscilloscope; microwave oven. Period; wavelength; frequency; amplitude and speed of a wave; transverse and longitudinal waves; speed of sound waves; the electromagnetic spectrum; reflection of waves; standing waves; beats; the Doppler effect. Elasticity; stress; strain; the elastic limit; Young's modulus; Poisson's ratio; plasticity; surface tension; surface energy; capillary action; excess pressure inside a spherical drop. The nucleus, its size and structure; symbols to describe the nucleus; the description of nuclear reaction equations; isotopes. Radioactivity; the decay constant; half lives; the equations for radioactivity; source mass and activity; the Curie; radioactive carbon dating. Definitions of the Gray and Sievert; relative biological effectiveness; biological effects of radiation; procedures and precautions in handling radioactive sources.

Practicals:Students attend, on average, one practical every two weeks for the semester. Experimental work includes: graphical treatment of experimental results; experiments on calorimetry; use of a Wheatstone bridge; use of an oscilloscope; experiments with digital and analog meters; experiments on radioactivity.

Assessment:Class record based on one 20-minute and one 40-minute theory test, one 120-minute practical test and practical reports; written theory examination; practical examination.

PHYS211 – Mechanics & Modern Physics
(PPY2MP1) (36L-12T-36P-0S-40H-30R-0F-6A-16C-13W)
*Prerequisites:*PHYS111, 112; MATH110, 120 (Concession to complete MATH110 and MATH120 concurrently with PHYS211 and PHYS212 may be granted in special cases to students who have performed well in MATH111 and MATH112.)

Corequisites: None.

Aim:To teach the basics of Newtonian mechanics, the conservation laws of classical mechanics, the harmonic approximation in classical mechanics, and rigid-body mechanics. Also, to provide an introduction to the ideas of general relativity, quantum mechanics and fundamental particles and forces in nature, presented at a level accessible to students with a minimal background in mathematics.

Content:Frames of reference; inertial frames. Absolute space-time; the Galilean transformation. Newton's laws of motion and applications. Inertial mass; gravitational mass. Conservation of energy; momentum and angular momentum for a system of particles. Energy diagram. The harmonic oscillator. Planar motion of rigid bodies. Experimental evidence for the constancy of the speed of light. Lorentz transformations. Contractions of the length of a moving object. Slowing down of moving clocks. Relativistic mass. The energy-mass equivalence. Black-body radiation and its energy spectrum. Planck's formula for the spectral density of black-body radiation. Experimental facts about the photo-electrical effect. Einstein's photoelectric equation and the photon. The Compton effect. Particle-wave dualism and de Broglie's hypothesis. The stability of the hydrogen atom. Diffraction of low-energy electrons and the Davisson-Germer experiment. Atomic nuclei and their main characteristics. The liquid drop model and phenomenological expressions for the binding energy and the mass of an atomic nucleus. Nuclear fission. Quarks and Leptons as the fundamental building blocks of matter.

Practicals:Students will attend one practical per week for the semester, dealing with experiments in modern physics.

Assessment:Class record based on practical reports and 2 tests; written theory examination.

PHYS212 – Electromagnetism, Waves & Vibrations
(PPY2EV2) (36L-12T-36P-0S-40H-30R-0F-6A-16C-13W)

*Prerequisites:*PHYS111; 112; MATH110, 120 (Concession to complete MATH110 and MATH120 concurrently with PHYS211 and PHYS212 may be granted in special cases to students who have performed well in MATH111 and MATH112.*)*

Corequisites: PHYS211.

Aim:To develop techniques for calculating electric and magnetic fields of extended charge and current distributions, become acquainted with Maxwell's equations in integral form, establish some of the basic principles of linear dc and ac circuits, provide instruction in the safe and proper use of some common electronic instrumentation: power supplies, waveform synthesizers, digital counters, dual-beam oscilloscopes, etc. To develop practical skills in connecting and analyzing elementary circuits using passive components. Also, to provide an introduction to the theory of waves and vibrations, including basic wave equations and their simplest mathematical solutions, waves in physical media, damped, driven vibrations, and coupled oscillators.

Content:Electric field of an arbitrary distribution of charge; Gauss= law; conservative nature of the electrostatic field and definition of the electric scalar potential. Capacitance. Electrostatic energy density. Definition of magnetic field; Ampere=s law; Biot-Savart law. Faraday=s law of electromagnetic induction. Maxwell=s equations in integral form. Inductance. Magnetostatic energy density. Kirchhoff=s rules and mesh analysis. Network theorems (Thevenin, delta-star and superposition). Complex impedance, voltage and current. AC theory. Transient effects in LRC circuits. The driven LRC circuit (series and parallel). Resonance. The non-dispersive wave equation. Plane waves; spherical waves; harmonic waves; stationary waves. Method of separation of variables. Normal modes, eigenfunctions, eigenfrequencies. Wave packets, dispersion, group velocity, phase velocity. Waves on strings, waves in fluids. Energy transmission by waves. Reflection of waves. The damped, driven harmonic oscillator, resonance. Analysis of coupled oscillators.

Practicals:Students will attand one practical per week for the semester dealing with topics in electricity, electronics, and instrumentstation.

Assessment:Class record based on practical reports and 3 tests; written theory examination;.

PHYS311 – Quantum Mechanics & Experimental Physics 1
(PPY3QE1) (27L-9T-36P-0S-68H-16R-0F-4A-16C-13W)
Prerequisites: PHYS211, 212.
Corequisites: None.
Aim: To introduce the concepts and formalism of quantum mechanics which lies at the core of modern physics. The new ideas are fortified by working through a series of applications which are important in the development of atomic and molecular physics and the related fields of atomic, microwave and infra-red spectroscopy. Also to acquire familiarity with physics review literature and computer information search techniques, and to develop a range of experimental physics techniques, including the setting up of complicated experimental systems, a culture of precision and accuracy, critical analysis of results, and effective professional report writing making use of word-processing, statistical, and graphical computer packages.
Content: Wave-particle duality; the double slit experiment with electrons; the de Broglie hypothesis. The wave function and its statistical interpretation; meaning of expectation values; operators and hermiticity; Born's interpretation of the wave function. Derivation of the Schrödinger wave equation for a plane wave. Formal introduction to Schrödinger's time-dependent equation. Separation of variables and Schrödinger's time-independent equation; eigenfunctions. Examples of particle in a box; particle on a ring and particle in a plane. Quantization as a consequence of boundary conditions; general nature of wave functions; orthonormality; degeneracy. Molecular application of particle-in-a-box theory. The simple harmonic oscillator; Hermite polynomials; calculation of expectation values; energy eigenvalues; infra-red spectra of diatomic molecules; calculations of molecular properties. General consideration of particles in mutual central potential; introduction of internal coordinates. The rigid rotator; the Hamiltonian in spherical polar coordinates; spherical harmonic solutions; energy eigenvalues; microwave rotational spectra of simple diatomic molecules; angular momentum operators in spherical polar coordinates; the angular momentum quantum numbers. The hydrogen atom; Hamiltonian in Cartesian and spherical polar coordinates; reappearance of spherical harmonics in angular part of the wave function; the radial part and the Laguerre polynomials; quantum numbers n, l, m of hydrogen atom; angular momentum; charge distribution in the various states; calculation of expectation values; role of the hydrogen atom in the concept of a configuration in atomic spectroscopy. Also, lectures on certain topics (phase sensitive detection, Fourier methods) plus six projects, as listed:- Literature survey; the phase sensitive detector; harmonic analysis and harmonic synthesis; The Joule-Thomson effect; the speed of sound in gases; analysis of an infrared spectrum and an ultraviolet spectrum.
Practicals: As listed above, with students attending two 3-hour practicals per week for the semester.
Assessment: In the Quantum Mechanics component: Class record based on assignments and 1 test; written examination. For practical component: 1 test, and assessment of 6 project reports.

PHYS312 – Electromagnetism & Experimental Physics 2
(PPY3PE2) (27L-9T-36P-0S-68H-16R-0F-4A-16C-13W)
Prerequisites: PHYS211, 212.
Corequisites: None.
Aim: To equip the student with an understanding of and facility with microscopic and macroscopic electromagnetic theory in the form of Maxwell's equations in vacuum and matter,

respectively; and applications thereof, including to electromagnetic waves in isotropic matter. Also, to establish a range of experimental techniques including to teach students how to link up complicated experimental systems from diagrams; establish a culture of taking precise and accurate measurements; acquire familiarity with the use of certain measuring instruments; how to critically analyze experimental results; teach effective report writing in which data is presented and discussed coherently, conclusions are drawn and the mode of presentation is professional, making due use of word-processing, statistical, and graphical computer packages.

Content:Practical Cartesian tensors; definitions of grad, div, curl, proof of gradient, Gauss', and Stokes' theorems. Revision of integral laws of electromagnetism (2nd year) and derivation of Maxwell's equations in vacuum. Multipole expansions of potential, force, torque, energy in electrostatics. Molecular multipoles and their interactions; potential and field of electric dipole. Permanent and induced dipoles, polarizability as a tensor. Microscopic and macroscopic fields; polarization, magnetization. Vector potential of a static current distribution. Magnetic dipole of a current distribution, its potential and field. Magnetic dipole of plane current loop and charge distribution. Permanent and induced dipoles in molecules. Magnetic materials; dia- and para-magnetics. Maxwell's macroscopic equations in terms of free and bound sources: D and H fields. Electromagnetic waves in a source-free lih medium. Energy dissipation in an electromagnetic field. Poynting's theorem in vacuum and matter; intensity. Polarization of a plane wave. Also, introductory lectures on certain topics (electron spin resonance, ferromagnetism, properties of gases, magnetic susceptibility, interferometry) plus six projects as listed:- Electron spin resonance. The BH cycle. Dielectric constant, polarizability and dipole moment of gases. Measurement of magnetic susceptibility. Measurement of refractive index of gases. Interferometric measurement of spectral splitting.

Practicals:As listed above, with students attending two 3-hour practicals per week for the semester.

Assessment:For the electromagnetism component:- Class record based on assignments and 1 test; written theory examination. For practical component:- 1 test, and assessment of 6 project reports.

PHYS321 – Stat Physics Thermodyn & Properties of Matter
(PPY3ST1) (36L-12T-0P-0S-74H-32R-0F-6A-16C-13W)
*Prerequisites:*PHYS211, 212.

Aim:To introduce the basic concepts of thermodynamics and statistical physics. The focus will be on classical (i.e. non-quantum, non-relativistic) systems. Also, to show how the macroscopic properties of bulk matter can be described (using simple MATH and models) by the physics of the microscopic properties of molecules, and in particular the thermal energy and interatomic or intermolecular forces.

Content:Macroscopic physics versus microscopic physics; first law of thermodynamics; reversible work done and reversible heat transferred; second law of thermodynamics; equilibrium of an isolated system (microcanonical ensemble); equilibrium of a system in a heat bath (canonical ensemble); application to the ideal classical gas, paramagnetic solid; Schottky defect and system of independent harmonic oscillators. Atoms, ions, molecules and the states of matter; molecular and atomic interactions, interactomic potential energy, binding energy, latent heat, surface energy, surface tension, elastic moduli. Properties of liquids, solids and gases; the non-ideal behaviour of a real gas.

Assessment:Class record based on 2 tests, essay/project work, tutorial assignments and computer project work; written theory examination.

PHYS322 – Solid State Phys, Atomic Spectros & Symmetry
(PPY3PA2) (36L-12T-0P-0S-74H-32R-0F-6A-16C-13W)
Prerequisites: PHYS211, 212.

Aim: To introduce the basic concepts of solid state systems, especially the properties of solids, and the experimental and theoretical techniques used to study such properties. Also, to understand how the central field approximation and perturbation methods applied to many-electron atoms give rise to configurations, terms and levels; hence to draw energy-level diagrams and predict spectra. To understand the Zeeman effect. To teach the theory and procedures for the formal description of symmetry, leading to the understanding of assigning a body to its symmetry group, and assessment of the consequences of symmetry on the forms of physical property tensors.

Content: A survey of solid state physics, basic properties, theory and experimental techniques; real crystal lattices and structures of solids; elastic scattering of waves; bonding in solids; electron states; thermodynamics of phonons and electrons. A review of the hydrogen atom and its spectrum, spin- orbit coupling, the spectra of the alkali metal atoms, the central field approximation, the electronic configurations, Pauli's exclusion principle, perturbation theory, terms and levels, Hund's rules, energy-level diagrams of many-electron atoms, selection rules, allowed and forbidden transitions, the normal and anomalous Zeeman effects. Symmetry elements and operations, symmetry operations as elements of a symmetry group, formal procedures for assigning a given body to a symmetry group. Definition of Cartesian physical property tensors, tensor transformation laws for polar and axial tensors. The effect of a symmetry operation on the property tensor of a body, development of an inspection method for assessing the effects of symmetry on the property tensor, prediction of physical effects.

Practicals: None.

Assessment: Class record derived from 2 tests, assignments, tutorials and mini-project; written theory examination.

PHYS711 – Quantum Mechanics & Electrodynamics
(PPY7QE1) (60L-21T-0P-0S-133H-100R-0F-6A-32C-13W)
Prerequisites: PHYS311, 321, 312, 322.

Corequisites: None.

Aim: To consolidate quantum-mechanical ideas and procedures encountered at 3rd-year level, and to introduce the powerful Hilbert-space formalism in terms of Dirac's abstract bra and ket vectors, the elegance of which is demonstrated by solving a range of problems. Also, to consolidate the student's undergraduate introduction to electromagnetism through the advanced use and application of Maxwell's equations.

Content: Brief introduction to Lagrangian and Hamiltonian mechanics and Poisson brackets. Abstract vector space and operators on it; Dirac's non-negativity of the norm; adjoint, self-adjoint, Hermitian and unitary operators. Postulates of quantum mechanics. Significance of commuting observables. Proof of Heisenberg's Uncertainty Principle. Representations and pictures. Dirac's ä-function. Infinitesimal displacement operators for position and momentum, and their generators. The Coordinate representation and Schrödinger's wave mechanics. Time-evolution operator, Hamiltonian as the generator of an infinitesimal time displacement, Schrödinger's equation of motion, conservation laws. Hellmann-Feynman, virial, and hypervirial theorems. Theory of shift operators and application to harmonic oscillator, angular momentum, hydrogen atom. Perturbation theory: non-degenerate to 2nd order, degenerate, time-dependent;

applications to simple systems. Parity operator and its use in matrix elements and the secular equation. Review of Maxwell's equations in vacuum and matter. Boundary conditions for the electromagnetic field at interfaces between different media. Poisson and Laplace equations; uniqueness of the solution with Dirichlet and Neumann boundary conditions. Vector and scalar potentials; gauge transformations, Lorentz and Coulomb gauges. Plane electromagnetic waves. Fresnel equations. Dispersion of electromagnetic waves in plasma. Guided electromagnetic waves. Applications of the Lorentz transformation in electrodynamics. Electromagnetic radiation.

Practicals:None within this module, but project work may stem from it.

Assessment:Two written theory examinations.

PHYS712 – Stat Physics, Superfluidity & Solid State

(PPH7SS2) (60L-24T-0P-0S-140H-90R-0F-6A-32C-13W)

*Prerequisites:*PHYS711, 721, 731 (two modules each with a mark of at least 50%, the other module with a mark of at least 40%).

Corequisites:None.

Aim:The statistical theory of systems in thermal and diffusive contact with surroundings; an introduction to the theory of fluctuations; an introduction to quantum statistics and their classical limit; the basic properties and theories of superfluids and their applications; the basic notions of the quantum theory of solids; application of quantum statistics to solids; aspects of collective excitations such as plasmons, phonons, etc; an introduction to semiconductor devices.

Content:The grand canonical ensemble, the Gibbs distribution and the grand partition function. Theory of fluctuations. Thermodynamic limit, equivalence of ensembles. Distinguishable and indistinguishalbe particles. Quantum statistics; the ideal fermion and boson gases; the photon gas. Classical statistics and applications. Experimental properties of superfluids. Phenomenological theories and microscopic theories of superfluids. The phonon dispersion relations in solids. The free electron model of solids. The periodic potential and Bloch's Theorem. General properties of solids. Choice of topics from: semiconductors and semiconductor devices, metals, insulators, magnetism in solids, transport in solids, defects in solids, etc.

Practicals:None within this module, but it may form the basis for a project within the project modules.

Assessment:Two written theory examinations.

PHYS721 – Special Topics I

(PPY7ST1) (30L-12T-0P-0S-70H-45R-0F-3A-16C-13W)

*Prerequisites:*PHYS311, 321, 312, 322.

Aim:This first-semester module (Special Topics I), and its counterpart in the second semester (Special Topics II) serve to introduce the Honours student to a number of specialist topics in Physics with a limited range of choice to suit the career directions and interests of students. A total of at least six topics will be on offer, and arrangements will be made with the class to determine which topics are presented in each semester. Further topics will be on offer from time to time as the basis of expertise changes, and the students are also given the option of going outside the Physics discipline to a cognate area of study to select material with equivalent credits. This will require the approval of the Programme Director. A total of 16C is elected per semester, and each topic carries 8C.

Content:Advanced Symbolic Programming: The fundamentals of Macsyma (the front end, creating expressions, numbers, variables, defined constants, equations functions); algebra (expanding, simplifying, factoring, substitution); Solving equations (single and multiple), Vectors; Tensors; Matrices; Calculus; Ordinary differential equations; Graph plotting in two and three dimensions; C and Fortran translation. Group Theory: Definition of a group representation; use of Cartesian coordinate transformations for symmetry operations of a system to generate simple group representations. Introduction of the concept of transforming a function; use of complete sets of functions to generate group representations. Reducible and Irreducible representations. Transformation of the Hamiltonian under symmetry operations, and hence the behaviour of quantum-mechanical wave functions under symmetry operations; the accidental degeneracy theorem and the perturbation splitting theorem. The grand orthogonality theorem and the reduction of a reducible representation by the projection procedure. The unit representation and its presence to determine whether transitions take place between given quantum states; selection rules. Atomic displacements in distortion of a molecular group; normal modes of vibration; application of selection rules and identification of fundamental lines in the infra-red spectrum of a molecule. Molecular Spectroscopy: Vibrational energies of a diatomic molecule; rotational energies of linear molecules; the Stark effect; rotational spectra of symmetric top molecules; rotation-vibration spectra; electronic spectra of diatomic molecules. Polarization Optics: Various descriptors of polarized light. Operational and analytical definitions of the Stokes vector. Description and use of the Poincare sphere for determining the effects of an element on a given beam. The Mueller calculus, derivation of the Mueller matrices. Application of the Mueller calculus in experimental design. The Jones calculus. Introduction to molecular optics; natural optical activity, the Kerr and Faraday effects; depolarization ratio in light scattering. Molecular theories of these effects relating measurements to different molecular tensor properties. Relativity: The relativity principle. Constancy of the speed of light. The relativity of simultaneity. The Lorentz transformation. Length contraction and time dilation. Doppler effect. Light cones and world lines. The Lorentz transformation as an orthogonal transformation in four dimensions. Four-tensor calculus. Covariance of physical laws. Covariance of Maxwell's equations; applications. Relativistic kinematics. Covariant form of classical mechanics; Applications.

Practicals:None within this module, but topics may form the basis for projects with the Project modules.

Assessment:In the topic dealing with Advanced Symbolic Programming, tutorial and mini-project work is submitted for 100% of the assessment; in the remainder of the topics assessment will be by a written examination for each topic.

PHYS722 – Special Topics II

(PPY7ST2) (30L-12T-0P-0S-70H-45R-0F-3A-16C-13W)

*Prerequisites:*PHYS711, 721, 731 (two modules each with a mark of at least 50%, the other module with a mark of at least 40%).

Aim:Special Topics II (and its counterpart Special Topics I in the first semester) serve to introduce the Honours student to a number of specialist topics in Physics with a limited range of choice to suit the career directions and interests of students. A total of at least six topics will be on offer, and arrangements will be made with the class to determine which topics are presented in each semester. Further topics will be on offer from time to time as the basis of expertise changes, and the students are also given the option of going outside the Physics discipline to a cognate area of study to select material with equivalent credits. This will require the approval of the Programme Director. 16C elected per semester, and each topic carries 8C.

Content:See PHYS722, Special Topics I for a list of present options.

Practicals:Topics may form the basis for projects with the Project modules.

Assessment:In the topic dealing with Advanced Symbolic Programming, tutorial and mini-project work is submitted for 100% of the assessment; in the remainder of the topics assessment will be by a written examination for each topic.

PHYS731 – Project I
(PPY7PP1) (0L-0T-70P-20S-70H-0R-0F-0A-16C-13W)
*Prerequisites:*PHYS311, 321, 312, 322.

Aim:To provide an introduction to research methods in experimental, theoretical, and computational Physics. Projects will also be used to promote writing and verbal skills through the preparation of written reports and presentation of a seminar.

Content:Variable, but in the general fields of experimental, theoretical, and computational physics. Topics or problems will be on offer from lecturers, who will supervise the projects, giving guidance and assistance as within a normal research programme.

Practicals:Each project will contain a large experimental and/or computational component.

Assessment:This will be based on the written project report and a verbal presentation.

PHYS732 – Project II
(PPY7PP2) (0L-0T-70P-20S-70H-0R-0F-0A-16C-13W)
*Prerequisites:*PHYS711, 721, 731 (two modules each with a mark of at least 50%, the other module with a mark of at least 40%).

Corequisites:None.

Aim:To provide an introduction to research methods in experimental, theoretical, and computational Physics. Projects will also be used to promote writing and verbal skills through the preparation of written reports and presentation of a seminar.

Content:Variable, but in the general fields of experimental, theoretical, and computational physics. Topics or problems will be on offer from lecturers, who will supervise the projects, giving guidance and assistance as within a normal research programme.

Practicals:Each project will contain a large experimental and/or computational component.

Assessment:This will be based on the written project report and a verbal presentation.

Plant Molecular Biology

Offered in the School of Botany & Zoology

PMBP301 – Recombinant DNA Technology
(PPM3RD1) (13L-0T-18P-0S-33H-10R-0F-6A-8C-13W)
*Corequisites:*GENE327.

*Aim:*Introduces the candidates to gene cloning and its importance in research and biotechnology ; outlines methods employed in gene transfer and gene analysis.

*Content:*Principles of gene cloning; plasmid vector selection; transformation techniques; gene location and structure.

*Practicals:*6 Practicals.

*Assessment:*Theory test; Practical test; Practical reports; Theory exam (2 hr).

PMBP302 – Plant Biotechnology: Tissue Culture
(PPM3PB2) (14L-3T-18P-0S-29H-10R-0F-6A-8C-13W)
Prerequisites: BIOS101; BOTY102 each with a minimum mark of 50%.
Corequisites: BOTY301.

Aim: To provide the learner with an introduction to basic experimental methods of each of the major areas of investigation involving the isolation and culture of plant cells, tissues and organs.

Content: Overview of biotechnology: introduction to plant biotechnology, principles, techniques and morality. Propagation: Principles of micropropagation, somaclonal variation and commercial application. Callus and organ culture: Aspects of callus induction organogenesis and morphgenesis. Culture of determinate and indeterminate organs. Embryogenesis: Aspects of embryo induction and the production of synthetic seeds. Survey: The range of organisms in culture from algae to higher plants.

Practicals: 6 Practicals- techniques of plant tissue culture.

Assessment: Essay; Practical and theory test; Practical write ups; Theory exam (2 hr).

PMBP304 – Plant Biotechnology: growth manipulation
(PPM3GM2) (14L-3T-18P-0S-29H-10R-0F-6A-8C-13W)
Corequisites: BOTY301.

Aim: To provide the students with an opportunity to manipulate plant growth and function by the application of various biotechnology techniques.

Content: Study methods whereby the plant resources can be manipulated using environmental strategies and plant growth regulators. Emphasis is placed on the relevance of biotechnology in modern society.

Practicals: 6 Practicals - Hands-on experience will be obtained both in the laboratory and field situation on plant growth modification *in situ* and *in vitro*.

Assessment: Theory and practical test; Practical reports; Oral presentation; Theory exam (2 hr).

PMBP306 – Plant Molecular Technology: Basis
(PPM3MT2) (13L-0T-18P-0S-33H-10R-0F-6A-8C-13W)
Corequisites: PMBP301.

Aim: To discuss the organisation of nuclear DNA, genome variation and mechanisms involved in the regulation of gene expression.

Practicals: 6 Practicals - the course includes laboratory work which must be completed by all students.

Assessment: Theory & practical tests; Essay; Practical reports; Theory exam (2 hr).

PMBP308 – Plant Molecular Technology: Applications
(PPM3AP2) (13L-3T-18P-0S-30H-10R-0F-6A-8C-13W)
Corequisites: PMBP301.

Aim: To demonstrate the relevance of Biotechnology techniques in the manipulation of plant genetic material.

Content: Introduction of novel and foreign genes into plants using direct methods of gene transfer, Agrobacterium mediated transformation, suspension culture, germplasm storage and differential gene expression.

Practicals: The course includes laboratory work which must be completed by all students.

Assessment: Theory test; Essay; Practical Test; Practical reports; Theory exam (2 hr).

PMBP701 – Plant Hormones
(PPM7PHM) (13L-5T-0P-0S-49H-10R-0F-3A-8C-13W)
Prerequisites: BOTY 301 (with a minimum mark of 50%).

Aim: To provide students with detailed information on hormonal occurrence, biosynthesis, transport, metabolism and mode of action and/or involvement in physiological processes.

Content: Hormone structure, biosynthetic pathways, use of hormones as inhibitors of growth, hormonal inactivation, understanding of the molecular control exerted by plant hormones.

Practicals: None.

Assessment: Theory test; Essay; Oral presentation; Theory exam (2 hr).

PMBP702 – Gene Expression & Regulation
(PPM7GRM) (13L-0T-0P-0S-54H-10R-0F-3A-8C-13W)
Prerequisites: BOTY301, PMBP304, PMBP306, PMBP308.

Aim: To develop an understanding of contemporary trends in research investigation gene regulation in plants.

Content: The course covers aspects of gene regulation, plant stress responses, current finding about signal transduction pathways and issues of biosafety and risk assessment of genetically modified organisms.

Practicals: None.

Assessment: Theory test; Essay; Oral presentation; Theory exam (2 hr).

PMBP790 – Plant Molecular/Physiology Research Project
(PPM7RPY) (0L-20T-0P-30S-590H-0R-0F-0A-64C-26W)
Prerequisite: Acceptance into Honours in Plant Molecular/Physiology.

Aim: To provide learners with the opportunity, under supervision, to gain first-hand experience in the formulation, planning, execution, analysis, and reporting on, their Honours research project(s)

Content: Students will be provided with a list of supervisors and possible research topics at the beginning of their Honours year. The final choice and number (1 or 2) of research projects will be decided by discussion and negotiation between the student and supervisor.

Practicals: No formal practicals. Students will be expected to execute a research plan and, where necessary, demonstrate competence in the use of sophisticated research equipment to collect data for their project.

Assessment: 2 Oral presentations (project proposal and research findings); Research report.

Plant Pathology

Offered in the School of Applied Environmental Sciences

PPTH222 – Plant Diseases in Agriculture
(PPP2PD2) (11L-0T-23P-16S-14H-12R-0F-4A-8C-13W)
Prerequisite: BIOS101, [BOTY102 *or* ZOOL102].

Aim: Introduction to fungi, bacteria, viruses and nematodes causing diseases in plants.

Content: Biotic, abiotic and agricultural practices affecting the spread and multiplication of pathogens; basic taxonomy of fungi, fungal epidemiology, disease symptoms on plants and methods of control.

Practicals: Identification of plant parasitic and pathogenic fungi, bacteria, viruses and nematodes.

Assessment: Short tests, one class test, a disease collection, practical assignments, one two-hour examination.

PPTH242 – Plants & their Diseases
(PPP2PL2) (11L-0T-36P-3S-14H-12R-0F-4A-8C-13W)
Prerequisite: MYCO211.

Aim: A basic understanding of fungi, bacteria, viruses and nematodes causing plant diseases.

Content: Biotic, abiotic factors and agricultural practices causing plant disease; fungal epidemiology, disease symptoms on plants and methods of control.

Practicals: Practical skills in identification of disease symptoms on plants. Isolation techniques for identifying fungal plant pathogens.

Assessment: One short test, one class test, presentation of literature survey from MYCO210, disease collection, one two-hour examination.

PPTH310 – Introductory Plant Virology
(PPP3PV1) (18L-0T-18P-0S-28H-15R-0F-1A-8C-13W)
Prerequisite: PPTH211 and PPTH242, or PPTH222.

Aim: An introduction to virus diseases of plants, especially their epidemiology and control, and to plant pathogenenic plants (phanerogams)

Practicals: An introduction to plant viruses diseases in the laboratory and the field.

Assessment: Short tests, one class test, practical assignments, one two-hour examination.

PPTH320 – Plant Disease Management
(PPP3DM2) (19L-0T-21P-0S-26H-13R-0F-1A-8C-13W)
Prerequisite: PPTH211 and PPTH242, or PPTH222.

Aim: An introduction to disease management including preventative management practices, sanitation and the safe use of appropriate agrochemicals for plant disease control.

Practicals: An applied project involved in the control of a selected disease using either biocontrol agents or agrochemicals in an efficacy trial.

Assessment: Short tests, one class test, practical project, one two-hour examination.

PPTH330 – Plant Disease Epidemiology & Bacteriology
(PPP3PD1) (38L-0T-39P-0S-0H-2R-0F-2A-8C-13W)
Prerequisite: PPTH211 and PPTH242, or PPTH222.

Aim: An introduction to quantitative plant disease epidemiology, host-parasite interactions, the genetics of plant disease resistance and plant bacteriology.

Practicals: An applied project involved in the isolation and testing of a biocontrol agent.

Assessment: Short tests, two class tests, bacteriology assignment, practical project and assignments, literature review presentation, one three-hour examination.

PPTH710 – Fungi in Phytopathology: Advanced Topics
(PPP7FP1) (54L-0T-0P-28S-50H-24R-0F-4A-16C-13W)
Aim: To provide students with a broad understanding of the role of fungi in phytopathology.

Content: An extensive reading course in advanced topics in plant pathology.

Practicals: Read a broad range of papers in an allocated topic and summarise important points succinctly; present findings of these papers to fellow students in the form of interesting seminars highlighting, debating and clarifying difficult and controversial topics. Use information retrieval skills to find additional papers on the subject.

Assessment: Two theory examinations.

PPTH720 – Advanced Virology
(PPP7AV2) (0L-0T-38P-0S-101H-20R-0F-1A-16C-13W)
Aim: To provide students with a broad understanding of the role of viruses in phytopathology.
Content: An extensive reading course in advanced topics in plant virology.
Practicals: Read a broad range of papers in an allocated topic and summarise important points succinctly; present findings of these papers to fellow students in the form of interesting seminars highlighting, debating and clarifying difficult and controversial topics. Use information retrieval skills to find additional papers on the subject.
Assessment: Assignments, essays, two examinations.

PPTH730 – Advanced Plant Disease Epidemiology
(PPP7PD1) (0L-38T-0P-0S-0H-41R-0F-1A-8C-13W)
Aim: Advanced topics in plant disease epidemiology.

Practicals: An applied project involved in the isolation and testing of a biocontrol agent.

Assessment: Short tests, short essays, one class test, one three-hour examination.

PPTH740 – Plant Pathology in the Field
(PPP7PF2) (0L-6T-66P-0S-0H-8R-0F-0A-8C-13W)
Aim: Advanced topics in plant disease epidemiology.
Practicals: An applied project involved in the isolation and testing of a biocontrol agent.
Assessment: Short tests, short essays, one class test, one three-hour examination.

PPTH790 – Plant Pathology Research Project
(PPP7PRY) (0L-39T-0P-0S-281H-0R-0F-0A-32C-26W)
Aim: A research project on a plant pathological topic, to give the student experiential learning of the application of the scientific process in plant pathology.
Practicals: The project will require detailed design, implementation and analyses of a series of experiments for an overall project.
Assessment: An overall project report, a research paper taken from the overall report and a conference presentation of results.

PPTH795 – Plant Pathology Literature Review
(PPP7PL1) (0L-1T-0P-0S-79H-0R-0F-0A-8C-13W)
Aim: A detailed literature review on a plant pathology topic, using all accessible forms of technical information.

Practicals: Use of library resources, interlibrary loans, abstracting services, computer databases, the internet, etc. to access information on the chosen subject. Collation and synthesis of the information into a coherent review using correct technical writing. Formal presentation of the review in a seminar.
Assessment: Literature review, seminar presentation.

Poultry Science

Offered in the School of Agricultural Sciences & Agribusiness

POLT210 – Introduction to Poultry Production
(PPO2IP1) (38L-0T-39P-0S-39H-40R-0F-4A-16C-13W)
Pre- or Corequisites: None.

Aim: To enable students to develop the ability to provide useful advice and to solve problems that may be encountered in any aspect of poultry production.

Content: Anatomical differences between birds and mammals. Physiology of the reproductive systems of male and female fowl. Environmental control of ovulation in hens. Management of a pullet replacement programme. Management of broiler production from hatching to processing. Broiler breeder management, including fertility and hatchability. Economic factors influencing management decisions in broiler and egg production. Bird welfare.

Practicals: Anatomy of a chicken, visit different poultry production systems.

Assessment: Development of spreadsheets for integrating biological and economic data. Oral and written presentation of reports. Participation in debate on animal welfare issues. Formal tests. Formal examination.

Protected-area Management

Offered in the School of Applied Environmental Sciences

PAMT880 – Protected-Area Management Internship
(PPA8IN2) (0L-0T-0P-0S-0H-0R-640F-0A-64C-17W)
Prerequisites: Successful completion of all prescribed modules (with a minimum weighted mean mark of 50%) and the capstone examination (minimum mark of 50%) for the course-work component of the programme in Protected-Area Management.

Aim: To provide relevant experience in an organization, whether public or private, which deals with appropriate environmental and development issues for those learners who do not want to pursue a research dissertation.

Content: Location within host organization for a period, usually August through October, performing duties as required by the organizational supervisor.

Practicals: None.

Assessment: Two written reports and at least two formal verbal reports by the intern on progress made during the period of the internship; written reports by the organizational and internal.

PAMT890 – Protected-Area Management Mini-Dissertation
(PPA8RS2) (0L-0T-0P-0S-640H-0R-0F-0A-64C-0W)
Prerequisites: Successful completion of all prescribed modules (with a minimum weighted mean mark of 50%) and the capstone examination (minimum mark of 60%) for the course-work component of the programme in Protected-Area Management.

Aim: To undertake supervised research on a interdisciplinary theme of the student's choice.

Content: Decided upon by the student in consultation with his/her supervisor(s) and the related research panel.

Practicals: None.

Assessment: Internal and external examination of the mini-dissertation.

Rural Resource Management

Offered in the School of Agricultural Sciences & Agribusiness

RRMG111 – Organisation & Project Management
(PRR1OM1) (39L-52T-0P-0S-54H-12R-0F-3A-16C-13W)

Pre- or Corequisites: None.

Aim: To provide an introduction to basic economic theory and it's application to agriculture.

Content: Basic concepts in economics; Theory of demand and supply; Price analysis; Marketing efficiency; Agricultural Cooperatives; Government intervention in agricultural markets.

Practicals: None.

Assessment: 2 Tests; 1 Exam.

RRMG121 – Introduction to Rural Sociology
(PRR1RS2) (37L-10T-0P-0S-93H-15R-0F-5A-16C-13W)

Pre- or Corequisites: None.

Aim: To enable students to understand social, economic & political dynamics in South Africa's rural areas and ways in which these issues can be researched.

Content: An historical overview of rural development interventions in S.A.; Social institutions in rural areas; Race, class & gender - power relations in rural society & development; Introduction to rural research.

Practicals: Students are required to use specified research methods to gather data and complete a mini research project.

Assessment: 1 poster construction & oral presentation; 1 written test; 1 written essay assignment; 1 group research project; 1 individual journal showing reflection on learning processes.

RRMG212 – Extension Methods
(PRR2ME1) (30L-0T-10P-0S-100H-15R-0F-5A-16C-13W)

Prerequisites: RRMG111 & RRMG121.

Aim: To introduce different models of extension and to equip learners with basic skills in participatory extension work.

Content Introduction to rural development and extension; Perspectives, values and attitudes in rural development; Theory of adult learning and experiential learning; Introduction to systems thinking; Participatory approaches to extension; PRA, PTD, Farmer to Farmer; Policies impacting on extension and rural development.

Practicals: None.

Assessment: Journal; Individual presentation; 1 Test; 1 written examination.

RRMG222 – Extension Practice
(PRR2EP2) (30L-0T-26P-0S-85H-15R-0F-4A-16C-13W)
Prequisites: RRMG212.

Aim: The module offers the RRM students the opportunity to apply the competencies learned in RRM 212 in a "real" extension tasks in resource poor rural communities.

Content: Group dynamics; Farmer Experimentation; Facilitation and presentation skills; Active listening and team contracts; Basic farming systems analysis; 'Rich picturing'.

Practicals: Field trips & community placements.

Assessment: Journal; Group report and presentation; Individual report; Written examination.

RRMG311 – Rural Organisations & their Management
(PRR3OM1) (19L-12T-0P-0S-109H-15R-0F-5A-16C-13W)
Prerequisites: RRMG111 & RRMG121.

Aim: To explore the potential that local rural organisations have to contribute to development in South Africa and to build the knowledge and skills of students in facilitating collective organisation.

Content: Contextualising local organisation in rural development; the anticipated role of local organisations in rural development in South Africa; power in rural development as a local and international level; theories of group action; research skills.

Practicals: Students are required to undertake a (specified) campus based research project.

Assessment: 1 Test; 1 Group project; 1 Group oral presentation; 1 Written assignment.

RRMG312 – Organisation & Project Management
(PRR3MP1) (21L-0T-15P-0S-116H-6R-0F-2A-16C-13W)
Prerequisites: RRMG222.

Aim: To enable students to (a) get a basic understanding of the Soft Systems Methodology and (b) design a project to improve a problematic situation.

Content: Mental models; Organisational learning; Soft systems thinking; Participatory project planning.

Practicals: Students work on campus in planning a situation-improving project.

Assessment: 1 Test; 1Project report.

RRMG350 – Community Development Systems Project
(PRR3SPW) (12L-0T-0P-0S-304H-3R-0F-1A-32C-13W)
Prerequisites: RRMG312.

Aim: To enable students to design and implement a situation improving project in a rural community context.

Content: The theory for this module is given in RRMG312.

Practicals: Students are required to spend 5-6 weeks in a rural community during which time they are expected to engage with key stakeholders in the community in designing and implementing a project to improve a problematic situation in the community.

Assessment: 1 Portfolio.

RRMG700 – Systems Thinking Foundations
(PRR7ST1) (32L-0T-0P-0S-124H-0R-0F-4A-16C-13W)
Pre- or Corequisites: None.

Aim: To give students a foundation in experiential learning and systems methodologies.
Content: Formal systems characteristics; Kolb's Learning Cycle; Hard & Soft Systems Thinking; Soft Systems Methodology; Viable Systems Method; Critical Systems Thinking.
Practicals: None.

Assessment: 1 report on a project in which a systems methodology is applied to a real world problem situation.

RRMG711 – Advanced Extension Theory
(PRR7AE1) (32L-0T-0P-0S-124H-0R-0F-4A-16C-13W)
Prerequisites: RRMG700.
Aim: To give students an understanding of agricultural innovation processes and rural knowledge systems.

Content: Social learning theory; farmers individual experimenting using Participatory Technology Development (PTD); farmer to farmer learning through Farmer Field Schools (FFS); stakeholder and inter-institutional learning using Rapid Appraisal of Agricultural Knowledge Systems (RAAKS); facilitating joint learning and action through Participatory Learning & Action methodologies (incl. Participatory Rural Appraisal and RAAKS)
Practicals: None.
Assessment: Short topic papers; assignments; essay.

RRMG712 – Project Design & Management
(PRR7PD2) (32L-0T-0P-0S-124H-0R-0F-4A-16C-13W)
Prerequisites: RRMG700.
Aim: To give students advanced project design & management skills.
Content: Development & development projects: Project cycle: blueprint vs. process approach; Project boundaries & environments: taxonomy of environments & insights from CST; Project Appraisal; Implementation planning: work breakdown structure; Gantt Charts; Critical Path Analysis; PERT; Recent trends in the development paradigm.
Practicals: None.
Assessment: 1 Test; 1 written report on the process and outcome of a project designing activity.

RRMG720 – Internship: Extension & Rural Systems
(PRR7ERW) (12L-0T-0P-0S-624H-0R-0F-4A-64C-6W)
Pre- or Corequisites: prerequisite RRMG711 & RRMG712.
Aim: To enable learners to plan, implement and reflect on a development/extension project with a client community.
Content: The theory for this module is provided by RRMG711 & RRMG712.
Practicals: An internship with an organisation/institution.
Assessment: A written portfolio and oral presentation reflecting on the internship experience

Science Education

Offered in the School of Molecular & Cellular Biosciences

SCED701 – Learning difficulties in Science & Maths
(PSE7DS1) (0L-12T-0P-0S-44H-0R-0F-24A-8C-13W)
Prerequisites: At least a Bachelors degree in science, mathematics or agriculture, *or* an approved 4-year teaching diploma in science/mathematics, *or* any qualification approved by senate. In addition, candidates should have demonstrated a sufficiently high standard of proficiency in their undergraduate programme.

Aim: To give students insight into current theories on how people learn science and mathematics, and some typical learning difficulties encountered by teachers and lecturers.

Content: Current theories of learning of Piaget, Ausubel, Vygotsky and constructivism; and their application to the learning and teaching of science and mathematics. Selected examples of student conceptual and reasoning difficulties identified in the discipline areas of mathematics, computer science, physics, chemistry, as well as the biological-, earth- and life sciences including, biochemistry, genetics and microbiology;.

Assessment: 1 essay, 1 literature review.

SCED703 – Remediation of learning in Science & Maths
(PSE7RS1) (0L-12T-0P-0S-44H-0R-0F-24A-8C-13W)
Prerequisites: At least a Bachelors degree in science, mathematics or agriculture, *or* an approved 4-year teaching diploma in science/mathematics, *or* any qualification approved by senate. In addition, candidates should have demonstrated a sufficiently high standard of proficiency in their undergraduate programme.

Aim: To give students insight into possible sources of learning difficulties and strategies for identifying and remediating them.

Content: Methods and analytical tools for probing for students' understanding of science and mathematics and for identifying students' learning difficulties: coding, concept mapping, interviews, free-response questions, two-tier multiple choice questions, methodological frameworks. Possible sources of student learning difficulties. Approaches for remediating student difficulties and improving curriculum and teaching in science and mathematics: reorganising the curriculum, developing teaching approaches such as problem-solving, conceptual change and metacognitive strategies, and uses of analogies and multiple representations of concepts.

Assessment: 2 written assignments.

Soil Science

Offered in the School of Applied Environmental Sciences

SSCI212 – Introduction to Soil Science
(PSS2IS1) (18L-4T-18P-0S-25H-12R-0F-3A-8C-13W)
Prerequisite: CHEM111.

Aim: To provide a basic introduction to the physicochemical properties and processes of soils.

Content: Particulate nature of soil and major soil components; texture, structure and porosity; retention and movement of water in soil; plant available water; quantitative expression of bulk density, water content and porosity. Types of clay minerals; origin of electrostatic charge; cation exchange capacity and ion exchange reactions; the diffuse double layer at colloid surfaces; flocculation/dispersion behaviour of colloids. Interaction between dissolved solids and soil particles in the context of environmental pollution and crop fertilization.

Practicals: The measurement of important soil chemical and physical properties. Field determination of texture, colour and water infiltration. Laboratory analysis of particle size, organic carbon, exchangeable cations, extractable phosphorus, acidity and hydraulic conductivity. Assessment of soil variability.

Assessment: One two-hour examination, two theory tests, practical laboratory reports and tutorial write-ups.

SSCI215 – Introduction to Soil Management

(PSS2SM2) (36L-2T-37P-0S-50H-30R-0F-5A-16C-13W)

Note: This course is only available to students registered for the Diploma in Rural Resource Management.

Aim: To gain a basic understanding of how to manage soils.

Content: Land use planning; capability of agricultural land; soil conservation systems; soil tillage and compaction; soil physical properties important for plant growth; soil water management; nutrient requirements of plants and crop fertilization; management of acid soils; use of animal manures as fertilizer; particular soil management practices in low-input agriculture.

Practicals: Field examination and description of soil; basic soil mapping; assessment of land capability; evaluation of management requirements of soil; soil testing for fertilizer requirements; visiting runoff plots for studying soil and water loss from land.

Assessment: One three-hour examination, two theory tests and practical write-ups.

SSCI217 – Introduction to Soils & the Environment

(PSS2ES1) (37L-6T-33P-0S-54H-25R-0F-5A-16C-13W)

Aim: To gain an understanding of soil processes and their role within the environment.

Content: Soils in the natural ecosystem. Soil quality; weathering; soil formation; fundamental soil properties; soil classification; soil survey; land evaluation. Soil as a reservoir of nutrients: Reactions of nutrients with soil mineral and organic surfaces; chemical retention of nutrients; soil dispersion. Relevance of these reactions to application of fertilizers, land treatment of wastes and pollution of soils. Soil organisms and soil fertility: soil micro- organisms; soil fauna; soil biota and man; nitrogen cycle; nutrient budgets in farming systems; fertilizer sources. Behaviour of water in soil: water retention in soil; water availability to plants; water movement through soil; infiltration; evaporation from soil surfaces. Soil compaction, aggregate stability and crusting.

Practicals: Field determination of texture, colour and water infiltration. Field identification of soils and land evaluation. Laboratory analysis of particle size, pH, cation exchange properties, phosphorus, organic matter and hydraulic conductivity. Experiments to demonstrate heavy metal sorption on soils, the importance of soil organisms and nutrient cycling. Assessment of soil variability.

Assessment: One three-hour examination, two theory tests, practical laboratory and field reports and tutorial write-ups.

SSCI230 – Pedology
(PSS2PP2) (36L-0T-61P-0S-40H-19R-0F-5A-16C-13W)
Prerequisite: SSCI217 or 212.

Aim: To provide a fundamental understanding of the field study of soils including their formation, survey and classification and appropriate use.

Content: The soil as a natural body and its morphology and genesis. Controlling factors of the spatial distribution of soils. An introduction to palaeopedology and the recognition of fossil soils and relict features within current surface soils. The classification of South African soils and their place in the FAO and USDA soil classification systems. Soil survey and mapping methods and objectives. Introduction to remote sensing of soils and use of aerial photography for soil mapping. Land evaluation using the land capability and land suitability systems; modifications of these systems used locally and bioresource units/groups developed for KwaZulu-Natal.

Practicals: The field description and classification of soils and production of a soil survey and land evaluation report. Attendance at two full day field trips held on weekends and at a five-day field mapping project are compulsory and students are required to contribute towards the costs.

Assessment: One three-hour examination, two theory tests, practical reports and a soil survey/land evaluation report.

SSCI320 – Soil Fertility & Plant Nutrition
(PSS3SF2) (36L-5T-40P-0S-51H-24R-0F-5A-16C-13W)
Prerequisite: SSCI217 or 212.

Aim: To provide a scientific and practical understanding of the management of agricultural and horticultural soils for sustainable crop production.

Content: Sustainable soil management practices to maintain soil organic matter status, soil physical conditions and soil nutrient status. Soil testing and plant analysis as aids to making fertilizer recommendations and diagnosing nutrient deficiencies/imbalances. Fundamentals of fertilizer practice, the nature of commonly-used fertilizer products and economics of their use. Chemistry/biochemistry of nitrogen, phosphorus, potassium, magnesium, calcium, sulphur and micronutrients in soils in relation to their uptake and use by crops. Nature of soil acidity, tolerance of crops to acidity, use of lime and gypsum as ameliorants. Nature of soil salinity/sodicity, tolerance of crops to such conditions and methods of amelioration.

Practicals: Soil fertility evaluation involving a glasshouse experiment and soil and plant analysis.

Assessment: One three-hour examination, two theory tests and a written practical project report.

SSCI351 – Soil Water Use & Management
(PSS3SW1) (17L-4T-18P-0S-26H-12R-0F-4A-8C-13W)
Prerequisite: MATH110, 120 or 111, 122; SSCI217 or 212.

Aim: To provide a fundamental understanding of soil-water relationships.

Content: Soil water content and energy; water retention characteristics; measurement of soil water; water flow under saturated and unsaturated conditions. Soil physical properties in relation to hydrological processes; infiltration; internal drainage and redistribution; evaporation from bare and vegetated surfaces; soil water management in irrigated agriculture.

Practicals: A laboratory project involving measurement of soil water status and water flow through soils.

Assessment: One two-hour examination, one theory test and a written laboratory project report.

SSCI352 – Soil Structure & its Management
(PSS3SM1) (18L-3T-18P-0S-26H-12R-0F-4A-8C-13W)
Prerequisite: SSCI217 or 212.

Aim: To gain an understanding of the structural make-up of soils and its implications.

Content: Factors influencing soil strength and consistence and the formation and stabilization of micro- and macrostructure. Effects of dissolved salts on hydraulic properties, crusting and hard setting. Quality of irrigation water and liquid wastes and their effects on soil structure. Sodic soils and their reclamation. Sources and consequences of soil compaction and corrective measures.

Practicals: A laboratory project on selected local soils involving measurement of various soil structural characteristics.

Assessment: One two-hour examination, one theory test and a written laboratory project report.

SSCI371 – Contaminants of the Soil Environment
(PSS3SC1) (18L-4T-18P-0S-25H-12R-0F-4A-8C-13W)
Prerequisite: CHEM111, 112, SSCI217 or 212.

Aim: To provide an understanding of the causes and consequences of contamination of soils.

Content: Source and nature of the major contaminants added to soils (e.g. industrial, municipal and agricultural wastes, pesticides, petroleum hydrocarbons and other organic materials). Reactions of inorganic (e.g. heavy metals) and organic (e.g. pesticides) contaminants with soils and soil components; factors affecting their mobility and/or degradation in soils; their effect on soil processes; management and amelioration of contaminated soils.

Practicals: A laboratory project on soil contamination and its effect on soil processes.

Assessment: One two-hour examination, one theory test and a written laboratory project report.

SSCI372 – Soil Processes; Ground, Water & Atmospheric Pollution
(PSS3SP2) (18L-4T-18P-0S-25H-12R-0F-4A-8C-13W)
Prerequisite: SSCI217 or 212.

Aim: To provide an understanding of soil processes that lead to pollution of waterways and the atmosphere.

Content: Leaching losses of nitrate and other solutes from soils; principles and Modeling of solute movement: factors affecting leaching and effects on groundwater pollution. Processes involved in gaseous emissions of nitrous oxide, ammonia and methane from soils including denitrification, ammonia volatilization and methanogenisis. Extent and consequences and such losses.

Practicals: A laboratory project on soil processes leading to environmental pollution.

Assessment: One two-hour examination, one theory test and a written laboratory project report.

SSCI710 – Chemical Processes in the Soil Environment
(PSS7CP1) (18L-4T-18P-0S-25H-12R-0F-4A-8C-13W)
Prerequisite: CHEM111, 112; SSCI217 or 212.

Aim: To provide an understanding of basic chemical processes which occur in the soils.

Content: Soil solution chemistry; colloidal chemistry; electrical double layer theory; adsorption phenomena; mineral solubility; ion exchange; redox equilibria; organic interactions with soil surfaces. Applications of soil chemical processes in agriculture and environmental protection.

Practicals: Laboratory measurements of chemical properties and processes in soils.

Assessment: One two-hour examination, one theory test and a written laboratory project report.

SSCI760 – Biological Processes in the Soil Environment
(PSS7BP2) (18L-4T-18P-0S-25H-12R-0F-3A-8C-13W)

Prerequisite: SSCI217 or 212.

Aim: To provide an understanding of biota and the biological processes that occur in soils.

Content: Nature of microorganisms and fauna that inhabit soils. Role of the soil microbial biomass and soil enzymes in nutrient availability and as indicators of soil quality. Role of earthworm and termite communities in nutrient turnover and soil structural condition. Manipulation of the soil microbial community to ameliorate contaminated soils.

Practicals: A laboratory project on soil biological processes.

Assessment: One two-hour examination, one theory test and a written laboratory project report.

SSCI770 – Sustainable Soil Fertility Management
(PSS7FM2) (18L-4T-18P-0S-25H-12R-0F-3A-8C-13W)

Prerequisite: SSCI217 or 212.

Aim: To provide an understanding of selected contemporary issues in soil fertility management.

Content: Nature and management of acid soils; chemistry of soil Al, speciation of Al in soil solution, Al toxicity in plants, lime as an ameliorant; P/lime interactions. Nature of subsoil acidity, role of gypsum. Role of soil organic matter in sustainable agriculture, effects of tillage practice and crop rotations on soil fertility. Concept and role of soil quality indices.

Practicals: A field/laboratory project on soil fertility evaluation.

Assessment: One two-hour examination, one theory test and a written laboratory project report.

SSCI780 – Pedological Processes in the Environment
(PSS7PP2) (18L-4T-23P-0S-22H-10R-0F-4A-8C-13W)

Prerequisite: SSCI217 or 212.

Aim: To provide a detailed understanding of selected contemporary pedological topics.

Content: Weathering and humification processes and environmental factors; movement of material in soils and across landscapes; time as a factor of soil formation; soils and archaeology; alternative theories of soil formation; micromorphological and electron optical studies of soil materials; pedological Modeling; X-ray diffraction as a pedological tool.

Practicals: Computer simulation techniques for pedology; introduction to electron microscopy and X-ray diffraction for clay mineral identification; field trip.

Assessment: One two-hour examination, one theory test and written reports on practical work.

SSCI790 – Research Project
(PSS7RPY) (0L-0T-430P-0S-210H-0R-0F-0A-64C-26W)

Prerequisite: Admission to BSc (Hons) majoring in Soil Science or to level 4 of BSc (Agric) majoring in Soil Science.

Aim: To provide experience in conducting of a research project and preparation of a scientific paper.

Content: Conduct an approved research project, prepare a scientific paper on the results, present the results orally.

Assessment: Written scientific paper and its oral presentation.

SSCI792 – Soil Science Seminar
(PSS7SS1) (0L-0T-0P-160S-0H-0R-0F-0A-16C-13W)
Prerequisite: SSCI217 or 212.

Aim: To provide experience in researching and synthesizing scientific literature on a specific topic.

Content: Search for information in the scientific literature on an approved topic, prepare a scientific review paper, present the paper orally.

Assessment: Written review paper, oral presentation.

Sports Turf Management

Offered in the School of Agricultural Sciences & Agribusiness

PTMA241 – Introduction to Sports Turfs
(PSM2LT1) (18L-0T-18P-0S-30H-10R-0F-4A-8C-13W)
Prerequisite: None.

Aim: To provide students with a basic understanding of sports turfs and their growth and management requirements.

Content: Common turf grass identification, morphology and response to mowing, fertilization and irrigation. Fertilizers and fertilization. Field levelling.

Practicals: Visits, exercises, demonstrations and assignments to reinforce and supplement the lectures.

Assessment: Two class tests, practical exercises, one examination.

STMA242 – Sports Field Management
(PSM2FM2) (3L-0T-6P-0S-7H-3R-58F-3A-8C-13W)
Prerequisites: STMA241 with a minimum mark of 50%.

Aim: To provide students with experience of basic field management operations.

Practical content: Field placements at various sporting venues to learn techniques of mowing scarifying levelling irrigating setting and marking sports fields.
Assessment: Field assessment, assignment, one examination.

STMA340 – Sports Venue Work Experience
(PSM3SWW) (4L-0T-7P-0S-20H-5R-120F-4A-16C-8W)
Prerequisites: STMA241 and STMA242 with a minimum mark of 50% in each.

Aim: To provide students with experience of more advanced field management operations for a variety of sports codes.

Practical content: Field placements at various sporting venues to learn how to prepare a field for play and to learn about whole-venue management.

Assessment: Field assessment, assignment, one examination.

STMA342 – Sports Turf Management
(PSM3TM1) (37L-0T-39P-0S-70H-10R-0F-4A-16C-13W)
Prerequisites: STMA241 with a minimum mark of 50%.

Aim: To provide students with an understanding of specialized practices of sports turf management, and the basics of sports field design and construction.

Content: Specialized management practices for summer and winter sports fields including thatch accumulation, layering, compaction, liquid and foliar fertilization. Design criteria and construction methods for different sports.

Practicals: Visits, exercises, demonstrations and assignments to reinforce and supplement the lectures.

Assessment: Two class tests, practical exercises, assignments, one examination.

STMA344 – Sports Turf Project and Seminar
(PSM3SP2) (4L-3T-0P-10S-60H-0R-0F-3A-8C-13W)
Prerequisites: STMA241 with a minimum mark of 50%.

Corequisite: STMA342.

Aim: To provide students with the opportunity to research and conduct a field experiment.

Content: One Seminar and a research project.

Assessment: Presentation of seminar and project.

Statistics

Offered in the School of Mathematics, Statistics & Information Technology

STAT101 – Basic Statistics
(PST1BSB) (18L-10T-8P-0S-24H-15R-0F-5A-8C-13W)
Prerequisite: None.

Aim: To introduce the student to the basic concepts of Statistics and how these may be applied in problem-solving.

Content: Organizing data. Introduction to probability. Probability distributions. Estimation, confidence limits and hypothesis testing. Regression and correlation. Chi-square tests.

Practicals: None.

Assessment: 2 tests, practical assignments and 1 examination.

STAT110 – Introduction to Statistics
(PST1IS1) (38L-18T-18P-0S-60H-20R-0F-6A-16C-13W)
Aim: To introduce the student to basic statistical theory and methods, and in particular to equip the student with the knowledge to apply these ideas to statistical problem solving.

Content: Collecting and appraising data. Organizing and summarizing data. Probability and probability distributions. Sampling distributions. Estimation, confidence intervals and hypothesis testing. Analysis of categorical data.

Assessment: 2 tests, practical assignments and 1 examination.

STAT112 – Quantitative Methods 120
(PST1MQ2) (36L-18T-0P-0S-72H-27R-0F-7A-16C-13W)
Prerequisite: None.
Aim: To introduce the student to statistical techniques required for the analysis of quantitative data.

Content: Organizing data. Introduction to probability. Probability distributions. Estimation, confidence limits and hypothesis testing. Regression and correlation. Chi-square tests. Analysis of variance. Time series. Quality control. Introduction to queuing.

Practicals: None.

Assessment: 3 tests and 1 examination.

STAT120 – Statistical Methods
(PST1SM2) (38L-18T-18P-0S-60H-20R-0F-6A-16C-13W)
Prerequisite: STAT110.

Aim: To expand the student's knowledge of basic statistical theory and methods, to introduce the student to a wide range of statistical techniques and to reinforce the student's ability to solve statistical problems.

Content: Simple linear regression. Multiple regression. Analysis of variance. Time series. Quality control. Decision theory.

Practicals: None.

Assessment: 2 tests, practical assignments and 1 examination.

STAT210 – Probability Theory
(PST2TP1) (38L-36T-0P-0S-58H-20R-0F-8A-16C-13W)
Prerequisites: MATH110, MATH120 with a minimum mark of 50%.

Corequisite: MATH213.

Aim: To introduce the student to the elements of probability theory.

Content: The axioms of probability. Random variables, probability density functions and distribution functions. Expectation and moment generating functions. Special distributions. Two or more random variables. Transformation of variables.

Assessment: 2 tests, assignments and 1 examination.

STAT213 – Sample Survey Methods
(PST2SS1) (18L-0T-20P-0S-27H-10R-0F-5A-8C-13W)
Prerequisite: BMET210; STAT101, 110, 112 with a minimum mark of 50%.

Aim: To equip the student with the tools to design and effectively analyze the results of a sample drawn from a finite population.

Content: Scope of sample surveys. Simple random sampling. Ratio and regression estimation. Stratified random sampling. Cluster sampling. Principles of questionnaire design. Estimation of population size.

Assessment: 1 test, 1 assignment and 1 examination.

STAT220 – Statistical Inference
(PST2IS2) (38L-36T-0P-0S-58H-20R-0F-8A-16C-13W)
Prerequisites: MATH110, 120 with a minimum mark of 50%; STAT210.

Corequisite MATH224.

*Aim:*To introduce the student to the elements of statistical inference.

*Content:*Point and interval estimation. Properties of estimators. Principles of Bayesian estimation. Hypothesis testing.

*Practicals:*None.

*Assessment:*2 tests, assignments and 1 examination.

STAT311 – Probability Theory
(PST3TP1) (38L-18T-0P-0S-76H-20R-0F-8A-16C-13W)

*Prerequisites:*MATH213, 224; STAT210 with a minimum mark of 50%.

*Aim:*To expose the student to a range of applications of probability theory and to provide the student with the necessary techniques for recognizing and solving problems in probability.

*Content:*Combinatorial analysis. Union of events. Conditional probability. Random walks. Generating functions. Markov chains. Exponential distribution and Poisson process.

*Practicals:*None.

*Assessment:*2 tests, 1 assignment and 1 examination.

STAT322 – Stochastic Processes
(PST3SP2) (38L-18T-0P-0S-76H-20R-0F-8A-16C-13W)

*Prerequisites:*MATH213, 224; STAT210, 311with a minimum mark of 50%.

*Aim:*To expose the student to a range of application of stochastic processes and to provide the student with the necessary techniques for recognizing and solving problems in this area.

*Content:*Birth-and-death models. Renewal theory. Queuing theory. Monte Carlo methods. Introduction to reliability theory.

*Practicals:*None.

*Assessment:*2 tests, 1assignment and 1examination.

STAT325 – Statistical Modeling for Finance
(PST3SM2) (38L-18T-0P-0S-76H-20R-0F-8A-16C-13W)

*Prerequisites:*MATH213, 224; STAT210, 220 with a minimum mark of 50%.

*Aim:*To expose the student to a range of statistical models which are used in finance and elsewhere.

*Content:*Time series Modeling. Forecasting. Loss distributions. Risk models. Decision making under uncertainty.

*Practicals:*None.

*Assessment:*2 tests, 1assignment and 1 examination.

STAT710 – Time Series & Forecasting
(PST7TS1) (36L-0T-18P-0S-80H-20R-0F-6A-16C-13W)

*Prerequisites:*A first degree with MATH213, 224; STAT210, 220, 311, 325.

*Aim:*To provide the student with a thorough understanding of time series methodology and forecasting and to expose the student to a range of practical problems in those areas.

*Content:*Descriptive techniques for time series. Probability models for time series. Estimation in the time domain. Principles of forecasting. A miscellany of topics in time series analysis which may include, *inter alia*, stationary processes in the frequency domain, spectral analysis, bivariate processes and state-space Modeling.

Practicals: None.

Assessment: 1 test, assignments and 1 examination.

STAT720 – Generalized Linear Models
(PST7GL1) (36L-0T-18P-0S-80H-20R-0F-6A-16C-13W)
Prerequisites: A first degree with BMET210; MATH213, 224; STAT210, 220

Aim: To provide the student with a thorough understanding of generalized linear models and to expose the student to a range of practical problems in that area.

Content: The principles of model fitting. Exponential family of distributions and generalized linear models. Estimation and inference for generalized linear models. Binary responses and logistic regression. Contingency tables and log-linear models. A miscellany of additional topics in generalized linear models.

Practicals: None.

Assessment: 1 test, assignments and 1 examination.

STAT730 – Mixed Models & Spatial Statistics
(PST7MM2) (36L-0T-18P-0S-80H-20R-0F-6A-16C-13W)
Prerequisites: A first degree with BMET314,316; MATH213; STAT210.

Aim: To provide the student with a basic theory of linear mixed models and the particular extension to spatial forms of covariance.

Content: Stationary and non-stationary mixed models. Kriging equations for prediction. Co-kriging and validation. Practical examples using various computer packages.

Practicals: None.

Assessment: 1 test, assignments and 1examination.

STAT740 – Experimental Design
(PST7ED1) (36L-0T-18P-0S-80H-20R-0F-6A-16C-13W)
Prerequisites: A first degree with BMET314; MATH213; STAT210.

Aim: To provide the student with a basic theory of experimental design, particularly in incomplete blocks and in the design and analysis of complex experiments.

Content: Partial confounding in factorials. Fractional replication. Incomplete block designs and the recovery of inter-block information. Incomplete blocks from a mixed model perspective. Practical analysis of complex designs using GENSTAT.

Assessment: 1 test, assignments and 1 examination.

STAT750 – Sampling
(PST7SS1) (18L-0T-9P-0S-40H-8R-0F-5A-8C-13W)
Prerequisites: A first degree with MATH213; STAT210.

Aim: To equip the student with the theoretical understanding and practical tools to design and effectively analyze the results of a sample drawn from a finite population.

Content: Scope of sample surveys. Simple random sampling. Ratio and regression estimation. Stratified random sampling. Cluster sampling. Principles of questionnaire design. Estimation of population size.

Assessment: 1 test, assignments and 1 examination.

STAT760 – Financial Statistics
(PST7FS1) (36L-0T-18P-0S-80H-20R-0F-6A-16C-13W)
Prerequisites: A first degree with MATH213, 224; STAT210, 220.

Aim: To provide the student with an understanding of the basic concepts pertaining to financial statistics and to expose the student to a range of practical problems in that area.

Content: Overview of loss distributions. The theory and practice of risk Modeling. Ruin theory.

Practicals: None.

Assessment: 1 test, assignments and 1 examination.

STAT770 – Medical Statistics
(PST7MS2) (36L-0T-18P-0S-80H-20R-0F-6A-16C-13W)
Prerequisites: A first degree with BMET314; MATH213; STAT210.

Aim: To provide the student with a thorough understanding of medical statistics and to expose the student to a range of practical problems in that area.

Content: Introduction to epidemiology including the standardization of mortality rates, morbidity studies and clustering of diseases. Clinical trials. Cohort studies. Survival analysis.

Practicals: None.

Assessment: 1 test, assignments and 1 examination.

STAT780 – Advanced Experimental Design
(PST7AD2) (36L-0T-18P-0S-80H-20R-0F-6A-16C-13W)
Prerequisites: A first degree with MATH213, 224; STAT210, 220; STAT740.

Aim: To provide the student with extended theory of experimental design in complex situations.

Content: Experimental design for repeated measures including cross-overs. Optimal design. Alpha lattices and designs for spatial models.

Practicals: None.

Assessment: 1 test, assignments and 1 examination.

STAT790 – Project in Statistics
(PST7SPY) (0L-0T-0P-20S-220H-0R-0F-0A-24C-26W)
Prerequisites: A first degree with BMET314; MATH213; STAT210.

Aim: To provide the student with the opportunity to apply the understanding and skills acquired in the Statistics or Biometry programme to a real-world problem.

Content: Formulation of a real-life problem in which Statistics is applicable. Analysis of the problem statistically and interpretation of the results. The drawing of meaningful conclusions from the results.

Assessment: A report presented in written form and delivered orally.

Virology

Offered in the School of Applied Environmental Sciences

VIRO320 – Introduction to Viruses
(PVR3IV1) (36L-0T-36P-0S-57H-30R-0F-2A-16C-13W)
Prerequisite: PPTH211.

Aim: An introduction to diseases of microbes, plants and animals caused by viruses, mycoplasmas, viroids and prions, covering taxonomy, transmission, epidemiology, identification and characterization, and control.

Practicals: An introduction to the techniques used to detect and characterize plant and animal viruses.

Assessment: Short tests, one class test, practical assignments, one three-hour examination.

Wildlife Science

Offered in the School of Applied Environmental Sciences

WILD220 – Conservation Areas: planning & management
(PWD2PMW) (9L-0T-54P-0S-0H-13R-0F-4A-8C-13W)
Prerequisite: None.

Aim: This single module is designed to equip students taking any programme in the agricultural, environmental, geographical and life sciences with a basic understanding of the factors which need to be taken into consideration in acquiring and planning the development of a conservation area or game farm. On completion of this module students should be able to:

(a) identify and evaluate relevant criteria which provide an objective basis for assessing whether or not an area is suitable for acquisition as a conservation area or game farm;

(b) compile a management plan for such areas;

(c) implement the management prescriptions contained in such a plan;

(d) update such plans as and when needs arise;

(e) recognise where basic research may be required to improve management;

(f) undertake basic monitoring and analyse and interpret such data.

Content: The role of formal and informal conservation areas in conserving the faunal and floral diversity of southern Africa, potential socio-economic conflicts arising from establishing such areas, the relevanceof such areas in the formal and informal economy of southern Africa. Criteria to be considered in assessing the importance and potential viability of an area: physical location, environmental characteristics, existing resources and constraints, existing fauna, determining suitable new introductions, diseases, size, acquisition costs, potential to support mixed use (game and domestic stock), ecological capacity. Planning: purposes of a management plan, plan structure, identifying key elements of the plan, roles of the planner and the manager, structure and qualifications of the management team, identifying and scheduling management objectives, management tools (fire, fencing, chemicals, biological controls, support staff, road and path networks etc), planning principles (sighting of buildings, powerlines, staff and guest accommodation, water points, roads and tracks, fire breaks, delineation of management compartments etc.) Implementation of plans: delegation of responsibilities, coordination and integration of activities, monitoring the effects of management activities, assessment and implementation of monitoring information.

WILD301 – Conservation Areas Field Project
(PWD3GPW) (1L-0T-66P-0S-13H-0R-0F-0A-8C-13W)
Prerequisite: ECOL201; GRAS226, 228.

Aim: This single module is designed to provide students taking any programme in the agricultural, environmental, geographical and life sciences with a basic understanding of how a group of trained environmental scientists can work together to gather information and data that can be used to solve problems associated with the conservation and management of wild animals.
On completion of this module students should be able to:

(a) comprehend the value of team work in gathering information and data;
(b) identify with land owners and other knowledgeable persons problems which require investigation, prioritise these and formulate a program to address these;
(c) plan and execute information gathering and data collection;
(d) analyse and interpret data collected and integrate this with existing relevant knowledge in a report which is useful to the landowner/manager.

Content: This course will involve firstly the identification of a real problem on a game farm, game reserve, nature reserve etc. which may be thwarting optimal use of the wild animal resource on the property. Once the nature of the problem(s) has been clearly identified students will scrutinise relevant literature to identify what data need to be collected to try and provide scientifically based answers to the problem(s). Thereafter, the class will spend one week in the field working in groups, which will be rotated, gathering data which will be analysed in the field and in the laboratory. Each student will be required to produce a report which integrates known facts and the new findings.

WILD720 – Integrated Wildlife Case Studies
(PWD7CS1) (9L-9T-0P-8S-38H-13R-0F-3A-8C-13W)
Prerequisites: AGRI220.

Corequisites: GRAS728; WILD790.

Aim: To expose learners to topical issues in the national and international debate around areas under conservation management.

Content: Learners will research topical issues and present their findings during several report-back sessions.

Assessment: written documents, oral presentations and group participation.

WILD790 – Wildlife Research Project
(PWD7RPY) (0L-13T-547P-78S-0H-0R-0F-2A-64C-26W)
Prerequisites: WILD301.

Corequisites: GRAS728

Aim: To familiarize learners with the basic principles involved in undertaking research to investigate issues pertaining to the conservation and sustainable utilization of wildlife resources.
Learning outcomes:.
On completion of this module learners will be able to:

(a) Appreciate the processes whereby problems requiring research study are identified;
(b) Undertake relevant reviews of published and unpublished literature with the aims of obtaining a broader background on the issue(s) to be researched and formulating a succinct set of questions to be addressed by the intended research study;
(c) Present these findings to a critical audience and participate in discussion in a seminar forum dealing with issues related to wildlife science;
(d) Plan undertaking a research investigation;
(e) Carry out research in practice applying tools and skills which they have acquired earlier in their studies and;
(f) analyse and interpret the data which they have gathered using tools and skills which they have acquired earlier in their studies.

In essence learners will gain first-hand exposure to "The Scientific Method".

Content: Learners will either select a research topic from a list preparedby the Coordinator of the Wildlife Science degree or propose their own relevant topic which will be vetted by an appropriately qualified supervisor. Thereafter learners will precede with their research project under the supervision of a qualified member of the academic staff.

WILD791 – Wildlife Literature Review

(PWD7SS1) (0L-0T-0P-79S-0H-0R-0F-1A-8C-13W)

Aim: To familiarize learners with the basic principles involved in undertaking a research seminar pertaining to the conservation and sustainable utilization of wildlife resources.

Learning outcomes:.
On completion of this module learners will be able to:

(a) Identify and locate literature relevant to a chosen topic and review and integrate the information contained therein into a written document in a style which is rational and succinct
(b) Present verbally a summary of the main issues discussed in the written supporting document; be able to defend their presentations and initiate and participate in discussion which may arise from their own and the presentations delivered by other learners in the class.

Content: Learners will either select a research topic from a list prepared by the Coordinator of the Wildlife Science degree in consultation with the Head of the Discipline of Agricultural Economics or propose their own relevant topic which will be approved.

Practicals: Preparation of literature review and synthesis of published material.

Assessment: 1 written document, 1 oral presentation.

Zoology

Offered in the School of Botany & Zoology

ZOOL102 – Animal Diversity & Function

(PZO1AD2) (37L-10T-36P-0S-54H-15R-0F-8A-16C-13W)

Aim: To develop the basic knowledge and understanding about the major kinds of animal body plans and the concept of evolution and natural selection. In addition, learners will have the opportunity to acquire an appropriate range of cognitive and practical skills, apply their knowledge and understanding to real-life situations and continue their development as independent, life-long learners.

Content: Evolutionary constraints and opportunities of different kinds of body plans leading to the present diversity of animal life forms, from unicellular to the vertebrates. Evolution of Earth, geological time and the influence of major extinction events on animal diversity. Darwin and Natural Selection.

Practicals: 10 practicals - 1 field excursion to the beach.

Assessment: Essay; Theory Tests; Oral presentation (group); Weekly practical assessment; Practical test; theory exam (3 hr). 1 Practical Exam (3hr).

ZOOL201 – Invertebrate Diversity & Functional Biology
(PZO2DF1) (38L-5T-46P-0S-48H-15R-0F-8A-16C-13W)
Prerequisites: ZOOL102 (with a minimum mark of 50%).

Aim: To familiarize students with a) the identity, classification, origin and evolution of invertebrates of major evolutionary, ecological and economic or medical importance and b) features of the functional biology of representative taxa.

Content: Overview of the morphology and structure of major groups including the Protista, Porifera, Cnidaria, Platyhelminthes, Nematoda, Rotifera, Annelida, Onychophora, Arthropoda and Mollusca; invertebrate phylogeny; the arthropod cuticle and implications; aspects of feeding, respiration, locomotion, excretion and water conservation in invertebrates.

Practicals: 8 - 2 day-length sampling field trips.

Assessment: Theory/ practical tests; Practical write ups / field collecting reports; Dissection; Oral presentation; Practical test; Theory exam. (3 hr).

ZOOL202 – Comparative Biology of Vertebrates
(PZO2BV2) (15L-3T-18P-0S-28H-10R-0F-6A-8C-13W)
Prerequisites: ZOOL102 (with a minimum mark of 50%).

Aim: To enable learners to acquire a comparative, phylogenetic understanding of the basic biology of vertebrate animals.

Content: Classification, origin and evolution, anatomy and physiology , behaviour and ecology of fishes, amphibians, reptiles, birds and mammals.

Practicals: 6 - use of identification keys, dissection, biological illustration, scientific writing in an integrated comparative style .

Assessment: Practical test; Theory test; Theory exam (2 hr).

ZOOL204 – Ornithology & Mammalogy
(PZO2OM2) (15L-3T-18P-0S-31H-10R-0F-3A-8C-13W)
Prerequisites: ZOOL102 (with a minimum mark of 50%).

Aim: To train students in the fundamental aspects of avian and mammalian biology.

Content: Adaptive radiation and adaptation, life histories, foraging and feeding, digestion and metabolism, demography and social organisation.

Practicals: 6 Practicals - identification, life tables, census, capture-mark-and release, mist-netting and ringing, small mammal trapping.

Assessment: Mini project report; Theory test; Theory exam (2 hr).

ZOOL301 – Energy & Water Balance of Animals
(PZO3EB1) (15L-3T-18P-0S-27H-10R-0F-7A-8C-13W)
Prerequisites: BIOS101, ZOOL102 (each with a minimum mark of 50%).

Aim: To provide an overview of the two most important homeostatic states in invertebrates and vertebrates; energy and water balance.

Content: Principles of homeostasis; oxidative phosphorylation; thermogenesis (futile cycling, shivering and non-shivering thermogenesis); energy balance equation; measuring energy consumption; factors influencing energy consumption (temperature; locomotion; photoperiod; heterothermy; production; growth); Water balance equation; physical properties of water and water vapour; sources of water gain (atmospheric; free-standing; metabolic; food); sources of water loss (evaporation; respiration; faeces; urine, uric acid, urea, allantoin, ammonia excretion).

Practicals: 6 Practicals - energy and water balance in animals.

Assessment: Theory and practical test; Theory and practical exam (4 hr).

ZOOL302 – Behavioural Ecology
(PZO3BE2) (27L-3T-39P-0S-71H-15R-0F-5A-16C-13W)
Prerequisites: BMET210.

Aim: Exposure to current concepts in the overlap between behavioural and ecological research.
Content: Historical overview of the development of behavioural ecology as a discipline; adaptation, proximate causes of behaviour, trade-offs, optimality theory, evolutionary stable strategies; foraging theory; competition for resources; sexual selection; sociality; coevolution.
Practicals: 12 Practicals - laboratory based practicals will included simulations of animal behaviour; Day field trip; Mini-project.
Assessment: Theory tests; Practical reports; Mini -project write-up; Theory exam (3 hr).

ZOOL303 – Vertebrate Nutrition & Reproduction
(PZO3VN1) (15L-3T-18P-0S-27H-10R-0F-7A-8C-13W)
Prerequisites: BIOS101, ZOOL102 (each with a minimum mark of 50%).
Aim: To provide an overview of the physiological structure and function of digestive and reproductive systems in mammals and birds. Where examples of theory are to be illustrated, ruminant examples will be given where possible.
Content: Principles of carbohydrate, fat and protein metabolism and digestion; morphology of vertebrate digestive systems; cellose digestion and rumination; allometric constraints of ruminant digestion; vertebrate reproductive endocrinology and morphology (ovary and testis); factors influencing reproduction (primary and secondary cues); reproductive life history characteristics of vertebrates.
Practicals: 6 Practicals - nutrition and reproduction in mammals and birds.
Assessment: Theory and practical test; Practical assignments; Theory and practical exam (4 hr).

ZOOL701 – Applied Behavioural Ecology
(PZO7BEM) (9L-5T-24P-0S-30H-10R-0F-2A-8C-13W)
Pre- or Corequisites: At least 64C in Zoological Sciences (including ZOOL302) at level 3.

Aim: An advanced course in the principles of behavioural ecology, including special sections on simple mathematical Modeling and behavioural approaches to conservation.

Content: Mathematical methods; principles of computer simulation; optimisation; optimal foraging theory and risk sensitivity; evolution of animal signals; sexual selection and territoriality; social behaviour and game theory; coevolution and brood parasitism; adaptation of life histories; integrating behaviour into conservation biology.

Practicals: By application of various optimality models learners will explore the ecology of single behaviours, temporal patterns of behaviour, and behaviour sequences. Problem solving and presentation skills are enhanced through computer simulations of behaviour. Two one-day field trips.

Assessment: Theory test; Weekly assessment of practicals; Tutorial participation Theory exam (2 hr).

ZOOL702 – Evolutionary Physiology

(PZO7EPM) (14L-3T-18P-0S-32H-10R-0F-3A-8C-13W)

Prerequisites: BIOS101, ZOOL102 (each with a minimum mark of 50%), at least 64C at level 3, including ZOOL301 and ZOO 303, or equivalent, with Dean's permission.

Aim: To provide students with an awareness of the contemporary trends in research in evolutionary physiology.

Content:The evolution of physiological traits; the influence of biotic and abiotic selection pressures; the importance of population differentiation; the nature versus nurture debate; the common garden experimental approach; geographical variation; phenotypic plasticity; Modeling physiological problems; the relationship between physiology, morphology and behaviour; the future approach; selected advanced topics on animal metabolism.

Practicals: In the practicals students will learn various research procedures such as animal surgery, anaesthesia and blood sampling (cardiac puncture). They will also be required to manipulate complex physiological equipment and to learn the basics of equipment-computer interfacing.

Assessment: Literature review; Assessed tutorials; Theory exam (2 hr).

ZOOL790 – Zoology Research Project

(PZO7RPY) (0L-20T-0P-30S-590H-0R-0F-0A-64C-26W)

Prerequisite: Acceptance into Honours in Zoology.

Aim: To provide learners with the opportunity, under supervision, to gain first-hand experience in the formulation, planning, execution, analysis, and reporting on, their Honours research project(s)

Content: Students will be provided with a list of supervisors and possible research topics at the beginning of their Honours year. The final choice and number (1 or 2) of research projects will be decided by discussion and negotiation between the student and supervisor.

Practicals: No formal practicals. Students will be expected to execute a research plan and, where necessary, demonstrate competence in the use of sophisticated research equipment to collect data for their project.

Assessment: 2 Oral presentations (project proposal and research findings); Research report.

APPENDIX 1

SYLLABI FOR MODULES OFFERED IN THE FACULTY OF HUMAN SCIENCES

Note:

Not all information for syllabi in the year 2000 was available at the time of printing. Students are advised to consult the Handbooks of the Faculty of Human Sciences, Pietermaritzburg.

Academic Communication Studies

Academic Communication Studies 101(**PAL1011**) (13W-16C)

This module is primarily for first year University students who would benefit from a greater understanding of the kinds of language, learning and teaching used at university. It makes explicit the demands and conventions used for successful academic communication. Students work intensively in small groups.

Class mark:33,3%

Examination mark: 66,%

Academic Communication Studies 102 (PAL1022) (13W-16C)

A continuation of Academic Communication Studies 110, this module develops academic communicative competence further through a small research project which learners design, conduct, write up and present in collaborative group work.

Class mark:33 1/3%

Examination mark: 66 2/3%

Accounting

Accounting 100 (**PAC100Y**) (26W-32C)

Accounting theory: the nature and function of accounting; the fundamental concepts of accounting; the use of accounting information; the structure, concepts and conventions of financial statements. **Accounting practice**: the effect of transactions on the accounting equation relating to all aspects of the syllabus; the double entry system; the accounting aspects of the different types of business ownerships: sole proprietor; partnership and company; the accounting aspects of the different types of business endeavour: service, retail and manufacturing. Preparation of financial statements: income statement, balance sheet and cash flow statement of the three types of business endeavour and business ownership; value added tax; hire-purchase transactions; year end adjusting entries and subsequent reversing entries. **Introducing management accounting**: full absorption costing; short term decision-making; marginal costing including CVP and break-even analysis.

Agricultural Law

Agricultural Law 110 (**PLA1AG2**) (13W-16C)

A special module covering the law with which farmers and agricultural officers should be acquainted is provided by the Faculty of Law.

Principles of law applicable to all contracts (agreement and contract, offer and acceptance - ticket cases - signature - terms and conditions - *justa causa* - formalities - mistake - misrepresentation - contractual capacity, minors and married women - illegality - restraint of trade - impossibility - prescription). Law of Property (real and personal rights - movable and immovable property - ownership of river beds and seashore - acquisition of ownership, *traditio*, land registration, prescription - ownership, vindication, encroachment, planting of trees, lateral support, drainage, water rights and irrigation, nuisance, trespass, co-ownership - possession - servitudes - mortgage, pledge, lien - ownership and protection of wild animals).

Business Finance

Business Finance 230 (**PBF230M**) (13W-16C)

Prerequisite: Economics 120 and Management 120

The Economics of Finance: SA Financial Institutions; Valuation concepts in finance; Capital budgeting under certainty. **Business Finance**: Capital budgeting with uncertainty and risk; Financial Structure, debt versus equity, cost capital; Capital constraints, ranking projects.

Business Finance 310 (PBF3101) (13W-32C)

Prerequisite : Business Finance 230

Term structure interest rates; Long-term finance, alternative sources, dividend policy, leasing; Short-term finance, sources, management; International finance.

Business Finance 320 (PBF3202) (13W-32C)

Prerequisite : Business Finance 230 and 310

Risk and portfolio analysis; Capital asset pricing model and arbitrage pricing theory; Financial and Technical Analysis; Mergers and acquisitions.

Cognitive Science Honours

The honours in Cognitive Science (128C) is a multidisciplinary programme based primarily on Psychology, Philosophy, and Computer Science. Entry into the programme requires a major in one of these disciplines at the undergraduate level, or in an equivalent discipline in an equivalent qualification. Although this is not fundamentally a quantitative course, demonstrated or tested numeracy is a requirement for selection. Selection will be based on academic merit.

The detailed curriculum for each student is arranged in consultation with staff. The offer of certain options depends on the availability of staff with and a minimum number of candidates. Not all options will be offered in any one year. The course outline for any particular year is available from the school. Students wishing to pursue multidisciplinary study through mixed honours degrees which combine the study of some aspect of Cognitive Science with other disciplines should consult the Head of the School.

Honours in Cognitive Science is made up of four modules, some of which are subdivisible to enable articulation between qualifications both within the School of Psychology and with other Schools and Universities

Cognitive Science 710 Foundations of Cognitive Science (PCG7101) (32C)
This module serves to introduce learners to the central topics and methods of cognitive science and aims to enable them to engage with the contemporary debate at graduate level. It also provides a foundation in the research methods used by cognitive scientists. Topics covered include: History of cognitive science; The nature of explanation; Representational models of the mind and strong AI; Non-representational models of the mind; The problem of consciousness; Emergence and Complexity; Methods and arguments in cognitive science, including experimentation, simulation, thought experiments, efficiency analysis.

Cognitive Science 720 Psychological and Philosophical aspects of Cognitive Science (PCG7201) (32C)
The course consists of one 32 credit module, two 16 credit modules or one 16 credit module and two 8 point credit modules depending upon student interests. The choices offered are: "Persons and Identity" (32), "Consciousness and folk psychology" (16), "Perception" (16), "Cognition language and discourse" (16), "The Brain, Mind and Thinking" (16), "Comparative Cognition and Evolutionary Psychology" (16), "Cognitive Development" (16), "Human neuropsychology" (8), "Personality" (8), "Social Psychology" (8), and/or any other topics approved by the school from time to time.

Cognitive Science 730 Computers and Cognitive Science (PCG7302) (32C)
This module consists of one 32-credit module taken from the following topics: "Human Computer Interaction", "Systems Thinking for Management", and "Introduction to Artificial Intelligence".

Cognitive Science 740 Research Project (PCG7402) (32C)
The aim of the research project is at the honours level is for students to gain experience of research by focussing on a chosen area of specialist study, reviewing the available knowledge in the field, devising methods to describe and investigate issues of interest to cognitive scientists, and evaluating their efforts by the criteria used in the field.

Economics

Economics 110 - Microeconomics and International Trade (PEC1101) (13W-16C)
Prerequisite: A pass of at least 40% in the higher grade *or* 60% in the standard grade in mathematics at the matriculation level *or* equivalent.

Foundational concepts, principles of microeconomics, international trade theory.

Economics 120 - Macroeconomics and Development (PEC1202) (13W-16C)
Prerequisite: A pass of at least 40% in the higher grade *or* 60% in the standard grade in mathematics at the matriculation level *or* equivalent.

Principles of macroeconomics, financial markets, South African economic development.

Economics 130 - Introduction to Microeconomics (PEC1301) (13W-16C)
Restriction: Candidates who meet the prerequisite for Economics 110 may not register for this module.

Foundational concepts, principles of microeconomics.

Economics 140 - Introduction to Macroeconomics (PEC1402) (13W-16C)
Restriction: Candidates who meet the prerequisite for Economics 120 may not register for this module.

Principles of macroeconomics, financial markets.

Economics 150 - Understanding the South African Economy (PEC1501) (13W-16C)
Note:

Credit may not be obtained for Economics 150 and Economics 110 and/or Economics 120. This module may not always be offered, or it may only be offered in the Winter semester. Please consult the head of the discipline regarding the availability of this module.

Growth and structural change; regional development and location of industry; national income and macroeconomic variables; international trade, the balance of payments and exchange rates; the labour market; market structure and competition policy; income distribution and poverty; contemporary economic policy.

Economics 160 - Introduction to Environmental Economics in a South African Context (PEC1602) (13W-16C)
Prerequisite: A pass of at least 40% in the higher grade *or* 60% in the standard grade in mathematics at the matriculation level *or* equivalent.
Note:

This module may not always be offered, or it may only be offered in the Winter semester. Please consult the head of the discipline regarding the availability of this module.

Foundational concepts, economic theory for resources policy, valuing the environment, aspects of global environmental issues, the environment and development, environmental policy in the South African economy.

Economics 210 - Microeconomics and Public Finance (PEC2101) (13W-16C)
Prerequisite: Economics 110 *or* 60% in Economics 130

Intermediate microeconomics, public finance.

Economics 220 - Macroeconomics and Development (PEC2202) (13W-16C)
Prerequisite: Economics 120 *or* 60% in Economics 140

Intermediate macroeconomics, business cycles, stabilization policy, development economics.

Economics level-3 modules
Note:

The full range of semester modules may not always be offered nor may it always be available to an individual student. Please consult the head of the discipline about the modules which will be offered and about time-tabling.

Economics 310 - Analytical Methods (PEC3101) (13W-16C)
Prerequisite: Economics 210, 220, 50% in Quantitative Methods 110 (*or* an equivalent module).
Mathematical economics, optimization, static, comparative static and dynamic analysis.

Economics 320 - Econometrics (PEC3202) (13W-16C)
Prerequisite: Economics 110, 120, *or* 60% in both Economics 130, 140.

Note:
An introductory statistics module is desirable.
Theory and pathology of simple and multiple regression analysis, economic applications.

Economics 330 - Applied Microeconomics (PEC3301) (13W-16C)
Prerequisite: Economics 210.
Applications of consumer and producer theory, market equilibrium analysis.

Economics 340 - Monetary Economics (PEC3401) (13W-16C)
Prerequisite: Economics 220, Economics 110 *or* 60% in Economics 130.
Theory of monetary policy, demand for and supply of money, monetary policy, money and inflation, monetary approach to the balance of payments, South African applications.

Economics 350 - Labour Economics (PEC3502) (13W-16C)
Prerequisite: Economics 210, Economics 120 *or* 60% in Economics 140.
Labour markets, labour supply, labour demand, human capital, unions, discrimination, unemployment, South African applications.

Economics 360 - International Trade (PEC3602) (13W-16C)
Prerequisite: Economics 210, Economics 120 *or* 60% in Economics 140.
International trade theory and policy, exchange rate determination and policy, South African applications.

Level-7 modules in Economics

Components of the Economics Honours modules offered in the Faculty of Human Sciences (Pietermaritzburg) are to be found in the relevant Handbook.

Human Resource Management

Human Resource Management 230 (PHM230M) (13W-16C)
Prerequisite: Management 110 and 120.
Review of Human Resource problems in South Africa; Diagnostic and systems approaches to Human Resource Management; The objectives of Human Resource Management; The Human Resource Functions; The Responsibilities of Line Managers in the Management of People ; Job Analyses, Job descriptions and Job Specifications; Human Resource Planning; Recruitment; Selection; Placement and Induction; Compensation Management; Job Evaluation; Remuneration Systems; Employee Benefits; Incentive Schemes; Performance Appraisal; and Performance Management.

Human Resource Management 310 (PHM3101) (13W-32C)
Prerequisite: Human Resource Management 230; Employee Training; Management Development; Career Management; Quality of Work Life; Social Responsibility; Health and Safety; and Evaluation of Human Resource Management.

Human Resource Management 320 (PHM3202) (13W-32C)
Prerequisite: Human Resource Management 230
The legal framework of the Labour Relationship and advanced topics in Labour Relations.

Management

Management 110 - Introduction to Business Management **(PMN1101)** (13W-16C)
The world of business management; the nature of business management; the development of business management; the functioning of a business enterprise; the establishment of a business enterprise; the enterprise in a business environment; the enterprise's socio-technical environment; introduction to general management; the role of management; developments in management theory; planning and organising in management; the basic principles of organising; factors that influence organising; leadership and control in management; aspects of leadership in organisations; motivation in organisations; groups in organisations; formal and informal communication; the nature of control in organisations; characteristics of an effective control system; module review.

Management 120 - An Introduction to Business Administration Special Fields (PMN1202) (13W-16C)
Prerequisite: Management 110
Business finance: financial markets and financial intermediation; money market and capital market; financial instruments; simple and compound interest; the time-value of money - present value and future value; annuities and perpetuities. **Human resource management:** definition of human resource management; objectives of human resource management; outline of human resource management functions; future of human resource management in South Africa; motivational theory and practice; management groups; organisational communications. **Marketing and advertising management:** the marketing philosophy, definition of marketing, evolution of marketing; the role of marketing; functions of a marketing manager; the marketing process; an introduction to contemporary marketing issues. **Supply chain management:** introduction to supply chain management; the role of purchasing and supply in business; objectives of purchasing.

Management 210 (PMN2101) (13W-16C)
Prerequisites: At least 50% in Management 110 and 120; Quantitative Methods 110, 120 with at least 50% in one of them.
Note:
Agriculture students who register for Management 210, 220 may register without the Management 110, 120 prerequisites. However, they must register for Agricultural Economics 220 and Agricultural Economics 270 as co-requisites, and must have passed Quantitative Methods 110, 120 as prerequisites.

Small business management: definition of small business; the importance of small business in the economy; entrepreneurship; the business plan; legal concerns when starting a small business including legal forms of business; factors responsible for success and failure in small business; starting a new small business/buying an already established small business; marketing in a small business; advertising in a small business; raising finance; location issues; franchising; managing a small business including risk management; other important issues in small business. **Industrial relations**: essentials of collective bargaining (labour relations); an introduction to the principles, parties, and processes in the collective bargaining relationship.

Management 220 (PMN2202) (13W-16C)
Prerequisites: Management 210, at least 50% in Management 110 and 120; Quantitative Methods 110, 120 with at least 50% in one of the two.
Note:
Agriculture students who register for Management 210, 220 may register without the Management 110, 120 prerequisites. However, they must register for Agricultural Economics 220 and Agricultural Economics 270 as co-requisites, and must have passed Quantitative Methods 110, 120 as prerequisites.

Operations management: introduction to operations management; strategic role and objectives of operations management; design in operations management; the design of products and services; layout and flow in operations management; process technology; job design and work organization; the nature of planning and control; capacity planning; inventory planning; supply chain planning and control; materials requirements planning (MRP); just-in-time planning (JIT); project planning and control; quality planning; failure detection & preventative maintenance; total quality management; international development of operations management and module review. **Introduction to management science**: introduction to management science/break-even analysis; introduction to linear programming; graphical solutions in linear programming; graphical sensitivity analysis; the simplex method and linear programming; max-min analysis with mixed constraints; postoptimality analysis; transportation/assignment problems; goal programming; decision theory; forecasting; inventory models I: independent demand; inventory models II: MRP and JIT applications; networks: shortest route algorithms; PERT/DPM methods; queuing models; simulations; Markov analysis; calculus-based optimisation; decision making and information systems; review of module.

Management 310 (PMN3101) (13W-32C)
Prerequisites: At least 50% in Management 110, 120, 210 and 220; at least 50% in Quantitative Methods 110 and 120

Marketing and advertising management: industrial marketing research; advertising and media research; price and distribution research; product research; international marketing. **Research methodology**: the aim of this unit is to introduce students to methods used in conducting a scientific investigation or inquiry. At the end of the module students will be expected to write a dissertation in any business area. Approaches to scientific inquiry (deductive vs inductive approach); types of research designs; sources of research data; measurement scales and operationalizing business variables; sampling methods and preliminary data analysis; writing the research report; business research applications. **Information systems in management**: contemporary approaches to information systems and the changing management process; information as a strategic resource, how IS can be used for competitive advantage; how organisations affect information systems; how information systems affect organisations; organisational models of decision making; systems development and organisational change. Business process reengineering; understanding the business value of an information system; knowledge and information work; information work and office automation; decision support systems; group decision support systems; an overview of intelligent decision support systems; the Internet and WWW and their impact on business, EDI; management of IS resources - general issues; downsizing, outsourcing; strategic planning of information systems; controlling information systems; summary.

Management 320 (PMN3202) (13W-32C)
Prerequisites: Management 310, at least 50% in Management 110, 120, 210, 220, Quantitative Methods 110 and 120

Strategic management and international business: introduction to strategic management; strategic analysis, choice and implementation; strategic management in different business contexts; strategic management in practice; strategic analysis and the internal/external environment; resources, competences and strategic capability; stakeholder expectations and organisational aims; introduction to case study analysis; strategic choice; strategic options; strategy evaluation and selection; strategic implementation; resource allocation and control; managing strategic change; introduction to international business; strategy and structure of international business; global manufacturing and materials management; global marketing and new product development; global human resource management; review.

Marketing Management

Marketing Management 230 (PMK230M) (13W-16C)
Prerequisite : Management 110, at least 50% in Management 120

The marketing environment. Introduction to marketing research and information systems. Introduction to consumer and business buyer behaviour. Marketing management. Marketing segmentation and targeting. Marketing mix strategies: product strategies; price strategies; place strategies; promotional strategies. Strategic marketing. Contemporary marketing issues.

Marketing Management 310 (PMK3101) (13W-32C)
Prerequisite: At least 50% in Marketing Management 230

Consumer Behaviour. Retail Marketing. Contemporary marketing issues.

Marketing Management 320 (PMK3202) (13W-32C)
Prerequisite: Marketing Management 310, at least 50% in Marketing Management 230

Industrial marketing. Services marketing. Contemporary marketing issues.

Policy & Development Studies

Policy & Development Studies 231 - Governance and Public Policy in South Africa (PPD2311) (16C)
Note:
This module is offered in part-time hours only.
Syllabus: Power and organisation; Intergovernmental relations; elements of public policy analysis using South African case studies.

Examination: 2 hours

Class mark: 50%

Examination mark: 50%

Policy & Development Studies 701 - Public Policy Analysis: techniques and issues (PPD701M) (13W-32C)

Power and organisation; elements of public policy analysis using South African case studies; intergovernmental relations.

Examination: 5 hours

Class mark: 50%

Examination mark: 50%

Political Science

Note:

Political Science modules are not generally available to BScAgric students.

Political Science 210 - Political Theory in Context (PPS2101) (13W-16C)

Prerequisite: Political Science 110 or 121.

Syllabus: Power, the stage; justice; nation-building, class and ethnicity; elites, bureaucracy and democracy.

Examination: 2 hours

Class Mark: 50%

Examination mark: 50%

Political Science 240 - Issues in International Affairs (PPS2402) (13W-16C)

Note:

This module may also be offered in part-time hours.

Prerequisite: Political Science 110 or 121

Syllabus: Using topical events and issues as a basis for enhancing analytic skills in comparative and international politics.

Examination: 2 hours

Class mark: 50%

Examination mark: 50%

Psychology

Note:

Psychology modules are not generally available to BScAgric students.

At the discretion of the Head of the School, certain modules may not be offered in any given year. Modules may be moved from one semester to the other, depending on staff availability. Please consult the Head of the School for details about the modules which will be offered.

Psychology 110 - Foundations of Psychology, Part 1 (PPG1101) (13W-16C)
This introductory module in Psychology provides an orientation to the history and conceptual underpinnings of the subject, including the principles and methods of psychological research and psychological practice.

Psychology 120 - Foundations of Psychology, Part 2 (PPG1202) (13W-16C)
Part 2 of the introductory module in Psychology introduces students to the major content areas of the discipline - biological bases of behaviour, human development, cognition and language - and the theories and methods used to understand social behaviour.

Psychology 201 - Introduction to Research (PPG2011) (13W-16C)
This module introduces students to scientific theory and how constructs are operationalised in psychological research. Quantitative and qualitative research methods, and supporting analytical procedures (including statistics) are taught through lectures and tutorials.

Psychology 202 - Neuropsychology (PPG2022) (13W-16C)
This course introduces students to conceptual frameworks and methodologies used in neuropsychology and neuroscience, as well as to the assessment procedures used by psychologists to assess brain functions and their relationships to behaviour.

Psychology 203 - Social and Cultural Psychology (PPG2031) (13W-16C)
This course aims to introduce students to major perspectives and theories in social psychology with a view to teaching reflective theoretical skills central to understanding contemporary society and ourselves as social being.

Psychology 204 - Child and Adult Development (PPG2042) (13W-16C)
The module focuses on the processes of psycho-social change across the lifespan. Students are introduced to the major conceptual, research and applied areas of developmental psychology, including in the fields of family life, education, and public health.

Psychology 205 - Personality and Personnel Psychology (PPG2052) (13W-16C)
The course firstly focuses on a review of theories of personality to familiarise students with the major concepts and research methods in the area. In the second part of the course these theories are examined and applied in terms of the relationships between individuals and work.

Psychology 206 - Educational Applications of Psychology (PPG2061) (13W-16C)
The course is designed to enable students to consider education in various settings from a psychological perspective, including learning and teaching styles, outcomes orientations, career development, and communicative approaches to adult learning.

Psychology 301 - Research Methods and Psychological Measurement (PPG3012) (13W-16C)
This lecture and tutorial-based course focuses on experimental and quasi-experimental designs for psychological investigations, principles of test design and psychometrics, and the statistical procedures appropriate to these methods.

Psychology 302 - The Psychology of Change and Transformation (PPG3021) (13W-16C)

This course aims to teach students reflective skills central to understanding individual and social change, and is illustrated by theories, applied psychological and social interventions and policy in the fields of cultural hermeneutics, community development and work.

Psychology 303 - The Psychology of Health and Illness (PPG3031) (13W-16C)
The course examines health and illness from a psychological perspective, through epidemiological models, theoretical perspectives in psycho-neuro-immunology and social constructivism, and intervention. Students are also introduced to basic interviewing and counselling skills.

Psychology 304 - Organizational Behaviour and Development (PPG3042) (13W-16C)
This course traces processes and theories of organizational change and development, including organizational assessment and programme evaluation. These models are then applied to organizational issues, including employment equity and conflict management.

Psychology 305 - Cognitive Psychology (PPG3052) (13W-16C)
This course aims to link perception, thinking and acting through current models and theories of cognition. The course examines the evolution of mind and consciousness, computer models, neuroscience, decision-making, everyday cognition and applications to various areas of psychology.

Psychology 306 - Psychology and the Law (PPG3062) (13W-16C)
This course examines psychological theory and research as applied and communicated through law and forensic practice, and includes material on the nature of testimony, criminal behaviour, disability and compensation, crime prevention and rehabilitation, and professional ethics.

PSYCHOLOGY HONOURS (128C)
An Honours programme is available for candidates who have achieved good results at undergraduate level. In general, applicants should obtain an aggregate of at least 68% in undergraduate psychology courses. Applicants must have majored in the required number of undergraduate psychology credits. Acceptance is limited by the number of places available and selection is primarily on merit based on achievement in the undergraduate psychology programme. The school reserves the right to interview applicants.

The Honours course is designed to provide a critical and conceptual base for learners wishing to proceed to higher degree study in psychology.

The Honours programme is comprised of three taught modules of 32 credit points (C) each and a research project of 32C. There is choice of topics within some of the taught modules. Students are also permitted to take credits from modules or courses outside of the School of Psychology, subject to approval of the honours coordinator.

The course commences with a thorough orientation programme which assists learners in integrating with the School of Psychology and related resources, and which assists learners in making topic selections.

Psychology 711 Conceptual Foundations (PPG7111) (32C)
This module comprises three topics: Paradigms (16C) is a compulsory topic for all students. In addition, students must select two (8C each) topics from the following list: Cognitive Development; Neuropsychology; Personality; Social Psychology; and/or any other topic approved by the school.

Psychology 721 Research Fundamentals (PPG7211) (32C)
This module comprises two compulsory 16 C course: Research Design and Data Analysis. Research Design introduces learners to a range of methodologies that are used by psychologists and social scientists, and provides learners with an understanding of when to use different methods appropriately. Data Analysis is an intermediate level course, ensuring that learners will know the necessary foundations for experimental, quasi-experimental and field research.

Psychology 712 Theory of Applied Psychology(PPG7122) (32C)
This module comprises four topics of 8CP each, which may be selected from the list below. Topics on the list are subject to change and may not be offered if fewer that 3 students select the topic. This module may accommodate interdisciplinary topics. Topics offered include: Career Psychology; Cognitive Development; Community Psychology; Consciousness and Thinking; Critical Issues in Clinical Psychology; Cultural Psychology; Ethology; Developmental Problems of Childhood and Adolescence; Discourse Analysis; Epidemiology and Child Mental Health; Emotional and Social Development; Gender Issues in Psychology; Governmentality: Liberalism, Power and Identity; Organisational Psychology; Perception; Psychological Assessment; Psychology and Social Policy; Psychology of Criminal Behaviour; Psychopathology; Psychology and Education; Psychology of Action; Psychology of the Family; Psychology and Evolution; Special Seminar; Sport Psychology; Suicidology; Therapeutics; Theories of Emotion, and/or other topics approved by the School.

Psychology 701 Research Project (PPG701Y) (32C)
The aim of the research project at the honours level is for students to gain experience of research by focussing on a chosen area of specialist study, reviewing the available knowledge in the field, devising methods to describe and investigate issues of social and psychological interest, and evaluating their research by the criteria used in the field. The research project is a scholarly undertaking, and students should choose topics for study that facilitate the achievement of academic excellence. Students are strongly encouraged to choose research projects in the fields of interest and research activities of staff members so that they can enter into a close and collaborative relationship with a mentor. A brief description of staff research interests will be made available to students at the first project meeting.

Semester modules may be rotated depending on staff availability.

Part-time learners are required to complete Research Fundamentals and the Research Project in the first year, and Conceptual Foundations and Theory of Applied Psychology in the second year. Learners considering part-time study must note that admission to the programme is based on applications received by October 31st only and that after-hours classes are not customary.

MASTERS PROGRAMMES

Prerequisite: Psychology Honours, preferably with an upper second class pass.

The admission of candidates is subject to selection and to the available facilities of the School.

Programmes are offered which will qualify candidates for registration with the Health Professional Council of South Africa (HPCSA), in the categories of Clinical, Counselling, Educational and Research Psychologist, subject to staff availability.

NOTE: In order to be registered as a psychologist with the HPCSA, all students are required to complete a year's internship at an accredited facility. The School of Psychology is an accredited training facility, but cannot guarantee a place for all candidates.

General restriction on all COURSE WORK Masters degrees in the School of Psychology:

Candidates may not present their dissertation for examination, and candidates may not commence HPCSA internship programmes, until all course work components of the masters programme have been passed.

Clinical, Counselling, and Educational Psychology Masters (160C)

The programme takes place over one year. Clinical, Counselling and Educational Psychology candidates are required to pass the following modules:-

Research Component

Psychology 810	(PPG810Y)	Research Dissertation	(64C)
Psychology 811	(PPG811Y)	Community Project	(16C)

Academic Courses

Psychology 814	(PPG814Y)	Child Psychology	(16C)
Psychology 821	(PPG821Y)	Personality, Object Relations and Psychodynamics	(16C)
AND			
Psychology 819	(PPG819Y)	Health, Forensic and Neuropsychology	(16C)
OR			
Psychology 820	(PPG820Y)	Career, Forensic and Neuropsychology	(16C)

Professional Courses

Psychology 813	(PPG8131)	Basic Applied Psychology	(16C)
AND			
Psychology 817	(PPSG817Y)	Clinical Psychology: Theory and Practice	(16C)
OR			
Psychology 818	(PPG818Y)	Counselling Psychology: Theory and Practice	(16C)
OR			
Psychology 822	(PPG822Y)	Educational Psychology: Theory and Practice	(16C)

Internship

Psychology 823	(PPG823Y)	Internship (Clinical)	(0C)
Psychology 824	(PPG824Y)	Internship (Counselling)	(0C)
Psychology 825	(PPG825Y)	Internship (Education)	(0C)

Research Psychology Masters (144C)

This course is intended to lead to registration as a research psychologist. All candidates must pass all the following:-

Psychology 830	(PPG8301/2)	Research dissertation	(80C)
Psychology 831	(PPG831Y)	Quantitative Methods	(12W-16C)
Psychology 832	(PPG832Y)	Qualitative Methods	(12W-16C)
Psychology 833	(PPG833Y)	Applied Research	(12W-16C)
Psychology 835	(PPG835Y)	Specialization Module	(12W-16C)

Internship

Psychology 836	(PPG836Y)	Internship (Research)	(0C)

Syllabuses for the modules are available from the School on request.

Sociology

Note: Sociology modules are not generally available to BScAgric students.

Sociology 110 - Introduction to Sociology (PSO1101) (13W-16C)
Syllabus: Sociological perspective, theory, research, culture, socialization, deviance, gender, social institutions and modernity.

Examination: 3 hour

Class mark: 33.3%

Examination mark: 66.6%

Sociology 120 - Social Structure and South African Society (PSO1202) (13W-16C)
Syllabus: Class, race, ethnicity, gender, structure and distribution of population in South Africa, social change.

Examination: 3 hour

Class mark: 33.3%

Examination mark: 66.6%

Sociology 210 - The Sociological Tradition (PSO2102) (13W-16C)
Syllabus: The classical sociologists and an assessment of their contribution. Theoretical treatment of important areas: structure, class, power, rationalisation, solidarity, regulation, change and development, consciousness, ideology etc. Continuity and departures in contemporary theorising - from ethnomethodology to postmodernism. Survival and change in the sociological tradition.

Examination: 3 hour

Class mark: 33.3%

Examination mark: 66.6%

Sociology 221 - Sociology of Development in South Africa (PSO2211) (13W-16C)
Syllabus: Wealth, poverty, health, transport infrastructure and education in South Africa; related policy initiatives - GEAR, Women's Budget, Health particularly AIDS, Welfare, Education, Transport, macro theoretical paradigms - Modernisation and Globalisation and their critiques.

Examination: 3 hour

Class mark: 33.3%

Examination mark: 66.6%

Sociology 310 - Practical Course in Research Methods (PSO3101) (13W-16C)
Syllabus: What is research? Research interests of staff, philosophies in social research. Ethical and Political considerations in conducting research. Introduction to quantitative research designs. Sampling for quantitative research designs. Survey research. Survey method. Introduction to qualitative research approaches and design. Qualitative data collection techniques. Participant observation, unobtrusive observation, qualitative methods. Qualitative data analysis. Quantitative data analysis. Case studies of research reports. Report writing. Presentation of research findings (actual presentation to an audience).

Examination: 3 hour

Class mark: 33.3%

Examination mark: 66.6%

Sociology 322 - Social and Economic Issues in Third World Development (PSO3221) (13W-16C)
Syllabus: Third world debt, Structural adjustment, Understanding and addressing poverty, Globalization, state and civil society, the crisis in development theory.

Examination 3 hour

Class mark: 33.3%

Examination mark: 66.6%

Sociology 330 - Sociology of Rural South Africa (PSO3302) (13W-16C)
Syllabus: South African land reform policy, Land ownership and tenure patterns, Poverty and rural livelihood strategies, Power and inequality in the South African countryside.

Examination: 3 hour

Class mark: 33.3%

Examination mark: 66.6%

Sociology 371 - Culture, Communication and Development (PSO3712) (13W-16C)
Syllabus: Topics for this module include: globalization (and the debates surrounding the notion); communication technologies and theories of their social impact; theories of culture and cultural production and consumption; reception theory; methodology; case studies; development paradigms and culture.

Examination: 3 hour

Class mark: 33.3%

Examination mark: 66.6%

Sociology 380 - Social Studies in Conservation (PSO3801) (13W-16C)
Human dimension of conservation, role of local communities in managing natural resources, tourism, ideas of wilderness. Case studies.

Examination: 3 hour

Class mark: 33.3%

Examination mark: 66.6%

Sociology 390 - Gender Studies (PSO3902) (13W-16C)
Syllabus: Theorising gender, race, class and gender relations, gender and the family, gender and work, gender and power, gender policies, women's budget initiative, gender and development.

Examination: 3 hour

Class mark: 33.3%

Supply Chain Management

Supply Chain Management 230 - Fundamentals of Supply Chain Management (PSC2BBM) (13W-16C)
Prerequisite: Management 110, at least 50% in Management 120

Supply Chain Management concepts; purchasing methods and procedures; organisation of the purchasing function; purchasing ethics; determination of requirements; quality, specification, design, price, contacts, terms, delivery; selection and evaluation of suppliers, and supplier relationships.

Supply Chain Management 310 - Purchasing (PSC3AA1) (13W-32C)
Prerequisite: At least 50% in Supply Chain Management 230

Inventory control; purchasing techniques; standardisation, value analysis and value engineering; make or buy; capital and projects purchasing; international purchasing; partnerships and outsourcing; introduction to negotiation; and selected topics in purchasing and supply.

Supply Chain Management 320 (PSC3BB2) (13W-32C)
Prerequisite: Supply Chain Management 310, at least 50% in Supply Chain Management 230

Supply Chain Management in manufacturing and service operations, - operations planning and control, -MRP II ERP JIT, - physical distribution, -transportation; strategic purchasing; development of historically underutilised business (HUBS); special topics in supply chain management; and negotiation practicals.

Zulu

Note:
Zulu modules are not generally available to BScAgric students.

Zulu NMT 110 - Communicative Zulu I (PZN1101) (13W-16C)
Prerequisite: Open to students who have not written an Nguni mother tongue matric examination.

This module introduces students to basic Zulu grammatical structures, emphasis being on communicative Zulu, i.e. speaking, reading and writing.

Class Work: $33^1/_3$%

Exam: $66^2/_3$%

Zulu NMT 120 - Communicative Zulu 2 (PZN1202) (13W-16C)
Prerequisite: Zulu NMT 110

This module expands and consolidates aspects introduced in Zulu 110 NMT.

Class Work: $33^1/_3$%

Exam: $66^2/_3$%

University of Natal

General Prospectus
Student Rules

Other Faculty Handbooks Available

Faculty of Community and Development Disciplines (Durban)
Faculty of Engineering (Durban and Pietermaritzburg)
Faculty of Human Sciences (Durban)
Faculty of Human Sciences (Pietermaritzburg)
Faculty of Law (Durban and Pietermaritzburg)
Faculty of Management Studies (Durban)
Faculty of Medicine (Durban)
Faculty of Science (Durban)
Faculty of Science and Agriculture (Pietermaritzburg)