**FACULTIES OF THE UNIVERSITY
OF PRETORIA**

HUMANITIES

NATURAL AND AGRICULTURAL SCIENCES

LAW

THEOLOGY

ECONOMIC AND MANAGEMENT SCIENCES

VETERINARY SCIENCE

EDUCATION

HEALTH SCIENCES

ENGINEERING, BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY

FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

- Agriculture Economics, Extension and Rural Development
- Anatomy
- Animal and Wildlife Sciences
- Biochemistry
- Chemistry
- Consumer Science
- Food Science
- Genetics
- Geography, Geoinformatics and Meteorology
- Geology
- Insurance and Actuarial Science
- Mathematics and Applied Mathematics
- Microbiology and Plant Pathology
- Physics
- Physiology
- Plant Production and Soil Science
- Plant Science
- Statistics
- Zoology and Entomology

TABLE OF CONTENTS

Bachelor of Agricultural Science [BScAgric]

Bachelor of Consumer Science [BConsumer Science]

Bachelor of Secondary Education in Science

Diplomas

FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

ACADEMIC PERSONNEL
AS ON 30 SEPTEMBER 2011

DEAN
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Department of Anatomy
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     PhD (Tunlane Univ, New Orleans)... Honorary Professor
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     Studies(Unisa) PrSciNat(Anim) SASAS………………..............Senior Lecturer
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Pretorius, S., BSc(Hons)(Pretoria) ....Junior Lecturer

Mammal Research Institute
Millar, R.P., MSc(London) PhD(Liverpool) RFCPath FRSE FRSSA ..Professor (Director)
Best, P.B., MA PhD(Cantab)...Extraordinary Professor
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Department of Mathematics and Applied Mathematics

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Rajagopal, K.R., PhD(Minnesota) ....Extraordinary Professor
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Van Zyl, A.J., MSc PhD(Pretoria) ....Lecturer
Verwey, A., BSc(Hons) MSc(Pretoria) ....Lecturer

Ostaszewicz, A.J., BSc(Hons)(Pretoria) ....Junior Lecturer
Van Wyk, D.W., BSc(Hons)(Pretoria) ....Junior Lecturer
Yani, B.M., BSc(Hons)(Pretoria) ....Junior Lecturer

Department of Microbiology and Plant Pathology
Venter, S.N., MSc PhD(Pretoria) ....Associate Professor
(Head)
Ashton, P.J., BSc(Hons) MSc PhD(Rhodes) ....Extraordinary Professor
Grabow, W.O.K., BSc(Hons) MSc DSc(Pretoria) ....Extraordinary Professor
Paweska, J.T., BVSc DVSc Dr hab ....Extraordinary Professor
Rupprecht, C.E., BA(Rutgers Univ) MSc(Wisconsin)
VMD(Pennsylvania) PhD(Wisconsin)...Extraordinary Professor
Pietersen, G., MSc(Pretoria) PhD(Witwatersrand)............................Extraordinary Professor
Coutinho, T.A., BSc(Hons) MSc PhD(Natal)......................................Professor
Nel, L.H., MSc(Free State) PhD(Pretoria) ....Professor
Korsten, L., BSc(Hons)(Stellenbosch) MSc PhD(Pretoria) ....Professor
Roux, J., MSc PhD(Free State)..Professor
Aveling, T.A.S., MSc PhD(Natal)..Associate Professor
Labuschagne, N., MSc(Agric) DSc(Agric)(Pretoria) PrSciNat ....Associate Professor
Steenkamp, E.T., BSc(Hons) MSc (Free State) PhD(Pretoria) ....Associate Professor
Theron, J., BSc BSc(Hons) MSc PhD(Pretoria)................................Associate Professor
Markotter, W., BSc(Hons) MSc PhD(Pretoria)...................................Senior Lecturer
Moleleki, L.N., BSc(Hons) MSc PhD(KwaZulu-Natal)
PhD(Univ of Dundee, UK)..Senior Lecturer
Thantsha, M., BSc(Hons)(Univ of the North) MSc PhD(Pretoria).......Senior Lecturer
Van der Waals, J.E., MSc(Agric) PhD(Pretoria) ....Senior Lecturer

Department of Physics
Adam, R.M., BSc(Hons)(Chem)(Cape Town)
BSc(Hons)(Phys) MSc PhD(Unisa)..Honorary Professor
Bharuth-Ram, K., BSc(Hons) MSc(Natal) DPhil(Oxon) ....Honorary Professor
Chakraborty, P., MSc PhD(Calcutta, India) ....Honorary Professor
Gries, W., BSc MSc(Pretoria) PhD(Stellenbosch) ....Honorary Professor
Malaza, E.D., MSc(Brown) DPhil(Cantab)...Honorary Professor
Van der Merwe, J.H., MSc(Appl Maths)(Stellenbosch)
MSc(Maths)(Pretoria) PhD(Bristol)..Honorary Professor
Vilakazi, Z.Z., MSc PhD(Witwatersrand) ....Honorary Professor
Boeyens, J.C.A, MSc(Free State) DSc(Pretoria) FRSSA ....Extraordinary Professor
Friedland, E.K.H., MSc DSc(Pretoria) ....Extraordinary Professor
Alberts, H.W., BSc(Hons) MSc(Potchefstroom) DSc(Pretoria) ....Emeritus Professor
Bredell, L.J., MSc DSc(Pretoria) ....Emeritus Professor
Gaigher, H.L., MSc DSc(Pretoria) ....Emeritus Professor
Kunert, H.W., MSc(Poznan) PhD(Warszawa) ....Emeritus Professor
Malherbe, J.B., MSc DSc(Pretoria) ....Emeritus Professor
Van Staden, J.C., MSc(Pretoria) Dr Rer Nat(Heidelberg) ....Emeritus Professor
Van der Berg, N.G., BSc(Port Elizabeth) MSc(Unisa)   Emeritus Senior
DSc(Pretoria)...Lecturer
Auret, F.D., MSc(Physics) MSc(Appl Maths) DSc(Pretoria) ....Professor
Rakitianski, S., MSc(Tashkent) PhD(Joint Institute for Nuclear
Research, Dubna, Russia)..Professor
Selyshchev, P., PhD(Inst. For Nuclear Research,
Taras Shevchenko Kyiv University)..Professor

Theron, C.C., BSc(Hons)(PortElizabeth)
MSc PhD(Stellenbosch)..Professor
Chetty, N., BSc(Hons)(Natal) MS PhD(Illinois) ....Associate Professor
Diale, M., BSc(Ed)(UNIBO) MSc(Medunsa) PhD(Pretoria)...............Senior Lecturer
Duvenhage, R. deV., BSc(Hons) MSc PhD(Pretoria) ....Senior Lecturer
Manyala, N.I., BSc(Hons) MSc(Witwatersrand)
PhD(Louisiana State Univ)...Senior Lecturer
Meyer, W.E., MSc PhD(Pretoria) ....Senior Lecturer
Moji, C., BSc(Hons)(University of the North) MSc PhD(Natal) ....Senior Lecturer
Nel, J.M., BSc(Hons)(Port Elizabeth) MSc(Cape Town)
PhD(Pretoria) ....Senior Lecturer
Hlatshwayo, T.T MSc(Zululand) PhD(Pretoria)............................ …Lecturer
Janse van Rensburg, P.J., BSc(Hons)(Pretoria) ....Lecturer
Legodi, M.J., BSc(Medunsa) MSc(Pretoria) ....Lecturer
Machatine, A., MSc(Leipzig) ....Lecturer
Odendaal, R.Q., MSc(Pretoria) ....Lecturer
Prinsloo, L.C., MSc HED PhD(Pretoria) ....First Technical
Assistant

Department of Physiology
Van Papendorp, D.H., MBChB(Pretoria) BSc(Hons)
MSc PhD(Stellenbosch) M.Akad.SA ....Professor (Head)
Joubert, A.M., MSc PhD(Pretoria) ....Professor
Pretorius E., BSc(Hons) MSc(Stellenbosch) PhD DTI(Pretoria) ....Professor
Apatu, R.S.K., MBChB(Ghana) PhD(Cantab)....................................Associate Professor
Ker, J., MBChB MMed(Int) PhD(Pretoria) MRCP(Edinburgh)
Fellow: European Society of Cardiology.....................................Associate Professor
Viljoen, M., MSc PhD(Pretoria) PhD(Witwatersrand)
Nat Dip(Microbiology) ....Emeritus Professor
Dippenaar, N.G., MSc(Stellenbosch) MPhil(Cantab)
PhD(Medunsa) DipMedTech(ChemPath).................................Extraordinary Professor
Coetzee, M., BSc(DomSci)(Ed) MSc(Potchefstroom)
PhD(Pretoria) ....Senior Lecturer
Du Toit, P.J., BSc MSc PhD(Pretoria) ....Senior Lecturer
Soma, P., MBChB(Medunsa) MSc(Pretoria) ....Senior Lecturer
Abraham, S., MBChB(Transkei)..Lecturer
Alummoottill, S., BSc MSc(India) ....Lecturer
Govender, C.O., BSocSci(Hons) MA Clinical
Psychology MSc(Pretoria) ....Lecturer
Grobbelaar, C.W., MBChB(KwaZulu-Natal) MSc(Pretoria)...............Lecturer
Koorts, A.M., MSc PhD(Pretoria..Lecturer
Theron, A.E., MBChB BSc(Hons)(Pretoria)......................................Lecturer

Department of Plant Production and Soil Science
Annandale, J.G., MSc(Agric)(Pretoria) PhD(WSU)...........................Professor
(Acting Head)
Bristow, K.L., BSc(Hons)(Natal) MSc(Free State) PhD(WSU)...........Honorary Professor
Duke, S.O., MS(Univ Arkansas) PhD(Duke Univ).............................Extraordinary Professor
Everson, C.S., BSc(Hons) MSc PhD (KwaZulu-Natal) ....Extraordinary Professor
Haverkort, A.J., MSc(Wageningen) PhD(Reading)...........................Extraordinary Professor
Reinhardt, C.F., BSc(Hons)(Free State) BSc(Agric)(Hons)
MSc(Agric) PhD(Pretoria) ....Extraordinary Professor

Singels, A., BSc(Agric)(Hons) MSc(Agric) PhD(Free State) ....Extraordinary Professor
Stirzaker, R.J., MSc(Agric) PhD(Sydney) ....Extraordinary Professor
Chirwa, P. W. C., BSc(Hons)(Bangor) MSc(Gainesville, Florida)
    PhD(Nottingham)..Associate Professor
Du Toit, E.S., BSc(Hons) MSc(Agric) PhD(Pretoria)..........................Associate Professor
Soundy, P., MSc(Agric)(Natal) PhD(Florida) ....Associate Professor
Steyn, J.M., BSc(Hons) MSc(Agric)(Free State) PhD(Pretoria) ....Associate Professor
Avenant, E., BSc(Hons) MSc(Agric)(Pretoria) ....Extraordinary Lecturer
Ghebremariam, T.T., MSc(Agric)(Pretoria)..Extraordinary Lecturer
Karsen, P.A., MSc(Agric)(Stellenbosch)...Extraordinary Lecturer
Van der Laan, M., BSc(Hons) MSc(Agric) PhD(Pretoria)...................Extraordinary Lecturer
Surridge-Talbot, A.K.J., BSc(Hons) MSc PhD(Pretoria) ....Extraordinary Lecturer
Vahrmeijer, J.T., BSc(Hons) MSc(Potchefstroom)............................Extraordinary Lecturer
Madakadze, I.C., BSc(Agric)(Hons)(Zimbabwe)
    MSc(Reading) PhD(McGill)...Senior Lecturer
Taylor, N. J., PhD(KwaZulu-Natal) ....Senior Lecturer
Truter, W. F., MSc(Agric) PhD(Pretoria) ....Senior Lecturer
De Jager, P.C., BSc(Hons)(Potchefstroom) MSc(Pretoria)…………Lecturer
Marais, D., BSc(Agric)(Hons) MSc(Agric) PhD(Pretoria) ....Lecturer
Moshia, M.E., BSc(Agric)(Univ of the North) PhD(Colorado State)....Lecturer
Tesfamariam, E.H., MSc(Agric) PhD(Pretoria) ....Lecturer
Vorster, B.J., MSc PhD(Pretoria) ....Lecturer

Department of Plant Science
Meyer, J.J.M., PhD(Pretoria)..Professor (Head)
Bredenkamp, G.J., DSc(Pretoria) THOD FLS PrSciNat MSAIE ES
    MGSSA ....Extraordinary Professor
Smith, G.F., PhD (J.P.H.Acocks Chair) ....Extraordinary Professor
Berger, D.K., PhD(Cape Town) ....Professor
Van Wyk, A.E., MSc(Potchefstroom) DSc(Pretoria) HED FLS...........Professor
Lall, N., PhD(Pretoria)..Associate Professor
Rouget, M.J.F., PhD(Cape Town) ....Associate Professor
Van Rooyen, M. W., PhD(Pretoria) HNED ....Associate Professor
Kunert, K.S., PhD (Konstanz Germany) ....Senior Research Fellow
Chikwamba, R.K., PhD(USA)..Extraordinary Senior
                                                                                                            Lecturer
Crampton, B.G., PhD(Pretoria..Senior Lecturer
Kritzinger, Q., PhD(Pretoria) ....Senior Lecturer
Tshikalange, T.E., MSc PhD(Pretoria) ....Senior Lecturer
Bapela, M.J., MSc(Pretoria) ....Lecturer
Kiviet, A.M., BSc(Hons)(Fort Hare) MSc(Michigan State Univ)
    HED(Transkei) BEd DEd(Unisa) MEd(Columbia, USA)..............Lecturer

Postgraduate School of Agriculture and Rural Development
Machethe, C.L., BSc(Agric)(Hons)(Fort Hare)
    MSc(Agric)(University of the North) M.S. PhD(Michigan) ....Professor / Director

SADC Centre for Land-related, Regional and Development Law and Policy
Olivier, N.J.J., BA(Law) LLB BA(Hons)(Pretoria)
    Drs Juris LLD(Leiden) MA(Pretoria)
    BA(Hons)(Potchefstroom) LLD(Pretoria)....................................Professor / Director

SAFCOL Forest Science Chair

Chirwa, P. W. C., BSc(Hons)(Bangor) MSc(Gainesville, Florida)   Director /
    PhD(Nottingham)..Associate Professor

Department of Statistics

Crowther, N.A.S., BSc(Hons)(Free State) MSc(Port Elizabeth)
    DSc(Free State)... Professor (Head)
Stoker, D.J., BSc MSc(Potchefstroom) MSc(Stellenbosch)
    Dr(Math&Phys)(Amsterdam)... Honorary Professor
Smit, C.F., MSc DSc(Pretoria) .... Emeritus Professor
Van Zyl, G.J.J., BCom(Stellenbosch) PhD(North Carolina) .... Professor, Acting
    Director STATOMET
Chakraborti, S., PhD(State University of New York) .... Professor (SARchi
    chair holder)
Bekker, A., MSc(Johannesburg) PhD(Unisa) .... Associate Professor
Crafford, G., MSc PhD(Pretoria) .... Senior Lecturer
Debusho, L.K., MSc(Addis Ababa) PhD(KwaZulu-Natal)................. Senior Lecturer
Fletcher, L., MSc PhD(Unisa).. Senior Lecturer
Kanfer, F.H.J., MSc PhD(Potchefstroom)... Senior Lecturer
Louw, E.M., MSc PhD(Pretoria) .... Senior Lecturer
Millard, S.M., MCom(Pretoria)... Senior Lecturer
Swanepoel, A., MSc(Port Elizabeth) .... Senior Lecturer
Adamski, K., BSc(Hons) MSc(Pretoria) .... Lecturer
Basson, E.M., BSc(Hons) MSc(Pretoria)... Lecturer
Bodenstein, L.E., BCom(Hons) MCom(Pretoria) .... Lecturer
Coetsee, J., BCom(Hons) MCom(Pretoria) .... Lecturer
Corbett, A.D., BCom BSc(Hons)(Pretoria).. Lecturer
De Villiers, G.M., BSc(Hons) MSc(Pretoria) .... Lecturer
Ehlers, R., MSc PhD(Pretoria) .... Lecturer
Fabris-Rotelli, I.N., BSc(Hons) MSc(Pretoria)................................... Lecturer
Graham, M.A., BSc(Hons) MSc(Pretoria) .... Lecturer
Reyneke, F., BSc(Hons) MSc(Pretoria)... Lecturer
Strydom, H.F., BSc(Hons)(Pretoria) MSc(Unisa) HED(Pretoria)....... Lecturer
Van Staden, P.J., BCom(Hons) MCom(Pretoria)............................... Lecturer

Wingfield M Mondi Chair

Roux, J., PhD(Free State)..Professor

Department of Zoology and Entomology

Nicolson, S.W., BSc(Hons)(Auckland) PhD(Cantab) FRES..............Professor (Head)
Best, P.B., MA PhD(Cantab)..Extraordinary Professor
Clutton-Brock, T.H., MA PhD ScD(Cantab) ....Extraordinary Professor
Crewe, R.M., BSc(Agric) MSc(Agric)(Natal) PhD(Georgia)
    FRES FRSSA MSAAS PrSciNat...Extraordinary Professor
Dippenaar-Schoeman, A.S., BSc(Unisa) BSc(Hons) MSc
    PhD(RAU) ....Extraordinary Professor
Du Toit, J.T., BSc(Hons) PhD(Witwatersrand)...................................Extraordinary Professor
Faulkes, C.G, PhD (University College London)................................Extraordinary Professor
Getz, W.M., BSc BSc(Hons) PhD(Witwatersrand)............................Extraordinary Professor
Kfir, R., BSc(Agric) MSc(Agric) PhD(Hebrew University Jerusalem)..Extraordinary Professor
Mansell, M.W., BSc(Hons) PhD(Rhodes)...Extraordinary Professor
Moritz, R.F.A., Dip PhD(Frankfurt) ....Extraordinary Professor

Bennett, N.C., BSc(Hons)(Bristol) MSc PhD(Cape Town) FZS ....Professor
Bester, M.N., BSc(Hons) MSc(Stellenbosch) DSc(Pretoria)
    PrSciNat ....Professor
Chimimba, C.T., BSc(Malawi) MSc(Western Australia)
    PhD(Pretoria) FLS FZS(London) PrSciNat………........................Professor
Ferguson, J.W.H., BSc(Port Elizabeth) BSc(Hons)
    MSc(Pretoria) PhD(Witwatersrand)..Professor
Millar, R.P., MSc(London) PhD(Liverpool) RFCPath FRSE
    FRSSA ....Professor (Director)
Scholtz, C.H., BSc(Hons) MSc DSc(Pretoria) FRES ....Professor
Van Aarde, R.J., MSc DSc(Pretoria) PrSciNat ....Professor
Bastos, A., BSc(Hons) MSc PhD(Pretoria).......................................Associate Professor
Janse van Rensburg, B., BSc(Hons)(Free State) MSc
    PhD(Pretoria) ....Associate Professor
McKechnie, A.E., MSc PhD(Natal)..Associate Professor
Garnas, J.R., BA(Colorado) MSc(Maine) PhD(Dartmouth)...............Senior Lecturer
Krüger, K., MPhil(Wales) PhD(Pretoria) FRES.................................Senior Lecturer
Pirk, C.W.W., MSc(Berlin TU) PhD(Rhodes) ....Senior Lecturer
Robertson, M.P., BSc BSc(Hons) PhD(Rhodes) ....Senior Lecturer
De Bruyn, P.J.N., BSc(Hons) MSc PhD(Pretoria).............................Lecturer
Hurley, B., BSc(Hons) MSc PhD(Pretoria) ....Lecturer
Golpalraj, J.B.P., BSc MSc(Madurai Kamaraj Univ) ....Lecturer

BSc Four-year Programme
Kritzinger, Q., PhD(Pretoria) ....Senior Lecturer
                                                                                             /Director
Carney, T.R., BA(Hons)(Pretoria) MA(Pretoria)...............................Lecturer
Fouché, I., BA(Hons)(Pretoria) MA(Pretoria)....................................Lecturer
Tloti, S., BA(Hons)(Fort Hare)..Lecturer
Immelman, S., BA(Hons)(Unisa) ....Junior Lecturer

Student Administration
Beresford, M.E., Mrs...Head: Student
                                                                                             Administration

Faculty Manager
Kotze, S.l, MA PhD(Pretoria)

GENERAL INFORMATION

Admission
Any person who wishes to register at the University for the first time, or after an interruption of studies, should apply or reapply for admission. Application for admission to all undergraduate programmes closes on 30 September.

Selection
A selection procedure takes place prior to admission to the following degree programmes in the Faculty of Natural and Agricultural Sciences:

Postgraduate programmes:
BScHons in Chemistry: Applications close on 15 December.
BScHons in Mathematical Statistics: Admissions test compulsory for admission.
BScHons in Wildlife Management: Applications close on 30 October.
MScAgric in Animal Science (all specialisations): Applications close on 30 October.

Statement of symbols
When registering at this University for the first time, a candidate has to submit a record of symbols obtained for each subject in the Grade 12 examination.

National Senior Certificate
All undergraduate candidates who enrol at the University of Pretoria for the first time, must show their original National Senior Certificate at the Student Administration of their faculty before the end of the first semester.

Language of tuition
In conducting its general business, the University uses two official languages, namely Afrikaans and English. In formal education, the language of tuition is either Afrikaans or English, or both languages, taking the demand as well as academic and economic viability into consideration. However, it remains the student's responsibility to determine in which language a module and any further level of that module is presented. The information is published annually in the Timetable. The University reserves the right to change the language of tuition on short notice, depending on the size of the groups and the avail-ability of lecturers. In respect of administrative and other services, a student may choose whether the University should communicate with him or her in Afrikaans or English.

Bursaries and loans
Particulars of bursaries and loans are available on request.
Visit the website: www.up.ac.za/fao

Accommodation
Applications for accommodation in university residences for a particular year should be submitted as from March 1 of the preceding year. Applications will be considered as long as vacancies exist, and prospective students are advised to apply well in advance.
Please note that admission to the University does not automatically mean that lodging will also be available.

Welcoming day, registration and start of the academic year
Details of the welcoming day to which all parents are cordially invited, the subsequent programme for registration and start of the academic year during which all new first-year students **must** be present, are obtainable from the Dean of Students.

Prescribed books
Lists of prescribed books are not available. The appropriate lecturers will supply information regarding prescribed books to students at the commencement of lectures.

Amendment of regulations and fees
The University retains the right to amend the regulations and to change module fees without prior notification.
Please note: The fees advertised and thus levied in respect of a module or study programme presentation represents a combination of the costs associated with the formal services rendered (for example lectures, practicals, access to laboratories, consumables used in laboratories, etc) as well as associated indirect overheads such as the provision of library and recreation facilities, security and cleaning services, electricity and water supply, etc. Therefore the fees in respect of a module or study programme presentation cannot simply be reconciled with the visible services that are rendered in respect of such module or study programme.

NB: The University of Pretoria started phasing in a new system of education and learning during 2000, which meets the requirements set out in the SAQA guidelines (South African Qualifications Authority) and in the NQF (National Qualification Framework). This entails the implementation of training programmes that will be outcomes-based and market-orientated. This system was implemented in the Faculty during 2001.

Presentation of a module or a programme
The Faculty reserves the right not to offer a particular module or programme if there is insufficient resources to do so, or if an insufficient number of qualified students present themselves.

Definition of terms

Familiarise yourself with the following terms. They are used generally in all faculties.

academic year: the duration of the academic year which is determined by the University Council
core module: a compulsory module for a specific study programme or package
module code: consists of an equal number of capitals and digits, which indicate the name of the module, the year of study, the period of study and the level of the module
credits: a number of credits are allocated to each module. These represent the quantity of work and the extent of the module
curriculum: a series of modules grouped together from different subjects over a specified period of time and in a certain sequence according to the regulations
elective module: a module that forms part of a study programme and which may be chosen by the students on condition that sufficient module credits on a specific level is obtained, as is required for the qualification for which the student is registered
examination mark: the mark a student obtains for an examination in a module, including practical and clinical examinations where applicable. If necessary, the examination mark is finalised after ancillary examinations have been completed
extended study programme: a study programme for a degree or diploma which is completed according to the regulations over a longer period than the minimum duration of the particular degree or diploma
final mark: the mark calculated on the basis of the semester/year mark and the examination mark a student obtained in a particular module according to a formula which

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is determined from time to time in the regulations for each module with the proviso that should no semester/year mark be required in a module, the examination mark serves as the final mark

fundamental module: a module that is regarded as the academic basis of the learning activities in a specific programme or package

grade point average based on module credits (GPA): an average mark that is calculated by multiplying the final mark achieved in a module with the credit value of that module and then dividing the sum of these values by the total of the credit values of all the modules for which a student was enrolled. The result of these calculations is a weighted average based on module credits.

GS: a combined mark (semester/year mark plus examination mark) of at least 40% required for admission to a specific prescribed module

level of a module or **year level**: the academic level of a module which is indicated in the module code: this is an indication of the complexity of a module; the year level is indicated by the first digit of the module code (thus, PHY 131 is a module in Physics at level 1)

learning hours: This refers to the notional number of hours students should spend to master the learning content of a particular module or programme. The total number of learning hours for a module consists of the time needed for lectures, practicals, self-study and any other activity required by the training programme. Learning hours for modules are calculated on the basis of 40 working hours per week x 28 weeks = 1120 + 80 additional hours for evaluation = 1200. For undergraduate modules, the total number of learning hours per module are calculated using the formula number of credits (per module) x 10.

module: a defined part of a subject deemed to be an independent learning unit to which a module code is being allocated; a module is normally offered over seven weeks (quarter module).

registration: the process a candidate is required to complete to be admitted as a student of the University or for admission to a module

regulation for admission: a regulation drawn up by the Dean of a faculty regarding the admission of students to the faculty. It includes a provision regarding the selection process

semester module: a module that extends over one semester

semester/year mark: the mark a student obtains during the course of a semester or a year for tests, class-work, practical work or any other work in a particular module as approved by regulation

subject: a demarcated field of study of which one module or more may be chosen for a study programme

syllabus: the division of the study material for a specific module, according to the regulations

year module: a module that extends over one year (two semesters)

REGULATIONS AND CURRICULA

The rules for degrees, diplomas and certificates here published are subject to change and may be amended prior to the commencement of the academic year in 2012.

1. Admission to undergraduate study

1.1. General

(a) To register for a first bachelor's degree at the University, a candidate must, in addition to the required National Senior Certificate with admission for degree purposes, comply with the specific admission requirements for particular modules and fields of study as prescribed in the admission regulations and the faculty regulations.

(b) Candidates are advised to write the Institutional Proficiency Test of the University of Pretoria.

(c) Applicants are notified in writing of provisional admission. Admission to the Faculty of Natural and Agricultural Sciences is based on the final grade 12 examination results. In the case of the BSc (Four-year programme) candidates may be considered for admission based on the final grade 12 examination results and the results of the compulsory Institutional Proficiency Test .

(d) The following persons may also be considered for admission:
  (i) A candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required National Senior Certificate with admission for degree purposes.
  (ii) A candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution.
  (iii) A candidate who passes an entrance examination, as prescribed by the University from time to time.
  Abovementioned candidates are requested to contact the Student Administration at the faculty for more information regarding admission requirements.
  Note: A conditional exemption certificate does not grant admission to bachelor's study. However, in certain circumstances some of the faculties do accept a conditional exemption on the basis of mature age. Candidates are advised to contact the specific faculty administration in this regard.

(e) The Senate may limit the number of students allowed to register for a module, in which case the Dean concerned may, at his own discretion, select from the students who qualify for admission those who may be admitted.

(f) Subject to faculty regulations and the stipulations of General Regulations G.1.3 and G.62, a candidate will only be admitted to postgraduate bachelor's degree studies, if he or she is already in possession of a recognised bachelor's degree.

(g) **Admission requirements for the Faculty of Natural and Agricultural Sciences for candidates with a National Senior Certificate:**
  To be able to gain access to the Faculty and specific programmes prospective students require the appropriate combinations of recognised NSC subjects as well as certain levels of achievement in the said subjects. In this regard the determination of an admission point score (APS) is explained and a summary of the specific requirements, i.e. the APS and the specific subjects required is provided.

Determination of an Admission Point Score (APS)
The calculation is simple and based on a candidate's achievement in six 20-credit recognised subjects by using the NSC ratings, that is the "1 to 7 scale of achievement". Thus, the highest APS that can be achieved is 42.

Life Orientation is excluded from the calculation determining the APS required for admission per faculty.

Rating code	Rating	Marks %
7	Outstanding achievement	80-100%
6	Meritorious achievement	70-79%
5	Substantial achievement	60-69%
4	Adequate achievement	50-59%
3	Moderate achievement	40-49%
2	Elementary achievement	30-39%
1	Not achieved	0-29%

Preliminary admission is based on the results obtained in the final Grade 11 examination. Final admission is based on Grade 12 results.
Please note: The final Grade 12 results will be the determining factor with regard to admission.

Alternative admission channels:
Candidates with an APS lower than required, could be considered for admission to the faculty if they meet the additional assessment criteria specified by the faculty from time to time. Preference will, however, be given to students who comply with the regular admission requirements of the faculty.

Specific requirements for the Faculty of Natural and Agricultural Sciences
1. A valid National Senior Certificate with admission for degree purposes.
2. It is recommended that all applicants write the UP Institutional Proficiency Test
3. The following minimum subject and level requirements:

Degree	APS	Group A		Group B	
		Two languages	Mathematics	Physical Science	Two other subjects
BSc in Biological Sciences (All the degrees including Medical Sciences)	30	Comply with NSC minimum require-ments; ADDITIONALLY one of these languages must be Afrikaans OR English at level 4(50-59%).	5 (60%-69%) **or** 4 (50-59%) **provided** a 5 symbol is obtained for Physical Science	5 (60%-69%) **or** 4 (50-59%) **provided** a 5 symbol is obtained for Mathematics	Any two subjects 4 (50-59%)
	There are only 72 places available in the first year of BSc (Medical Sciences). Students who apply for Medical Sciences as their first choice before 30 September will be admitted until the places have been filled. Students who indicate it as their second choice will be placed on a waiting list and will be considered in January of the first year of study, if places become available. Students who do not comply with these entrance requirements and who wrote the Institutional Proficiency Test may be considered for the BSc (Four-year programme) by the Admissions Committee.				

Degree	APS	Group A		Group B	
		Two languages	Mathematics	Physical Science	Two other subjects
BSc in Physical Sciences (Geography, Geology, Environment and Engineering Geology, Meteorology, Environmental Science, Chemistry, Physics, Geoinformatics)	30	Comply with NSC minimum require-ments; ADDITION-ALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	5 (60-69%)	5 (60-69%)	Any two subjects 4 (50-59%)
		Students who do not comply with these entrance requirements and who wrote the Institutional Proficiency Test may be considered for the BSc: Four-year programme.			

Degree	APS	Group A		Group B
		Two languages	Mathematics	Three other subjects
BConsumer Science	26	Comply with NSC minimum require-ments; ADDITIONALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	4 (50-59%)	Any three subjects 4 (50-59%)
BConsumer Science Education	26	Comply with NSC minimum requirements; ADDITIONALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	4 (50-59%)	Any three subjects 4 (50-59%)
BSc in Mathematical Sciences (Applied Mathematics, Mathematics, Mathematical Statistics)	30	Comply with NSC minimum requirements; ADDITIONALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	6 (70-79%)	Any three subjects 4 (50-59%)
		Students who do not comply with these entrance requirements and who wrote the Institutional Proficiency Test may be considered for the BSc: Four-year programme by the Admissions Committee.		
BSc in Mathematical Sciences (Actuarial and Financial Mathematics)	32	Comply with NSC minimum require-ments; ADDITIONALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	7 (80-100%)	Any 3 subjects 4 (50-59%)
		Students who do not comply with the entrance requirements of the BSc: Actuarial and Financial Mathematics and who wrote the Institutional Proficiency Test may be considered for the BSc: Mathematical Statistics or the BSc: Four-year programme.		

Degree	APS	Group A		Group B	
		Two languages	Mathematics	Physical Science	2 other subjects
BScAgric	30	Comply with NSC minimum requirements; ADDITIONALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	5 (60%-69%) **or** 4 (50-59%) **provided** a **5** symbol is obtained for Physical Science	5 (60%-69%) **or** 4 (50-59%) **provided** a **5** symbol is obtained for Mathematics	Any two subjects 4 (50-59%)
		Students who do not comply with these entrance requirements and who wrote the Institutional Proficiency Test may be considered for the BSc: Four-year programme with a view to apply to transfer to BSc(Agric) programmes after successful completion of the first year of the first year of the BSc: Four-year programme.			
BSecEd(Sci): Mathematics and Physical Sciences Education	30	Comply with NSC minimum requirements; ADDITIONALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	5 (60-69%)	5 (60-69%)	Any two subjects 4 (50-59%)
		Conditional admission: Candidates who do not comply with these entrance requirements and who achieved an APS of 30 and a rating of 4 (50-59%) for both of the subjects Mathematics and Physical Science and who wrote the Institutional Proficiency Test may be considered for placement on the BSecEd(Sci) or the BSc (Four-year programme).			
BSecEd(Sci): Biology Education	30	Comply with NSC minimum require-ments; ADDITION-ALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	5 (60%-69%) **or** 4 (50-59%) **provided** a **5** symbol is obtained for Physical Science	5 (60%-69%) **or** 4 (50-59%) **provided** a **5** symbol is obtained for Mathematics	Any two subjects 4 (50-59%)
		Students who do not comply with these entrance requirements and who wrote the Institutional Proficiency Test may be considered for the BSc (Four-year programme) with a view to apply to transfer to BSecEd(Sci) programmes after successful completion of the first year of the first year of the BSc (Four-year programme).			
BSc (Four-year programme) (Biological and Agricultural Sciences) **Institutional Proficiency Test compulsory**	22	Comply with NSC minimum requirements; ADDITIONALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	4 (50-59%) **or** 3 (40-49%) **provided** a **4** symbol is obtained for Physical Science	4 (50-59%) **or** 3 (40-49%) **provided** a **4** symbol is obtained for Mathematics	Any two subjects 4 (50-59%)

Degree	APS	Group A		Group B	
		Two languages	Mathematics	Physical Science	2 other subjects
BSc (Four-year programme) (Physical Sciences) **Institutional Proficiency Test compulsory**	22	Comply with NSC minimum requirements; ADDITIONALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	4 (50-59%) **or** 3 (40-49%) **provided a 4** symbol is obtained for Physical Science	4 (50-59%) **or** 3 (40-49%) **provided a 4** symbol is obtained for Mathematics	Any two subjects 4 (50-59%)

Degree	APS	Group A		Group B
		Two Languages	Mathematics	Three subjects
BSc (Four-year programme) (Mathematical Sciences) **Institutional Proficiency Test compulsory**	22	Comply with NSC minimum requirements; ADDITIONALLY one of these languages must be Afrikaans OR English at level 4 (50-59%).	4 (50-59%)	Any three subjects 4 (50-59%)

1.2. Requirements for specific modules

A candidate who:

(a)   passed the Grade 12 examination in Mathematics with at least 60% will be admitted to the modules GLY 155, 161 and 162 in Geology;

(b)   passed the Grade 12 examination in Mathematics with at least 50%, will be admitted to WTW 134, WTW 115 and WTW 152 and 60% for WTW114, WTW126, WTW 158 and WTW 161 in Mathematics, and to WST 111 in Mathematical Statistics (For the degree programme in Actuarial and Financial Mathematics, 80% in Mathematics is required);

(c)   passed the Grade 12 examination in Mathematics as well as in Physical Science with at least 50%, will be admitted to Molecular and Cell Biology and a module in the subjects Zoology and Entomology, Genetics, Microbiology or Plant Science;

(d)   passed the Grade 12 examination in Mathematics with at least 50%, or obtained at least 50% in STK 113 and 123 will be admitted to BME 120;

(e)   passed the Grade 12 examination in Mathematics and Physical Science with at least 50%, will be admitted to the module CMY 117, 127 and 151 in Chemistry and PHY 131 and 114 and 124 in Physics;

(f)   obtained at least 60% in Accounting on higher grade in the Grade 12 examination, may enrol immediately for INF 181, a module covering computer applications in accounting and offered for the duration of the first semester (14 weeks). All other students who have obtained at least 40% in FRK 111, must enroll for INF 181 in the second semester (14 weeks).

(g)   obtained at least 50% in Grade 12 Mathematics will be admitted for COS 131.

(h)   obtained at least 60% in Grade 12 Mathematics will be admitted for STK110. Candidates who do not qualify for STK 110, must enroll for STK 113 and STK 123.

(i)   The modules Mathematical Statistics (WST) and Statistics (STK), except for STK 281, may not be taken simultaneously in a programme.

Please note:
-       'The Grade 12 examination' refers to the final National Senior Certificate examination.
-       A student who takes a module presented by another faculty must take note of the admission requirements of that module, subminimum required in examina-tion papers, supplementary examinations, etc.

2.   Registration for a particular year of study
At the beginning of an academic year, a student registers for all the modules he or she intends taking in that particular year (whether these be first-semester, second-semester or year modules). Changes to the chosen field of study may be made at the beginning of the second semester/third quarter with the Dean's approval. A student may also only register for modules that will fit in on the lecture, test and examination timetables. Should a student be prepared to attend one module after hours to avoid clashes on the timetables, the approval of the Dean is not required. (This will only be possible if the module in question is offered full-time and extramurally). A student is allowed to register for the next year of study only if at least the equivalent of four semester modules have been passed in a particular year of study.

2.1.   Extended Programmes:
BSc (Four-year programme) – Mathematical Sciences (02130007)
BSc (Four-year programme) – Biological and Agricultural Sciences (02130008)
BSc (Four-year programme) – Physical Sciences (02130010)
(a)   These programmes are followed by students who, as a result of exceptional circumstances, will benefit from an extended programme.
(b)   Students who wish to follow one of the BSc four-year programmes will be subjected to an Institutional Proficiency Test and will be considered for admission by the Admissions Committee.
(c)   Applications for admission to the BSc (Four-year programme) should be submitted before 30 September each year. Details are obtainable from the Student Administration at the Faculty of Natural and Agricultural Sciences.
(d)   The rules and regulations applicable to the normal study programmes apply *mutatis mutandis* to the BSc (Four-year programme), with exceptions as indicated in the regulations pertaining to the BSc (Four-year programme).
(e)   Students who are admitted to one of the BSc four-year programmes register for one specific programme.

3.   Module credits for unregistered students
There are students who attend lectures, write tests and examinations and in this manner earn "marks", but have either not registered for modules or even as students at all. These marks will not be communicated to any student before he/she has provided proof of registration. A student cannot obtain any credits in a specific academic year for a module "passed" in this manner during a previous academic year and for which he/she was not registered. This arrangement applies even where the student is prepared to pay the tuition fees.

4.   Examination admission and pass requirements
Students who are registered for a module in this faculty are entitled to write the examination in that module. A final mark of at least 50% is required to pass the module.

Please note: The requirements for admission to the examination is published in the study guide and the relevant department if required to inform students of the specific requirements at the beginning of each module.

4.1. Subminima in examinations

A subminimum of 40% is required in the examination in each module. The year or semester mark of a module is obtained through continuous assessment of a student's performance during the module. A student must satisfactorily complete the practical component of the module (if applicable). The method by which the year/semester mark will be obtained, is published in the study guide of the module.

4.2. Examinations

The examinations for first-semester modules and the first- and second-quarter modules take place in May/June, while all other examinations (second-semester modules, third- and fourth-quarter modules and year modules) take place in October/November.

The final mark for the module is a combination of the year or semester mark and the examination mark, with the proviso that a module can only be passed if a subminimum of 40% is obtained in the examination and the practical component (if applicable) of the module has been satisfactorily completed. A final mark of at least 50% is required to pass a module. The year or semester mark must fall within a range of 40%-60% and the examination mark must fall within a range of 40%-60% of the final mark. Deviations from this rule can be approved by the Dean. The formula that is used to determine the final mark will be specified in the study guide of the module.

4.3. Ancillary examinations

After completion of an examination and before the examination results are published, the examiners may decide to summon a student for an ancillary examination on particular aspects of the work in that module with a view to determining:

- whether a candidate who does not comply with the requirements to pass a module could achieve a final pass mark; or
- whether a candidate, who does not comply with the requirements for a pass with distinction, will be able to improve his or her final mark.
- It is, therefore, possible that, depending on the importance a lecturer attaches to continuous evaluation, no supplementary examinations may be awarded in a certain module.
- If ancillary examinations are awarded in a module, the guidelines indicating the basis for such consideration, have to be published in the study guide of the module.

4.4. Re-marking of examination papers (also consult Reg G.14)

After an examination, departments give feedback to students about the framework that was used by the examiners during the examination. The way in which feedback is given, is determined by the departmental heads. Students may apply for re-marking of an examination paper after perusal and within 14 calendar days after commencement of lectures in the next semester. The prescribed fee has to be paid. The paper will then be re-marked by an examiner appointed by the head of the department.

4.5. Supplementary examinations

(a) Supplementary examinations in first-semester modules take place after the May/June examinations, while those in second-semester and year modules take place after the October/November examinations.

(b) To pass a supplementary examination, a student must obtain a minimum of 50%.

(c)   The highest final percentage a student can obtain in a supplementary examination is 50%.

(d)   Special supplementary examinations are not arranged for students who are unable to write the examinations at the times and venues scheduled for supplementary examinations. (Also consult Reg.G.12).

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4.6.   Academic information management (AIM 101 or AIM 111 and AIM 121)

It is a requirement for all new first-year students to register for the Academic information management modules.

7.7.   Academic literacy (EOT 110 and EOT 120)

All new first-year students are required to write a language profiency test. Based on the results of the test, a student will be enrolled in language development modules that have to be passed before the degree will be awarded. All students who pass the Academic Literacy Test have to enrol for modules of equal value to make up the credits from the following: FIL 110, FIL 155 or other language modules: AFT 110, AFR 110, ENG 110, ENG 120, EOT 161, EOT 162, EOT 164, NDE 120, SEP 110, STW 110, ZUL 110, SCI 154, SCI 164 or MTL 181.

DEGREES AND DIPLOMAS CONFERRED/AWARDED IN THE FACULTY

The following degrees and diplomas are presented in the Faculty (minimum period of study is given in brackets):

Bachelor's degrees:
Bachelor of Science – [BSc] (3 years)
Bachelor of Agricultural Science – [BScAgric] (4 years)
Bachelor of Secondary Education in Science – [BSecEdSci] (4 years)
Bachelor of Consumer Science – [BConsumer Science] (4 years)

Honours degrees: (1 year)
Bachelor of Science Honours – [BScHons]
Bachelor of Agricultural Management Honours – [BInstAgrarHons]

Master's degrees: (minimum 1 year)
Master of Science – [MSc]
Master of Agricultural Science – [MScAgric]
Master of Agricultural Management – [MInstAgrar]
Master of Consumer Science – [MConsumer Science] (minimum 2 year)

Doctoral degrees:
Doctor of Philosophy – [PhD] (minimum 1 year)
Doctor of Science – [DSc]

Diplomas:
Advanced University Diploma in Extension and Rural Development – (1 year)

BACHELOR'S DEGREES

GENERAL INFORMATION FOR DEGREES IN THE FACULTY

General Regulations G.1 to G.15 are applicable to a bachelor's degree.

Sc.1 Duration
BSc
The minimum duration of study is three years full-time study.

BScAgric, BConsumer Science, BSecEdSci, BSc in Food Management
The minimum duration of study is four years full-time study.

Sc.2 Study programmes
The curricula are compiled from the study programmes in Sc. 7 or an alternative study programme as approved by the Dean.

Sc.3 Compilation of the curriculum
BSc
A student must obtain at least 434 module credits to comply with the requirements for a BSc degree programme. At least 144 credits must be obtained at 300/400 level, or otherwise indicated by curriculum. The minimum module credits needed to comply with degree requirements is set out at the end of each study programme. A maximum of 168 credits will be recognised at 100-level. A student may, in consultation with the Dean, follow modules not indicated in BSc three-year study programmes to the equivalent of a maximum of 36 module credits. The credits allocated per quarter/semester/year to each elective module should be regarded as a guideline only and not as an instruction. It is, however, important that the total number of prescribed elective module credits are completed during the course of the study programme. The Dean may, on the recommendation of the head of department, approve deviations in this regard.
A student may not register for more than 100 module credits per semester, unless it is with the permission of the Dean.
Students who are already in possession of a bachelor's degree, will not receive credit for modules of which the content overlap with modules of the degree that was already conferred and will not receive, in any circumstance, credit for more than half the credits passed previously for an uncompleted degree. No credits at the final-year or 300- and 400-level will be approved.

BSc in Medical Science
As from 2004 the BScMedSci degree is presented in this Faculty.

NB: Due to the limited facilities, only 72 students can be admitted. Only candidates who have applied for admission by 30 September and who indicated this programme as a first choice, are provisionally admitted pending Grade 12 final results.

Promotion requirements:
A student will be promoted to the following year of study if he or she passed 100 credits of the prescribed credits for a year of study, unless the Dean on the recommendation of the head of department decides otherwise. A student who does not comply with the

requirements for promotion to the following year of study, retains the credit for the modules already passed and may be admitted by the Dean, on recommendation of the head of department, to modules of the following year of study to a maximum of 48 credits, provided that it will fit in with both the lecture and examination timetable.

BScAgric
The minimum toral of credits needed to comply with degree requirements is set out at the end of each study programme.
Students must register for elective modules in consultation with the head of department who must ensure that the modules do not clash on the set timetable.
The Dean may, in exceptional cases and on recommendation of the head of department, approve deviations from the prescribed curriculum.

Promotion requirements:
A student will be promoted to the following year of study if he or she passed 100 credits of the prescribed credits for a year of study, unless the Dean on the recommendation of the head of department decides otherwise. A student who does not comply with the requirements for promotion to the following year of study, retains the credit for the modules already passed and may be admitted by the Dean, on recommendation of the head of department, to modules of the following year of study to a maximum of 48 credits, provided that it will fit in with both the lecture and examination timetable.

BConsumer Science
Promotion requirements:
All the degrees in Consumer Science
A student who did not pass all the prescribed modules of a particular year of study, has to register for the outstanding modules first. With the approval of the head of the department, modules of the following year of study may be taken in advance only if no timetable clashes occur; all the requirements and prerequisites have been met and not more than a specified number of credits per semester are taken. The credits of the semester of which modules are repeated, are taken as a guideline for the calculation of the number of modules permitted.
(a)   A student registers for the second year when at least 80% of the first-year module credits have been passed.
(b)   A student registers for the third year when at least 85% of the module credits of the previous years have been passed.
(c)   A student registers for the fourth year when at least 95% of the module credits of the previous years have been passed.

BSecEdSci
See Sc.6.2

BSc (Four-year programme)
Three extended programmes are available:
BSc (Four-year programme) – Mathematical Sciences (02130007),
BSc (Four-year programme) – Biological and Agricultural Sciences (02130008) as well
BSc (Four-year programme) – Physical Sciences (02130010).
Students who do not comply with the normal three-year BSc entrance requirements for study in the Faculty of Natural and Agricultural Sciences, may nevertheless be admitted to the Faculty by being placed on the BSc (Four-year programme). Generally the BSc (Four-year programme) means that first study year in Mathematics, Physics, Biology and Chemistry is extended to take two years. After completing the BSc (Four-year

programme) successfully, students join the second year of the normal BSc programme to complete their degrees. The possibility of switching over to other faculties such as Engineering, Built Environment and Information Technology, Veterinary Science and Health Sciences, after one or two years in the four-year programme, exists. This depends on selection rules and other conditions stipulated by the other faculties.

Applications for admission to the BSc (Four-year programme) must be submitted annually before 30 September. All students considered for the BSc (Four-year programme) must have written an Institutional Proficiency Test . Information in this regard is available at the Client Services Centre. In addition all rules and regulations applicable to the normal study programmes, apply *mutatis mutandis* to the BSc (Four-year programme), with exceptions stated in the regulations for the BSc (Four-year programme). For instance, students placed in the BSc (Four-year programme) must have a National Senior Certificate with admission for degree purposes.

An admissions committee considers applications for the BSc (Four-year programme) annually. Regarding subject choices, admitted students are individually placed on the BSc (Four-year programme) according to their prospective field of study. Students may NOT change this placement without the permission of the Chairperson of the admissions committee.

Curriculum
The following available modules as indicated below, are prescribed modules for a BSc (Four-year programme) and the equivalence to the first-year modules of the normal BSc programme:

BSc (Four-year programme) – Mathematical Sciences		02130007

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM111	**Academic information management 111**	S1	0	2	4
COS133	**Introduction to programming 133** Prerequisite/s: as for the BSc (IT) (Four-year programme)	S1	2	2	8
LST133	**Language, life and study skills 133** Prerequisite/s: As for BSc (Four-year programme)	S1	1	0	8
WST133	**Mathematical statistics 133** Prerequisite/s: At least 3 (40-49%) in Mathematics in Grade 12 examination. To be taken concurrently with WTW133	S1	2	2	8
WTW133	**Precalculus 133** Prerequisite/s: As for BSc (Four-year programme)	S1	5	1	8
Total credits for compulsory modules					**36**

An elective can be chosen from the modules FRK133, CMY133, PHY133 or MLB133
Compulsory credits = (36) Elective credits = (8) Total credits = (44)

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM121	**Academic information management 121**	**S2**	**0**	**2**	**4**
COS143	**Introduction to programming 2 143** Prerequisite/s: COS133	**S2**	**2**	**2**	**8**
LST143	**Language, life and study skills 143** Prerequisite/s: LST133	**S2**	**1**	**0**	**8**
WST143	**Mathematical statistics 143** Prerequisite/s: WTW133 and WST133. To be taken concurrently with WTW143	**S2**	**4**	**1**	**8**
WTW143	**Calculus 143** Prerequisite/s: WTW133	**S2**	**4**	**1**	**8**
	Total credits for compulsory modules				**36**
An elective can be chosen from the modules FRK143, CMY143, PHY143 or MLB143 based on the elective chosen from the first semester					
	Compulsory credits = (36) Elective credits = (8) Total credits = (44)				
	Compulsory credits = (72) Elective credits = (16) Total credits = (88)				

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
COS153	**Introduction to programming 3** Prerequisite/s: COS 133 and COS143	**S1**	**2**	**2**	**8**
WST153	**Mathematical statistics 153** Prerequisite/s: WST133 GS and WST143 GS	**S1**	**4**	**1**	**8**
WTW153	**Calculus 153** Prerequisite/s: WTW143	**S1**	**4**	**1**	**8**
With regard to the rest of the third semester modules(second year, first semester) and the second semester, prescribed modules must be selected from the normal BSc programme of your choice.					

BSc (Four-year programme) – Biological and Agricultural Sciences	**ADM**	**02130008**

First year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM111	**Academic information management 111**	**S1**	**0**	**2**	**4**
CMY133	**Chemistry 133** Prerequisite/s: As for BSc (Four-year programme)	**S1**	**2**	**0**	**8**
LST133	**Language, life and study skills 133** Prerequisite/s: As for BSc (Four-year programme)	**S1**	**1**	**0**	**8**
MLB133	**Molecular and cell biology 133** Prerequisite/s: As for BSc (Four-year programme)	**S1**	**2**	**2**	**8**

PHY133	Physics 133 Prerequisite/s: As for BSc (Four-year programme)	S1	2	2	8
WTW133	Precalculus 133 Prerequisite/s: As for BSc (Four-year programme)	S1	5	1	8
	Total credits for compulsory modules				**44**

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM121	**Academic information management 121**	S2	0	2	4
CMY143	**Chemistry 143** Prerequisite/s: CMY133	S2	2	0	8
LST143	**Language, life and study skills 143** Prerequisite/s: LST133	S2	1	0	8
MLB143	**Molecular and cell biology 143** Prerequisite/s: MLB133	S2	2	2	8
PHY144	**Physics 144** Prerequisite/s: PHY133	S2	2	2	8
WTW144	**Calculus 144** Prerequisite/s: WTW133	S2	4	1	8
	Total credits for compulsory modules				**44**
	Compulsory credits = (88) Elective credits = (0)				

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY154	**Chemistry 154** Prerequisite/s: CMY143	S1	3	0	8
MLB153	**Molecular and cell biology 153** Prerequisite/s: MLB143	S1	2	2	8
PHY154	**Physics 154** Prerequisite/s: PHY144	S1	3	2	8
WTW154	**Finite mathematics 154** Prerequisite/s: WTW144	S1	4	1	8
	Total credits for compulsory modules				**32**
	Compulsory credits = (88) Elective credits = (0)				

With regard to the rest of the third semester modules(second year, first semester) and the second semester, prescribed modules must be selected from the normal BSc programme of your choice.

BSc (Four-year programme) – Physical Sciences	WTW	02130010

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM111	**Academic information management 111**	S1	0	2	4
CMY133	**Chemistry 133** Prerequisite/s: As for BSc (Four-year programme)	S1	2	0	8

LST133	**Language, life and study skills 133** Prerequisite/s: As for BSc (Four-year programme)	**S1**	**1**	**0**	**8**
PHY133	**Physics 133** Prerequisite/s: As for BSc (Four-year programme)	**S1**	**2**	**2**	**8**
WTW133	**Precalculus 133** Prerequisite/s: As for BSc (Four-year programme)	**S1**	**5**	**1**	**8**
	Total credits for compulsory modules				**36**

An elective can be chosen from modules COS133, or MLB133, or WST133

Compulsory credits = (36) Elective credits = (8) Total credits = (44)

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM121	**Academic information management 121**	**S2**	**0**	**2**	**4**
CMY143	**Chemistry 143** Prerequisite/s: CMY133	**S2**	**2**	**0**	**8**
LST143	**Language, life and study skills 143** Prerequisite/s: LST133	**S2**	**1**	**0**	**8**
PHY143	**Physics 143** Prerequisite/s: PHY133	**S2**	**2**	**2**	**8**
WTW143	**Calculus 143** Prerequisite/s: WTW133	**S2**	**4**	**1**	**8**
	Total credits for compulsory modules				**36**

An elective module can be chosen from modules COS143, MLB143 or WST143 based on the elective chosen from the first semester

Compulsory credits = (36) Elective credits = (8) Total credits = (44)

Compulsory credits = (72) Elective credits = (16) Total credits = (88)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY154	**Chemistry 154** Prerequisite/s: CMY143	**S1**	**3**	**0**	**8**
PHY153	**Physis 153** Prerequisite/s: PHY143	**S1**	**3**	**2**	**8**
WTW153	**Calculus 153** Prerequisite/s: WTW143	**S1**	**4**	**1**	**8**

With regard to the rest of the third semester modules(second year, first semester) and the second semester, prescribed modules must be selected from the normal BSc programme of your choice.

Prescribed: CMY133 Chemistry 133, CMY143 Chemistry 143 and CMY154 Chemistry 154: Equivalent module – a BSc First-semester prescribed module: CMY117.
Physics modules
For students in biological study directions: PHY133 Physics 133, PHY144 Physics 144 and PHY154 Physics 154 Equivalent module: PHY131.

For students who want to study Physical Sciences and engineering: PHY133 Physics 133, PHY143 Physics 143, PHY153 Physics 153 Equivalent module: FSK 116 (or FSK 176)

For all other students: PHY133 Physics 133, PHY143 Physics 143, PHY153 Physics 153, PHY 163 General physics: Equivalent modules: PHY114 and PHY124.

Prescribed: WTW133 Precalculus 133, WTW143 Calculus 143 and WTW153 Calculus 153: Equivalent module – a BSc First-semester prescribed module: WTW114.

For students in biological study directions: WTW133 Precalculus 133, WTW144 Calculus 144 and WTW154 Finite mathematics 154: Equivalent module WTW134 Mathematics 134

Prescribed: MLB133 Molecular and cell biology 133, MLB143 Molecular and cell biology, MLB153 Molecular and cell biology 153: Equivalent module – a BSc First-semester prescribed module: MLB111 Molecular and cell biology 111.

NB! Students may register for an extended module (e.g: codes: PHY133, PHY143, PHY153 and PHY163 module codes) only once.

Compulsory modules:
AIM111 and AIM121 Academic information management modules, 4 + 4 credits.
LST133 and LST 143 Academic literacy, 8+ 8 credits.

All new students must register for the academic literacy modules LST.

Academic promotion requirements
General
All students whose academic progress is not acceptable can be suspended from further studies.

- A student who is excluded from further studies in terms of the stipulations of the abovementioned regulations, will be notified in writing by the Dean or Admissions Committee at the end of the relevant semester.
- A student who has been excluded from further studies may apply in writing to the Admissions Committee of the Faculty of Natural and Agricultural Sciences for re-admission.
- Should the student be re-admitted by the Admissions Committee, strict conditions will be set which the student must comply with in order to proceed with his/her studies.
- Should the student not be re-admitted to further studies by the Admissions Committee, he/she will be informed in writing.
- Students who are not re-admitted by the Admissions Committee have the right to appeal to the Senior Appeals Committee.
- Any decision taken by the Senior Appeals Committee is final.

Specific
BSc (Four-year programme):
It is expected of students who register for the first year of the BSc (Four-year programme) to pass all the prescribed modules of the first year;

It is expected of students accepted into the BSc (Four-year programme) to finish a complete corresponding BSc first year within the two years of enrolment in the BSc (Four-year programme). Students who do not show progress during the first semester of the first year will be referred to the Admissions Committee of the Faculty.

By the end of year 1 semester 2, a student must have passed at least 4 of the 5 prescribed semester 2 modules. The final mark in the module failed must not be lower

than 40% allowing the student to write a special exam in this subject early in the following year. This exam must be passed in order to register for the second year of the programme.

Sc.4 Special examinations in the Faculty of Natural and Agricultural Sciences
A student who requires a maximum of two modules and not more than 36 credits outstanding to comply with all the requirements for the degree, may be admitted by the Dean, on the recommendation of the head of department, to special examinations in modules failed, provided that this will enable him or her to comply with all the degree requirements. A student who has obtained a final mark of less than 40% in any one of the relevant modules, or who has previously been admitted to a special examination, does not qualify for this concession.

Sc.5 Degree with distinction
BSc
A student obtains his or her degree with distinction if all prescribed modules at 300 level (or higher) are passed in one academic year with a weighted average of at least 75%, and obtain at least a subminimum of 65% in each of the relevant modules.

BSc (Food Management)
A student obtains his or her degree with distinction if a weighted average of at least 75% is obtained in the following modules:
Recipe development and standardisation 413
Foods 423
Food research project 426
Food service management 410
Food science and technology 413

BScAgric
The BScAgric degree is conferred with distinction if a student obtains a weighted average of at least 75% in the modules of the major subjects in the third and the fourth year of study, with a weighted average of at least 65% in the other modules of the third and the fourth year of study.

BConsumer Science
A student obtains his or her degree with distinction if a weighted average of at least 75% is obtained in the following modules:
- **Clothing: Clothing Retail Management:**
  A combination equivalent to six semester modules
  Marketing management 314 and 321
  Clothing 410 and 420
  Clothing production 321, 411
  Project: Clothing textile project 402
  Textiles 421

- **Food Management: Food Retail Management:**
  A combination equivalent to six semester modules:
  Marketing management 314 and 321
  Food service management 410
  Consumer food research 310
  Food safety and hygiene 354
  Recipe development and standardisation 413

Visual merchandising of foods 415
Foods 423
Project: Visual merchandising of foods 425
Food research project 426

- **Hospitality Management:**
  A combination equivalent to six semester modules
  Tourism management 310
  Project hospitality management 410, 420
  Large-scale food production and restaurant management 322
  Recipe development and standardisation 413
  Culinary art 414, 424
  Food service management 410

- **Interior Merchandise Management: Interior Retail Management:**
  A combination equivalent to six semester modules:
  Marketing management 311 and 321
  Interior planning 322, 410
  Interior production 310
  Interior merchandise 311
  Interior project 481
  Consumer facilitation 411

- **Education:**
  Consumer Studies:
  The degree is conferred with distinction on a student who obtains a weighted average of at least 75% in the following modules:
  Subject didactics: Consumer studies 400
  Professional portfolio 400
  Interior merchandise 311
  Interior planning 320
  Nutrition during life cycle 321
  Large-scale food production and restaurant management 322

- **Hospitality Studies:**
  The degree is conferred with distinction on a student who obtains a weighted average of at least 75% in the following modules:
  Subject didactics: Hospitality studies 400
  Professional portfolio 400
  and any other four of the following:
  Food service management 321
  Nutrition 311
  Large-scale food production and restaurant management 322
  Culinary art 414, 424
  Tourism management 310

BSecEdSci
See Sc.6.2

Sc.6 DEGREE PROGRAMMES

The curriculum is composed of one of the following study programmes. The Dean may, on the recommendation of the programme manager, approve deviations in this regard.

Sc.6.1   GENERAL INFORMATION

- Where elective modules are not specified, these may be chosen from any modules appearing in the list of modules.

lpw/ppw: lectures per week/ practicals per week (e.g.: 3+1 = 3 lectures and 1 practical per week)

Quarter: The quarter in which the specific module is presented.

J1 = the whole year (year module: extends over two semesters)

S1 = the first semester (Q1 + Q2)

S2 = the second semester (Q3 + Q4)

K1 = first quarter

K2 = second quarter

K3 = third quarter

K4 = fourth quarter

Credits: Credit value of a module.

: Module must be taken before or together with the module for which it is a prerequisite.

Prerequisite modules: clarification		**Minimum requirements**
[ ]	Code in brackets: [AGR313]	Obtained a minimum of 50%
#	Code followed by #: AGR313#	Concurrent registration
GS	Code followed by GS: AGR313GS	Average of 40% - 49%

TDH: Approval from the head of department is required to register for the module.

Par 1.2: Refers to the admission requirements for specific modules that appear at the beginning of this publication.

Field of study	Dept	Code
BSc in Actuarial and Financial Mathematics	**WTW**	**02133388**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
COS132	Imperative programming 132	S1	4	1	16
EKN113	Economics 113 Prerequisite/s: At least 6(70-79%) in Mathematics in the Grade 12 examination or STK113 (60%) and STK123 (60%)	S1	3	0	15
EOT110	Academic literacy(1) 110	S1	2	0	6
FBS112	Financial management 112 Prerequisite/s: Par 1.2	S1	3	0	10
WST111	Mathematical statistics 111 Prerequisite/s: Par 1.2	S1	4	1	16
WTW114	Calculus 114 Prerequisite/s: Par 1.2	S1	4	1	16
Total credits for compulsory modules					**79**

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	Academic information management 101 *	S2	0	2	6
EKN123	Economics 123 Prerequisite/s: EKN113 GS and at least 6(70-79%) in Mathematics in the Grade 12 examination or STK113 (60%) and STK123 (60%)	S2	3	0	15
EOT120	Academic literacy(2) 120	S2	2	0	6
FBS122	Financial management 122 Prerequisite/s: Par 1.2	S2	3	0	10
WST121	Mathematical statistics 121 Prerequisite/s: WST111 GS	S2	4	1	16
WTW123	Numerical analysis 123 Prerequisite/s: WTW114 GS	S2	2	1	8
WTW126	Linear algebra 126 Prerequisite/s: Par 1.2	S2	2	1	8
WTW128	Calculus 128 Prerequisite/s: WTW114 GS	S2	2	1	8
Total credits for compulsory modules					**77**

* Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content spaced over 2 semesters)

Compulsory credits = (156) Elective credits = (0)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
IAS211	Actuarial mathematics 211 Prerequisite/s: WTW114 60% and WTW128 60%	S1	2	1	12

INF214	Informatics 214 Prerequisite/s: AIM101 or AIM111 and AIM 121	S1	3	2	14
WST211	Mathematical statistics 211 Prerequisite/s: WST111 and WST121 and WTW114 GS and WTW126 GS and WTW128 GS	S1	4	2	24
WTW211	Linear algebra 211 Prerequisite/s: WTW126	S1	2	1	12
WTW218	Calculus 218 Prerequisite/s: WTW114 and WTW128	S1	2	1	12
WTW286	Differential equations 286 Prerequisite/s: WTW114 and WTW126 and WTW128	S1	2	1	12
	Total credits for compulsory modules				**86**

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
IAS221	Actuarial mathematics 221 Prerequisite/s: IAS211 GS	S2	2	1	12
WST221	Mathematical statistics 221 Prerequisite/s: WST211 GS	S2	4	2	24
WTW220	Analysis 220 Prerequisite/s: WTW114 and WTW128	S2	2	1	12
WTW221	Linear algebra 221 Prerequisite/s: WTW211	S2	2	1	12
	Total credits for compulsory modules				**60**

Elective module : IAS282. (Only for non-degree purposes)

Compulsory credits = (146) Elective credits = (0)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
WST311	Multivariate analysis 311 Prerequisite/s: WST211 and WST221 and WTW211 GS and WTW218 GS	S1	2	1	18
WTW310	Analysis 310 Prerequisite/s: WTW220	S1	2	1	18
WTW354	Financial engineering 354 Prerequisite/s: WST211 and WTW211 and WTW218	S1	2	1	18
	Total credits for compulsory modules				**54**

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
WST321	Time series analysis 321 Prerequisite/s: WST211 and WST221 and WST311 GS and WTW211 GS and WTW218 GS	S2	2	1	18
WTW364	Financial engineering 364 Prerequisite/s: WST211 and WTW126 and WTW218 and WTW286	S2	2	1	18
	Total credits for compulsory modules				**36**

Elective modules : IAS361, IAS382, WST312, WST322, WTW320, WTW382, WTW383, WTW386. All 72 elective credits must be on 3rd year level.

Compulsory credits = (90) Elective credits = (72) Total credits = (162)
A minimum of (464) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Animal Science	**VKU**	**03134002**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	**General physics 131** Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				70

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	S2	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	**Academic literacy(2) 120**	S2	2	0	6
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
VKU120	**Animal science 120**	S2	2	0.5	8
	Total credits for compulsory modules				76

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9

Code	Name	Trm	lpw	ppw	Crdt
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
DAF200	**Animal anatomy and physiology 200** Prerequisite/s: CMY127 or TDH	**J1**	**4**	**1**	**18**
GKD250	**Introductory soil science 250** Prerequisite/s: CMY117 GS or TDH	**S1**	**3**	**1**	**12**
GTS251	**Gene and chromosome organisation 251** Prerequisite/s: GTS161 GS or TDH	**S1**	**2**	**0.5**	**12**
PPK251	**Sustainable production systems 251** Prerequisite/s: BOT161	**S1**	**2**	**0.5**	**12**
VKU210	**Animal science 210** Prerequisite/s: VKU120 GS	**S1**	**2**	**0.5**	**8**
Total credits for compulsory modules					**86**

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**2**	**0**	**9**
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**0**	**0.5**	**3**
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**2**	**0**	**9**
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**0**	**0.5**	**3**
DAF200	**Animal anatomy and physiology 200** Prerequisite/s: CMY127 or TDH	**J1**	**4**	**1**	**18**
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	**S2**	**2**	**0.5**	**12**
VDG260	**Nutrition 260** Prerequisite/s: CMY127	**S2**	**3**	**0.5**	**12**
VKU220	**Animal science 220** Prerequisite/s: VKU210 GS or TDH	**S2**	**2**	**0.5**	**12**
Total credits for compulsory modules					**78**
Compulsory credits = (164) Elective credits = (0)					

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM355	**Immunobiology 355** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	1	0.5	9
BME210	**Biometry 210** Prerequisite/s: BME120	S1	4	1	24
DAN310	**Animal anatomy 310** Prerequisite/s: DAF200	S1	1	0.5	8
DFS311	**Animal physiology 311** Prerequisite/s: DAF200	S1	2	0	10
LEK251	**Introduction to financial management in agriculture 251**	K1	3	0	6
LEK252	**Introduction to agricultural production economics 252** Prerequisite/s: LEK251	K2	3	0	6
RPL310	**Reproduction science 310** Prerequisite/s: DAF200	S1	1	0.5	8
VGE301	**Nutrition science 301** Prerequisite/s: BCM263 and BCM264 and BCM265 and BCM266 and DAF200 and VDG260 and VKU220	J1	3	0.5	16
WDE310	**Principles of veld management 310**	S1	2	0.5	14
Total credits for compulsory modules					**101**

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM363	**Xeno biochemistry 363** Prerequisite/s: BCM265	K4	1	0	5
DFS320	**Growth physiology 320** Prerequisite/s: DFS311 and DAN310	S2	2	0.5	10
RPL320	**Reproduction science 320** Prerequisite/s: RPL310	S2	2	0.5	10
TLR320	**Animal breeding 320** Prerequisite/s: GTS261	S2	2	0.5	10
VGE301	**Nutrition science 301** Prerequisite/s: BCM263 and BCM264 and BCM265 and BCM266 and DAF200 and VDG260 and VKU220	J1	3	0.5	16
VKU362	**Animal science biotechnology 362** Prerequisite/s: GTS261	S2	1	0	8
WDE320	**Planted pastures and foddercrops 320** Prerequisite/s: WDE310	S2	2	0.5	14
Total credits for compulsory modules					**73**

Compulsory credits = (174) Elective credits = (0)
A minimum of (484) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Applied Mathematics	**WTW**	**02133252**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
EOT110	**Academic literacy(1) 110**	**S1**	**2**	**0**	**6**
WST111	**Mathematical statistics 111** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
WTW114	**Calculus 114** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
WTW115	**Discrete structures 115** Prerequisite/s: Par 1.2	**S1**	**2**	**1**	**8**
WTW152	**Mathematical modelling 152** Prerequisite/s: Par 1.2	**S1**	**2**	**1**	**8**
Total credits for compulsory modules					**54**

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	**S2**	**0**	**2**	**6**
EOT120	**Academic literacy(2) 120**	**S2**	**2**	**0**	**6**
WST121	**Mathematical statistics 121** Prerequisite/s: WST111 GS	**S2**	**4**	**1**	**16**
WTW123	**Numerical analysis 123** Prerequisite/s: WTW114 GS	**S2**	**2**	**1**	**8**
WTW126	**Linear algebra 126** Prerequisite/s: Par 1.2	**S2**	**2**	**1**	**8**
WTW128	**Calculus 128** Prerequisite/s: WTW114 GS	**S2**	**2**	**1**	**8**
WTW162	**Dynamical processes 162** Prerequisite/s: WTW114 GS	**S2**	**2**	**1**	**8**
Total credits for compulsory modules					**60**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (114) Elective credits = (32) Total credits = (146)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
WTW211	**Linear algebra 211** Prerequisite/s: WTW126	**S1**	**2**	**1**	**12**
WTW218	**Calculus 218** Prerequisite/s: WTW114 and WTW128	**S1**	**2**	**1**	**12**
WTW286	**Differential equations 286** Prerequisite/s: WTW114 and WTW126 and WTW128	**S1**	**2**	**1**	**12**
Total credits for compulsory modules					**36**

Second year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
WTW220	**Analysis 220** Prerequisite/s: WTW114 and WTW128	**S2**	**2**	**1**	**12**

WTW221	Linear algebra 221 Prerequisite/s: WTW211	S2	2	1	12
WTW248	Vector analysis 248 Prerequisite/s: WTW218	S2	2	0	12
WTW285	Discrete structures 285 Prerequisite/s: WTW115	S2	2	1	12
	Total credits for compulsory modules				48
	Compulsory credits = (84) Elective credits = (60) Total credits = (144)				

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
WTW310	Analysis 310 Prerequisite/s: WTW220	S1	2	1	18
WTW382	Dynamical systems 382 Prerequisite/s: WTW218 and WTW286	S1	2	1	18
WTW386	Partial differential equations 386 Prerequisite/s: WTW248 and WTW286	S1	2	1	18
	Total credits for compulsory modules				54

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
WTW383	Numerical analysis 383 Prerequisite/s: WTW114 and WTW128 and WTW211	S2	2	1	18
WTW387	Continuum mechanics 387 Prerequisite/s: WTW248 and WTW286	S2	2	1	18
	Total credits for compulsory modules				36

Elective credits : A minimum of 54 elective credits at 100 to 300 level can be chosen from any WTW and WST modules. The remainder of the electives at 100 to 300 level can be chosen from any other modules in the list of modules of this faculty.

Compulsory credits = (90) Elective credits = (54) Total credits = (144)

A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Biochemistry	**BCM**	**03133001**

First year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY117	General chemistry 117 Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	Academic literacy(1) 110	S1	2	0	6
MLB111	Molecular and cell biology 111 Prerequisite/s: Par 1.2	S1	4	1	16

PHY131	General physics 131 Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	Mathematics 134 Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				**70**

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	**Academic information management 101***	S2	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	**Academic literacy(2) 120**	S2	2	0	6
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
ZEN161	**Animal diversity 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
	Total credits for compulsory modules				**76**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM271	**Biochemistry practical 271** Prerequisite/s: BCM253# en BCM254# and BCM255# and BCM256# and BCM263# and BCM264# and BCM265# and BCM266# and CMY283# and CMY284#	J1	0	1	6
CMY282	**Physical chemistry 282** Prerequisite/s: CMY117 and CMY127	K1	2	0.5	12

CMY284	Organic chemistry 284 Prerequisite/s: CMY117 and CMY127	K2	2	0.5	12
	Total credits for compulsory modules				**54**

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM271	**Biochemistry Practical 271** Prerequisite/s: BCM253# en BCM254# and BCM255# and BCM256# and BCM263# and BCM264# and BCM265# and BCM266# and CMY283# and CMY284#	J1	0	1	6
CMY283	**Anatical chemistry 283** Prerequisite/s: CMY117 and CMY127	K3	2	0.5	12
CMY285	**Inorganic chemistry 285** Prerequisite/s: CMY117 and CMY127	K4	2	0.5	12
	Total credits for compulsory modules				**54**
Electives can be chosen from Genetics, Microbiology, Human Physiology, Plant Science or Zoology.					
	Compulsory credits = (108) Elective credits = (48) Total credits = (156)				

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM351	**Biochemistry of proteins 351** Prerequisite/s: BCM253 and BCM254	K1	2	1	9
BCM352	**Proteome analysis 352** Prerequisite/s: BCM253 and BCM254 and BCM351 GS	K2	2	1	9
BCM354	**Biochemistry of nucleic acids 354** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	1	0.5	9
BCM355	**Immunobiology 355** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	1	0.5	9
	Total credits for compulsory modules				**36**

Third year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM362	Nutritional biochemistry 362 Prerequisite/s: BCM265	K3	1	0	4
BCM363	Xeno biochemistry 363 Prerequisite/s: BCM265	K4	1	0	5
BCM364	Building the cell 364	S2	1	0.5	9
BCM365	Immunobiochemistry 365 Prerequisite/s: BCM355 GS	S2	1	0.5	9
BCM366	Enzymology 366	S2	1	1	9
	Total credits for compulsory modules				36

Electives can be chosen from Chemistry, Genetics, Microbiology, Human Physiology, Plant Science or Zoology.

Compulsory credits = (72) Elective credits = (72) Total credits = (144)

A minimum of (446) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Biological Sciences	**ADM**	**03130001**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	General chemistry 117 Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	Academic literacy(1) 110	S1	2	0	6
MLB111	Molecular and cell biology 111 Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	General physics 131 Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	Mathematics 134 Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				70

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	Academic information management 101	S2	0	2	6
BME120	Biometry 120 Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	Plant biology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	General chemistry 127 Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	Academic literacy(2) 120	S2	2	0	6
GTS161	Introductory genetics 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	Introduction to microbiology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8

ZEN161	**Animal diversity 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
	Total credits for compulsory modules				**76**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Generic first-year modules in Biological Sciences: Students who are going to apply for the 20-30 MBChD, or the 2-3 BChD places that become available in the second term, may enroll for FIL155, MGW112 and MTL181 instead of WTW134 in the first semester,under the condition that, should they not be selected and want to continue with BSc, WTW134 be taken in the second semester.
Compulsory credits = (146) Elective credits = (0)

Field of study	Dept	Code
BSc in Biotechnology	**GTS**	**03133052**

First year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
EOT110	**Academic literacy(1) 110**	**S1**	**2**	**0**	**6**
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
PHY131	**General physics 131** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
Totals for compulsory					**70**

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	**Academic information management 101***	**S2**	**0**	**2**	**6**
BME120	**Biometry 120** Prerequisite/s: Par 1.2	**S2**	**4**	**1**	**16**
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	**S2**	**4**	**1**	**16**
EOT120	**Academic literacy(2) 120**	**S2**	**2**	**0**	**6**
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
ZEN161	**Animal diversity 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
Total credits for compulsory modules					**76**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BOT251	**South African flora and vegetation 251** Prerequisite/s: BOT161 or TDH	S1	2	1	12
GTS251	**Gene and chromosome organisation 251** Prerequisite/s: GTS161 GS or TDH	S1	2	0.5	12
MBY251	**Growth, diversity and control of bacteria 251** Prerequisite/s: MBY161 GS	S1	2	1	12
Total credits for compulsory modules					**60**

Second year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	S2	2	1	12
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	S2	2	0.5	12

MBY261	Growth activity and control of fungi 261 Prerequisite/s: MBY161	S2	2	1	12
	Total credits for compulsory modules				**60**

Electives may be chosen from ZEN251 and ZEN261 or PLG251 and PLG262 or GKD250 and GKD225 or DAF200 or BME210 or other module/s subject to TDH.
Compulsory credits = (120) Elective credits = (24) Total credits = (144)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM351	**Biochemistry of proteins 351** Prerequisite/s: BCM253 and BCM254	K1	2	1	9
BCM354	**Biochemistry of nucleic acids 354** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	1	0.5	9
GTS352	**Genomes 352** Prerequisite/s: GTS251 GS and GTS261 GS or TDH	S1	2	1	18
	Total credits for compulsory modules				**36**

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
MBY364	**Genetic manipulation of microbes 364** Prerequisite/s: BCM253 and BCM254 and CMY127 and MBY161	S2	2	1	18
	Total credits for compulsory modules				**18**

Contact the Department of Genetics for information regarding elective modules.
Compulsory credits = (18) Elective credits = (126) Total credits = (144)
A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Chemistry	**CMY**	**02133172**

First year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
PHY114	**First course in physics 114** Prerequisite/s: Par 1.2	S1	4	1	16
WTW114	**Calculus 114** Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				**54**

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	**Academic information management 101***	S2	0	2	6
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	**Academic literacy(2) 120**	S2	2	0	6
PHY124	**First course in physics 124** Prerequisite/s: WTW114 GS and PHY114 GS	S2	4	1	16
WTW126	**Linear algebra 126** Prerequisite/s: Par 1.2	S2	2	1	8
WTW128	**Calculus 128** Prerequisite/s: WTW114 GS	S2	2	1	8
Total credits for compulsory modules					60
* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)					

Compulsory credits = (114) Elective credits = (32) Total credits = (146)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY282	**Physical chemistry 282** Prerequisite/s: CMY117 and CMY127	K1	2	0.5	12
CMY284	**Organic chemistry 284** Prerequisite/s: CMY117 and CMY127	K2	2	0.5	12
Total credits for compulsory modules					24

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY283	**Analytical chemistry 283** Prerequisite/s: CMY117 and CMY127	K3	2	0.5	12
CMY285	**Inorganic chemistry 285** Prerequisite/s: CMY117 and CMY127	K4	2	0.5	12
Total credits for compulsory modules					24

Electives can be chosen from modules in the following departments: Geography, Geoinformatics and Meteorology, Geology, Biochemistry, Zoology and Entomology, Physics, Plant Science, Computer Science, Mathematics and Applied Mathematics.

Compulsory credits = (48) Elective credits = (96) Total credits = (144)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY383	**Analytical chemistry 383** Prerequisite/s: CMY282 and CMY283 and CMY284 and CMY285	K1	4	1	18

CMY385	Inorganic chemistry 385 Prerequisite/s: CMY282 and CMY283 and CMY284 and CMY285	K2	4	1	18
	Total credits for compulsory modules				**36**

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY382	**Physical chemistry 382** Prerequisite/s: CMY282 and CMY283 and CMY284 and CMY285	K4	4	1	18
CMY384	**Organic chemistry 384** Prerequisite/s: CMY282 and CMY283 and CMY284 and CMY285	K3	4	1	18
	Total credits for compulsory modules				**36**

Compulsory credits = (72) Elective credits = (72) Total credits = (144)
A minimum of (434) credits is required to obtain the degree.

Field of study	**Dept**	**Code**
BSc in Ecology	**ZEN**	**03133031**

First year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	**General physics 131** Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				**70**

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	**Academic information management 101***	S2	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	**Academic literacy(2) 120**	S2	2	0	6
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8

ZEN161	Animal diversity 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
Total credits for compulsory modules					76

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BOT251	**South African flora and vegetation 251** Prerequisite/s: BOT161 or TDH	S1	2	1	12
GKD250	**Introductory soil science 250** Prerequisite/s: CMY117 GS or TDH	S1	3	1	12
GTS251	**Gene and chromosome organisation 251** Prerequisite/s: GTS161 GS or TDH	S1	2	0.5	12
MBY251	**Growth, diversity and control of bacteria 251** Prerequisite/s: MBY161 GS	S1	2	1	12
ZEN251	**Invertebrate biology 251** Prerequisite/s: ZEN161 GS or TDH	K1	4	1	12
	Total credits for compulsory modules				72

Second year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	S2	2	1	12
GLY161	**Historical geology 161** Prerequisite/s: Par 1.2	K4	4	1	8
GLY162	**Environmental geology 162** Prerequisite/s: Par 1.2	K3	4	1	8
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	S2	2	0.5	12
MBY261	**Growth activity and control of fungi 261** Prerequisite/s: MBY161	S2	2	1	12
ZEN261	**African vertebrates 261** Prerequisite/s: ZEN161 GS or TDH	K3	4	1	12
	Total credits for compulsory modules				64

Compulsory credits = (136) Elective credits = (10) Total credits = (146)

Third year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BOT356	Plant ecophysiology 356 Prerequisite/s: BOT161 or TDH	S1	2	1	18
BOT358	Plant ecology 358 Prerequisite/s: BOT161 or TDH	S1	2	1	18
ZEN351	Population ecology 351	K1	4	2	18
ZEN353	Community ecology 353	K2	4	2	18
Total credits for compulsory modules					72

Third year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
BOT366	Plant diversity 366 Prerequisite/s: BOT161 or TDH	S2	2	1	18
ZEN361	Ecophysiology 361	K3	4	2	18
ZEN362	Evolution and phylogeny 362	K3	4	2	18
ZEN364	Conservation ecology 364	K4	4	2	18
Total credits for compulsory modules					72

Compulsory credits = (144) Elective credits = (0)
A minimum of (436) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Entomology	ZEN	03133041

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	General chemistry 117 Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	Academic literacy(1) 110	S1	2	0	6
MLB111	Molecular and cell biology 111 Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	General physics 131 Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	Mathematics 134 Prerequisite/s: Par 1.2	S1	4	1	16
Total credits for compulsory modules					70

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	Academic information management 101*	S2	0	2	6
BME120	Biometry 120 Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	Plant biology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	General chemistry 127 Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	Academic literacy(2) 120	S2	2	0	6

Code	Name	Trm	lpw	ppw	Crdt
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
ZEN161	**Animal diversity 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
Total credits for compulsory modules					**76**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
BOT251	**South African flora and vegetation 251** Prerequisite/s: BOT161 or TDH	**S1**	**2**	**1**	**12**
GTS251	**Gene and chromosome organisation 251** Prerequisite/s: GTS161 GS or TDH	**S1**	**2**	**0.5**	**12**
MBY251	**Growth, diversity and control of bacteria 251** Prerequisite/s: MBY161 GS	**S1**	**2**	**1**	**12**
ZEN251	**Invertebrate biology 251** Prerequisite/s: ZEN161 GS or TDH	**K1**	**4**	**1**	**12**
Total credits for compulsory modules					**72**

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	**S2**	**2**	**1**	**12**
GLY161	**Historical Geology 161** Prerequisite/s: Par 1.2	**K4**	**4**	**1**	**8**
GLY162	**Environmental geology 162** Prerequisite/s: Par 1.2	**K3**	**4**	**1**	**8**
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	**S2**	**2**	**0.5**	**12**

MBY261	Growth activity and control of fungi 261 Prerequisite/s: MBY161	S2	2	1	12
ZEN261	African vertebrates 261 Prerequisite/s: ZEN161 GS or TDH	K3	4	1	12
	Total credits for compulsory modules				64

Compulsory credits = (136) Elective credits = (12) Total credits = (148)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
ZEN351	Population ecology 351	K1	4	2	18
ZEN353	Community ecology 353	K2	4	2	18
ZEN354	Physiology 354	K2	4	2	18
ZEN355	Insect diversity 355 Prerequisite/s: ZEN251 GS or TDH	K1	4	2	18
	Total credits for compulsory modules				72

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
ZEN361	Ecophysiology 361	K3	4	2	18
ZEN362	Evolution and phylogeny 362	K3	4	2	18
ZEN364	Conservation ecology 364	K4	4	2	18
ZEN365	Insect pest management 365	K4	4	2	18
	Total credits for compulsory modules				72

Compulsory credits = (144) Elective credits = (0)

A minimum of (438) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Environmental and Engineering Geology	**GLY**	**02133042**

First year, first semester:

Degree programmes in the Department of Geology: Students will be informed timeously of compulsory excursions that could take place during the vacations. The attendance of excursions for first-year students is compulsory, while excursions of longer duration are compulsory for senior students.

Code	Name	Trm	Lpw	ppw	Crdt
CMY117	General chemistry 117 Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	Academic literacy(1) 110	S1	2	0	6

Code	Name	Trm	Lpw	ppw	Crdt
GLY155	Introduction to geology 155 Prerequisite/s: Par 1.2	S1	4	1	16
PHY114	First course in physics 114 Prerequisite/s: Par 1.2	S1	4	1	16
WTW158	Calculus 158 Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				70

First year, second semester:					
Code	Name	Trm	Lpw	ppw	Crdt
AIM101	Academic information management 101*	S2	0	2	6
CMY127	General chemistry 127 Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	Academic literacy(2) 120	S2	2	0	6
GLY161	Historical geology 161 Prerequisite/s: Par 1.2	K4	4	1	8
GLY162	Environmental and hazard geology 162 Prerequisite/s: Par 1.2	K3	4	1	8
SWK122	Mechanics 122 Prerequisite/s: WTW158 or WTW114	S2	4	0	16
WTW128	Calculus 128 Prerequisite/s:WTW158 or WTW114	S2	2	1	8
	Total credits for compulsory modules				68

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (138) Elective credits = (8) Total credits = (146)

Second year, first semester:					
Code	Name	Trm	Lpw	ppw	Crdt
GKD250	Introductory soil science 250 Prerequisite/s: CMY117 GS or TDH	S1	3	1	12
GLY254	Structural geology 254 Prerequisites: CMY117 and GLY155 and **1 of** GLY161, GLY162 and WTW114/WTW158 or PHY114	K2	4	2	12
GLY255	Fundamental and applied mineralogy 255 Prerequisite/s: CMY117,GLY155 and 1 of GLY161, GLY162 and WTW114/WTW158 or PHY114	S1	4	2	24
SWK210	Strength of materials 210 Prerequisite/s: SWK122 and WTW168/WTW128	S1	3	2	16
	Total credits for compulsory modules				64

Second year, second semester:					
Code	Name	Trm	Lpw	ppw	Crdt
GLY253	Sedimentology 253 Prerequisites: CMY117, GLY155 and **1 of** GLY161, GLY162 and WTW114/WTW158 or PHY114	K3	4	2	12
GLY261	Igneous petrology 261 Prerequisite/s: GLY255	K3	4	2	12
GLY262	Metamorphic petrology 262 Prerequisite/s: GLY255	K4	4	2	12

Code	Name	Trm	Ipw	ppw	Crdt
GLY265	**Groundwater 265** Prerequisites: GLY155 and **1 of** GLY161, GLY162 and WTW158/WTW114 or PHY114 and WTW128/WTW168	K4	4	2	12
	Total credits for compulsory modules				48

Compulsory credits = (112) Elective credits = (36) Total credits = 148

Third year, first semester:					
Code	**Name**	**Trm**	**Ipw**	**ppw**	**Crdt**
GKD350	**Soil classification and surveying 350** Prerequisite/s: GKD250 GS	S1	2	1	14
GLY363	**Engineering geology 363** Prerequisites: GLY155 and GLY265 and **4 of** the second-year modules: GLY253, GLY254, GLY255, GLY261, GLY262	K2	4	2	18
GLY364	**Rock mechanics 364** Prerequisite/s: **5 of** the second-year modules: GLY255, GLY253, GLY254, GLY261, GLY262, GLY265	K1	4	2	18
SGM311	**Soil mechanics 311** Prerequisite/s: SWK210 or SWK220	S1	3	1	16
	Total credits for compulsory modules				66

Third year, second semester:					
Code	**Name**	**Trm**	**Ipw**	**ppw**	**Crdt**
GKD320	**Soil chemistry 320** Prerequisite/s: GKD250	S2	2	1	14
GLY361	**Ore deposits 361** Prerequisites: **5 of** the second-year modules: GLY253, GLY254, GLY255, GLY261, GLY262, GLY265	K3	4	2	18
GLY362	**Geostatistics and ore reserve calculations 362** Prerequisites: **5 of** the second-year modules: GLY253, GLY254, GLY255, GLY261, GLY262, GLY265	K4	4	2	18
	Total credits for compulsory modules				50

Electives for the first to third year can be chosen from the following departments: Geography, Geoinformatics and Meteorology, Plant Production and Soil Science, Chemistry, Mathematics and Applied Mathematics and Physics.

Compulsory credits = (116) Elective credits = (28) Total credits = (144)

A minimum of (438) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Environmental Sciences	**GGY**	**02133361**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
EOT110	**Academic literacy(1) 110**	**S1**	**2**	**0**	**6**
ENV101	**Introduction to environmental sciences 101**	**K1**	**3**	**0**	**8**
GGY158	**Geographical Skills 158**	**S1**	**0**	**1**	**4**
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
WTW114	**Calculus 114** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
Total credits for compulsory modules					**66**
WTW 134 can be taken instead of WTW 114					

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	**S2**	**0**	**2**	**6**
BME120	**Biometry 120** Prerequisite/s: Par 1.2	**S2**	**4**	**1**	**16**
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	**S2**	**4**	**1**	**16**
EOT120	**Academic literacy(2) 120**	**S2**	**2**	**0**	**6**
GGY166	**Southern African geomorphology 166**	**K3**	**4**	**0**	**8**
WKD164	**Climate and weather of Southern Africa 164**	**K4**	**4**	**0**	**8**
ZEN161	**Animal diversity 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
Total credits for compulsory modules					**76**
* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)					

Electives can be chosen from the following departments: Geography, Geoinformatics and Meteorology, Geology, Plant Production and Soil Science, Physics, Chemistry, Plant Science , Mathematics and Applied Mathematics, Zoology and Entomology, Anthropology and Archaeology and Computer Science.

Compulsory credits = (142) Elective credits = (6) Total credits = (148)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BOT251	**South African flora and vegetation 251** Prerequisite/s: BOT161 or TDH	**S1**	**2**	**1**	**12**

GGY252	Process geomorphology 252 Prerequisite/s: GGY166 or GLY155	K2	4	2	12
GGY283	Introductory GIS 283	S1	2	1	12
GKD250	Introductory soil science 250 Prerequisite/s: CMY117 GS or TDH	S1	3	1	12
ZEN251	Invertebrate biology 251 Prerequisite/s: ZEN161 GS or TDH	K1	4	1	12
Total credits for compulsory modules					**60**

Second year, second semester:					
Code	**Name**	**Trm**	**Ipw**	**ppw**	**Crdt**
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	S2	2	1	12
ZEN261	**African vertebrates 261** Prerequisite/s: ZEN161 GS or TDH	K3	4	1	12
Total credits for compulsory modules					**24**
Electives can be chosen from the following departments: Geography, Geoinformatics and Meteorology, Physics, Geology, Plant Production and Soil Science, Chemistry, Plant Science , Mathematics and Applied Mathematics, Zoology and Entomology, Anthropology and Archaeology and Computer Science.					
Compulsory credits = (84) Elective credits = (60) Total credits = (144)					

Third year, first semester:					
Code	**Name**	**Trm**	**Ipw**	**ppw**	**Crdt**
ENV301	Human environmental interactions 301	K2	4	2	18
GIS310	**Geographic information systems 310** Prerequisite/s: GGY283 or GIS221	S1	3	1	24
Total credits for compulsory modules					**42**

Third year, second semester:					
Code	**Name**	**Trm**	**Ipw**	**ppw**	**Crdt**
GIS320	**Spatial analysis 320** Prerequisite/s: GIS310 or TDH	S2	3	1	24
GGY361	**Environmental geomorphology 361** Prerequisite/s: GGY252	K4	4	2	18
Total credits for compulsory modules					**42**

Electives can be chosen from modules in the departments: Geography, Geoinformatics and Meteorology, Geology, Plant Production and Soil Science, Physics, Chemistry, Plant Science , Mathematics and Applied Mathematics, Zoology and Entomology, Anthropology and Archaeology and Computer Science
Compulsory credits = (84) Elective credits = (60) Total credits = (144)
A minimum of (436) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Food Management	**VBR**	**02133384**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	**S1**	4	1	16
EOT110	**Academic literacy(1) 110**	**S1**	2	0	6
FSG110	**Physiology 110**	**S1**	3	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	**S1**	4	1	16
OBS114	**Business management 114**	**S1**	3	0	10
VDS111	**Basic food preparation 111**	**S1**	1	0.5	6
Total credits for compulsory modules					60

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	**S2**	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	**S2**	4	1	16
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	**S2**	4	1	16
EOT120	**Academic literacy(2) 120**	**S2**	2	0	6
FSG120	**Physiology 120** Prerequisite/s: FSG110	**S2**	3	0	6
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	**S2**	2	0.5	8
OBS124	**Business management 124** Prerequisite/s: Admission to the examination in OBS114	**S2**	3	0	10
VDS121	**Basic food preparation 121** Prerequisite/s: VDS111	**S2**	1	0.5	6
Total credits for compulsory modules					74

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (134) Elective credits = (0)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	2	0	9
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	0	0.5	3

BCM255	Carbohydrate metabolism 255 Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	Practical: Carbohydrate metabolism 256 Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
MBY251	Growth, diversity and control of bacteria 251 Prerequisite/s: MBY161 GS	S1	2	1	12
OBS210	Business management 210 Prerequisite/s: OBS114 or OBS124 with admission to the examination in the other	S1	3	0	16
VDS210	Food commodities and preparation 210 Prerequisite/s: VDS121	S1	3	1	18
Total credits for compulsory modules					**70**

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM263	Lipid and nitrogen metabolism 263 Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	Practical: Lipid and nitrogen metabolism 264 Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	Biochemistry in perspective 265 Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM266	Practical: Biochemistry in perspective 266 Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
FST260	Principles of food processing and preservation 260 Prerequisite/s: CMY117 and CMY127 and MBY161 and PHY131 and WTW134 or TDH	S2	2	1	12
KEP220	Cultural eating patterns 220 Prerequisite/s: VDS121	S2	3	0	12
VDS221	Food commodities and preparation 221 Prerequisite/s: VDS210	S2	3	1	18
Total credits for compulsory modules					**66**

Compulsory credits = (136) Elective credits = (0)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BEM110	Marketing Management 110	S1	3	0	10
FST351	Food chemistry (1) 351 Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	2	1	18

FST352	Food chemistry (2) 352 Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	2	1	18
VDG311	Nutrition 311 Prerequisite/s: FSG110 and FSG120 or VDG220	S1	3	1	17
VDS310	Consumer food research 310 Prerequisite/s: VDS221	S1	3	1	21
Total credits for compulsory modules					**84**

Third year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
BEM122	Marketing applications 122 Prerequisite/s: BEM110 GS	S2	3	0	10
VDB321	Food service management 321 Prerequisite/s: VDS322#	S2	3	0.5	18
VDG321	Nutrition during life cycle 321 Prerequisite/s: VDG311	S2	3	1	17
VDS322	Large-scale food production and restaurant management 322 Prerequisite/s: KEP261 or KEP220 and VDS221	S2	3	3	29
Total credits for compulsory modules					**74**

Compulsory credits = (158) Elective credits = (0)

Fourth year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
FST412	Sensory analysis 412 Prerequisite/s: FST260 and FST351 and FST352 or TDH	S1	1	1	10
FST413	Product development and quality management 413 (Capita selecta 20 credits) Prerequisite/s: FST260 and FST351 and FST352 or TDH	S1	3	1	20
PGB410	Project: Research methodology 410 Prerequisite/s: Final-year status	S1	2	0	10
VDB410	Food service management 410 Prerequisite/s: VDB321 GS	S1	3	1	24
VDS413	Recipe development and standardisation 413 Prerequisite/s: VDS310 or VDS322	S1	3	2	30
VDS423	Foods 423	S1	3	0	15
Total credits for compulsory modules					**109**

Fourth year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
MBY362	Food microbiology 362 Prerequisite/s: MBY251	S2	2	1	18
VDS426	Food research project 426 Prerequisite/s: PGB410# and VDS310	S2	1	2	18
Total credits for compulsory modules					**36**

OPI480 6 credits (Experiential training in the industry): During the 4 years of study, during holidays, weekends and after hours, students must complete a total of 480 hours experiential training in the industry to develop practical and occupational skills. This is equal to 3 weeks x 40 hours (120 hours) per year, according to requirements as determined by the head of department. This training must be successfully completed together with a complete portfolio before the degree will be conferred.

Compulsory credits = (145) Elective credits = (0)

A minimum of (573) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Food Science	**VDW**	**03134011**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	**General physics 131** Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				70

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	S2	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	**Academic literacy(2) 120**	S2	2	0	6
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
ZEN161	**Animal diversity 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
	Total credits for compulsory modules				76

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
FST250	**Introduction to food science and technology 250** Prerequisite/s: CMY117 and CMY127 and PHY131 and WTW134 or TDH	S1	2	1	12
MBY251	**Growth, diversity and control of bacteria 251** Prerequisite/s: MBY161 GS	S1	2	1	12
Total credits for compulsory modules					48

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
FST260	**Principles of food processing and preservation 260** Prerequisite/s: CMY117 and CMY127 and MBY161 and PHY131 and WTW134 or TDH	S2	2	1	12
MBY261	**Growth activity and control of fungi 261** Prerequisite/s: MBY161	S2	2	1	12
VDG260	**Nutrition 260** Prerequisite/s: CMY127	S2	3	0.5	12
Total credits for compulsory modules					60

Compulsory credits = (108) Elective credits = (36) Total credits = (144)

Third year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
FST350	**Integrated food science 350** Prerequisite/s: FST250 and FST260 or TDH	J1	2	0	9
FST351	**Food chemistry (1) 351** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	2	1	18
FST352	**Food chemistry (2) 352** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	2	1	18
FST353	**Food engineering 353** Prerequisite/s: FST260 or TDH	S1	3	0.5	18
	Total credits for compulsory modules				63

Third year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
FST350	**Integrated food science 350** Prerequisite/s: FST250 and FST260 or TDH	J1	2	0	9
FST360	**Principles of the science and technology of plant foods 360** Prerequisite/s: FST250 and FST260 and FST351 and FST352 or TDH	S2	2	1	18
FST361	**Animal food science 361** Prerequisite/s: FST250 and FST260 and FST351 and FST352 or TDH	S2	2	1	18
MBY362	**Food microbiology 362** Prerequisite/s: MBY251	S2	2	1	18
	Total credits for compulsory modules				63

Compulsory credits = (126) Elective credits = (18) Total credits = (144)

A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Genetics	**GTS**	**03133051**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	**General physics 131** Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				70

Code	Name	Trm	lpw	ppw	Crdt
First year, second semester:					
AIM101	Academic information management 101*	S2	0	2	6
BME120	Biometry 120 Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	Plant biology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	General chemistry 127 Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	Academic literacy(2) 120	S2	2	0	6
GTS161	Introductory genetics 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	Introduction to microbiology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
ZEN161	Animal diversity 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
Total credits for compulsory modules					76
* Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content spaced over 2 semesters)					

Compulsory credits = (146) Elective credits = (0)

Code	Name	Trm	lpw	ppw	Crdt
Second year, first semester:					
BCM253	Introduction to proteins and enzymes 253 Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	Practical: Introduction to proteins and enzymes 254 Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	Carbohydrate metabolism 255 Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	Practical: Carbohydrate metabolism 256 Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BOT251	South African flora and vegetation 251 Prerequisite/s: BOT161 or TDH	S1	2	1	12
GTS251	Gene and chromosome organisation 251 Prerequisite/s: GTS161 GS or TDH	S1	2	0.5	12
MBY251	Growth, diversity and control of bacteria 251 Prerequisite/s: MBY161 GS	S1	2	1	12
ZEN251	Invertebrate biology 251 Prerequisite/s: ZEN161 GS or TDH	K1	4	1	12
Total credits for compulsory modules					72

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	S2	2	1	12
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	S2	2	0.5	12
MBY261	**Growth activity and control of fungi 261** Prerequisite/s: MBY161	S2	2	1	12
ZEN261	**African vertebrates 261** Prerequisite/s: ZEN161 GS or TDH	K3	4	1	12
Total credits for compulsory modules					**72**

Compulsory credits = (144) Elective credits = (0)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
GTS351	**Eukaryotic gene control and development 351** Prerequisite/s: GTS251 GS and GTS261 GS or TDH	S1	2	1	18
GTS352	**Genomes 352** Prerequisite/s: GTS251 GS and GTS261 GS or TDH	S1	2	1	18
GTS353	**Advanced population genetics 353** Prerequisite/s: GTS251 GS and GTS261 GS or TDH	S1	2	1	18
Total credits for compulsory modules					**54**

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
GTS361	**Human genetics 361** Prerequisite/s: GTS352 GS or TDH	S2	2	1	18
GTS363	**Evolutionary and phylo-genetics 363** Prerequisite/s: GTS353 GS or TDH	S2	2	1	18
GTS366	**Plant genetics and biotechnology 366** Prerequisite/s: GTS251 GS and GTS261 and GTS351 and GTS352 are recommended or TDH	S2	2	1	18
Total credits for compulsory modules					**54**

Electives can be chosen from the following list of third-year modules: BCM351, BCM352, BCM354, BCM355, BCM364, BCM365, BCM366, BIF311, BOT357, BOT365, GTS365, MBY351, MBY353, MBY361, MBY363, MBY364, PLG364, ZEN351, ZEN352, ZEN354, ZEN355, ZEN362, ZEN363, ZEN364.

Compulsory credits = (108) Elective credits = (36) Total credits = (144)

A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Geography	**GGY**	**02133385**

Code	Name	Trm	lpw	ppw	Crdt
First year, first semester:					
EOT110	Academic literacy(1) 110	S1	2	0	6
GGY156	Introduction to human geography 156	K2	3	0	6
ENV101	Introduction to environmental sciences 101	K1	3	0	8
GGY158	Geographical skills 158	S1	0	1	4
GMC110	Cartography 110	S1	3	1	12
WTW114	Calculus 114 Prerequisite/s: Par 1.2	S1	4	1	16
Total credits for compulsory modules					52

WTW 134 can be taken instead of WTW 114.

Code	Name	Trm	lpw	ppw	Crdt
First year, second semester:					
AIM101	Academic information management 101*	S2	0	2	6
EOT120	Academic literacy(2) 120	S2	2	0	6
GGY166	Southern African geomorphology 166	K3	4	0	8
WKD164	Climate and weather of Southern Africa 164	K4	4	0	8
Total credits for compulsory modules					28

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Electives can be chosen from modules in the following departments: Geography, Geoinformatics and Meteorology, Plant Production and Soil Science, Chemistry, Plant Science, Physics, Zoology and Entomology, Geology, Mathematics and Applied Mathematics, Computer Science, Anthropology and Archaeology, Economics, History, Psychology, Sociology, Political Sciences.

Compulsory credits = (80) Elective credits = (68) Total credits = (148)

Second year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
GGY252	Process geomorphology 252 Prerequisite/s: GGY166 or GLY155	K2	4	2	12
GGY283	Introductory GIS 283	S1	2	1	12
	Total credits for compulsory modules				24

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
GGY266	City structures, environment and society 266	S2	3	1	24
GIS220	Geographic data analysis 220	S2	3	1	12
	Total credits for compulsory modules				36

Electives can be chosen from modules in the following departments: Geography, Geo-informatics and Meteorology, Plant Production and Soil Science, Chemistry, Plant Science, Physics, Zoology and Entomology, Geology, Mathematics and Applied Mathematics, Computer Science, Anthropology and Archaeology, Economics, History, Psychology, Sociology, Political Sciences.

Compulsory credits = (60) Elective credits = (84) Total credits = (144)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
ENV301	Human environmental interactions 301	K2	4	2	18
GGY356	Sustainable development 356	K1	3	1	18
GIS310	Geographic information systems 310 Prerequisite/s: GGY283 or GIS221	S1	3	1	24
	Total credits for compulsory modules				60

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
GGY361	Environmental geomorphology 361 Prerequisite/s: GGY252	K4	4	2	18
GGY366	Development frameworks 366	K3	3	1	18
GIS320	Spatial analysis 320 Prerequisite/s: GIS310 or TDH	S2	3	1	24
	Total credits for compulsory modules				60

Electives can be chosen from modules in the following departments: Geography, Geoinformatics and Meteorology, Plant Production and Soil Science, Chemistry, Plant Science, Physics, Zoology and Entomology, Geology, Mathematics and Applied Mathematics, Computer Science, Anthropology and Archaeology, Economics, History, Psychology, Sociology, Political Sciences.

Compulsory credits = (120) Elective credits = (24) Total credits = (144)

A minimum of (436) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Geoinformatics	GGY	02133383

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
EOT110	Academic literacy(1) 110	S1	2	0	6
GGY156	Introduction to human geography 156	K2	3	0	6
ENV101	Introduction to environmental sciences 101	K1	3	0	8
GMC110	Cartography 110	S1	3	1	12
INF112	Informatics 112 Prerequisite/s: Par 1.2, STK113 and STK123	S1	2	0	10
INF153	Informatics 153 Prerequisite/s: Par 1.2	S1	2	0	5
INF154	Informatics 154 Prerequisite/s: Par 1.2	S1	1	2	5
WTW114	Calculus 114 Prerequisite/s: Par 1.2	S1	4	1	16
Total credits for compulsory modules					68

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	Academic information management 101*	S2	0	2	6
EOT120	Academic literacy(2) 120	S2	2	0	6
GGY166	Southern African geomorphology 166	K3	4	0	8
GIS120	Geoinformatics 120 Prerequisite/s: GMC110	S2	3	1	12
INF163	Informatics 163 Prerequisite/s: INF153	S2	2	0	5
INF164	Informatics 164 Prerequisite/s: INF154	S2	1	2	5
WKD164	Climate and weather of Southern Africa 164	K4	4	0	8
WTW126	Linear algebra 126 Prerequisite/s: Par 1.2	S2	2	1	8
WTW128	Calculus 128 Prerequisite/s: WTW114 GS	S2	2	1	8
Total credits for compulsory modules					66
* Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content spaced over 2 semesters)					

Compulsory credits = (134) Elective credits = (0) Total credits = (134)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BER210	**Business law 210**	**S1**	**3**	**0**	**16**
GGY283	**Introductory GIS 283**	**S1**	**2**	**1**	**12**
GMA220	**Remote sensing 220**	**S1**	**3**	**1**	**16**
INF214	**Informatics 214** Prerequisite/s: AIM101 or AIM111 and AIM121	**S1**	**3**	**2**	**14**
STK110	**Statistics 110** Prerequisite/s: Par 1.2*	**S1**	**3**	**1**	**13**
	Total credits for compulsory modules				**71**
* Students who do not comply with the requirements for STK110 [Reg 1.2(h)] must enrol for STK113 and STK123					

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
GIS220	**Geographic data analysis 220**	**S2**	**3**	**1**	**12**
INF225	**Informatics 225** Prerequisite/s: AIM101 or AIM111 and AIM121 and INF163 and INF 164	**S2**	**3**	**2**	**14**
INF261	**Informatics 261** Prerequisite/s: INF214	**S2**	**1**	**1**	**7**
STK120	**Statistics 120** Prerequisite/s: STK110 GS or both STK113 GS and STK123 GS	**S2**	**3**	**1**	**13**
SUR220	**Surveying 220**	**S2**	**3**	**1**	**16**
	Total credits for compulsory modules				**62**

Compulsory credits = (133) Elective credits = (13) Total credits = (146)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
GIS310	**Geographic information systems 310** Prerequisite/s: GGY283 or GIS221	**S1**	**3**	**1**	**24**
GMC310	**Geometrical and space geodesy 310** Prerequisite/s: GMC110 and WTW114	**S1**	**3**	**1**	**24**
OBS114	**Business management 114**	**S1**	**3**	**0**	**10**
	Total credits for compulsory modules				**58**

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
GIS320	**Spatial analysis 320** Prerequisite/s: GIS310 or TDH	**S2**	**3**	**1**	**24**
GMA320	**Remote sensing 320** Prerequisite/s: GMA220 or TDH	**S2**	**3**	**1**	**24**
GMT320	**Geoinformatics project 320** Prerequisite/s: GIS310 and INF214 and INF261 or TDH. **Only for Geoinformatics students**	**S2**	**3**	**1**	**24**

OBS124	**Business management 124** Prerequisite/s: Admission to the examination in OBS114	S2	3	0	10
	Total credits for compulsory modules				82

Compulsory credits = (140) Elective credits = (22) Total credits = (162)

A minimum of (442) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Geology	**GLY**	**02133022**

First year, first semester:

Degree programmes in the Department of Geology: Students will be informed timeously of compulsory excursions that could take place during the vacations. The attendance of excursions for first-year students is compulsory, while excursions of longer duration are compulsory for senior students.

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
GLY155	**Introduction to geology 155** Prerequisite/s: Par 1.2	S1	4	1	16
PHY114	**First course in physics 114** Prerequisite/s: Par 1.2	S1	4	1	16
WTW114	**Calculus 114** Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				70

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	S2	0	2	6
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	**Academic literacy(2) 120**	S2	2	0	6
GLY161	**Historical geology 161** Prerequisite/s: Par 1.2	K4	4	1	8
GLY162	**Environmental and hazard geology 162** Prerequisite/s: Par 1.2	K3	4	1	8
WTW128	**Calculus 128** Prerequisite/s:WTW158 or WTW114	S2	2	1	8
	Total credits for compulsory modules				52

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Electives can be chosen from modules in the following departments: Geography, Geoinformatics and Meteorology, Plant Production and Soil Science, Chemistry, Mathematics and Applied Mathematics, Physics and Computer Science.

Compulsory credits = (122) Elective credits = (24) Total credits = (146)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
GKD250	**Introductory soil science 250** Prerequisite/s: CMY117 GS or TDH	S1	3	1	12
GLY254	**Structural geology 254** Prerequisites: CMY117 and GLY155, and 1 of, GLY161, GLY162 and WTW114/WTW158 or PHY114	K2	4	2	12
GLY255	**Fundamental and applied mineralogy 255** Prerequisite/s: CMY117 and GLY155 and 1 of GLY161, GLY162 and WTW114/WTW158 or PHY114	S1	4	2	24
	Total credits for compulsory modules				48

Second year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
GLY253	**Sedimentology 253** Prerequisites: CMY117 and GLY155 and 1 of GLY161, GLY162 and WTW114/WTW158 or PHY114	K3	4	2	12
GLY261	**Igneous petrology 261** Prerequisite/s: GLY255	K3	4	2	12
GLY262	**Metamorphic petrology 262** Prerequisite/s: GLY255	K4	4	2	12
GLY265	**Groundwater 265** Prerequisites: GLY155 and **1 of** GLY161, GLY162 and WTW158/WTW114 or PHY114 and WTW128/ WTW168	K4	4	2	12
	Total credits for compulsory modules				48

Electives can be chosen from modules in the following departments: Geography, Geoinformatics and Meteorology, Plant Production and Soil Science, Chemistry, Mathematics and Applied Mathematics and Physics.

Compulsory credits = (96) Elective credits = (48) Total credits = (144)

Third year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
GLY363	**Engineering geology 363** Prerequisites: GLY155 and GLY265 and **4 of** the second-year modules: GLY253, GLY254, GLY255, GLY261, GLY262	K2	4	2	18
GLY364	**Rock mechanics 364** Prerequisite/s: **5 of** the second-year modules: GLY255, GLY253, GLY254, GLY261, GLY262, GLY265	K1	4	2	18
	Total credits for compulsory modules				36

Third year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
GLY361	**Ore deposits 361** Prerequisites: **5 of** the second-year modules: GLY253, GLY254, GLY255, GLY261, GLY262, GLY265	K3	4	2	18

GLY362	**Geostatistics and ore reserve calculations 362** Prerequisites: **5 of** the second-year modules: GLY253, GLY254, GLY255, GLY261, GLY262, GLY265	**K4**	**4**	**2**	**18**
	Total credits for compulsory modules				**36**

Electives can be chosen from modules in the following departments: Geography, Geoinformatics and Meteorology, Plant Production and Soil Science, Chemistry, Mathematics and Applied Mathematics and Physics.
Compulsory credits = (72) Elective credits = (72) Total credits = (144)
A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Human Genetics	**GTS**	**03134031**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	Academic literacy(1) 110	S1	2	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	**General physics 131** Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				**70**

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	S2	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	Academic literacy(2) 120	S2	2	0	6
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8

ZEN161	Animal diversity 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
	Total credits for compulsory modules				**76**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
FLG211	**Introductory and neurophysiology 211** Prerequisite/s: CMY117 and CMY127 and MLB111 and PHY131	S1	2	1	16
FLG212	**Circulatory physiology 212** Prerequisite/s: CMY117 and CMY127 and MLB111 and PHY131	S1	2	1	16
GTS251	**Gene and chromosome organisation 251** Prerequisite/s: GTS161 GS or TDH	S1	2	0.5	12
MBY251	**Growth, diversity and control of bacteria 251** Prerequisite/s: MBY161 GS	S1	2	1	12
	Total credits for compulsory modules				**80**

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9

BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**0**	**0.5**	**3**
FLG221	**Lung and renal physiology, acid-base balance and temperature 221** Prerequisite/s: FLG211 and FLG212	**S2**	**2**	**1**	**16**
FLG222	**Digestion, endocrinology and reproductive systems 222** Prerequisite/s: FLG211 and FLG212	**S2**	**2**	**1**	**16**
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	**S2**	**2**	**0.5**	**12**
Total credits for compulsory modules					**68**

Compulsory credits = (148) Elective credits = (0)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM351	**Biochemistry of proteins 351** Prerequisite/s: BCM253 and BCM254	**K1**	**2**	**1**	**9**
BCM354	**Biochemistry of nucleic acids 354** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	**S1**	**1**	**0.5**	**9**
BCM355	**Immunobiology 355** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	**S1**	**1**	**0.5**	**9**
GTS351	**Eukaryotic gene control and development 351** Prerequisite/s: GTS251 GS and GTS261 GS or TDH	**S1**	**2**	**1**	**18**
GTS352	**Genomes 352** Prerequisite/s: GTS251 GS and GTS261 GS or TDH	**S1**	**2**	**1**	**18**
GTS353	**Advanced population genetics 353** Prerequisite/s: GTS251 GS and GTS261 GS or TDH	**S1**	**2**	**1**	**18**
Total credits for compulsory modules					**81**

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
GTS361	**Human genetics 361** Prerequisite/s: GTS352 GS or TDH	**S2**	**2**	**1**	**18**
GTS363	**Evolutionary and phylo-genetics 363** Prerequisite/s: GTS353 GS or TDH	**S2**	**2**	**1**	**18**
GTS365	**Applied medical genetics 365** Prerequisite/s: GTS251 GS and GTS261 or TDH	**S2**	**2**	**1**	**18**
Total credits for compulsory modules					**54**

Electives to be chosen from the following list of third-year modules: BCM352, BCM365, BCM366, BCM364, BIF311, FAR381, FAR382, GTS366, MBY351, MBY353, MBY364, MBY363.

Compulsory credits = (135) Elective credits = (18) Total credits = (153)
A minimum of (447) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Human Physiology	**FLG**	**03134021**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	**S1**	4	1	16
EOT110	**Academic literacy(1) 110**	**S1**	2	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	**S1**	4	1	16
PHY131	**General physics 131** Prerequisite/s: Par 1.2	**S1**	4	1	16
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	**S1**	4	1	16
Total credits for compulsory modules					**70**

Students intending to apply for the 20-30 MBChB, or the 2-3 BChD places, that become available in the second term, may enroll for FIL155(6), MGW112(6) and MTL181(12) instead of WTW134 under the condition that, should they not be selected and want to continue with BSc, WTW134 **must** be taken in the second semester. Students should take note of the prerequisites for FLG 211 and FLG 212. Students who, after the first year do not comply with the prerequisites for these modules, will be required to apply to Student Administration, Faculty of Natural and Agricultural Sciences, to remain in the study programme.

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	**S2**	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	**S2**	4	1	16
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	**S2**	4	1	16
EOT120	**Academic literacy(2) 120**	**S2**	2	0	6
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	**S2**	2	0.5	8
Total credits for compulsory modules					**52**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Electives can be chosen from ANA121(4), ANA126(4), MBY161(8) , BOT161(8), ZEN 161(8) or WTW152(8). Students that did not take WTW134 in the first semester are reminded to enroll for it in the second semester. Students should take note of the prerequisites for FLG 211 and FLG 212. Students, who after the first year do not comply with the prerequisites for these modules will be required to apply to Student

Administration, Faculty of Natural and Agricultural Sciences, to remain in the study programme.

Compulsory credits = (122) Elective credits = (24) Total credits = (146)

Code	Name	Trm	lpw	ppw	Crdt
Second year, first semester:					
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
FLG211	**Introductory and neurophysiology 211** Prerequisite/s: CMY117 and CMY127 and MLB111 and PHY131	**S1**	**2**	**1**	**16**
FLG212	**Circulatory physiology 212** Prerequisite/s: CMY117 and CMY127 and MLB111 and PHY131	**S1**	**2**	**1**	**16**
Total credits for compulsory modules					**56**

Code	Name	Trm	lpw	ppw	Crdt
Second year, second semester:					
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**2**	**0**	**9**
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**0**	**0.5**	**3**
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**2**	**0**	**9**
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**0**	**0.5**	**3**
FLG221	**Lung and renal physiology, acid-base balance and temperature 221** Prerequisite/s: FLG211 and FLG212	**S2**	**2**	**1**	**16**
FLG222	**Digestion, endocrinology and reproductive systems 222** Prerequisite/s: FLG211 and FLG212	**S2**	**2**	**1**	**16**
Total credits for compulsory modules					**56**

Electives can be chosen from Chemistry 283 and 284 (in consultation with the Head of the Department), Genetics, Microbiology, Plant Science or Zoology.
Compulsory credits = (112) Elective credits = (24) Total credits = (136)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
ANA316	**Histology techniques 316** Prerequisite/s: ANA226*	**S1**	**2**	**2**	**18**
FLG311	**Applied cellular physiology 311** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	**S1**	**1**	**1**	**14**
FLG312	**Developmental physiology 312** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	**S1**	**1**	**0**	**9**
FLG313	**Research methodology and literacy study 313** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	**S1**	**1**	**1**	**14**
FLG314	**Immunology 314** Prerequisite/s: Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	**S1**	**1**	**0**	**9**
Total credits for compulsory modules					**64**

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
FLG322	**Industrial physiology 322** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	**S2**	**1**	**1**	**14**
FLG324	**Exercise physiology 324** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	**S2**	**1**	**1**	**14**
FLG325	**Nutrition physiology 325** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	**S2**	**1**	**0**	**9**
FLG328	**Pathophysiology 328** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	**S2**	**1**	**0**	**9**

FLG329	**Integrated human physiology 329** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	S2	0	1	9
	Total credits for compulsory modules				**55**

*ANA226 is compulsory for all students with Anatomy as main subject.
Electives can be chosen from Chemistry 383 and 384 (in consultation with the Head of the Department), Genetics, Biochemistry, Microbiology, Plant Science, Zoology or Pharmacology.

Compulsory credits = (119) Elective credits = (35) Total credits = (154)

A minimum of (436) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Human Physiology, Genetics and Psychology	**FLG**	**02133392**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	**General physics 131** Prerequisite/s: Par 1.2	S1	4	1	16
SLK110	**Psychology 110**	S1	2	0	12
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				**82**

Students intending to apply for the 20-30 MBChB, or the 2-3 BChD places, that become available in the second term, may enrol for FIL155(6), MGW112(6) and MTL181(12) instead of WTW134 under the condition that, should they not be selected and want to continue with BSc, WTW134 **must** be taken in the second semester. Students should take note of the prerequisites for FLG211 and FLG212. Students who, after the first year do not comply with the prerequisites for this modules will be required to apply to Student Administration, Faculty of Natural and Agricultural Sciences, to remain in the study programme.

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	S2	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	S2	4	1	16

CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	**S2**	**4**	**1**	**16**
EOT120	**Academic literacy(2) 120**	**S2**	**2**	**0**	**6**
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
SLK120	**Psychology 120**	**S2**	**2**	**0**	**12**
	Total credits for compulsory modules				**64**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Students should take note of the prerequisites for FLG211 and FLG212. Students who after the first year do not comply with the prerequisites for these modules, will be required to apply to Student Administration, Faculty of Natural and Agricultural Sciences, to remain in the study programme. Students who intend to apply for the BSocSciHons (Psychology) programme must complete the following research modules: RES261 (second year) and RES361 (third year).

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
FLG211	**Introductory and neurophysiology 211** Prerequisite/s: CMY117 and CMY127 and MLB111 and PHY131	**S1**	**2**	**1**	**16**
FLG212	**Circulatory physiology 212** Prerequisite/s: CMY117 and CMY127 and MLB111 and PHY131	**S1**	**2**	**1**	**16**
GTS251	**Gene and chromosome organisation 251** Prerequisite/s: GTS161 GS or TDH	**S1**	**2**	**0.5**	**12**
SLK210	**Psychology 210** Prerequisite/s: SLK110 and SLK120 (GS)	**S1**	**2**	**0**	**20**
	Total credits for compulsory modules				**88**

Students that do not comply with the prerequisites for the modules FLG211 and FLG212, will be required to apply to Student Administration at the Faculty to remain in the study programme.

Code	Name	Trm	lpw	ppw	Crdt
Second year, second semester:					
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**2**	**0**	**9**
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**0**	**0.5**	**3**
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**2**	**0**	**9**
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**0**	**0.5**	**3**
FLG221	**Lung and renal physiology, acid-base balance and temperature 221** Prerequisite/s: FLG211 and FLG212	**S2**	**2**	**1**	**16**
FLG222	**Digestion, endocrinology and reproductive systems 222** Prerequisite/s: FLG211 and FLG212	**S2**	**2**	**1**	**16**
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	**S2**	**2**	**0.5**	**12**
SLK220	**Psychology 220** Prerequisite/s: SLK110 and SLK120 GS. RES261 is recommended	**S2**	**2**	**0**	**20**
Total credits for compulsory modules					**88**

Students who intend to apply for BScHons (Genetics), will be required to register for additional undergraduate Genetics modules. Students intending to apply for the BSocSciHons in Psychology programme must complete the following research modules: RES261 (second year) and RES361 (third year).

Compulsory credits = (176) Elective credits = (0)

Code	Name	Trm	lpw	ppw	Crdt
Third year, first semester:					
FLG314	**Immunology 314** Prerequisite/s: Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	**S1**	**1**	**0**	**9**
GTS351	**Eukaryotic gene control and development 351** Prerequisite/s: GTS251 GS and GTS261 GS or TDH	**S1**	**2**	**1**	**18**
GTS352	**Genomes 352** Prerequisite/s: GTS251 GS and GTS261 GS or TDH	**S1**	**2**	**1**	**18**
SLK310	**Psychology 310** Prerequisite/s: SLK210 GS and SLK220 GS and RES361 is recommended	**S1**	**2**	**0**	**30**
Total credits for compulsory modules					**75**

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
FLG325	**Nutrition physiology 325** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	S2	1	0	9
FLG327	**Higher neurological functions 327** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	S2	2	0	20
FLG328	**Pathophysiology 328** Prerequisite/s: BCM253 GS and BCM254 GS and BCM255 GS and BCM256 GS and BCM263 GS and BCM264 GS and BCM265 GS and BCM266 GS and FLG221 and FLG222	S2	1	0	9
GTS361	**Human genetics 361** Prerequisite/s: GTS352 GS or TDH	S2	2	1	18
SLK320	**Psychology 320** Prerequisite/s: SLK310 GS	S2	2	0	30
Total credits for compulsory modules					86

Students intending to apply for the BSocSciHons (Psychology)programme must complete the following research modules: RES261 (second year) and RES 361 (third year).

Compulsory credits = (161) Elective credits = (0)

A minimum of (483) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Mathematical Statistics	**WST**	**02133273**

First year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
EOT110	**Academic literacy(1) 110**	S1	2	0	6
WST111	**Mathematical statistics 111** Prerequisite/s: Par 1.2	S1	4	1	16
WTW114	**Calculus 114** Prerequisite/s: Par 1.2	S1	4	1	16
Total credits for compulsory modules					38

First year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	S2	0	2	6
EOT120	**Academic literacy(2) 120**	S2	2	0	6

WST121	Mathematical statistics 121 Prerequisite/s: WST111 GS	S2	4	1	16
WTW126	Linear algebra 126 Prerequisite/s: Par 1.2	S2	2	1	8
WTW128	Calculus 128 Prerequisite/s: WTW114 GS	S2	2	1	8
	Total credits for compulsory modules				**44**
* Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content spaced over 2 semesters)					

It is recommended that COS132 be taken as a first-year elective by all students in this programme. Additional electives should be chosen as follows:
Students in Mathematical Statistics who also want to be trained for the Mathematics Industry normally choose from WTW123 (8), 115 (8), 152 (8), 162 (8) and COS110 (16)

Students in Mathematical Statistics who also want to be trained for the Insurance Industry, Econometrics, normally choose:
EKN113, 123 (30)   or   EKN110, 120 (20)
FBS110, 120 (20)   or   FBS112, 122 (20)
FRK111, 121 (22)
COS110 (16)

Students in Mathematical Statistics with other career requirements, choose modules from any other subject/faculty to meet their specific needs.

Compulsory credits = (82) Elective credits = (64) Total credits = (146)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
WST211	Mathematical statistics 211 Prerequisite/s: WST111 and WST121 and WTW114 GS and WTW126 GS and WTW128 GS	S1	4	2	24
WTW211	Linear algebra 211 Prerequisite/s: WTW126	S1	2	1	12
WTW218	Calculus 218 Prerequisite/s: WTW114 and WTW128	S1	2	1	12
	Total credits for compulsory modules				**48**

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
WST221	Mathematical statistics 221 Prerequisite/s: WST211 GS	S2	4	2	24
WTW220	Analysis 220 Prerequisite/s: WTW114 and WTW128	S2	2	1	12
WTW221	Linear algebra 221 Prerequisite/s: WTW211	S2	2	1	12
	Total credits for compulsory modules				**48**

Students in Mathematical Statistics who also want to be trained for the Mathematics Industry normally choose from WTW286 (8), 285 (8).

Students in Mathematical Statistics who also want to be trained for the Insurance Industry normally choose IAS221 (20) (note the prerequisite specified by the Department of Insurance and Actuarial Science).

Students in Mathematical Statistics who also want to be trained for the Econometrics Industry normally choose from: EKN214, 224 (32) and STK281 (10).

Students in Mathematical Statistics with other career requirements, choose modules from any other subject/faculty to meet their specific needs.

Compulsory credits = (96) Elective credits = (48) Total credits = (144)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
WST311	**Multivariate analysis 311** Prerequisite/s: WST211 and WST221 and WTW211 GS and WTW218 GS	S1	2	1	18
WST312	**Stochastic processes 312** Prerequisite/s: WST211 and WST221 and WTW211 GS and WTW218 GS	S1	2	1	18
Total credits for compulsory modules					36

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
WST321	**Time series analysis 321** Prerequisite/s: WST211 and WST221 and WST311 GS and WTW211 GS and WTW218 GS	S2	2	1	18
WST322	**Actuarial statistics 322** Prerequisite/s: WST211 and WST221 and WTW211 GS and WTW218 GS	S2	2	1	18
Total credits for compulsory modules					36

Students in Mathematical Statistics who also want to be trained for the Mathematics Industry normally choose from: WTW310 (18), 320 (18), 354 (18), 364 (18), 381 (18), 382 (18), 383 (18), 385 (18), 386 (18), 387 (18), 389 (18).

Students in Mathematical Statistics who also want to be trained for the Insurance Industry normally choose IAS382 (20)

Students in Mathematical Statistics who also want to be trained for the Econometrics Industry normally choose from: EKN310, 320 and 314 (60).

Students in Mathematical Statistics with other career requirements, choose modules from any other subject/faculty to meet their specific needs.

Compulsory credits = (72) Elective credits = (72) Total credits = (144)

A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Mathematics	**WTW**	**02133262**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
EOT110	**Academic literacy(1) 110**	S1	2	0	6
WST111	**Mathematical statistics 111** Prerequisite/s: Par 1.2	S1	4	1	16
WTW114	**Calculus 114** Prerequisite/s: Par 1.2	S1	4	1	16
WTW115	**Discrete structures 115** Prerequisite/s: Par 1.2	S1	2	1	8
WTW152	**Mathematical modelling 152** Prerequisite/s: Par 1.2	S1	2	1	8
Total credits for compulsory modules					**54**

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	S2	0	2	6
EOT120	**Academic literacy(2) 120**	S2	2	0	6
WST121	**Mathematical statistics 121** Prerequisite/s: WST111 GS	S2	4	1	16
WTW123	**Numerical analysis 123** Prerequisite/s: WTW114 GS	S2	2	1	8
WTW126	**Linear algebra 126** Prerequisite/s: Par 1.2	S2	2	1	8
WTW128	**Calculus 128** Prerequisite/s: WTW114 GS	S2	2	1	8
WTW162	**Dynamical processes 162** Prerequisite/s: WTW114 GS	S2	2	1	8
Total credits for compulsory modules					**60**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (114) Elective credits = (32) Total credits = (146)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
WTW211	**Linear algebra 211** Prerequisite/s: WTW126	S1	2	1	12
WTW218	**Calculus 218** Prerequisite/s: WTW114 and WTW128	S1	2	1	12
WTW286	**Differential equations 286** Prerequisite/s: WTW114 and WTW126 and WTW128	S1	2	1	12
Total credits for compulsory modules					**36**

Second year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
WTW220	**Analysis 220** Prerequisite/s: WTW114 and WTW128	S2	2	1	12

WTW221	Linear algebra 221 Prerequisite/s: WTW211	S2	2	1	12
WTW248	Vector analysis 248 Prerequisite/s: WTW218	S2	2	0	12
WTW285	Discrete structures 285 Prerequisite/s: WTW115	S2	2	1	12
	Total credits for compulsory modules				48

Compulsory credits = (84) Elective credits = (60) Total credits = (144)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
WTW310	Analysis 310 Prerequisite/s: WTW220	S1	2	1	18
WTW381	Algebra 381 Prerequisite/s: WTW114 and WTW211	S1	2	1	18
	Total credits for compulsory modules				36

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
WTW320	Analysis 320 Prerequisite/s: WTW218 and WTW310	S2	2	1	18
WTW389	Geometry 389 Prerequisite/s: WTW211	S2	2	1	18
	Total credits for compulsory modules				36

A minimum of 54 elective credits at 100- to 300-level can be chosen from any WTW and WST modules. The remainder of the electives at 100-to 300-level can be chosen from any other modules in the list of modules of this faculty.

Compulsory credits = (72) Elective credits = (72) Total credits = (144)

A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Medical Sciences	ANA	03134020

Students who have not passed all the first-year, first-semester modules in BScMedSci are excluded from carrying on with BScMedSci in the second semester and need to deregister and reregister for another BSc programme, e.g. BSc in Biological Sciences (or a completely different degree programme).

First year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
CMY117	General chemistry 117 Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	Academic literacy(1) 110	S1	2	0	6
FIL155	Science and world views 155	S1	1	0	6

MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
PHY131	**General physics 131** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
	Total credits for compulsory modules				**76**

NOTE: Students who intend to apply for admission to one of the 20 to 30 MBChB places or the 2-3 BChD places becoming available in the second semester, may register in the first semester for FIL155, MGW112 and MTL181 with the proviso that these students, should they not be selected, take WTW134 in the second semester.

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	**Academic information management 101***	**S2**	**0**	**2**	**6**
ANA121	**Introduction: Human anatomy and embriology 121** Prerequisite/s: CMY117 and MLB111	**S2**	**1**	**1**	**4**
ANA122	**Human osteology 122**	**S2**	**1**	**1**	**4**
ANA126	**Basic human histology 126** Prerequisite/s: CMY117 and MLB111	**S2**	**1**	**1**	**4**
BME120	**Biometry 120** Prerequisite/s: Par 1.2	**S2**	**4**	**1**	**16**
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	**S2**	**4**	**1**	**16**
EOT120	**Academic literacy(2) 120**	**S2**	**2**	**0**	**6**
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
	Total credits for compulsory modules				**72**

* Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content spaced over 2 semesters)

Compulsory credits = (148) Elective credits = (0)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
ANA214	**Human cell and developmental biology 214** Prerequisite/s: ANA121 and ANA126 and CMY127	**S1**	**2**	**1**	**12**
ANA215	**Paleoantropology 215**	**S1**	**2**	**1**	**12**
ANA217	**Human anatomy 217** Prerequisite/s: ANA121 and ANA122 and CMY127	**S1**	**2**	**1**	**16**
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**

BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
Total credits for compulsory modules					**64**

Candidates must choose between either FLG211 (16) and FLG 212 (16) **OR** GTS251 (12) as options in the first semester and have to complete the chosen option until their final year.

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
ANA226	**Human histology 226** Prerequisite/s: ANA126	**S2**	**1**	**1**	**12**
ANA227	**Human anatomy 227** Prerequisite/s: ANA217 GS	**S2**	**2**	**2**	**16**
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**2**	**0**	**9**
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**0**	**0.5**	**3**
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**2**	**0**	**9**
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	**S2**	**0**	**0.5**	**3**
Total credits for compulsory modules					**52**

Depending on their choice of electives during the first semester, candidates need to complete either FLG221 (16) and FLG 222 (16) **OR** GTS 261 (12).
Elective credits:
GTS option: 24
FLG option: 64

Compulsory credits = (116)
Elective credits:
GTS option: 24
FLG option: 64

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
ANA315	**Forensic antropology 315** Prerequisite/s: ANA122 and ANA215	**S1**	**2**	**1**	**18**
ANA316	**Histology techniques 316** Prerequisite/s: ANA226***	**S1**	**2**	**2**	**18**
Total credits for compulsory modules					**36**

GTS options: GTS351, GTS352 and/or GTS353. A total of five GTS modules (90 credits) must be taken at 300-level; OR
FLG option: Any first semester- third-year Physiology modules and/or Pharmacology 381, to a a minimum of 37 credits.

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
ANA324	**Applied human cell and developmental biology 324** Prerequisite/s: ANA214 and ANA226	S2	2	1	18
ANA327	**Comparative anatomy 327** Prerequisite/s: ANA121 and ANA122 and ANA217 and ANA227	S2	1	1	18
Total credits for compulsory modules					**36**

GTS option: GTS361, GTS363 an/or GTS365. A total of five GTS modules (90 credits) must be taken at 300-level; OR
FLG option: Any second semester-third-year Physiology modules and/or Pharmacology 382, to a minimum of 39 credits.
** FLG311 must be taken by students who choose Pharmacology.
*** ANA226 is compulsory for all students with Anatomy as main subject.
** FAR383 must be taken by students who choose FAR384.
NOTE: FLG327 Higher Neurological Functions 327 may only be taken by students with Psychology as major subject.

Compulsory credits = (72)

Elective credits on third year:
GTS option: 90
FLG option: 76
A minimum of 450 credits for the GTS option is required to obtain the degree.
A minimum of 476 credits for the FLG option is required to obtain the degree.

Field of study	Dept	Code
BSc in Meteorology	**GGY**	**02133312**

First year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
EOT110	**Academic literacy(1) 110**	S1	2	0	6
PHY114	**First course in physics 114** Prerequisite/s: Par 1.2	S1	4	1	16
WKD151	**Atmospheric processes 151**	K1	4	1	8
WKD152	**Atmospheric circulation and climate 152**	K2	4	1	8
WTW114	**Calculus 114** Prerequisite/s: Par 1.2	S1	4	1	16
Total credits for compulsory modules					**54**

First year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
AIM101	Academic information management 101*	S2	0	2	6
EOT120	Academic literacy(2) 120	S2	2	0	6
PHY124	First course in physics 124 Prerequisite/s: WTW114 GS and PHY114 GS	S2	4	1	16
WKD162	Dynamic and numerical meteorology 162	K3	4	0.6	8
WKD164	Climate and weather of Southern Africa 164	K4	4	0	8
WTW126	Linear algebra 126 Prerequisite/s: Par 1.2	S2	2	1	8
WTW128	Calculus 128 Prerequisite/s: WTW114 GS	S2	2	1	8
	Total credits for compulsory modules				60
* Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content spaced over 2 semesters)					

Compulsory credits = (114) Elective credits = (28) Total credits = (142)

Second year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
WKD250	Weather forecasting 250	S1	5	0	24
WKD253	Community project 253	S1	0	2	18
WTW218	Calculus 218 Prerequisite/s: WTW114 and WTW128	S1	2	1	12
	Total credits for compulsory modules				54

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
GIS220	Geographic data analysis 220	S2	3	1	12
WKD261	Physical meteorology 261	K3	4	0	12
WTW248	Vector analysis 248 Prerequisite/s: WTW218	S2	2	0	12
	Total credits for compulsory modules				36

Compulsory credits = (90) Elective credits = (58) Total credits = (148)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
WKD351	Atmospheric balance laws 351 Prerequisite/s: WTW248	K1	4	1	18
WKD352	Atmospheric vorticity and divergence 352 Prerequisite/s: WTW248	K2	4	1	18
	Total credits for compulsory modules				36

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
WKD361	**Quasi-geostrophic analysis 361** Prerequisite/s: WKD351 GS and WKD352 GS	K3	4	0	18
WKD362	**Cloud and boundary layer dynamics 362** Prerequisite/s: WKD351 GS	K4	4	0	18
WKD365	**Atmospheric data manipulation 365**	K3	3	1	18
	Total credits for compulsory modules				**54**

Electives for the first to third year can be chosen from modules in the following departments: Geography, Geoinformatics and Meteorology, Geology, Plant Production and Soil Science, Chemistry, Plant Science, Mathematics and Applied Mathematics, Physics, Computer Science.

Compulsory credits = (90) Elective credits = (54) Total credits = (144)

A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Microbiology	**MBY**	**03133071**

First year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	**General physics 131** Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				**70**

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	**Academic information management 101***	S2	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	**Academic literacy(2) 120**	S2	2	0	6
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8

		Trm	lpw	ppw	Crdt
MBY161	Introduction to microbiology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
ZEN161	Animal diversity 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
	Total credits for compulsory modules				76

* Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM253	Introduction to proteins and enzymes 253 Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	Practical: Introduction to proteins and enzymes 254 Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	Carbohydrate metabolism 255 Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	Practical: Carbohydrate metabolism 256 Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BOT251	South African flora and vegetation 251 Prerequisite/s: BOT161 or TDH	S1	2	1	12
GTS251	Gene and chromosome organisation 251 Prerequisite/s: GTS161 GS or TDH	S1	2	0.5	12
MBY251	Growth, diversity and control of bacteria 251 Prerequisite/s: MBY161 GS	S1	2	1	12
ZEN251	Invertebrate biology 251 Prerequisite/s: ZEN161 GS or TDH	K1	4	1	12
	Total credits for compulsory modules				72

ZEN251 may be replaced with FST250.

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM263	Lipid and nitrogen metabolism 263 Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	Practical: Lipid and nitrogen metabolism 264 Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	Biochemistry in perspective 265 Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9

BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	S2	2	1	12
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	S2	2	0.5	12
MBY261	**Growth activity and control of fungi 261** Prerequisite/s: MBY161	S2	2	1	12
ZEN261	**African vertebrates 261** Prerequisite/s: ZEN161 GS or TDH	K3	4	1	12
	Total credits for compulsory modules				72

ZEN261 may be replaced with PLG262 or FST260.

Compulsory credits = (144) Elective credits = (0)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
MBY351	**Structure and diversity of viruses 351** Prerequisite/s: BCM253 and BCM254 and CMY127 and MBY161	S1	2	1	18
MBY352	**Environmental microbiology 352** Prerequisite/s: MBY161	S1	2	1	18
MBY353	**Vertibrate-microbe interaction 353** Prerequisite/s: MBY251	S1	2	1	18
PLG351	**General plant pathology 351** Prerequisite/s: MBY161 and MBY261 or TDH	S1	2	1	18
	Total credits for compulsory modules				72

PLG351 may be replaced with GTS352 or GTS353 or BCM351 and BCM355.

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
MBY361	**Trends in microbiology 361** Prerequisite/s: BCM253 and BCM254 and GTS261 and MBY251	S2	2	1	18
MBY362	**Food microbiology 362** Prerequisite/s: MBY251	S2	2	1	18
MBY363	**Molecular biology of prokaryotes 363** Prerequisite/s: BCM253 and BCM254 and CMY127 and MBY161	S2	2	1	18
MBY364	**Genetic manipulation of microbes 364** Prerequisite/s: BCM253 and BCM254 and CMY127 and MBY161	S2	2	1	18
	Total credits for compulsory modules				72

MBY362 may be replaced with GTS363 if GTS353 was taken during the first semester.

Compulsory credits = (144) Elective credits = (0)
A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Nutrition and Food Science	**VDW**	**03134012**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
FSG110	**Physiology 110**	S1	3	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	**General physics 131** Prerequisite/s: Par 1.2	S1	4	1	16
VDS111	**Basic food preparation 111**	S1	1	0.5	6
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	S1	4	1	16
Total credits for compulsory modules					82

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	S2	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	S2	4	1	16
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	**Academic literacy(2) 120**	S2	2	0	6
FSG120	**Physiology 120** Prerequisite/s: FSG110 GS	S2	3	0	6
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
VDS121	**Basic food preparation 121** Prerequisite/s: VDS111	S2	1	0.5	6
Total credits for compulsory modules					72

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (154) Elective credits = (0)

Second year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
FST250	**Introduction to food science and technology 250** Prerequisite/s: CMY117 and CMY127 and PHY131 and WTW134 or TDH	S1	2	1	12
MBY251	**Growth, diversity and control of bacteria 251** Prerequisite/s: MBY161 GS	S1	2	1	12
VDG311	**Nutrition 311** Prerequisite/s: FSG110 and FSG120 or VDG220	S1	3	1	17
VDS210	**Food commodities and preparation 210** Prerequisite/s: VDS121	S1	3	1	18
Total credits for compulsory modules					**83**

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
FST260	**Principles of food processing and preservation 260** Prerequisite/s: CMY117 and CMY127 and MBY161 and PHY131 and WTW134 or TDH	S2	2	1	12
KEP220	**Cultural eating patterns 220** Prerequisite/s: VDS121	S2	3	0	12

VDG321	Nutrition during life cycle 321 Prerequisite/s: VDG311	S2	3	1	17
VDS221	Food commodities and preparation 221 Prerequisite/s: VDS210	S2	3	1	18
Total credits for compulsory modules					**83**

Compulsory credits = (166) Elective credits = (0)

Third year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM355	**Immunobiology 355** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	1	0.5	9
FST350	**Integrated food science 350** Prerequisite/s: FST250 and FST260 or TDH	J1	2	0	9
FST351	**Food chemistry (1) 351** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	2	1	18
FST352	**Food chemistry (2) 352** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	2	1	18
VDS310	**Consumer food research 310** Prerequisite/s: VDS221	S1	3	1	21
Total credits for compulsory modules					**75**

Third year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM365	**Immunobiochemistry 365** Prerequisite/s: BCM355 GS	S2	1	0.5	9
FST350	**Integrated food science 350** Prerequisite/s: FST250 and FST260 or TDH	J1	2	0	9
MBY362	**Food microbiology 362** Prerequisite/s: MBY251	S2	2	1	18
VVW363	**Food, nutrition and health 363** Prerequisite/s: HNT210 or VDG311 and VDG321	S2	3	1	21
VVW364	**Food composition and applied nutritional programmes 364** Prerequisite/s: FST351 and FST352 or TDH	S2	2	1	18
Total credits for compulsory modules					**75**

Compulsory credits = (150) Elective credits = (0)

A minimum of (470) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Physics	**PHY**	**02133202**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
EOT110	**Academic literacy(1) 110**	S1	2	0	6
PHY114	**First course in physics 114** Prerequisite/s: Par 1.2	S1	4	1	16
WTW114	**Calculus 114** Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				38

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	S2	0	2	6
EOT120	**Academic literacy(2) 120**	S2	2	0	6
PHY124	**First course in physics 124** Prerequisite/s: WTW114 GS and PHY114 GS	S2	4	1	16
WTW126	**Linear algebra 126** Prerequisite/s: Par 1.2	S2	2	1	8
WTW128	**Calculus 128** Prerequisite/s: WTW114 GS	S2	2	1	8
	Total credits for compulsory modules				44

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

CMY117,127 are recommended. Electives can be chosen from e.g. Mathematics, Meteorology, Geology, Geography, IT, Mathematical Statistics, Computer Science, Biochemistry, Zoology etc.

Compulsory credits = (82) Elective credits = (64) Total credits = (146)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
PHY255	**Waves, thermodynamics and modern physics 255** Prerequisite/s: PHY114 and PHY124 GS and WTW211# and WTW218#	S1	4	1	24
WTW211	**Linear algebra 211** Prerequisite/s: WTW126	S1	2	1	12
WTW218	**Calculus 218** Prerequisite/s: WTW114 and WTW128	S1	2	1	12
	Total credits for compulsory modules				48

Second year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
PHY263	**General physics 263** Prerequisite/s: PHY255 GS and WTW211 GS and WTW248 # and WTW220# and WTW221#	S2	4	2	24

WTW220	Analysis 220 Prerequisite/s: WTW114 and WTW128	S2	2	1	12
WTW221	Linear algebra 221 Prerequisite/s: WTW211	S2	2	1	12
WTW248	Vector analysis 248 Prerequisite/s: WTW218	S2	2	0	12
Total credits for compulsory modules					60

Electives can be chosen from e.g. Mathematics, Meteorology, Geology, Geography, IT and Mathematical Statistics etc.

Compulsory credits = (108) Elective credits = (36) Total credits = (144)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
PHY356	Electronics, magnetism and quantum mechanics 356 Prerequisite/s: PHY255 GS and PHY263 GS and WTW211 GS and WTW248 GS	S1	4	1	36
Total credits for compulsory modules					36

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
PHY364	General physics 364 Prerequisite/s: PHY356 GS and WTW211 GS and WTW248	S2	4	2	36
Total credits for compulsory modules					36

PHY353 and/or PHY363 can be chosen as elective modules.

Compulsory credits = (72) Elective credits = (72) Total credits = (144)

A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Plant Pathology	**MBY**	**03134001**

First year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY117	General chemistry 117 Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	Academic literacy(1) 110	S1	2	0	6
MLB111	Molecular and cell biology 111 Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	General physics 131 Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	Mathematics 134 Prerequisite/s: Par 1.2	S1	4	1	16
Total credits for compulsory modules					70

Code	Name	Trm	lpw	ppw	Crdt
First year, second semester:					
AIM101	**Academic information management 101***	S2	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	**Academic literacy(2) 120**	S2	2	0	6
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
ZEN161	**Animal diversity 161** Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
Total credits for compulsory modules					**76**
* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)					

Compulsory credits = (146) Elective credits = (0)

Code	Name	Trm	lpw	ppw	Crdt
Second year, first semester:					
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BOT251	**South African flora and vegetation 251** Prerequisite/s: BOT161 or TDH	S1	2	1	12
GTS251	**Gene and chromosome organisation 251** Prerequisite/s: GTS161 GS or TDH	S1	2	0.5	12
MBY251	**Growth, diversity and control of bacteria 251** Prerequisite/s: MBY161 GS	S1	2	1	12
ZEN251	**Invertebrate biology 251** Prerequisite/s: ZEN161 GS or TDH	K1	4	1	12
Total credits for compulsory modules					**72**

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	S2	2	1	12
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	S2	2	0.5	12
MBY261	**Growth activity and control of fungi 261** Prerequisite/s: MBY161	S2	2	1	12
PLG262	**Principles of plant pathology 262** Prerequisite/s: MBY161	S2	2	1	12
Total credits for compulsory modules					**72**

Compulsory credits = (144) Elective credits = (0)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BOT356	**Plant ecophysiology 356** Prerequisite/s: BOT161 or TDH	S1	2	1	18
MBY351	**Structure and diversity of viruses 351** Prerequisite/s: BCM253 and BCM254 and CMY127 and MBY161	S1	2	1	18
MBY352	**Environmental microbiology 352** Prerequisite/s: MBY161	S1	2	1	18
PLG351	**General plant pathology 351** Prerequisite/s: MBY161 and MBY261 or TDH	S1	2	1	18
Total credits for compulsory modules					**72**

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
GTS366	**Plant genetics and biotechnology 366** Prerequisite/s: GTS251 GS and GTS261 and GTS351 and GTS352 are recommended or TDH	S2	2	1	18

MBY364	Genetic manipulation of microbes 364 Prerequisite/s: BCM253 and BCM254 and CMY127 and MBY161	S2	2	1	18
PLG363	Plant disease control 363 Prerequisite/s: PLG251 or PLG262 or TDH. MBY261 is recommended	S2	2	1	18
PLG364	Host pathogen interactions 364	S2	2	1	18
	Total credits for compulsory modules				72

Compulsory credits = (144) Elective credits = (0)

A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Plant Science	BOT	03133091

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	General chemistry 117 Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	Academic literacy(1) 110	S1	2	0	6
MLB111	Molecular and cell biology 111 Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	General physics 131 Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	Mathematics 134 Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				70

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	Academic information management 101*	S2	0	2	6
BME120	Biometry 120 Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	Plant biology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	General chemistry 127 Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	Academic literacy(2) 120	S2	2	0	6
GTS161	Introductory genetics 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	Introduction to microbiology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
ZEN161	Animal diversity 161 Prerequisite/s: MLB111 GS TDH	S2	2	0.5	8
	Total credits for compulsory modules				76

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BOT251	**South African flora and vegetation 251** Prerequisite/s: BOT161 or TDH	S1	2	1	12
GTS251	**Gene and chromosome organisation 251** Prerequisite/s: GTS161 GS or TDH	S1	2	0.5	12
MBY251	**Growth, diversity and control of bacteria 251** Prerequisite/s: MBY161 GS	S1	2	1	12
ZEN251	**Invertebrate biology 251** Prerequisite/s: ZEN161 GS or TDH	K1	4	1	12
Total credits for compulsory modules					72

Students specialising in plant ecology/taxonomy: Replace BCM 255 and BCM 256 with GKD 250.

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	S2	2	1	12
GLY161	**Historical geology 161** Prerequisite/s: Par 1.2	K4	4	1	8
GLY162	**Environmental geology 162** Prerequisite/s: Par 1.2	K3	4	1	8
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	S2	2	0.5	12
MBY261	**Growth activity and control of fungi 261** Prerequisite/s: MBY161	S2	2	1	12
ZEN261	**African vertebrates 261** Prerequisite/s: ZEN161 GS or TDH	K3	4	1	12
Total credits for compulsory modules					64

Students NOT specialising in plant ecology/taxonomy: Replace GLY161 and GLY162 with either PLG262 or HSC260 and an additional elective module with at least 4 credits.

Compulsory credits = (136) Elective credits = (8) Total credits = (144)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BOT356	**Plant ecophysiology 356** Prerequisite/s: BOT161 or TDH	**S1**	**2**	**1**	**18**
BOT357	**Crop biotechnology 357** Prerequisite/s: BOT161 or TDH	**S1**	**2**	**1**	**18**
BOT358	**Plant ecology 358** Prerequisite/s: BOT161 or TDH	**S1**	**2**	**1**	**18**
Total credits for compulsory modules					**54**

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BOT365	**Phytomedicine 365** Prerequisite/s: BOT161 or TDH	**S2**	**2**	**1**	**18**
BOT366	**Plant diversity 366** Prerequisite/s: BOT161 or TDH	**S2**	**2**	**1**	**18**
Total credits for compulsory modules					**36**

Plant ecology specialisation: Students take ZEN364(18) and suitable elective modules.

Compulsory credits = (90) Elective credits = (54) Total credits = (144)

A minimum of (434) credits is required to obtain the degree.

Field of study	Dept	Code
BSc in Zoology	**ZEN**	**03133021**

First year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
EOT110	**Academic literacy(1) 110**	**S1**	**2**	**0**	**6**
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
PHY131	**General physics 131** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
Total credits for compulsory modules					**70**

First year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	**S2**	**0**	**2**	**6**
BME120	**Biometry 120** Prerequisite/s: Par 1.2	**S2**	**4**	**1**	**16**
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	**S2**	**4**	**1**	**16**
EOT120	**Academic literacy(2) 120**	**S2**	**2**	**0**	**6**

GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
ZEN161	**Animal diversity 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
Total credits for compulsory modules					**76**

* Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
BCM255	**Carbohydrate metabolism 255** Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM256	**Practical: Carbohydrate metabolism 256** Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**
BOT251	**South African flora and vegetation 251** Prerequisite/s: BOT161 or TDH	**S1**	**2**	**1**	**12**
GTS251	**Gene and chromosome organisation 251** Prerequisite/s: GTS161 GS or TDH	**S1**	**2**	**0.5**	**12**
MBY251	**Growth, diversity and control of bacteria 251** Prerequisite/s: MBY161 GS	**S1**	**2**	**1**	**12**
ZEN251	**Invertebrate biology 251** Prerequisite/s: ZEN161 GS or TDH	**K1**	**4**	**1**	**12**
Total credits for compulsory modules					**72**

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	**S2**	**2**	**1**	**12**
GLY161	**Historical geology 161** Prerequisite/s: Par 1.2	**K4**	**4**	**1**	**8**
GLY162	**Environmental geology 162** Prerequisite/s: Par 1.2	**K3**	**4**	**1**	**8**
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	**S2**	**2**	**0.5**	**12**

MBY261	Growth activity and control of fungi 261 Prerequisite/s: MBY161	S2	2	1	12
ZEN261	African vertebrates 261 Prerequisite/s: ZEN161 GS or TDH	K3	4	1	12
Total credits for compulsory modules					64

Compulsory credits = (136) Elective credits = (12) Total credits = (148)

Third year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
ZEN351	Population ecology 351	K1	4	2	18
ZEN352	Mammalogy 352	K1	4	2	18
ZEN353	Community ecology 353	K2	4	2	18
ZEN354	Physiology 354	K2	4	2	18
Total credits for compulsory modules					72

Third year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
ZEN361	Ecophysiology 361	K3	4	2	18
ZEN362	Evolution and phylogeny 362	K3	4	2	18
ZEN363	Behavioural ecology 363	K4	4	2	18
ZEN364	Conservation ecology 364	K4	4	2	18
Total credits for compulsory modules					72

Compulsory credits = (144) Elective credits = (0)

A minimum of (438) credits is required to obtain the degree.

Field of study	Dept	Code
BScAgric in Agricultural Economics/Agribusiness Management	**LEK**	**03130050**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	General chemistry 117 Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	Academic literacy(1) 110	S1	2	0	6
FRK111	Financial accounting 111	S1	4	0	10
MLB111	Molecular and cell biology 111 Prerequisite/s: Par 1.2	S1	4	1	16

WTW134	Mathematics 134 Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				**64**

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	Academic information management 101*	S2	0	2	6
BOT161	Plant biology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	General chemistry 127 Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	Academic literacy(2) 120	S2	2	0	6
FRK121	Financial accounting 121 Prerequisite/s: FRK111 GS	S2	4	0	12
GTS161	Introductory genetics 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
VKU120	Animal science 120	S2	2	0.5	8
	Total credits for compulsory modules				**64**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (128) Elective credits = (0)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
EKN110	Economics 110	S1	3	0	10
GKD250	Introductory soil science 250 Prerequisite/s: CMY117 GS or TDH	S1	3	1	12
LEK251	Introduction to financial management in agriculture 251	K1	3	0	6
LEK252	Introduction to agricultural production economics 252 Prerequisite/s: LEK251	K2	3	0	6
PPK251	Sustainable production systems 251 Prerequisite/s: BOT161	S1	2	0.5	12
STK110	Statistics 110 Prerequisite/s: Par 1.2 *	S1	3	1	13
VKU210	Animal science 210 Prerequisite/s: VKU120 GS	S1	2	0.5	6
	Total credits for compulsory modules				**65**

* Students who do not comply with the requirements for STK110 [Reg 1.2(h)] must enrol for STK 113 and STK 123

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
EKN120	Economics 120 Prerequisite/s: EKN110 GS or EKN113 GS and at least 4 (50-59%) in Mathematics in the Grade 12 examination or STK 113 (60%) and STK123 60%	S2	3	0	10
HSC260	Crop propagation 260 Prerequisite/s: BOT161	S2	2	0.5	12

		Trm	lpw	ppw	Crdt
LBU260	**Agroclimatology 260**	S2	2	0.5	12
LEK220	**Agricultural economics 220** Prerequisite/s: LEK251 and LEK252 or EKN113 and/or EKN120	S2	3	0	12
STK120	**Statistics 120** Prerequisite/s: STK110 GS or both STK113 GS and STK123 GS	S2	3	1	13
VKU220	**Animal science 220** Prerequisite/s: VKU210 GS or TDH	S2	2	0.5	12
Total credits for compulsory modules					**71**

Compulsory credits = (136) Elective credits = (0)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BER210	**Business law 210**	S1	3	0	16
EKN214	**Economics 214** Prerequisite/s: EKN110 GS and EKN 120 or EKN113 GS and EKN123 and STK110 GS and STK120 GS	S1	3	0	16
FST250	**Introduction to food science and technology 250** Prerequisite/s: CMY117 and CMY127 and PHY131 and WTW134 or TDH	S1	2	1	12
LEK310	**Agricultural economics 310** Prerequisite/s: LEK251 or EKN110 and LEK252 or EKN120	S1	3	0	12
STK210	**Statistics 210** Prerequisite/s: STK110 and STK120	S1	3	1	20
Total credits for compulsory modules					**76**

EKN215 is recommended as an elective.

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AGV421	**Communication 421**	S2	2	0	20
BEL220	**Taxation 220** Prerequisite/s: FRK 111, FRK 121 or FRK100 or FRK101 and INF181	S2	3	0	16
EKN224	**Economics 224** Prerequisite/s: EKN110 or EKN113, STK110, EKN214 GS	S2	3	0	16
LEK320	**Agricultural economics 320** Prerequisite/s: LEK220 and LEK251 and LEK252	S2	3	2	18
STK281	**Statistics 281** Prerequisite/s: STK110 and STK120	S2	2	1	10
Total credits for compulsory modules					**80**

Compulsory credits = (156) Elective credits = (37) Total credits = (193)

Code	Name	Trm	lpw	ppw	Crdt
Fourth year, first semester:					
ARD480	**Agricultural and rural development studies 480**	J1	3	0	20
EKN314	**Economics 314** Prerequisite/s: EKN214, EKN224 and STK120	S1	3	0	20
LEK415	**Agricultural economics 415** Prerequisite/s: EKN110 and LEK220 and WTW134	S1	3	1	18
LEK451	**Agricultural demand and supply analysis 451** Prerequisite/s: LEK220 and LEK252 and STK281	K1	3	2	12
LEK452	**Commodity price analysis 452** Prerequisite/s: LEK220 and LEK252 and LEK451 and STK281	K2	3	2	12
	Total credits for compulsory modules				**82**

Code	Name	Trm	lpw	ppw	Crdt
Fourth year, second semester:					
ARD480	**Agricultural and rural development studies 480**	J1	3	0	20
LEK421	**Agricultural economics 421** Prerequisite/s: LEK451 and STK210 and STK281	S2	3	2	24
LEK424	**Introduction to resource economics 424** Prerequisite/s: LEK251 and LEK252	S2	3	0	15
	Total credits for compulsory modules				**59**

Elective modules can be chosen from the following: STK310 (Take note of the prerequisites), STK320, WDE320, EKN325, and any modules from Animal and Wildlife Sciences and Plant Production and Soil Sciences on 400-level that do not clash on the lecture, practical or examination time-table.

Compulsory credits = (141) Elective credits = (20) Total credits = (161)

A minimum of (618) credits is required to obtain the degree.

Field of study	Dept	Code
BScAgric in Animal Science	**VKU**	**03130140**

Code	Name	Trm	lpw	ppw	Crdt
First year, first semester:					
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	S1	4	1	16

PHY131	General physics 131 Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	Mathematics 134 Prerequisite/s: Par 1.2	S1	4	1	16
	Total credits for compulsory modules				**70**

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	Academic information management 101*	S2	0	2	6
BME120	Biometry 120 Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	Plant biology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	General chemistry 127 Prerequisite/s: CMY117 GS	S2	4	1	16
EOT120	Academic literacy(2) 120	S2	2	0	6
GTS161	Introductory genetics 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	Introduction to microbiology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
VKU120	Animal science 120	S2	2	0.5	8
	Total credits for compulsory modules				**76**
* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)					

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM253	Introduction to proteins and enzymes 253 Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	Practical: Introduction to proteins and enzymes 254 Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	Carbohydrate metabolism 255 Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	Practical: Carbohydrate metabolism 256 Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
DAF200	Animal anatomy and physiology 200 Prerequisite/s: CMY127 or TDH	J1	4	1	18
GKD250	Introductory soil science 250 Prerequisite/s: CMY117 GS or TDH	S1	3	1	12
GTS251	Gene and chromosome organisation 251 Prerequisite/s: GTS161 GS or TDH	S1	2	0.5	12

PPK251	Sustainable production systems 251 Prerequisite/s: BOT161	S1	2	0.5	12
VKU210	**Animal science 210** Prerequisite/s: VKU120 GS	S1	2	0.5	8
	Total credits for compulsory modules				86

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM263	**Lipid and nitrogen metabolism 263** Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	**Practical: Lipid and nitrogen metabolism 264** Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
DAF200	**Animal anatomy and physiology 200** Prerequisite/s: CMY127 or TDH	J1	4	1	18
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	S2	2	0.5	12
VDG260	**Nutrition 260** Prerequisite/s: CMY127	S2	3	0.5	12
VKU220	**Animal science 220** Prerequisite/s: VKU210 GS or TDH	S2	2	0.5	12
	Total credits for compulsory modules				78

Compulsory credits = (164) Elective credits = (0)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BME210	**Biometry 210** Prerequisite/s: BME120	S1	4	1	24
BCM355	**Immunobiology 355** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	1	0.5	9
DAN310	**Animal anatomy 310** Prerequisite/s: DAF200	S1	1	0.5	8
DFS311	**Animal physiology 311** Prerequisite/s: DAF200	S1	2	0	10
LEK251	**Introduction to financial management in agriculture 251**	K1	3	0	6
LEK252	**Introduction to agricultural production economics 252** Prerequisite/s: LEK251	K2	3	0	6

RPL310	Reproduction science 310 Prerequisite/s: DAF200	S1	1	0.5	8
VGE301	Nutrition science 301 Prerequisite/s: BCM263 and BCM264 and BCM265 and BCM266 and DAF200 and VDG260 and VKU220	J1	3	0.5	16
WDE310	Principles of veld management 310	S1	2	0.5	14
Total credits for compulsory modules					101

Third year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM363	Xeno biochemistry 363 Prerequisite/s: BCM265	K4	1	0	5
DFS320	Growth physiology 320 Prerequisite/s: DFS311 and DAN 310	S2	2	0.5	10
RPL320	Reproduction science 320 Prerequisite/s: RPL310	S2	2	0.5	10
TLR320	Animal breeding 320 Prerequisite/s: GTS261	S2	2	0.5	10
VGE301	Nutrition science 301 Prerequisite/s: BCM263 and BCM264 and BCM265 and BCM266 and DAF200 and VDG260 and VKU220	J1	3	0.5	16
VKU362	Animal science biotechnology 362 Prerequisite/s: GTS261	S2	1	0	8
WDE320	Planted pastures and foddercrops 320 Prerequisite/s: WDE310	S2	2	0.5	14
Total credits for compulsory modules					73

Compulsory credits = (174) Elective credits = (0)

Fourth year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
GVK420	Large stock science 420 Prerequisite/s: RPL320 and VGE301 and VKU210	S1	2	0.5	12
PVK420	Poultry science 420 Prerequisite/s: VGE301 and VKU220	S1	2	0.5	12
TLR411	Animal breeding 411 Prerequisite/s: Simultaneously register for GVK 420, PVK420, KVK420 and VKD 410	S1	2	0.5	12
VGE423	Nutrition science 423 Prerequisite/s: VGE301	S1	3	0	16
VKF411	Animal science pharmacology 411 Prerequisite/s: DFS320 and VGE301	S1	3	0	12
VKU400	Research methodology 400 Prerequisite/s: Simultaneously register for GVK420, PVK420, TLR411, VGE 423, VKF 411 and WLK410	J1	2	0	8
WLK410	Wool science 410	S1	1	0.5	8
Total credits for compulsory modules					80

Fourth year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
KVK420	**Small stock science 420** Prerequisite/s: RPL320 and VGE301 and VKU220	**S2**	**2**	**0.5**	**12**
TLR420	**Animal breeding 420** Prerequisite/s: TLR411	**S2**	**2**	**0.5**	**12**
VGE411	**Nutrition science 411** Prerequisite/s: VGE301	**S2**	**4**	**0.5**	**18**
VGE421	**Nutrition science 421** Prerequisite/s: VGE301	**S2**	**3**	**0.5**	**16**
VKD410	**Pig science 410** Prerequisite/s: VGE301 and VKU220	**S2**	**1**	**0.5**	**8**
VKU400	**Research methodology 400** Prerequisite/s: Simultaneously register for GVK420, PVK420, TLR411, VGE423, VKF411 and WLK410	**J1**	**2**	**0**	**8**
VSX420	**Meat and dairy science 420** Prerequisite/s: DFS320	**S2**	**2**	**0**	**10**
WKE420	**Wildlife science 420** Prerequisite/s: VGE301 and VKU361 or TDH	**S2**	**2**	**0**	**10**
Total credits for compulsory modules					**94**

Compulsory credits = (174) Elective credits = (0)

A minimum of (658) credits is required to obtain the degree.

Field of study	**Dept**	**Code**
BScAgric in Animal Science/Pasture Science	**VKU**	**03130250**

First year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
EOT110	**Academic literacy(1) 110**	**S1**	**2**	**0**	**6**
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
PHY131	**General physics 131** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
Total credits for compulsory modules					**70**

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	**Academic information management 101***	**S2**	**0**	**2**	**6**
BME120	**Biometry 120** Prerequisite/s: Par 1.2	**S2**	**4**	**1**	**16**
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	**S2**	**4**	**1**	**16**

EOT120	Academic literacy(2) 120	S2	2	0	6
GTS161	Introductory genetics 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	Introduction to microbiology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
VKU120	Animal science 120	S2	2	0.5	8
Total credits for compulsory modules					76

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM253	Introduction to proteins and enzymes 253 Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	Practical: Introduction to proteins and enzymes 254 Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BCM255	Carbohydrate metabolism 255 Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	Practical: Carbohydrate metabolism 256 Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BOT251	South African flora and vegetation 251 Prerequisite/s: BOT161 or TDH	S1	2	1	12
DAF200	Animal anatomy and physiology 200 Prerequisite/s: CMY127 or TDH	J1	4	1	18
GKD250	Introductory soil science 250 Prerequisite/s: CMY117 GS or TDH	S1	3	1	12
PPK251	Sustainable production systems 251 Prerequisite/s: BOT161	S1	2	0.5	12
VKU210	Animal science 210 Prerequisite/s: VKU120 GS	S1	2	0.5	8
Total credits for compulsory modules					86

Second year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM263	Lipid and nitrogen metabolism 263 Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	Practical: Lipid and nitrogen metabolism 264 Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3

BCM265	**Biochemistry in perspective 265** Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM266	**Practical: Biochemistry in perspective 266** Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	S2	2	1	12
DAF200	**Animal anatomy and physiology 200** Prerequisite/s: CMY127 or TDH	J1	4	1	18
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	S2	2	0.5	12
VKU220	**Animal science 220** Prerequisite/s: VKU210 GS or TDH	S2	2	0.5	12
VDG260	**Nutrition 260** Prerequisite/s: CMY127	S2	3	0.5	12
Total credits for compulsory modules					90

Compulsory credits = (176) Elective credits = (0)

Third year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BME210	**Biometry 210** Prerequisite/s: BME120	S1	4	1	24
DAN310	**Animal anatomy 310** Prerequisite/s: DAF200	S1	1	0.5	8
DFS311	**Animal physiology 311** Prerequisite/s: DAF200	S1	2	0	10
LEK251	**Introduction to financial management in agriculture 251**	K1	3	0	6
LEK252	**Introduction to agricultural production economics 252** Prerequisite/s: LEK251	K2	3	0	6
RPL310	**Reproduction science 310** Prerequisite/s: DAF200	S1	1	0.5	8
VGE301	**Nutrition science 301** Prerequisite/s: BCM263 and BCM264 and BCM265 and BCM266 and DAF200 and VDG260 and VKU220	J1	3	0.5	16
WDE310	**Principles of veld management 310**	S1	2	0.5	14
Total credits for compulsory modules					92

Third year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
DFS320	**Growth physiology 320** Prerequisite/s: DFS311 and DAN 310	S2	2	0.5	10
LBU260	**Agroclimatology 260**	S2	2	0.5	12
RPL320	**Reproduction science 320** Prerequisite/s: RPL310	S2	2	0.5	10
TLR320	**Animal breeding 320** Prerequisite/s: GTS261	S2	2	0.5	10

VGE301	Nutrition science 301 Prerequisite/s: BCM263 and BCM264 and BCM265 and BCM266 and DAF200 and VDG260 and VKU220	J1	3	0.5	16
WDE320	Planted pastures and foddercrops 320 Prerequisite/s: WDE310	S2	2	0.5	14
	Total credits for compulsory modules				**72**

Compulsory credits = (164) Elective credits = (0)

Fourth year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
GKD350	Soil classification and surveying 350 Prerequisite/s: GKD250 GS	S1	2	1	14
GVK420	Large stock science 420 Prerequisite/s: RPL320 and VGE301 and VKU210	S1	2	0.5	12
VGE423	Nutrition science 423 Prerequisite/s: VGE301	S1	3	0	16
VKF411	Animal science pharmacology 411 Prerequisite/s: DFS320 and VGE301	S1	3	0	12
VKU400	Research methodology 400 Prerequisite/s: Simultaneously register for GVK 420, PVK420, TLR411, VGE423, VKF411 and WLK410	J1	2	0	8
WDE450	Environmental resource assessment and management 450	S1	3	0.5	20
	Total credits for compulsory modules				**82**

Fourth year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
APS461	Crop physiology 461 Prerequisite/s: GKD250 and BOT356	S2	2	0.5	14
KVK420	Small stock science 420 Prerequisite/s: RPL320 and VGE301 and VKU220	S2	2	0.5	12
VGE411	Nutrition science 411 Prerequisite/s: VGE301	S2	4	0.5	18
VGE421	Nutrition science 421 Prerequisite/s: VGE301	S2	3	0.5	16
VKU400	Research methodology 400 Prerequisite/s: Simultaneously register for GVK420, PVK420, TLR411, VGE423, VKF 411 and WLK410	J1	2	0	8
VSX420	Meat and dairy science 420 Prerequisite/s: DFS320	S2	2	0	10
WKE420	Wildlife science 420 Prerequisite/s: VGE301 and VKU361 or TDH	S2	2	0	10
	Total credits for compulsory modules				**88**

Compulsory credits = (170) Elective credits = (0)

A minimum of (656) credits is required to obtain the degree.

Field of study	Dept	Code
BScAgric **Option: Applied Plant and Soil Sciences**	**PGW**	**03130162**

First year, first semester:					
Students who want to enrol for the main subjects: Agronomy, Horticulture or Pasture Science, must register for the BScAgric Option: Applied Plant and Soil Sciences degree programme.					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
EOT110	**Academic literacy(1) 110**	**S1**	**2**	**0**	**6**
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
PHY131	**General physics 131** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
Total credits for compulsory modules					**70**

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	**Academic information management 101***	**S2**	**0**	**2**	**6**
BME120	**Biometry 120** Prerequisite/s: Par 1.2	**S2**	**4**	**1**	**16**
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	**S2**	**4**	**1**	**16**
EOT120	**Academic literacy(2) 120**	**S2**	**2**	**0**	**6**
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
Total credits for compulsory modules					**68**
* Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content spaced over 2 semesters)					

Compulsory credits = (138) Elective credits = (8) Total credits = (146) **Electives: ZEN161 or VKU120**

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**

Code	Name	Trm	lpw	ppw	Crdt
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
BOT251	**South African flora and vegetation 251** Prerequisite/s: BOT161 or TDH	S1	2	1	12
GKD250	**Introductory soil science 250** Prerequisite/s: CMY117 GS or TDH	S1	3	1	12
LEK251	**Introduction to financial management in agriculture 251**	K1	3	0	6
LEK252	**Introduction to agricultural production economics 252** Prerequisite/s: LEK251	K2	3	0	6
PLG251	**Introduction: Crop protection 251**	S1	2	1	12
PPK251	**Sustainable production systems 251** Prerequisite/s: BOT161	S1	2	0.5	12
Total credits for compulsory modules					72

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BOT261	**Plant biochemical evolution 261** Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	S2	2	1	12
GTS261	**Genetic analysis and manipulation 261** Prerequisite/s: GTS161 GS or TDH	S2	2	0.5	12
HSC260	**Crop propagation 260** Prerequisite/s: BOT161	S2	2	0.5	12
LBU260	**Agroclimatology 260**	S2	2	0.5	12
LEK220	**Agricultural economics 220** Prerequisite/s: LEK251 and LEK252 or EKN113 and/or EKN120	S2	3	0	12
PLG262	**Principles of plant pathology 262** Prerequisite/s: MBY161	S2	2	1	12
Total credits for compulsory modules					72

Compulsory credits = (144) Elective credits = (0)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BOT356	**Plant ecophysiology 356** Prerequisite/s: BOT161 or TDH	S1	2	1	18
GKD350	**Soil classification and surveying 350** Prerequisite/s: GKD250 GS	S1	2	1	14
HSC351	**Nursery management 351**	S1	2	0.5	14
PGW350	**Soil-water-relationship and irrigation 350** Prerequisite/s: GKD250	S1	2	0.5	16
WDE310	**Principles of veld management 310**	S1	2	0.5	14
Total credits for compulsory modules					76

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
AGR361	**Field crops 361** Prerequisite/s: HSC260 and PPK251	S2	2	0.5	14
GKD320	**Soil chemistry 320** Prerequisite/s: GKD250	S2	2	1	14
PLG363	**Plant disease control 363** Prerequisite/s: PLG251 or PLG262 or TDH. MBY261 is recommended	S2	2	1	18
WDE320	**Planted pastures and foddercrops 320** Prerequisite/s: WDE310	S2	2	0.5	14
ZEN365	**Insect pest management 365**	K4	4	2	18
Total credits for compulsory modules					78

Compulsory credits = (154) Elective credits = (0)

Fourth year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
AGR410	**Vegetable crops 410**	S1	2	0.5	14
HSC490	**Ornament horticulture 490**	S1	2	0.5	14
LKM450	**Environmental biophysics 450**	S1	2	0.5	16
PGW400	**Seminar 400**	J1	1	0	10
PGW421	**Experimental design and analysis 421** Prerequisite/s: BME120	S1	2	0.5	14
WDE450	**Environmental resource assessment and management 450**	S1	3	0.5	20
Total credits for compulsory modules					88

Fourth year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
APS461	**Crop physiology 461** Prerequisite/s: GKD250 and BOT356	S2	2	0.5	14
GKD420	**Soil fertility, soil microbiology and plant nutrition 420** Prerequisite/s: GKD250 GS	S2	3	1	14
HSC420	**Fruit tree crops 420** Prerequisite/s: GKD250 and PGW350	S2	4	1	26
OKW413	**Weed science 413** Prerequisite/s: PLG251	S2	2	0.5	14
PGW400	**Seminar 400**	J1	1	0	10
Total credits for compulsory modules					78

Compulsory credits = (166) Elective credits = (0)

A minimum of (610) credits is required to obtain the degree.

Field of study	Dept	Code
BScAgric in Food Science and Technology	**VDW**	**03130370**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
EOT110	**Academic literacy(1) 110**	**S1**	**2**	**0**	**6**
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
PHY131	**General physics 131** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	**S1**	**4**	**1**	**16**
Total credits for compulsory modules					**70**

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	**S2**	**0**	**2**	**6**
BME120	**Biometry 120** Prerequisite/s: Par 1.2	**S2**	**4**	**1**	**16**
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	**S2**	**4**	**1**	**16**
EOT120	**Academic literacy(2) 120**	**S2**	**2**	**0**	**6**
GTS161	**Introductory genetics 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
MBY161	**Introduction to microbiology 161** Prerequisite/s: MLB111 GS	**S2**	**2**	**0.5**	**8**
ZEN161	**Animal diversity 161** Prerequisite/s: MLB111 GS or TDH	**S2**	**2**	**0.5**	**8**
Total credits for compulsory modules					**76**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BCM253	**Introduction to proteins and enzymes 253** Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**2**	**0**	**9**
BCM254	**Practical: Introduction to proteins and enzymes 254** Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	**S1**	**0**	**0.5**	**3**

BCM255	Carbohydrate metabolism 255 Prerequisite/s: BCM256# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM256	Practical: Carbohydrate metabolism 256 Prerequisite/s: BCM255# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
FST250	Introduction to food science and technology 250 Prerequisite/s: CMY117 and CMY127 and PHY131 and WTW134 or TDH	S1	2	1	12
LEK251	Introduction to financial management in agriculture 251	K1	3	0	6
LEK252	Introduction to agricultural production economics 252 Prerequisite/s: LEK251	K2	3	0	6
MBY251	Growth, diversity and control of bacteria 251 Prerequisite/s: MBY161 GS	S1	2	1	12
Total credits for compulsory modules					**60**

	Second year, second semester:				
Code	Name	Trm	lpw	ppw	Crdt
BCM263	Lipid and nitrogen metabolism 263 Prerequisite/s: BCM264# and CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM264	Practical: Lipid and nitrogen metabolism 264 Prerequisite/s: BCM263# and CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
BCM265	Biochemistry in perspective 265 Prerequisite/s: BCM266# en CMY117 GS and CMY127 GS and MLB111 GS	S2	2	0	9
BCM266	Practical: Biochemistry in perspective 266 Prerequisite/s: BCM265# en CMY117 GS and CMY127 GS and MLB111 GS	S2	0	0.5	3
FST260	Principles of food processing and preservation 260 Prerequisite/s: CMY117 and CMY127 and MBY161 and PHY131 and WTW134 or TDH	S2	2	1	12
LEK220	Agricultural economics 220 Prerequisite/s: LEK251 and LEK252 or EKN113 and/or EKN120	S2	3	0	12
MBY261	Growth activity and control of fungi 261 Prerequisite/s: MBY161	S2	2	1	12
VDG260	Nutrition 260 Prerequisite/s: CMY127	S2	3	0.5	12
Total credits for compulsory modules					**72**

Compulsory credits = (132) Elective credits = (12) Total credits = (144)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
FST350	**Integrated food science 350** Prerequisite/s: FST250 and FST260 or TDH	J1	2	0	9
FST351	**Food chemistry (1) 351** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	2	1	18
FST352	**Food chemistry (2) 352** Prerequisite/s: BCM253 and BCM254 and BCM255 and BCM256 and BCM263 and BCM264 and BCM265 and BCM266	S1	2	1	18
FST353	**Food engineering 353** Prerequisite/s: FST260 or TDH	S1	3	0.5	18
Total credits for compulsory modules					**63**

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
FST350	**Integrated food science 350** Prerequisite/s: FST250 and FST260 or TDH	J1	2	0	9
FST360	**Principles of the science and technology of plant foods 360** Prerequisite/s: FST250 and FST260 and FST351 and FST352 or TDH	S2	2	1	18
FST361	**Animal food science 361** Prerequisite/s: FST250 and FST260 and FST351 and FST352 or TDH	S2	2	1	18
LEK320	**Agricultural economics 320** Prerequisite/s: LEK220 and LEK 251 and LEK252	S2	3	2	18
MBY362	**Food microbiology 362** Prerequisite/s: MBY251	S2	2	1	18
Total credits for compulsory modules					**81**

Compulsory credits = (144) Elective credits = (0)

Fourth year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
FST400	**Research methodology and seminar 400** Prerequisite/s: Third-year status or TDH	J1	2	1	10
FST402	**Advanced plant food science and technology 402** Prerequisite/s: FST360 or TDH	J1	2	1	10
FST412	**Sensory analysis 412** Prerequisite/s: FST260 and FST351 and FST352 or TDH	S1	1	1	10
FST413	**Product development and quality management 413** Prerequisite/s: FST260 and FST351 and FST352 or TDH	S1	3	1	30
FST420	**Advanced food science 420** Prerequisite/s: Third-year status or TDH	J1	2	0	10

FST463	Research project 463 Prerequisite/s: Third-year status in Food Science or TDH	J1	0	1	20
Total credits for compulsory modules					**90**

Fourth year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
FST400	**Research methodology and seminar 400** Prerequisite/s: Third-year status or TDH	J1	2	1	10
FST401	**Animal food technology 401** Prerequisite/s: FST361 or TDH	S2	2	1	20
FST402	**Advanced plant food science and technology 402** Prerequisite/s: FST360 or TDH	J1	2	1	10
FST420	**Advanced food science 420** Prerequisite/s: Third-year status or TDH	J1	2	0	10
FST463	**Research project 463** Prerequisite/s: Third-year status in Food Science or TDH	J1	0	1	20
Total credits for compulsory modules					**70**

Compulsory credits = (160) Elective credits = (0)

A minimum of (594) credits is required to obtain the degree.

Field of study	Dept	Code
BScAgric in Plant Pathology	**MBY**	**03130321**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
CMY117	**General chemistry 117** Prerequisite/s: Par 1.2	S1	4	1	16
EOT110	**Academic literacy(1) 110**	S1	2	0	6
MLB111	**Molecular and cell biology 111** Prerequisite/s: Par 1.2	S1	4	1	16
PHY131	**General physics 131** Prerequisite/s: Par 1.2	S1	4	1	16
WTW134	**Mathematics 134** Prerequisite/s: Par 1.2	S1	4	1	16
Total credits for compulsory modules					**70**

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	S2	0	2	6
BME120	**Biometry 120** Prerequisite/s: Par 1.2	S2	4	1	16
BOT161	**Plant biology 161** Prerequisite/s: MLB111 GS	S2	2	0.5	8
CMY127	**General chemistry 127** Prerequisite/s: CMY117 GS	S2	4	1	16

EOT120	Academic literacy(2) 120	S2	2	0	6
GTS161	Introductory genetics 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
MBY161	Introduction to microbiology 161 Prerequisite/s: MLB111 GS	S2	2	0.5	8
ZEN161	Animal diversity 161 Prerequisite/s: MLB111 GS or TDH	S2	2	0.5	8
Total credits for compulsory modules					**76**
* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)					

Compulsory credits = (146) Elective credits = (0)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BCM253	Introduction to proteins and enzymes 253 Prerequisite/s: BCM254# and CMY117 GS and CMY127 GS and MLB111 GS	S1	2	0	9
BCM254	Practical: Introduction to proteins and enzymes 254 Prerequisite/s: BCM253# and CMY117 GS and CMY127 GS and MLB111 GS	S1	0	0.5	3
GKD250	Introductory soil science 250 Prerequisite/s: CMY117 GS or TDH	S1	3	1	12
GTS251	Gene and chromosome organisation 251 Prerequisite/s: GTS161 GS or TDH	S1	2	0.5	12
LEK251	Introduction to financial management in agriculture 251	K1	3	0	6
LEK252	Introduction to agricultural production economics 252 Prerequisite/s: LEK251	K2	3	0	6
PLG251	Introduction: Crop protection 251	S1	2	1	12
Total credits for compulsory modules					**60**

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BOT261	Plant biochemical evolution 261 Prerequisite/s: BOT161 and CMY117 and CMY127 or TDH	S2	2	1	12
GTS261	Genetic analysis and manipulation 261 Prerequisite/s: GTS161 GS or TDH	S2	2	0.5	12
HSC260	Crop propagation 260 Prerequisite/s: BOT161	S2	2	0.5	12
LBU260	Agroclimatology 260	S2	2	0.5	12
LEK220	Agricultural economics 220 Prerequisite/s: LEK251 and LEK252 or EKN113 and/or EKN120	S2	3	0	12

MBY261	Growth activity and control of fungi 261 Prerequisite/s: MBY161	S2	2	1	12
PLG262	Principles of plant pathology 262 Prerequisite/s: MBY161	S2	2	1	12
Total credits for compulsory modules					**84**

Compulsory credits = (144) Elective credits = (0)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BOT356	Plant ecophysiology 356 Prerequisite/s: BOT161 or TDH	S1	2	1	18
MBY251	Growth, diversity and control of bacteria 251 Prerequisite/s: MBY161 GS	S1	2	1	12
MBY351	Structure and diversity of viruses 351 Prerequisite/s: BCM253 and BCM254 and CMY127 and MBY161	S1	2	1	18
PLG351	General plant pathology 351 Prerequisite/s: MBY161 and MBY261 or TDH	S1	2	1	18
PPK251	Sustainable production systems 251 Prerequisite/s: BOT161	S1	2	0.5	12
Total credits for compulsory modules					**78**

MBY351 may be replaced with HSC351 and an additional elective of 4 credits.

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
GTS366	Plant genetics and biotechnology 366 Prerequisite/s: GTS251 GS and GTS261 and GTS351and GTS352 are recommended or TDH	S2	2	1	18
MBY364	Genetic manipulation of microbes 364 Prerequisite/s: BCM253 and BCM254 and CMY127 and MBY161	S2	2	1	18
PLG363	Plant disease control 363 Prerequisite/s: PLG251 or PLG262 or TDH. MBY261 is recommended	S2	2	1	18
PLG364	Host pathogen interactions 364	S2	2	1	18
Total credits for compulsory modules					**72**

Plant protection focus: MBY364 and GTS366 may be replaced with MBY362 and BOT365.

Compulsory credits = (150) Elective credits = (0)

Fourth year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
MBY352	Environmental microbiology 352 Prerequisite/s: MBY161	S1	2	1	18
PGW400	Seminar 400	J1	1	0	10
PGW421	Experimental design and analysis 421 Prerequisite/s: BME120	S1	2	0.5	14
PLG462	Research project 462	J1	1	1	15
PLG483	Advanced plant disease control 483 Prerequisite/s: PLG363 or TDH	S1	2	1	18
Total credits for compulsory modules					75

Fourth year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
MBY363	Molecular biology of prokaryotes 363 Prerequisite/s: BCM253 and BCM254 and CMY127 and MBY161	S2	2	1	18
OKW413	Weed science 413 Prerequisite/s: PLG251	S2	2	0.5	14
PGW400	Seminar 400	J1	1	0	10
PLG462	Research project 462	J1	1	1	15
PLG490	Current concepts in plant pathology 490 Prerequisite/s: Third-year status or TDH	S2	2	1	18
ZEN365	Insect pest management 365	K4	4	2	18
Total credits for compulsory modules					93

MBY363 may be replaced with HSC460 and an additional elective of 6 credits or an equivalent module of 18 credits.

Compulsory credits = (168) Elective credits = (0)

A minimum of (608) credits is required to obtain the degree.

Field of study	Dept	Code
BConsumer Science in Clothing: Retail Management	**VBR**	**02130124**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
EKN110	Economics 110	S1	3	0	10
EOT110	Academic literacy(1) 110	S1	2	0	6
FRK111	Financial accounting 111	S1	4	0	10

KLR110	Clothing production: Sewing techniques 110	S1	1	1	9
OBG111	Design principles 111	S1	1	1	7
STK110	Statistics 110 * Prerequisite/s: Par 1.2	S1	3	1	13
Total credits for compulsory modules					**55**

* Students who do not comply with the requirements for STK 110 [Reg 1.2(h)] must enrol for STK 113 and STK 123

First year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
AIM101	Academic information management 101 *	S2	0	2	6
EKN120	Economics 120 Prerequisite/s: EKN110 GS or EKN 113 GS and at least 4 (50-59%) in Mathematics in the Grade 12 examination or STK113 (60%) and STK 123 60%	S2	3	0	10
EOT120	Academic literacy(2) 120	S2	2	0	6
EST121	Aesthetics 121 Prerequisite/s: OBG111	S2	1	1	9
FRK121	Financial accounting 121 Prerequisite/s: FRK111 GS	S2	4	0	12
KLR120	Clothing product: Processes 120 Prerequisite/s: KLR110	S2	1	1	9
Total credits for compulsory modules					**52**

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters)

Compulsory credits = (107) Elective credits = (0)

Second year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BEM110	Marketing management 110	S1	3	0	10
EST212	Aesthetics: Product, consumer and environment 212 Prerequisite/s: EST121	S1	1	1	10
KLD210	Costume and fashion history 210	S1	3	0	12
KLR211	Flat pattern design 211 Prerequisite/s: KLR120	S1	0	2	12
OBS114	Business management 114	S1	3	0	10
TKS212	Textiles: Utility, fibres and yarns 212	S1	3	1	14
Total credits for compulsory modules					**68**

Second year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BEM122	Marketing applications 122 Prerequisite/s: BEM110 GS	S2	3	0	10

INF281	Informatics 281 Prerequisite/s: FRK111 GS	S2	2	0	3
KLD222	Fashion forecasting 222	S2	3	0	12
KLR221	Pattern use and good fit 221 Prerequisite/s: KLR211	S2	1	1	10
KTP220	Experiential training 220	S2	0	1	4
OBS124	Business management 124 Prerequisite/s: Admission to the examination in OBS114	S2	3	0	10
TKS222	Textiles: Structures and finishes 222 Prerequisite/s: TKS212 GS	S2	3	1	14
Total credits for compulsory modules					63

Compulsory credits = (131) Elective credits = (0)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BEM212	Consumer behaviour 212 Prerequisite/s: BEM 110 GS	S1	3	0	16
BER210	Business law 210	S1	3	0	16
KLR311	Tailoring 311 Prerequisite/s: KLR211 and KLR221	S1	1	1	11
OBS210	Business management 210 Prerequisite/s: OBS114 or OBS124 with admission to the examination in the other	S1	3	0	16
TKS310	New developments and textiles in use 310 Prerequisite/s: TKS212 and TKS222 GS	S1	2	0	10
Total credits for compulsory modules					69

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BEM224	Integrated brand communication 224 Prerequisite/s: BEM110 GS	S2	3	0	16
BER220	Business law 220 Prerequisite/s: BER210	S2	3	0	16
KLD322	Social and cultural aspects of clothing 322	S2	4	0	20
KLR321	Clothing production 321 Prerequisite/s: KLR221	S2	1	1	11
OBS220	Business management 220 Prerequisite/s: OBS114 or OBS124 with admission to the examination in the other	S2	3	0	16
SEM381	Seminar 381 Prerequisite/s: Third-year status	S2	1	0	5
Total credits for compulsory modules					84

Compulsory credits = (153) Elective credits = (0)

Fourth year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BEM314	**Marketing research 314** Prerequisite/s: BEM110, BEM212 and STK110 (or STK113 and STK123 or BME120)	S1	3	0	20
KLD410	**Clothing retail management 410** Prerequisite/s: Fourth-year status	S1	3	0	15
KLR411	**Product development 411** Prerequisite/s: KLR221 and KLR321	S1	2	1	19
KTP402	**Clothing textile project 402** Prerequisite/s: SEM381 and Fourth-year status	J1	0	1	9
Total credits for compulsory modules					**63**

Fourth year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
BEM321	**Marketing management 321** Prerequisite/s: BEM212	S2	3	0	20
KLD420	**Clothing merchandising 420** Prerequisite/s: Fourth-year status	S2	3	0	15
KTP402	**Clothing textile project 402** Prerequisite/s: SEM381 and Fourth-year status	J1	0	1	9
TKS421	**Textiles 421** Prerequisite/s: TKS212 and TKS222 and TKS310	S2	3	0	15
Total credits for compulsory modules					**59**

Experiential training in the industry: During the 4 years of study, during holidays, week-ends and after hours, students must complete a total of 480 hours experiential training in the industry to develop practical and occupational skills. This is equal to 3 weeks x 40 hours (120 hours) per year, according to requirements as determine by the head of department. These "credits" must be successfully completed together with a complete portfolio before the degree will be conferred.

Compulsory credits = (122) Elective credits = (0)
A minimum of (513) credits is required to obtain the degree.

Field of study	Dept	Code
BConsumer Science in Foods: Retail Management	**VBR**	**02130114**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BEM110	**Marketing management 110**	S1	3	0	10
EKN110	**Economics 110**	S1	3	0	10

EOT110	Academic literacy(1) 110	S1	2	0	6
FRK111	Financial accounting 111	S1	4	0	10
OBS114	Business management 114	S1	3	0	10
STK110	Statistics 110 Prerequisite/s: Par 1.2*	S1	3	1	13
VDS111	Basic food preparation 111	S1	1	0.5	6
	Total credits for compulsory modules				65

* Students who do not comply with the requirements for STK110 [Reg 1.2(h)] must enrol for STK 113 and STK 123.

First year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
AIM101	Academic information management 101*	S2	0	2	6
BEM122	Marketing applications 122 Prerequisite/s: BEM110 GS	S2	3	0	10
EKN120	Economics 120 Prerequisite/s: EKN110 GS or EKN 113 GS and at least 4 (50-59%) in Mathematics in the Grade 12 examination or STK113 (60%) and STK 123 60%	S2	3	0	10
EOT120	Academic literacy(2) 120	S2	2	0	6
FRK121	Financial accounting 121 Prerequisite/s: FRK111 GS	S2	4	0	12
OBS124	Business management 124 Prerequisite/s: Admission to the examination in OBS114	S2	3	0	10
VDS121	Basic food preparation 121 Prerequisite/s: VDS111	S2	1	0.5	6
	Total credits for compulsory modules				60

* Students may enrol for AIM 111 and AIM 121 instead of AIM 101 (the same content spaced over 2 semesters).

Compulsory credits = (125) Elective credits = (0)

Second year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BEM212	Consumer behaviour 212 Prerequisite/s: BEM 110 GS	S1	3	0	16
OBG111	Design principles 111	S1	1	1	7
OBS210	Business management 210 Prerequisite/s: OBS114 or OBS124 with admission to the examination in the other	S1	3	0	16
VDS210	Food commodities and preparation 210 Prerequisite/s: VDS121	S1	3	1	18
	Total credits for compulsory modules				57

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
BEM224	Integrated brand communication 224 Prerequisite/s: BEM110 GS	S2	3	0	16
INF281	Informatics 281 Prerequisite/s: FRK 111 GS	S2	2	0	3
KEP220	Cultural eating patterns 220 Prerequisite/s: VDS121	S2	3	0	12
VDG220	Nutrition 220	S2	3	0	12
VDS221	Food commodities and preparation 221 Prerequisite/s: VDS210	S2	3	1	18
Total credits for compulsory modules					61

Compulsory credits = (118) Elective credits = (0)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
BEM314	Marketing research 314 Prerequisite/s: BEM110, BEM212 and STK110 (or STK113 and STK123 or BME120)	S1	3	0	20
VDG311	Nutrition 311 Prerequisite/s: FSG110 and FSG120 or VDG220	S1	3	1	17
VDS310	Consumer food research 310 Prerequisite/s: VDS221	S1	3	1	21
VDS354	Food safety and hygiene 354	S1	2	1	14
Total credits for compulsory modules					72

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
ABV320	Labour relations 320	S2	3	3	20
BEM321	Marketing Management 321 Prerequisite/s: BEM212	S2	3	0	20
VDG321	Nutrition during life cycle 321 Prerequisite/s: VDG311	S2	3	1	17
Total credits for compulsory modules					57

Compulsory credits = (129) Elective credits = (0)

Fourth year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
FST412	Sensory evaluation 412 Prerequisite/s: FST260 and FST351 and FST352 or TDH	S1	1	1	10
PGB410	Project: Research methodology 410 Prerequisite/s: Final-year status	S1	2	0	10

VDB410	Food service management 410 Prerequisite/s: VDB321 GS	S1	3	1	24
VDS413	Recipe development and standardisation 413 Prerequisite/s: VDS310 or VDS322	S1	3	2	30
VDS423	Foods 423	S1	3	0	15
	Total credits for compulsory modules				89

Fourth year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
VDS415	Visual merchandising of foods 415	S2	3	0	15
VDS425	Project: Visual merchandising of foods 425 Prerequisite/s: VDS415 and VDS423	S2	3	0	15
VDS426	Food research project 426 Prerequisite/s: PGB410# and VDS310	S2	1	2	18
	Total credits for compulsory modules				48

OPI 480: 6 credits – (Experiential training in the industry): During the 4 years of study, during holidays, weekends and after hours, students must complete a total of 480 hours experiential training in the industry to develop practical and occupational skills. This is equal to 3 weeks x 40 hours (120 hours) per year, according to requirements as determined by the head of department. These "credits" must be successfully completed together with a complete portfolio before the degree will be conferred.

Compulsory credits = (143) Elective credits = (0)

A minimum of (515) credits is required to obtain the degree.

Field of study	Dept	Code
BConsumer Science in Hospitality Management	VBR	02130115

First year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
EKN110	Economics 110	S1	3	0	10
EOT110	Academic literacy(1) 110	S1	2	0	6
OBG111	Design principles 111	S1	1	1	7
OBS114	Business management 114	S1	3	0	10
STK110	Statistics 110 Prerequisite/s: Par 1.2 *	S1	3	1	13
TBE110	Tourism management 110	S1	4	0	10
VDS111	Basic food preparation 111	S1	1	0.5	6
	Total credits for compulsory modules				62

* Students who do not comply with the requirements for STK110 [Reg 1.2(h)] must enrol for STK113 and STK123.

First year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
AIM101	Academic information management 101*	S2	0	2	6
EKN120	Economics 120 Prerequisite/s: EKN110 GS or EKN 113 GS and at least 4 (50-59%) in Mathematics in the Grade 12 examination or STK113 (60%) and STK123 60%	S2	3	0	10
EOT120	Academic literacy(2) 120	S2	2	0	6
ITW121	Interior merchandise 121	S2	2	1	8
OBS124	Business management 124 Prerequisite/s: Admission to the examination in OBS114	S2	3	0	10
TBE120	Tourism management 120 Prerequisite/s: TBE110 GS	S2	4	0	10
VDS121	Basic food preparation 121 Prerequisite/s: VDS111	S2	1	0.5	6
Total credits for compulsory modules					56
* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters).					

Compulsory credits = (118) Elective credits = (0)

Second year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
OBS210	Business management 210 Prerequisite/s: OBS114 or OBS124 with admission to the examination in the other	S1	3	0	16
TBE210	Tourism management 210 Prerequisite/s: TBE110 or TBE120 with a GS in the other	S1	4	0	16
VDS210	Food commodities and preparation 210 Prerequisite/s: VDS121	S1	3	1	18
Total credits for compulsory modules					50

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
ABV320	Labour relations 320	S2	3	0	20
ITW261	Interior merchandise 261	K3	2	1	5
KEP220	Cultural eating patterns 220 Prerequisite/s: VDS121	S2	3	0	12
TBE220	Tourism management 220 Prerequisite/s: TBE210 GS	S2	4	0	16
VDG220	Nutrition 220	S2	3	0	12
VDS221	Food commodities and preparation 221 Prerequisite/s: VDS210	S2	3	1	18
Total credits for compulsory modules					83

Compulsory credits = (133) Elective credits = (0)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
ITW311	**Interior merchandise 311** Prerequisite/s: ITW121	S1	2	1	11
TBE310	**Tourism management 310** Prerequisite/s: TBE210 and TBE220 with a GS in the other	S1	4	0	20
VDG311	**Nutrition 311** Prerequisite/s: FSG110 and FSG120 or VDG220	S1	3	1	17
VDS354	**Food safety and hygiene 354**	S1	2	1	14
VDS355	**Food and beverage service management 355** Prerequisite/s: VDS221	K1	2	1	6
	Total credits for compulsory modules				68

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
VDB321	**Food service management 321** Prerequisite/s: VDS322#	S2	3	0.5	18
VDG321	**Nutrition during life cycle 321** Prerequisite/s: VDG311	S2	3	1	17
VDS322	**Large-scale food production and restaurant management 322** Prerequisite/s: KEP261 or KEP220 and VDS221	S2	3	3	29
	Total credits for compulsory modules				64

Compulsory credits = (132) Elective credits = (0)

Fourth year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
PGB410	**Project: Research methodology 410** Prerequisite/s: Final-year status	S1	2	0	10
VDB410	**Food service management 410** Prerequisite/s: VDB321 GS	S1	3	1	24
VDS413	**Recipe development and standardisation 413** Prerequisite/s: VDS310 or VDS322	S1	3	2	30
VDS414	**Culinary art 414** Prerequisite/s: VDS210 and VDS221	S1	2	1	19
	Total credits for compulsory modules				83

Fourth year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
INB320	**Interior planning 320** Prerequisite/s: ITW311 and OBG111	S2	1	1	11
OBS321	**Entrepreneurship 321** Prerequisite/s: Admission to the examination in OBS311*	S2	3	0	20

PGB420	**Project: Hospitality management 420** Prerequisite/s: PGB410 and Final-year status	**S2**	**4**	**0**	**20**
VDS424	**Culinary art 424** Prerequisite/s: VDS221 and VDS322# and VDS414	**S2**	**2**	**1**	**19**
	Total credits for compulsory modules				**70**

*Consumer science students do not register for OBS311. They must register and pass OBS114 and OBS124 before they could register for OBS321.
OPI480: Experiential training in the industry (6 credits): During the 4 years of study, during holidays, weekends and after hours, students must complete a total of 480 hours experiential training in the industry to develop practical and occupational skills. This is equal to 3 weeks x 40 hours (120 hours) per year, according to requirements as determined by the head of department. These "credits" must be successfully completed together with a complete portfolio before the degree will be conferred. Please note: Various practical and industry-interaction activities support the theoretical component of TBE110, 120, 220, 310 and VDS355 and take place after hours to develop practical and industry skills, namely TBE291 and TBE293.

Compulsory credits = (159) Elective credits = (0)

A minimum of (542) credits is required to obtain the degree.

Field of study	Dept	Code
BConsumer Science in Interior Merchandise: Retail Management	**VBR**	**02130125**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
EKN110	**Economics 110**	**S1**	**3**	**0**	**10**
EOT110	**Academic literacy(1) 110**	**S1**	**2**	**0**	**6**
FRK111	**Financial accounting 111**	**S1**	**4**	**0**	**10**
INK110	**Interior production 110**	**S1**	**1**	**1**	**9**
VKK111	**Visual culture studies 110**	**S1**	**3**	**0**	**12**
OBG111	**Design principles 111**	**S1**	**1**	**1**	**7**
STK110	**Statistics 110** Prerequisite/s: Par 1.2 *	**S1**	**3**	**1**	**13**
	Total credits for compulsory modules				**67**

* Students who do not comply with the requirements for STK110 [Reg 1.2(h)] must enrol for STK113 and STK123.

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	**S2**	**0**	**2**	**6**

EKN120	Economics 120 Prerequisite/s: EKN 110 GS or EKN 113 GS and at least 4 (50-59%) in Mathematics in the Grade 12 examination or STK113 (60%) and STK123 60%	S2	3	0	10
EOT120	Academic literacy(2) 120	S2	2	0	6
FRK121	Financial accounting 121 Prerequisite/s: FRK111 GS	S2	4	0	12
ITW121	Interior merchandise 121	S2	2	1	8
VKK123	Visual culture studies 120	S2	3	0	12
KOB183	Communication management 183	K3	3	0	5
Total credits for compulsory modules					59
* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters).					
Compulsory credits = (126) Elective credits = (0)					

Second year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
BEM110	Marketing management 110	S1	3	0	10
ERG282	Ergonomics 282	S1	1	1	8
INK210	Interior production 210 Prerequisite/s: INK110	S1	1	1	10
MTT210	Furniture and textile history 210	S1	3	0	12
OBS114	Business management 114	S1	3	0	10
TKS212	Textiles: Utility, fibres and yarns 212	S1	3	1	14
Total credits for compulsory modules					64

Second year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
BDO181	Industrial and organisational psychology 181	K3	4	0	5
BEM122	Marketing applications 122 Prerequisite/s: BEM110 GS	S2	3	0	10
INB220	Interior planning 220 Prerequisite/s: ERG282 GS and OBG111	S2	1	2	16
INF281	Informatics 281 Prerequisite/s: FRK111 GS	S2	2	0	3
ITW221	Interior merchandise 221 Prerequisite/s: ITW121	S2	2	1	10
MTT220	Furniture and textile history 220 Prerequisite/s: MTT210 GS	S2	3	0	12
OBS124	Business management 124 Prerequisite/s: Admission to the examination in OBS114	S2	3	0	10
TKS222	Textiles: Structures and finishes 222 Prerequisite/s: TKS212 GS	S2	3	1	14
Total credits for compulsory modules					80

Compulsory credits = (144) Elective credits = (0)

Third year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BEM212	**Consumer behaviour 212** Prerequisite/s: BEM 110 GS	S1	3	0	16
BER210	**Business law 210**	S1	3	0	16
INK310	**Interior production 310** Prerequisite/s: INK210	S1	1	1	11
ITW311	**Interior merchandise 311** Prerequisite/s: ITW121	S1	2	1	11
Total credits for compulsory modules					**54**

Third year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BEM224	**Integrated brand communication 224** Prerequisite/s: BEM110 GS	S2	3	0	16
BER220	**Business law 220** Prerequisite/s: BER210	S2	3	0	16
CIL122	**Visual design (AUTOCAD) 122**	S2	2	0	4
INB322	**Interior planning 322** Prerequisite/s: ERG282 and ITW311 and OBG111	S2	1	1	11
SEM381	**Seminar 381** Prerequisite/s: Third-year status	S2	1	0	5
OBS321	**Entrepreneurship 321** Prerequisite/s: Admission to the examination in OBS311*	S2	3	0	20
Total credits for compulsory modules					**72**

*Consumer science students do not register for OBS311. They must register and pass OBS114 and OBS124 before they can register for OBS321.

Compulsory credits = (126) Elective credits = (0)

Fourth year, first semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BEM314	**Marketing research 314** Prerequisite/s: BEM110, BEM212 and STK110 (or STK113 and STK123 or BME120)	S1	3	0	20
INB410	**Interior planning 410** Prerequisite/s: CIL122 and INB322	S1	1	2	23
ITP481	**Project: Interior merchandise 481** Prerequisite/s: INB322 and INB410# en SEM381 GS and Final-year status	J1	1	1	11
VBF411	**Consumer facilitation 411**	S1	2	0	10
Total credits for compulsory modules					**64**

Fourth year, second semester:					
Code	**Name**	**Trm**	**lpw**	**ppw**	**Crdt**
BEM321	**Strategic marketing** Prerequisite/s: BEM212	S2	3	0	20

ITP481	**Project: Interior merchandise 481** Prerequisite/s: INB322 and INB410# en SEM381 GS and Final-year status	**J1**	**1**	**1**	**11**
Total credits for compulsory modules					**31**

OPI480: Experiential training (6 credits): During the third year of study, during holidays, weekends and after hours, students must complete a total of 120 hours experiential training in the industry to develop practical and occupational skills. This is equal to 3 weeks x 40 hours (120 hours), according to requirements as determined by the head of department. This experiential training must be successfully completed together with a final report before the degree will be conferred.

Compulsory credits = (101) Elective credits = (0) Total credits = (101)
A minimum of (497) credits is required to obtain the degree.

Field of study	Dept	Code
BConsumer Science Education in Consumer Studies	**VBR**	**02130122**

First year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
EOT110	**Academic literacy(1) 110**	**S1**	**2**	**0**	**6**
KLR110	**Clothing production: Sewing techniques 110**	**S1**	**1**	**1**	**9**
OBG111	**Design principles 111**	**S1**	**1**	**1**	**7**
OBS114	**Business management 114**	**S1**	**3**	**0**	**10**
SCE171	**Religious instruction 171**	**S1**	**2**	**0**	**8**
SOC110	**Sociology 110**	**S1**	**3**	**0**	**12**
VDS111	**Basic food preparation 111**	**S1**	**1**	**0.5**	**6**
Total credits for compulsory modules					**58**

First year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
AIM101	**Academic information management 101***	**S2**	**0**	**2**	**6**
EOT120	**Academic literacy(2) 120**	**S2**	**2**	**0**	**6**
EOT164	**Communication in organisations 164**	**K4**	**3**	**0**	**6**
ITW121	**Interior merchandise 121**	**S2**	**2**	**1**	**8**
KLR120	**Clothing product: Processes 120** Prerequisite/s: KLR110	**S2**	**1**	**1**	**9**
OBS124	**Business management 124** Prerequisite/s: Admission to the examination in OBS114	**S2**	**3**	**0**	**10**
SOC121	**Sociology 121**	**S2**	**3**	**0**	**12**

135

VDS121	Basic food preparation 121 Prerequisite/s: VDS111	S2	1	0.5	6
	Total credits for compulsory modules				63

* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters).
Compulsory credits = (121) Elective credits = (0)

Second year, first semester:					
Code	**Name**	**Trm**	**Ipw**	**ppw**	**Crdt**
ERG282	**Ergonomics 282**	S1	1	1	8
INK210	**Interior production 210** Prerequisite/s: INK110	S1	1	1	10
SCE201	**Science education 201**	J1	2	0	8
TKS212	**Textiles: Utility, fibres and yarns 212**	S1	3	1	14
VDS210	**Food commodities and preparation 210** Prerequisite/s: VDS121	S1	3	1	18
	Total credits for compulsory modules				58

Second year, second semester:					
Code	**Name**	**Trm**	**Ipw**	**ppw**	**Crdt**
ITW221	**Interior merchandise 221** Prerequisite/s: ITW121	S2	2	1	10
KEP220	**Cultural eating patterns 220** Prerequisite/s: VDS121	S2	3	0	12
SCE201	**Science education 201**	J1	2	0	8
TKS222	**Textiles: Structures and finishes 222** Prerequisite/s: TKS212 GS	S2	3	1	14
VDG220	**Nutrition 220**	S2	3	0	12
VDS221	**Food commodities and preparation 221** Prerequisite/s: VDS210	S2	3	1	18
	Total credits for compulsory modules				74

Compulsory credits = (132) Elective credits = (0)

Third year, first semester:					
Code	**Name**	**Trm**	**Ipw**	**ppw**	**Crdt**
ITW311	**Interior merchandise 311** Prerequisite/s: ITW121	S1	2	1	11
SCE303	**Science education 303** Prerequisite/s: AIM101 GS or AIM111 and AIM121 GS	J1	2	1	18
VDG311	**Nutrition 311** Prerequisite/s: FSG110 and FSG120 or VDG220	S1	3	1	17
VDS354	**Food safety and hygiene 354**	S1	2	1	14
VDS355	**Food and beverage service management 355** Prerequisite/s: VDS221	K1	2	1	6
	Total credits for compulsory modules				66

Third year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
INB320	**Interior planning 320** Prerequisite/s: ITW311 and OBG111	S2	1	1	11
KLD322	**Social and cultural aspects of clothing 322**	S2	4	0	20
SCE303	**Science education 303** Prerequisite/s: AIM101 GS or AIM111 and AIM121 GS	J1	2	1	18
VDG321	**Nutrition during life cycle 321** Prerequisite/s: VDG311	S2	3	1	17
VDS322	**Large-scale food production and restaurant management 322** Prerequisite/s: KEP261 or KEP220 and VDS221	S2	3	3	29
Total credits for compulsory modules					**95**

Compulsory credits = (161) Elective credits = (0)

Fourth year, first semester:

Code	Name	Trm	lpw	ppw	Crdt
ASS400	**Assessment 400**	J1	Block session		6
COE400	**Social contexts in education 400**	J1	Block session		6
FCL400	**Facilitating learning 400**	J1	Block session		12
FOE400	**Foundations of education 400**	J1	Block session		3
GPE400	**Global perspectives in education 400**	J1	Block session		3
LNT400	**Learning theories 400**	J1	Block session		6
PEL400	**Professional ethics and law 400**	J1	Block session		3
PPF400	**Professional portfolio 400**	J1	Block session		6
VHT400	**Subject didactics of consumer studies 400**	J1	Block session		12
Total credits for compulsory modules in the first/second terms					**57**

Fourth year, second semester:

Code	Name	Trm	lpw	ppw	Crdt
ASS400	**Assessment 400**	J1	Block session		6
COE400	**Social contexts in education 400**	J1	Block session		6
FCL400	**Facilitating learning 400**	J1	Block session		12
FOE400	**Foundations of education 400**	J1	Block session		3
GPE400	**Global perspectives in education 400**	J1	Block session		3
LNT400	**Learning theories 400**	J1	Block session		6
PEL400	**Professional ethics and law 400**	J1	Block session		3
PPF400	**Professional portfolio 400**	J1	Block session		6
VHT400	**Subject didactics of consumer studies 400**	J1	Block session		12
Total credits for compulsory modules in the third/fourth terms					**57**

Compulsory credits = (114) Elective credits = (0)

A minimum of (528) credits is required to obtain the degree.

Field of study	Dept	Code
BConsumer Science Education in Hospitality Studies	VBR	02130123

First year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
EKN110	Economics 110	S1	3	0	10
EOT110	Academic literacy(1) 110	S1	2	0	6
OBG111	Design principles 111	S1	1	1	7
OBS114	Business management 114	S1	3	0	10
SCE171	Religious instruction 171	S1	2	0	8
TBE110	Tourism management 110	S1	4	4	10
VDS111	Basic food preparation 111	S1	1	0.5	6
Total credits for compulsory modules					57

First year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
AIM101	Academic information management 101*	S2	0	2	6
EKN120	Economics 120 Prerequisite/s: EKN110 GS or EKN 113 GS and at least 4 (50-59%) in Mathematics in the Grade 12 examination or STK113 (60%) and STK123 60%	S2	3	0	10
EOT120	Academic literacy(2) 120	S2	2	0	6
EOT164	Communication in organisations 164	K4	3	0	6
ITW121	Interior merchandise 121	S2	2	1	8
OBS124	Business management 124 Prerequisite/s: Admission to the examination in OBS114	S2	3	0	10
TBE120	Tourism management 120 Prerequisite/s: TBE110 GS	S2	4	0	10
VDS121	Basic food preparation 121 Prerequisite/s: VDS111	S2	1	0.5	6
Total credits for compulsory modules					62
* Students may enrol for AIM111 and AIM121 instead of AIM101 (the same content spaced over 2 semesters).					

Compulsory credits = (119) Elective credits = (0)

Second year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
SCE201	Science education 201	J1	2	0	8
TBE210	Tourism management 210 Prerequisite/s: TBE110 or TBE120 with a GS in the other	S1	4	0	16
TKS211	Textiles: Utility 211	K1	3	1	7
VDS210	Food commodities and preparation 210 Prerequisite/s: VDS121	S1	3	1	18
	Total credits for compulsory modules				49

Second year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
ITW221	Interior merchandise 221 Prerequisite/s: ITW121	S2	2	1	10
KEP220	Cultural eating patterns 220 Prerequisite/s: VDS121	S2	3	0	12
SCE201	Science education 201	J1	2	0	8
TBE220	Tourism management 220 Prerequisite/s: TBE210 GS	S2	4	0	16
VDG220	Nutrition 220	S2	3	0	12
VDS221	Food commodities and preparation 221 Prerequisite/s: VDS210	S2	3	1	18
	Total credits for compulsory modules				76

Compulsory credits = (125) Elective credits = (0)

Third year, first semester:					
Code	Name	Trm	lpw	ppw	Crdt
SCE303	Science education 303 Prerequisite/s: AIM101 GS or AIM111 and AIM121 GS	J1	2	1	18
TBE310	Tourism management 310 Prerequisite/s: TBE210 and TBE220 with a GS in the other	S1	4	0	20
VDG311	Nutrition 311 Prerequisite/s: FSG110 and FSG120 or VDG220	S1	3	1	17
VDS354	Food safety and hygiene 354	S1	2	1	14
VDS355	Food and beverage service management 355 Prerequisite/s: VDS221	K1	2	1	6
VDS414	Culinary art 414 Prerequisite/s: VDS210 and VDS221	S1	2	1	19
	Total credits for compulsory modules				94

Third year, second semester:					
Code	Name	Trm	lpw	ppw	Crdt
SCE303	Science education 303 Prerequisite/s: AIM101 GS or AIM111 and AIM121 GS	J1	2	1	18

VDB321	**Food service management 321** Prerequisite/s: VDS322#	**S2**	**3**	**0.5**	**18**
VDS322	**Large-scale food production and restaurant management 322** Prerequisite/s: KEP261 or KEP220 and VDS221	**S2**	**3**	**3**	**29**
VDS424	**Culinary art 424** Prerequisite/s: VDS221 and VDS322# and VDS414	**S2**	**2**	**1**	**19**
	Total credits for compulsory modules				**84**

Compulsory credits = (178) Elective credits = (0)

Fourth year, first semester:

Code	Name	Trm		Crdt
ASS400	**Assessment 400**	**J1**	**Block session**	**6**
COE400	**Social contexts in education 400**	**J1**	**Block session**	**6**
FCL400	**Facilitating learning 400**	**J1**	**Block session**	**12**
FOE400	**Foundations of education 400**	**J1**	**Block session**	**3**
GPE400	**Global perspectives in education 400**	**J1**	**Block session**	**3**
LNT400	**Learning theories 400**	**J1**	**Block session**	**6**
PEL400	**Professional ethics and law 400**	**J1**	**Block session**	**3**
PPF400	**Professional portfolio 400**	**J1**	**Block session**	**6**
VHS400	**Subject didactics of hospitality studies 400**	**J1**	**Block session**	**12**
Total credits for compulsory modules in the first/second terms				**57**

Fourth year, second semester:

Code	Name	Trm		Crdt
ASS400	**Assessment 400**	**J1**	**Block session**	**6**
COE400	**Social contexts in education 400**	**J1**	**Block session**	**6**
FCL400	**Facilitating learning 400**	**J1**	**Block session**	**12**
FOE400	**Foundations of education 400**	**J1**	**Block session**	**3**
GPE400	**Global perspectives in education 400**	**J1**	**Block session**	**3**
LNT400	**Learning theories 400**	**J1**	**Block session**	**6**
PEL400	**Professional ethics and law 400**	**J1**	**Block session**	**3**
PPF400	**Professional portfolio 400**	**J1**	**Block session**	**6**
VHS400	**Subject didactics of hospitality studies 400**	**J1**	**Block session**	**12**
Total credits for compulsory modules in the third/fourth terms				**57**

Compulsory credits = (114) Elective credits = (0)

A minimum of (536) credits is required to obtain the degree.

**Sc.6.2 Bachelor of Secondary Education (Science)
BSecEdSci (Code 02135001)**

(a) Admission requirements
A National Senior Certificate with admission for degree purposes, with Mathematics - at least 60%, Physical Sciences (Natural Sciences) - at least 50% as well as two official languages, including English or Afrikaans with at least 50%, and an APS (Admissions Point Score) of 30.

NB: Candidates who do not comply with the requirement regarding Physical Science (Natural Sciences) may only be admitted to the degree if the study programme is compiled from modules for which Physical Science (Natural Sciences) is not a prerequisite. Candidates may also follow this study programme through the BSc (Four-year programme).

(b) Duration
Four years of full-time study.

(c) Promotion requirements
A student will be promoted to the following year of study if at least 100 of the credits required have been passed, unless the Dean on the recommendation of the head of department decides otherwise. A student who does not comply with the requirements for promotion to the following year of study, retains the credit for the modules already passed and may be admitted by the Dean, on recommendation of the head of department, to modules of the following year of study to a maximum of 50 credits, provided that it will fit in with both the lecture and examination timetable.

(d) Curriculum
A minimum of 514 credits are required to obtain the degree.

One of the following:
- SCE204   Educational community project 204   (12)
                              Or

- SCE301   Educational community project 301   (18)

Module code	Module description	Credits	Prereq.
Faculty Requirement			
WTW 114	Calculus 114 **or**	(16)	Par.1.2
WTW 134	Mathematics 134	(16)	Par.1.2
General requirements (258 credits)			
AIM 101	Academic information management 101	(6)	
FIL 120	Philosophy 120	(12) or	
FIL 155	Science and world views 155	(6	
		plus any 4 credit module	
SCE 171	Religious instruction 171	(8)	
SCE 201	Science education 201	(16)	
SCE 303	Science education 303	(36)	
SLK 120	Psychology 120	(12)	

Additional requirements

- Two year modules[†] at 200-level, both of which should be recognised school subjects. As a guideline, 48 credits per year module for a total of 96 credits on 200-level should be obtained. Deviation from this is possible upon approval by the programme co-ordinator and the dean, bearing in mind that the total amount of credits required for the degree is not affected by such a deviation.
- At least 72 credits at 300-level of a single year module (two sequential semester modules) that is presented in the Faculty of Natural and Agricultural Sciences. In addition an elective module(s) worth at least 24 credits on 300-level must be passed.

The following modules are presented by the Faculty of Education at the Groenkloof Campus as part of the PGCE (Postgraduate Certificate in Education) programme. These modules also constitute the fourth year of the BSecEdSci degree and must be taken by final-year (4th year) BSecEdSci students.

Fundamental modules
GPE 400	Global perspectives in education 400	(6)
FOE 400	Foundations of education 400	(6)

Core modules
LNT 400	Learning theories 400	(12)
FCL 400	Facilitating learning 400	(24)
ASS 400	Assessment 400	(12)
PEL 400	Professional ethics and law 400	(6)
COE 400	Social contexts of education 400	(12)
PPF 400	Professional portfolio 400	(12)

Further Education and Training
(Choose one in accordance with the degree subject on 300 level)   (24)
VLW 400	Subj. Did in Life Sciences 400
VGG 400	Subj. Did in Geography 400
VNS 400	Subj. Did in Physical Science 400
VWS 400	Subj. Did in Mathematics 400
VIG 400	Subj. Did in Information Technology 400

Outstanding credits
Students may, in consultation with the Dean, take modules not listed in the curriculum.

†   A year module is equivalent to two successive semester modules in one subject. Also refer to point (k).

(e)   Teaching Practice
A student must gain teaching experience by means of:
- (i)   Attending demonstration lessons.
- (ii)   One of : SCE 204 or SCE 301
- (iii)   School Practice as incorporated in the PGCE programme in the 4th year.

(f)   Language endorsement
Students must demonstrate the ability to teach in at least two official languages, of which one must be either English or Afrikaans.

(g)   Compulsory language modules
The academic literacy modules (EOT 110 and 120) are compulsary.

Subject to satisfactory performance in the prescribed Academic Literacy Test, all or some of the above academic literacy modules must be replaced by EOT 161 and EOT 162. Other options may be taken upon approval by the BSecEd(Sci) co-ordinator.

(h)   Religious instruction (SCE 171)
Required by the Department of Education. A student may apply for exemption on the grounds of conscientious objection, only if a module of at least 8 credits is taken in the place of Religious instruction.

(i)   Professional studies
The professional studies component of the programme consists of the PGCE modules in the fourth year.

(j)   Education
Education consist of Science education (SCE 201 and SCE 303) as well as the PGCE modules.

(k)   Recognised school subjects

Subject	Level	Modules
Biology*††	100	MLB 111 and ZEN 161 and BOT 161
Biology*††	200	Appropriate modules in Plant Science or Zoology/Entomology or Human Physiology at 200-level.
Chemistry**	100	CMY 117, 127
Chemistry**	200	CMY 282,283,284,285
Physics**	100	PHY 114 and PHY 124
Physics**	200	PHY 253, 254, 263.
Natural Sciences	200	GLY 155, GGY 252, 355 or 361 GLY 162 or WKD 164 or a combination of appropriate modules in Chemistry and Physics at 200-level, on the recommendation of the head of department and with the approval of the Dean.
Geography	100	GGY 156, 157, 166, WKD 164
Geography	200	GGY 252, 283
Agriculture††	100	In consultation with the Programme Manager: Agricultural Sciences and with approval from the Dean.
Agriculture††	200	In consultation with the Programme Manager: Agricultural Sciences and with approval from the Dean.
Computer Science	100	COS 110, COS 132, COS 151.
Computer Science	200	COS 212, 216, (COS 222 or 226).
Mathematics	100	WTW 114,126,128
Mathematics	200	WTW 211, 389 plus a suitable combination of credits to the value of 24 from WTW

NB: All modules of a subject must be passed for the subject to be recognised as a school subject.

* Zoology, Plant Science and Biology are the equivalent of only one recognised school subject. A recognised module must be passed at 100-level.
** Physics, Chemistry and Physical Science are the equivalent of only one recognised school subject and is only accepted if a full year module (two consecutive semester modules) is passed in both Chemistry and Physics at 100-level.
†† The combination ZEN 251 and BOT 251 is the equivalent of Biology at 200-level, but does not lead to admission to modules at 300 level.
The combination with MLB 111, BOT 161, ZEN 161 together with appropriate second-year modules in Zoology, Plant Science and Human Physiology can lead to admission to modules at 300-level.

(l) Special examination in the Faculty of Natural and Agricultural Sciences
A final-year student who requires a maximum of 36 credits to comply with all the requirements for the degree, may be admitted by the Dean on the recommendation of the relevant head(s) of department, to special examinations in the modules he or she has failed, provided that this will enable them to qualify for the degree. Students with a final mark of less than 40% in any of the failed modules, or who have previously been admitted to a special examination, do not qualify for a special examination. (Also consult Reg. G.12)

(m) Degree with distinction
The BSecEdSci degree is conferred with distinction on a student who obtains a weighted average of at least 75% in:
(i) A compulsory year module at 300 level.
(ii) The PGCE modules.

Sc.7 DIPLOMAS

A Senior Certificate must be included in all applications.

Advanced University Diploma in Extension and Rural Development (Code 03120200)

The admission requirements are:

- an appropriate initial university diploma in one of the Agricultural disciplines plus one year appropriate extensive experience; or
- an appropriate BTech degree or National Diploma plus one year relevant extensive experience; or
- an appropriate Agricultural Diploma or related diploma plus five years' relevant extensive experience; or
- a qualification deemed appropriate by the Senate of the University plus approved experience (RPL).

POSTGRADUATE STUDIES

See the Postgraduate yearbook of the Faculty of Natural and Agricultural Sciences for more detail.

Sc.8   HONOURS DEGREES

SC.8.1 Bachelor of Science Honours [BScHons]

Also consult General Regulations G.1.3; G.16 – G. 29 and G.62, and postgraduate yearbook.

(a)   Admission requirements and prerequisites
(i)   **For the BScHons degree**
   Subject to the stipulations of General Reg. G.16, a student is only admitted to the study for the honours degree if he or she holds the BSc or BSecEdSci degree with an average mark of at least 60% and provided that he or she complies with the stipulations for the particular modules.
(ii)   The curriculum is compiled in consultation with the head of department, from whom full details may be obtained except if mentioned otherwise.
(iii)   (iii) In cases where the required module or linguistic basis is lacking, additional modules may be prescribed.

(b)   Examination admission and pass requirements
   For preparation, evaluation and examination of research reports, consult the manual of the Faculty, which is obtainable on request from the head of department. The pass mark for research reports is at least 50%. The stipulations regarding pass requirements for dissertations in General Regulation G.60.2.1 2(a) apply *mutatis mutandis* to research reports.

(c)   Degree with distinction
   The BScHons degree is awarded with distinction to a candidate who obtains a weighted average of at least 75% in all the prescribed modules and a minimum of 65% in any one module.

(d)   Degrees

Discipline	Degree code
Actuarial Science	02240275
Animal Science	03241201
Applied Mathematics	02240171
Biochemistry	03241011
Bioinformatics	03241014
Biotechnology	02240392
Chemistry	02240121
Engineering and Environmental Geology:	
Option: Engineering in Geology	02240370
Option:Hydrogeology	02240373
Entomology	03241031
Financial Engineering	02240274
Food Science	03240921
Genetics	03241051
Geography	02240411
Environmental Analysis and Management	02240412
Geoinformatics	02240408
Geology	02240141
Mathematical Statistics	02240191
Mathematics of Finance	02240272

Mathematics	02240181
Meteorology	02240070
Microbiology	03240911
Nutrition and Food Science	03240922
Option: Environmental Soil Science	03240902
Option: Medicinal Plant Science	03241090
Physics	02240231
Plant Science	03241091
Wildlife Management	03241001
Zoology	03241021

Sc.8.2 Bachelor of Agricultural Management Honours [BInstAgrarHons]

Also consult General Regulations G.16 to G.29

(a) Admission requirements

Subject to the stipulations of General Regulations G.1.3 and G.62, a candidate must hold the BInstAgrar degree or an appropriate bachelor's degree to be admitted to the BInstAgrarHons. Additional modules in the field of specialisation other than the honours modules may be prescribed by the Dean, on the recommendation of the head(s) of the department(s) concerned.

(b) Duration

Training is offered full-time.

(c) Curriculum

The curriculum consists of a minimum of eight modules, which include the following:

- A common core of modules, ARD 780, is compulsory for all fields of specialisation, except in the case of the Extension option, for which only ARD 781 and 782 are compulsory. Credit for equivalent modules already passed may be considered, in which case suitable alternative modules will be prescribed by the Dean in consultation with the relevant head of the department concerned.
- The prescribed module work in the student's field of specialisation. Credit for equivalent modules already passed may be considered, in which case suitable alternative modules will be prescribed by the Dean in consultation with the head of the department concerned.
- Additional modules required for the particular field of specialisation, as stipulated by the Dean in consultation with the head of the department concerned.

(d) Degree with distinction

A student must obtain a weighted average of at least 75 % in all the prescribed modules, with a minimum of 65 % in each of the modules to pass the degree with distinction.

(e) Degrees

Discipline	Degree code
Agribusiness Management	03242024
Agricultural Economics	03242021
Crop Protection	03242062

Extension	03242011
Plant Production	03242031
Plant Quarantine	03242183
Rural Development Planning	03242023

Sc.9 MASTER'S DEGREES

Sc.9.1 Master of Science [MSc]

Also consult General Regulations G.30 – G.44.

(a) Admission requirements for the MSc degree
Subject to the stipulations of General Regulations G.30, G.1.3 and G.62, an applicable BScHons degree is a prerequisite for admission. Additional requirements may be set by the Dean on the recommendation of the head of department. A candidate with an average mark of less than 60% for the honours degree will only be admitted to the MSc degree programme with the approval of the Dean on the recommendation of the head of department.

(b) Conferment of degree
The MSc degree is conferred by virtue of a dissertation and such additional postgraduate modules as may be prescribed.

(c) Pass requirements
(i)   A pass mark of at least 50% must be obtained in both the dissertations and the additional prescribed modules, if such additional module work is prescribed.
(ii) Guidelines with regard to the preparation, evaluation and examination of dissertation is available from the head of department on request. The pass mark for dissertations is at least 50%. The stipulations with regard to pass requirements for dissertations in G.60.2.1.2 (a) apply *mutatis mutandis* to mini-dissertations.

(d) Degree with distinction
The degree is conferred with distinction on a student who obtains a final average of at least 75%, as well as at least 75% for the dissertation and provided that all the members of the Examination Commission indicate in writing that the degree be conferred with distinction.

(e) General
Students should take particular note of the maximum period of registration (General Regulation G.32.4), as well as of the requirement regarding submission of a draft article/articles for publication (General Regulation G. 61).

(f) Degrees

Discipline	**Degree code**
Actuarial Science	02250395
Applied Mathematics	02250171
Applied Mineralogy	02250381
Applied Statistics	02250401
Biochemistry	03251011
Bioinformatics	03251014
Biotechnology	03251052

Chemistry	02250121
Engineering and Environmental Geology	02250372
Engineering Geology	02250371
Entomology	03251031
Environment and Society (Coursework)	03251032
Environmental Ecology (Coursework)	03251033
Environmental Economics (Coursework)	03251034
Environmental Management (Coursework)	03251037
Exploration Geophysics	02250431
Financial Engineering	02250184
Food Science	03250921
Genetics	03251051
Geography	02250411
Geoinformatics	02250412
Geology	02250141
Mathematical Statistics	02250191
Mathematics Education	02250183
Mathematics of Finance	02250182
Mathematics	02250181
Option: Air Quality Management (Coursework)	03251038
Option: Medicinal Plant Science	03251090
Option: Forest Science and the Environment (Coursework)	03251039
Meteorology	02250070
Microbiology	03250911
Nutition	03251106
Physics	02250231
Plant Pathology	03250881
Plant Science	03251091
Postharvest Technology	03251102
Science Education	02250442
Soil Science	03250901
Water Resource Management (Coursework)	03251035
Wildlife Management	03251001
Zoology	03251021

Sc.9.2   Master of Philosophy [MPhil] (Code: 03250700)

Also consult General Regulation G. 62

(a)   Admission requirements
Students wishing to enroll for the MPhil (Wildlife Management) should have a approved four-year first degree at a recognised university or any qualification that is accepted by the Senate as equivalent to it in terms of Regulation G. 62.

(b)   Duration
The duration of the internet-based part-time programme is two years. The theoretical component forms 40%, the research project 35% and the practical component 25% of the programme.

(c)   Curriculum
This programme aims to educate candidates interested in this field but who come

from non-biological backgrounds. It is a postgraduate programme focusing on the philosophy, ethics, ecological principles and application of wildlife management.

Sc.9.3   Master of Agricultural Science [MScAgric]

Also consult General Regulations G.30 to G.44.

(a)   Requirements for admission
Subject to the stipulations of General Regulations G.1.3 and G.62, the four-year BScAgric degree with an average of 60% in the final year of the major subject is a requirement for admission to the MScAgric degree. Additional requirements may be stipulated by the head of department.

(b)   Duration
Duration of study is at least two years of uninterrupted full-time study (or the part-time equivalent) at this University.

(c)   Residence
The Dean may on the recommendation of the head of the department concerned, set particular requirements concerning residence during master's degree studies.

(d)   Curricula
The curriculum for the MScAgric degree consists of:
(i)   a dissertation; and
further study in the major subject, supplemented by ancillary module/s as may be required by the Dean, on the recommendation of the head of department. Students who hold the BScAgricHons degree may be exempted from further ancillary modules.
(ii)   A total of 240 credits is required for the MScAgric degree, of which 120 are for the dissertation.

(e)   Examinations and pass requirements
(i)   The final examinations for the MScAgric may only be taken at the end of the second year of study.
(ii)   The examinations in the ancillary modules, if required, must be passed before or concurrent with the examinations in the major subject, unless the Board of the Faculty decides differently.
(iii) General Regulation G.12.2, as well as paragraph 4 of the Faculty regulations pertaining to examination admission and pass requirements, are applicable to the calculation of marks.
(iv)   A student must pass all prescribed modules as well as the dissertation to obtain the MScAgric degree.
(v)   The degree is conferred with distinction on a student who obtains a final mark of at least 75%, as well as at least 75% for the dissertation and provided that all the members of the Examination Commission indicate in writing that the degree be conferred with distinction.

(f)   General
Students should take particular note of the maximum period of registration (General Regulation G.32.4), as well as of the requirement regarding submission of a draft article/articles for publication (General Regulation G.61).

(g) Degrees

Discipline	Degree code
Agricultural Economics	03250041
Agricultural Extension	03251030
Agronomy	03250454
Animal Science: Production Management	03250441
Animal Science: Animal Breeding and Genetics	03250457
Animal Science: Meat Science	03250122
Animal Science: Production Physiology	03250391
Entomology	03250120
Genetics	03250291
Microbiology	03250071
Plant Pathology	03250301
Food Science and Technology	03250261
Horticulture	03250091
Nutition Science	03250421
Pasture Science	03250455
Soil Science	03250456

Sc.9.4   Master of Agricultural Management [MInstAgrar]

Also consult General Regulations G. 30 to G. 44.

(a) Admission requirements
Subject to the stipulations of General Requirements G.1.3 and G. 62, a candidate must hold the BInstAgrar(Hons) or an appropriate honours degree for admission to the MInstAgrar degree study. Additional modules may be prescribed by the Dean on the recommendation of the head of department. A candidate with an average mark of less than 60 % for the honours degree will only be admitted to MInstAgrar study with the approval of the Dean, on the recommendation of the head of the department.

(b) Curriculum
The curriculum consists of further study in the field of specialisation and a mini-dissertation, which encompasses research conducted by the student under supervision of a member of the academic staff.

(c) Degree with distinction
The degree is conferred with distinction on a student who obtains a final mark of at least 75%, as well as at least 75% for the mini-dissertation and provided that all the members of the Examination Commission indicate in writing that the degree be conferred with distinction.

(d) General
Students must take particular note of the maximum period of registration (General Regulation G.32.4), as well as of the requirement regarding submission of a draft article/articles for publication (General Regulation G. 61).

(e) Degrees

Discipline	Degree code
Agricultural Economics	03252021
Agronomy	03252072

Animal Production Management	03252093
Crop Protection	03252062
Environmental Management (Coursework)	03252132
Extension	03252011
Horticulture	03252082
Rural Development Planning	03252023
Pasture Science	03252092
Plant Quarantine	03252141

Sc.9.5 Master of Consumer Science [MConsumer Science]

(a) Admission requirements
A four-year BConsumer Science or other applicable degree.

(b) Duration
A minimum of two years full-time and a maximum of four years part-time study.

(c) Programme options
There are four disciplines with a further two options to choose from, each with a minimum of 240 credits:

(i) **Dissertation option**
Interior Merchandise Management	02253004
Clothing Management	02253006
General	02253009
Food Management	02253008

(ii) **Coursework option with research report**
Interior Merchandise Management	02253003
Clothing Management	02253005
General	02253010
Food Management	02253007

(d) Curriculum (a minimum of 240 credits)
(i) **Dissertation option**
Research Methodology 814	(30 credits)
Theoretical Orientation	(15 credits)*
Electives (30 credits each) (a minimum of 60 credits)	
VBR890 (Dissertation)	(120 credits)

(ii) **Coursework option**
Research Methodology 814	(30 credits)
Theoretical Orientation	(15 credits)*
Electives (30 credits each)	(4x30=120 credits)
VBR892 (Research report)	(60 credits)

*To earn credits for the Theoretical Orientation, at least one of the following options must be taken:
HSK 810:	Theoretical frameworks in cultural studies 810	(15 credits)
HSK 812:	Theoretical frameworks in consumer studies 812	(15 credits)
HSK 813:	Socio-cultural studies 813	(15 credits)

Other applicable orientations offered in and outside
the Department can be taken additionally.   (15-30 credits).
Students choose electives on 800-level from the following four electives groupings:

- Clothing and textiles
- Foods, nutrition and food service management
- Interior merchandising and consumer facilitation

Depending on the field of study, a maximum of two postgraduate modules may be selected from disciplines from other departments.
Depending on the academic background of the student and the chosen area of study, it may be required of the student to take additional modules.
Work on the dissertation/research report consists of three parts, namely the research proposal, project execution and an oral presentation of the research results.

A basic module in Statistics is compulsory when a quantitative approach is used for the research project.

(e)   Degree with distinction
The degree is conferred with distinction on a student who obtains a final average of at least 75%, as well as at least 75% for the dissertation and provided that all the members of the Examination Commission indicate in writing that the degree be conferred with distinction.

(f)   Prerequisites for the dissertation/research report
Consult the Department for more information on the structuring of programmes, the content of the theoretical orientations, and electives including their prerequisites.

(g)   Degrees

Discipline	Degree code
Interior Merchandise Management	02253004
Interior Merchandise Management (Coursework)	02253003
Clothing Management	02253006
Clothing Management (Coursework)	02253005
General	02253009
General (Coursework)	02253010
Food Management	02253008
Food Management (Coursework)	02253007

DOCTORATES

Sc.10   Doctor of Philosophy [PhD]

Also consult General Regulations G.45 to G.55.

(a)   Admission requirements
  (i)   **PhD degree**
        Subject to the stipulations of General Regulations G.1.3, G.45 and G.62, no student will be admitted to the study for a doctor's degree unless he or she holds an applicable master's degree or has been admitted to the status thereof.

Further requirements for admission, if any, are set out in the syllabi of the various departments.

(ii) **PhD in Consumer Science**
MConsumer Science or applicable master's degree with a pass mark of at least 60%.

To proceed with the thesis, a student should have fulfilled the requirements for the master's degree regarding:
- Theoretical orientation
- Research methodology (NMN 814)
- The student should also have published at least one article in a research journal during the two years prior to registration for the PhD degree or have proof that the article has been accepted for publication in a refereed journal. Furthermore, it should also be evident from the master's dissertation or publications that research can be undertaken independently.

NB: The student may be required to do additional modules/coursework.

(b) Duration
A minimum of two years full-time study.

(c) Residence
Doctoral students may be required to reside at the University for further study on the recommendation of the head of department and with the approval of the Dean.

(d) Curriculum
The curriculum for the PhD degree consists of:
(i) theoretical knowledge of the major subject and such ancillary modules as may be required; and
(ii) a thesis.

(e) Conferring of degree
(i) A PhD student must submit a thesis which deals with a topic from the list of subject disciplines.
(ii) The doctoral examination, either written and/or oral, is compulsory and covers the content of the thesis as well as the subdivisions of the field of study on which the thesis is based.

(f) General
Students must take particular note of the maximum period of registration (General Regulation G. 47), as well as of the requirements regarding the submission of a draft article/articles for publication (General Regulation G. 61).

(g) Degrees

Discipline	Degree code
Agrarian Extension	03262002
Agricultural Economics	03260042
Agronomy	03262164
Animal Production Management	02260545
Animal Science	03260141
Biochemistry	03260012

Biotechnology	03262162
Bioinformatics	03260014
Chemistry	02260451
Consumer Science: Development	02263003
Consumer Science: Food Management	02263004
Consumer Science: Interior Merchandise Management	02263001
Consumer Science: Clothing Management	02263002
Crop Protection	03262021
Engineering and Environmental Geology	02260542
Entomology	03260121
Environment and Society	03250122
Environmental Studies	03260127
Environmental Economics	03260124
Exploration Geophysics	02260531
Food Science	03260272
Genetics	03260292
Geography	02260511
Geoinformatics	02260512
Geology	02260521
Horticulture	03262167
Mathematical Sciences	02260761
Meteorology	02260630
Microbiology	03260072
Nutrition	03261006
Option: Air Quality Management	03260129
Option: Environmental Management	03260125
Option: Forest Science	03252160
Option: Medicinal Plant Science	03261090
Pasture Science	03262165
Physics	02260481
Plant Pathology	03260302
Plant Science	03261091
Rural Development Planning	03262023
Science and Mathematics Education	02260753
Soil Science	03262166
Water Resource Management	03260126
Wildlife Management	03261001
Zoology	03261021

Sc.11 Doctor of Science [DSc]

Consult General Regulation G.56.

This degree usually follows on the PhD degree and is conferred by virtue of publications emanating from independent research. The publication must represent a meaningful contribution to a specific subdiscipline.

(a)   Guidelines for evaluation

(i)   **Disciplines**
The DSc degree in the Faculty of Natural and Agricultural Sciences is conferred byvirtue of published research work in one of the disciplines in the faculty.

(ii)   **Criteria**
The work submitted for the DSc must constitute an original and important contribution to scientific knowledge and insight in that it isregarded as a substantial and coherent contribution to the advancement of the frontiers of knowledge and insight into the specific subdiscipline, and proof of the candidate's achievement with regard to international leadership in the specific field of scientific research.
The emphasis in the assessment of the work of a DSc candidate must be placed on originality, substance and excellence.

(iii)   **Presentation**
The document submitted for examination must consist of a selection of published articles as well as a substantiated representation in which the grounds for submission and coherency of the work presented is evident.

ALPHABETICAL LIST OF MODULES IN THE FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

 # = Concurrent registration
() = Examination admission
dpw = discussions per week
GS = combined (final) mark (semester/year mark plus examination mark) of at
  least 40% - 49%
hpw = hours per week
LP = Lecturer's permission
lpw = lectures per week
ppw = practicals per week
spw = seminars per week
TDH = Permission by head of department
tpw = tutorials per week

Language of tuition – options:
Afrikaans: Classes only presented in Afrikaans
English: Classes only presented in English
Both: 2 classes scheduled separately at the same time (1 English and 1 Afrikaans)
Double medium: One class scheduled in which English and Afrikaans is used in the same class

AGR 361 Field crops 361
Academic organisation: Plant Production and Soil Science
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
Botanical characteristics, classification, growth requirements, production practices and utilisation of crops rich in starch, oil and protein, fibre crops, tobacco, sugarcane and medicinal plants. Visits to research institutions and producers.

AGR 410 Vegetable crops 410
Academic organisation: Plant Production and Soil Science
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
Integration of agronomic, pedological, botanical, economic and management con-siderations in crop production systems with a view to sustainable maximum economic yield. Case studies of specific crops.

AGV 421 Communication 421
Academic organisation: Agricultural Economics, Extension and Rural Development
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 20
Module content:
Communication: Definition and clarification of concepts. Theory and elements of communication. Verbal and non-verbal communication. Determinants of interpersonal

communication. Abating factors impeding communication. Nature, classification and efficiency of communication channels.

APS 461 Crop physiology 461
Academic organisation: Plant Production and Soil Science
Prerequisite: GKD 250 and BOT 356
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 14
Module content:
An overview of photosynthesis and respiration, with the aim of examining the physiological basis of yield in cropping systems. This includes an assessment of parameters for determining plant growth, factors governing yield, partitioning of photoassimilates within plants and opportunities for increasing yield. Crop growth and yield will be put into context of a changing global climate. Evaluation of the manner in which plants respond to various abiotic stresses and how plants sense changing environments. The various roles of plant growth regulators in plants and the importance of these compounds in agriculture.

APZ 325 Livestock breeding 325
Academic organisation: Animal and Wildlife Sciences
Prerequisite: GTS 261
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 10
Module content:
Introduction to applied animal breeding and genetics: Genetic defects in farm and companion animals (single gene and multifactor characteristics). Phenotypic expression of genes in qualitative and quantitative inheritance. Principles of breeding and selecting farm and companion animals, breeding systems, application and interpretation of breeding values and animal recording schemes.

ARD 480 Agriculture and rural development studies 480
Academic organisation: Agricultural Economics, Extension and Rural Development
Contact time: 3 lpw
Period of presentation: Year
Language of tuition: English   **Credits:** 40
Module content:
Overview of the concepts and theories of rural development; the role of agriculture in rural development. Rural livelihood systems: household farming systems; decisions and the operation of farming systems; non-farm enterprises and SMMEs in the rural economy; household food security. Rural institutions: definitions and role of institutions; land tenure; rural financial markets; local institutional development; human capital, knowledge systems. Methodologies for rural development: the farming systems approach; participatory techniques; assessment of land use patterns (zoning techniques); typology techniques; technology transfer and decision-making support; communication for rural development; planning rural development at local level.

ARD 482 Resources and development 482
Academic organisation: Agricultural Economics, Extension and Rural Development
Contact time: 3 lpw
Period of presentation: Semester 2

Language of tuition: English   **Credits:** 20
Module content:
Review of the most important physical-biological agricultural resources – soil, water, climate, topography, plant species, animal species; differences in characteristics, quality and vulnerability; the concept of optimum land use; resource conservation; general eco-logical principles; examples of problems caused by mismatching of physical-biological resources and land use during development planning; principles of sensible technology transfer.

BCM 253 Introduction to proteins and enzymes 253
Academic organisation: Biochemistry
Prerequisite: Natural and Agricultural Sciences students: BCM 254 #, CMY 117 GS, CMY 127 GS and MLB 111 GS; Health Sciences students: MLB 111 GS
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 9
Module content:
Structural and ionic properties of amino acids. Peptides, the peptide bond, primary, secondary, tertiary and quaternary structure of proteins. Interactions that stabilize protein structure, denaturation and renaturation of proteins. Introduction to methods for the purification of proteins, amino acid composition, and sequence determinations. Introduction to enzyme kinetics and enzyme inhibition. Allosteric enzymes, regulation of enzyme activity, active centres and mechanisms of enzyme catalysis. Examples of industrial applications of enzymes.

BCM 254 Practical: Introduction to proteins and enzymes 254
Academic organisation: Biochemistry
Prerequisite: Natural and Agricultural Sciences students: BCM 253 #, CMY 117 GS, CMY 127 GS and MLB 111 GS; Health Sciences students: CMY 117 GS, CMY 127 GS
Contact time: 0.5 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 3
Module content:
Laboratory techniques and Good Laboratory Practice. Techniques for the quantitative and qualitative analysis of biological molecules. Processing and presentation of scientific data.

BCM 255 Carbohydrate metabolism 255
Academic organisation: Biochemistry
Prerequisite: Natural and Agricultural Sciences students: BCM 256 #, CMY 117 GS, CMY 127 GS and MLB 111 GS; Health Sciences students: MLB 111
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 9
Module content:
Biochemistry of carbohydrates. Thermodynamics and bioenergetics. Glycolysis, citric acid cycle and electron transport. Glycogen metabolism, pentose-phosphate pathway, gluconeogenesis and photosynthesis.

BCM 256 Practical: Carbohydrate metabolism 256
Academic organisation: Biochemistry
Prerequisite: Natural and Agricultural Sciences students: BCM 255 #, CMY 117 GS,

CMY 127 GS and MLB 111 GS
Contact time: 0.5 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 3
Module content:
Study and analysis of metabolic pathways and enzymes. Scientific method and design: hypothesis design and testing, method design and scientific controls.

BCM 263 Lipid and nitrogen metabolism 263
Academic organisation: Biochemistry
Prerequisite: Natural and Agricultural Sciences students: BCM 264 #, CMY 117 GS, CMY 127 GS and MLB 111 GS; Health Sciences students: BCM 253 GS, BCM 254 GS, BCM 255 GS and BCM 256 GS
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 9
Module content:
Biochemistry of lipids, membrane structure, anabolism and catabolism of lipids. Nitrogen metabolism, amino acid biosynthesis and catabolism. Biosynthesis of neuro-transmitters, pigments, hormones and nucleotides from amino acids. Catabolism of pureness and pyrimidines. Therapeutic agents directed against nucleotide metabolism. Examples of in-born errors of metabolism of nitrogen containing compounds. The urea cycle, nitrogen excretion.

BCM 264 Practical: Lipid and nitrogen metabolism 264
Academic organisation: Biochemistry
Prerequisite: Natural and Agricultural Sciences students: BCM 263 #, CMY 117 GS, CMY 127 GS and MLB 111 GS
Health Sciences students: BCM 253 GS, BCM 254 GS, BCM 255 GS and BCM 256 GS
Contact time: 0.5 ppw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 3
Module content:
Scientific writing skills: evaluation of a scientific report. Techniques for separation and analysis of biological molecules.

BCM 265 Biochemistry in perspective 265
Academic organisation: Biochemistry
Prerequisite: Natural and Agricultural Sciences students: BCM 266 #, CMY 117 GS, CMY127 GS and MLB 111 GS; Health Sciences students: BCM 253 GS, BCM 254 GS, BCM 255 GS and BCM 256 GS
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 9
Module content:
Integration of metabolic pathways; biochemistry of nutrition and xenobiochemistry; hormones and second messengers; hormonal control in metabolism, a case study in connectivity among metabolic pathways, nutrition, regulation and the immune system.

BCM 266 Practical: Biochemistry in perspective 266
Academic organisation: Biochemistry
Prerequisite: Natural and Agricultural Sciences students: BCM 265 #, CMY 117 GS,

CMY 127 GS and MLB 111 GS; Health Sciences students: BCM 253 GS, BCM 254 GS, BCM 255 GS and BCM 256 GS
Contact time: 0.5 ppw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 3
Module content:
Study of structure-function relationships and biological activity. Critical evaluation of results and identification of patterns or tendencies in observations.

BCM 271 Biochemistry practical 271
Academic organisation: Biochemistry
Prerequisite: BCM 253 and BCM 254 and BCM 255 and BCM 256 and BCM 263 and BCM 264 and BCM 265 and BCM 266 and CMY 283 and CMY 284
Contact time: 1 ppw
Period of presentation: Year
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
*Note: For students majoring in biochemistry only.
Basic biochemical separation methods, experimental design, biochemical calculations.

BCM 351 Biochemistry of proteins 351
Academic organisation: Biochemistry
Prerequisite: BCM 253 and BCM 254
Contact time: 2 lpw 1 ppw
Period of presentation: Quarter 1
Language of tuition: Double medium   **Credits:** 9
Module content:
Biochemistry of amino acids, peptides and proteins. Chemical modification of amino acids. Primary, secondary, tertiary and quaternary structure, protein folding, sequence motifs and domains, supersecondary and supramolecular structure, self assembly. Practical: subcellular fractionation (CBE) and purification of proteins. HPLC of proteins (CBE). Dipeptide sequencing and electrophoresis of proteins.

BCM 352 Proteome analysis 352
Academic organisation: Biochemistry
Prerequisite: BCM 253, BCM 254 and BCM 351 GS
Contact time: 2 lpw 1 ppw
Period of presentation: Quarter 2
Language of tuition: Double medium   **Credits:** 9
Module content:
Analysis of amino acid composition and sequence of proteins. Isolation and characterisation of proteins. Introduction to proteomics. Sequence-based characterisation of proteins, scoring matrices and algorithms. Basic techniques for three-dimensional modelling and characterisation. Practical: introduction to bioinformatics in protein structure-function relation investigations.

BCM 354 Biochemistry of nucleic acids 354
Academic organisation: Biochemistry
Prerequisite: BCM 253 and BCM 254 and BCM 255 and BCM 256 and BCM 263 and BCM 264 and BCM 265 and BCM 266
Contact time: 1 lpw 0.5 ppw
Period of presentation: Semester 1

Language of tuition: Double medium   **Credits:** 9
Module content:
Biochemistry of nucleic acids, nucleotides and nitrogen bases. Chemical and enzymatic methods for studying nucleic acid structure. Primary, secondary and tertiary structure of nucleic acids and sequence-induced conformational types, DNA enzymes. Chemical modification of nucleotides and nucleic acids and in vivo repair mechanisms. Application of sequence-specific modifications in drug design and antigene approaches. Sequence and structure-specific interactions between small ligands (dyes and antibiotics) and nucleic acids. Fundamentals of RNA structure; application of principles to understand ribozymes, gene silencing, ribosomes and protein translation. Interaction between nucleic acids and nucleic acids binding proteins, the role of DNA shape in protein-DNA recognition and the biochemical principles of gene regulation.

BCM 355 Immunobiology 355
Academic organisation: Biochemistry
Prerequisite: BCM 253 and BCM 254 and BCM 255 and BCM 256 and BCM 263 and BCM 264 and BCM 265 and BCM 266
Contact time: 1 lpw 0.5 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 9
Module content:
Adaptive and innate immunity. Complement. Organs and cells of the immune response. Cell killing: phagocytosis, apoptosis and necrosis. Anatomy and ontogeny (development) of the immune system. Chemical and cellular techniques of immunology. The origin of diversity in antigen receptors. Practical: working with experimental animals, the synthesis of hapten-protein conjugate, immunisation, bleeding and serum production and an immuno-assay.

BCM 362 Nutritional biochemistry 362
Academic organisation: Biochemistry
Prerequisite: BCM 265
Contact time: 1 lpw
Period of presentation: Quarter 3
Language of tuition: Double medium   **Credits:** 4
Module content:
Proximate analysis of nutrients. Review of energy requirements and expenditure. Metabolism of energy-yielding nutrients. Requirements and function of water, vitamins and minerals. Interpretation and modification of RDA values for specific diets, eg growth, exercise, pregnancy and lactation, aging and starvation. Comparison of monogastric and ruminant species. Composition of triglycerides, fatty acids and arteriosclerosis. Cholesterol, polyunsaturated, essential fatty acids and dietary anti-oxidants. Interactions between nutrients. Biochemical functions of water and fat-soluble vitamins and assessment of vitamin status. Mineral requirements, biochemical function, imbalances and diarrhea.

BCM 363 Xeno biochemistry 363
Academic organisation: Biochemistry
Prerequisite: BCM 265
Contact time: 1 lpw
Period of presentation: Quarter 4
Language of tuition: Double medium   **Credits:** 5

Module content:
Metabolism of xenobiotics: absorption, distribution, metabolism and excretion; oxidation/reduction (Phase I), conjugations (Phase II), export from cells (Phase III); factors affecting metabolism and disposition. Toxic responses: tissue damage and physiological effects; teratogenesis, immunotoxicity, mutagenesis and carcinogenesis. Examples of toxins: biochemical mechanisms of common toxins and their antidotes.

BCM 364 Building the cell 364
Academic organisation: Biochemistry
Contact time: 1 lpw 0.5 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 9
Module content:
Membrane structure: plasma membrane structure, organisation of lipid membranes, membrane proteins, glycoproteins and glycolipids, principles of membrane organisation (cytoskeletal components), specialisations of the plasma membrane (neuronal tissue). Transport across cell membranes: major types of membrane transport proteins; diffusion of small molecules across pure phospholipid bilayers; uniporter-catalysed transport of specific molecules; ion channels, intracellular ion environment and membrane electric potential; active ion transport and ATP hydrolysis; cotransport catalysed by symporters and antiporters; osmosis, water channels and the regulation of cell volume. Calculation of free energy change during transport. Synthesis and sorting of plasma membrane, secretory and lysosomal proteins. Protein modifications, folding and quality control in the ER, further glycoprotein processing in the Golgi. Vesicular traffic, protein secretion and endocytosis. Introduction to signaling: G-proteins, adenylyl cyclase, phospholipase C and secondary messenger molecules (cyclic AMP, calcium and inositol-triphosphates).

BCM 365 Immunobiochemistry 365
Academic organisation: Biochemistry
Prerequisite: BCM 355 GS
Contact time: 1 lpw 0.5 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 9
Module content:
Interactions between antigens and antibodies: quantitative and qualitative properties, regulation of the immune response, integrated immunology. Practical: tutorials on integrated and quantitative immunology.

BCM 366 Enzymology 366
Academic organisation: Biochemistry
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 9
Module content:
Nomenclature: enzyme nomenclature and classification. Specificity and mechanisms: the active site, mechanisms of catalysis and examples of specific enzyme mechanisms e.g. lysozyme and carboxypeptidase A. Enzyme kinetics: derivation of Michaelis-Menten (MM) equation by equilibrium and steady state assumptions, significance of Km and Vmax in the catalytic efficiency of enzymes and linear transformations of the MM equation. Enzyme inhibition: competitive, uncompetitive, non-competitive and irreversible inhibitors with examples of specific toxins and drugs. Multi-substrates: Cleland nomenclature and multisubstrate reactions. Allosteric enzymes: models by Koshland, Hill and Monod.

Problems and answers: tutorials of problems and answers based on above concepts. Practicals: isolation of an enzyme, determination of pH and temperature optimum, determination of Km and Vmax, enzyme activation, enzyme inhibition, purification table and final report, oral defense of report.

BIF 311 Bioinformatics 311
Academic organisation: Biochemistry
Prerequisite: WTW 114 OR WTW 134 and BME 120 and GTS 251 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Concepts in biological sequence analysis. Biological data structures. Deriving and using scoring matrices. Theory and application of sequence alignment algorithms. Nucleic acid feature analysis and prediction methods. Protein feature analysis and prediction methods. Pattern recognition. Protein structure prediction concepts and methods. Intermolecular interaction and biological pathway analysis. Introductory microarray data analysis. Phylogenomics. Common algorithms in bioinformatics. Introductory statistics for bioinformatics. Programming for bioinformatics.

BOT 161 Plant biology 161
Academic organisation: Plant Science
Prerequisite: MLB 111 GS
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: Both   **Credits:** 8
Module content:
Basic plant structure and function; introductory plant taxonomy and plant systematics; principles of plant molecular biology and applications of plant molecular tools; the ecosystem; adaptation of plants to extreme environments; medicinal compounds from plants; introduction to veld evaluation and veld management.

BOT 251 South African flora and vegetation 251
Academic organisation: Plant Science
Prerequisite: BOT 161 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Both   **Credits:** 12
Module content:
Origin and affinity of South African flora and vegetation types; principles of plant geography; plant diversity in southern Africa; characteristics, environments and vegetation of southern African biomes; major vegetation types of southern Africa; centra of plant endemism; rare and threatened plant species; red data lists; plant conservation; international conventions; local environmental laws; conservation status of southern African vegetation types.

BOT 261 Plant biochemical evolution 261
Academic organisation: Plant Science
Prerequisite: BOT 161, CMY 117, CMY 127 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Both   **Credits:** 12

Module content:
Role of biochemical evolution in the survival of plants as stationary organisms (coordination of heterotrophic metabolism on cellular and whole plant level, nitrogen fixation, defence mechanisms and interaction with other organisms). Families of economic importance, interrelationship between humans and plants; food, medicine, drugs and poisons, landscape architecture, energy, water and industry.

BOT 356 Plant ecophysiology 356
Academic organisation: Plant Science
Prerequisite: BOT 161 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 18
Module content:
The emphasis is on the efficiency of the mechanisms whereby C3-, C4- en CAM-plants bind CO_2 and how it is impacted upon by environmental factors. The mechanisms and factors which determine the respiratory conversion of carbon skeletons and how production is affected thereby will be discussed. Insight into the ecological distribution and manipulation of plants for increased production is gained by discussing the internal mechanisms whereby carbon allocation, hormone production, growth, flowering and fruitset are influenced by external factors. To understand the functioning of plants in diverse environments, the relevant structural properties of plants and the impact of soil composition and water flow in the soil-plant-air continuum will be discussed. Various important techniques in the field of study will be illustrated in the practicals and may be employed to investigate aspects such as: the effect of herbicides on isolated chloroplasts, water-use efficiency of plants, factors affecting stomata opening, determination of plant stress, photosynthetic rate and nitrogen fixation, compilation of Höfler diagrams and determination of elasticity coefficients.

BOT 357 Crop biotechnology 357
Academic organisation: Plant Science
Prerequisite: BOT 161 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 18
Module content:
Molecular tools in crop biotechnology; whole crop plant physiology explored by molecular techniques; usefulness of model plants; gene and promoter identification and transfer techniques for crop improvement; investigation of plant transcriptomes using microarrays; molecular analysis of plant reactions to stress; transgenic plant strategies for improved stress resistance in crops.

BOT 358 Plant ecology 358
Academic organisation: Plant Science
Prerequisite: BOT 161 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 18
Module content:
A description of the environment of plants. Theory of plant community concepts, vegetation change over space and time; surveying techniques of vegetation and environmental factors; floristic and structural composition. Data processing techniques;

ecological interpretation and description of plant communities. Vegetation and environmental management; vegetation and the grazing animal. An examination of the ecological traits of plant populations; conventional and diagrammatic life tables; population growth and population regulation; population dynamics. Species interactions and an evaluation of their effects on interacting species.

BOT 365 Phytomedicine 365
Academic organisation: Plant Science
Prerequisite: BOT 161 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
The module will include a review on the discovery and use of plant medicines and phyto-therapeutically important molecules obtained from plants. Certain aspects of natural product chemistry i.e. the biosynthesis and ecological role of the three main classes of secondary compounds; terpenoids, phenolics, and alkaloids will be discussed. The role of these natural products in defence against micro-organisms and herbivores will be presented during the module. The basics of alternative medicines such as homeopathy, ayurvedic medicine, acupuncture etc. will also be discussed. Key skills/practical elements to be covered in the module include modern techniques like high-performance liquid chromatography and flash chromatography used for the detection and isolation of active compounds from medicinal plants. Practical drug discovery approaches using chromato-graphic techniques for phytochemical analysis of secondary metabolites such as tannins, alkaloids, sterols and saponins will be conducted. Bioassays on micro-organisms will also be done during the practical sessions in order to develop the skills for the potential discovery of new antibiotics. Visits to several pharmaceutical laboratories will be arranged.

BOT 366 Plant diversity 366
Academic organisation: Plant Science
Prerequisite: BOT 161 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 18
Module content:
Basic principles and methods of plant classification. Sources of plant variation. Modern methods to ascertain evolutionary relationships among plants. The extent and significance of vascular plant diversity. General structural and biological characteristics of evolutionary and ecologically important plant groups. Botanical nomenclature. Plant identification in practice; identification methods, keys, herbaria and botanical gardens. Diagnostic characters for the field identification of trees, wild flowers and grasses. Family recognition of southern African plants. Available literature for plant identifica-tion. Methods to conduct floristic surveys. Nature and significance of voucher specimens.

CGS 152 Introductory physics 152
Academic organisation: Physics
Contact time: 2 lpw 2 ppw 2 dpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Heat and temp: Thermal interaction; operational definition of temperature; expansion;

temperature in the kinetic molecular model; work, energy and heat; phase transitions and mechanisms of heat transfer. Measurements: What is measuring; the scientific method; measuring error; significant figures. Geometric optics: Light travels straight; shadow formation; plane, convex and concave mirrors; refraction and lenses (thin); optical instruments.
Practicals related to the topics.

CGS 162 Introductory physics 162
Academic organisation: Physics
Prerequisite: CGS 152
Contact time: 2 lpw 2 ppw 2 dpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Kinematics: Basic concepts in kinematics in vector notation; different representations to describe motions; instantaneous velocity; acceleration; equations of motion (constant acceleration). Dynamics: Interactions, Newton's third law, Newton's first and second law; gravitation; normal force and friction. Forces in two dimensions: resolving and adding forces. Work energy and power. Electricity: Static and flowing electricity, current, potential difference, power, resistance, simple DC-circuits.
Practicals related to the topics.

CHM 171 General chemistry 171
Academic organisation: Chemistry
Contact time: 4 lpw 1 ppw 1 web-based period per week 1 dpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
General introduction to inorganic, analytical and physical chemistry. Nomenclature of inorganic ions and compounds, stoichiometric calculations concerning chemical reactions, redox reactions, solubilities and solutions, atomic structure, periodicity. Molecular structure and chemical bonding using the VSEPR model. Principles of reactivity, electrochemistry, energy and chemical reactions, entropy and free energy. Appropriate tutorial classes and practicals.

CHM 172 General chemistry 172
Academic organisation: Chemistry
Contact time: 4 lpw 1 ppw 1 web-based period per week 1 dpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
General introduction to inorganic, analytical and physical chemistry. Nomenclature of inorganic ions and compounds, stoichiometric calculations concerning chemical reactions, redox reactions, solubilities and solutions, atomic structure, periodicity. Molecular structure and chemical bonding using the VSEPR model. Principles of reactivity, electrochemistry, energy and chemical reactions, entropy and free energy. Appropriate tutorial classes and practicals.

CHM 181 General chemistry 181
Academic organisation: Chemistry
Contact time: 4 lpw 1 ppw 1 web-based period per week 1 dpw
Period of presentation: Semester 2

Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
General physical-analytical chemistry: Physical behaviour of gases, liquids and solids, intermolecular forces, solutions, chemical equilibrium, acids and bases, buffers, precipitation. Organic chemistry: Structure (bonding) and functional groups, nomenclature, isomerism, introductory stereo-chemistry, introduction to chemical reactions and chemical properties of organic compounds. Appropriate tutorial classes and practicals.

CHM 215 Chemistry 215
Academic organisation: Chemistry
Prerequisite: CHM 171 or CHM 172 and CHM 181
Contact time: 1 web-based period per week 3 lpw 1 ppw 1 dpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 16
Module content:
Organic chemistry. Chemical properties of organic (including aromatic) compounds. Functional group transformation and synthesis. Physical chemistry. Colloid chemistry. Surface chemistry and processes at solid surfaces. PVT properties of real gases.

CHM 226 Chemistry 226
Academic organisation: Chemistry
Prerequisite: CHM 171 or CHM 172 and CHM 181
Contact time: 2 lpw 6 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 8
Module content:
Theory: Introduction to instrumental chemical analysis. Integration of electronic, chemical, optical and computer principles for the construction of analytical instrumentation. Detail discussion of principles and some instrumental methods from three disciplines within analytical chemistry, namely electrochemistry, spectroscopy and chromatography. This includes potentiometry, (AA) atomic absorption, (ICP) atomic emission, ultraviolet (UV), and infrared (IR) spectroscopy, potentiometric and photometric titrations, gas chromatography, liquid chromatography as well as combinations of these techniques. Practical: IR spectroscopy, UV spectroscopy, AA spectroscopy, potentiometric titration, gas chromatography.

CMY 117 General chemistry 117
Academic organisation: Chemistry
Prerequisite: Refer to Regulation 1.2
Contact time: 4 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 16
Module content:
Theory: General introduction to inorganic and analytical chemistry. Nomenclature of inorganic ions and compounds, stoichiometric calculations concerning chemical reactions, redox reactions, solubilities, atomic structure, periodicity. Inorganic and physical chemistry. Molecular structure and chemical bonding using the VSEPR models. Chemical equilibrium, acids and bases, buffers, precipitation.

CMY 127 General chemistry 127
Academic organisation: Chemistry
Prerequisite: Natural and Agricultural Sciences students: CMY 117 GS
Health Sciences students: none
Contact time: 4 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 16
Module content:
Theory: General physical-analytical chemistry: Physical behaviour of gases, liquids and solids, intermolecular forces, solutions: Organic chemistry: Structure (bonding), nomenclature, isomerism, introductory stereochemistry, introduction to chemical reactions and chemical properties of organic compounds and biological compounds, i.e. carbohydrates, lipids and aminoacids. Practical: Molecular structure (model building), synthesis and properties of simple organic compounds.

CMY 133 Chemistry 133
Academic organisation: Chemistry
Prerequisite: As for BSc Four-year programme
Contact time: 2 lpw Fortnightly practicals 3 dpw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
The field of Chemistry – an overview; Mathematics in Chemistry; atomic theory: historical overview; atoms, molecules and ions; relative atomic mass; electronic structure of atoms; the periodic table; periodicity; chemical bonding.

CMY 143 Chemistry 143
Academic organisation: Chemistry
Prerequisite: CMY 133
Contact time: 2 lpw Fortnightly practicals 3 dpw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Bonding and molecular geometry: VSEPR theory; bonding and organic compounds (structural formulas, classification and nomenclature); matter and its properties; mole concept; reaction stoichiometry; reactions in aqueous solutions: precipitation, acid base and redox.

CMY 151 Chemistry 151
Academic organisation: Chemistry
Prerequisite: Refer to Regulation 1.2
Contact time: 4 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Theory: Introduction to general chemistry: Measurement in chemistry, matter and energy, atomic theory and the periodic table, chemical compounds and chemical bonds; quantitative relationships in chemical reactions, states of matter and the kinetic theory; solutions and colloids, acids, bases and ionic compounds, chemical equilibria. Introduction to organic chemistry: Chemical bonding in organic compounds, nature, physical properties and nomenclature of simple organic molecules, isomerism, chemical properties of alkanes and cycloalkanes, alkenes, alcohols, aldehydes and ketones,

carboxylic acids and esters, amines and amides, carbohydrates, proteins, and lipids. Practicals.

CMY 154 Chemistry 154
Academic organisation: Chemistry
Contact time: 3 lpw fortnightly practicals 2 tpw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Chemical equilibrium; acid and base equilibria; applications of aqueous equilibria: buffers and solubility; Introduction to electrochemistry; introduction to thermochemistry and thermodynamics; Introduction to electrochemistryorganic chemistry; Introduction to chemical kinetics; organic chemistry: hybridisation, isomers (structural, geometrical and conformational), reactions (substitution, addition and elimination), introduction to reaction mechanisms.

CMY 282 Physical chemistry 282
Academic organisation: Chemistry
Prerequisite: CMY 117 and CMY 127
Contact time: 4 lpw 2 ppw 1 tpw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 12
Module content:
Theory: Classical chemical thermodynamics, gases, first and second law and applications, physical changes of pure materials and simple compounds. Phase rule: Chemical reactions, chemical kinetics, rates of reactions. Fundamentals of spectroscopy (including NMR).

CMY 283 Analytical chemistry 283
Academic organisation: Chemistry
Prerequisite: CMY 117 and CMY 127
Contact time: 4 lpw 2 ppw 1 tpw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 12
Module content:
Theory: Statistical evaluation of data, aqueous solution chemistry, chemical equilibrium, precipitation, neutralisation and complex formation titrations, redox titrations, potentiometric methods, introduction to electrochemistry.

CMY 284 Organic chemistry 284
Academic organisation: Chemistry
Prerequisite: CMY 117 and CMY 127
Contact time: 4 lpw 2 ppw 1 tpw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 12
Module content:
*Selection criteria based on performance in CMY 127 will be applied due to limited capacity in the practical course.
Theory: NMR spectroscopy: Applications. Organic reactivity: Rates and equilibrium. Acidity and basicity. Conjugation and resonance: Allylic systems. Alkenes, alkyl halides, alcohols, ethers. Carbonyl compounds: ketones, aldehydes, carboxylic acids and their derivatives. Dynamic stereochemistry: Nucleophilic substitution, elimination, addition.

CMY 285 Inorganic chemistry 285
Academic organisation: Chemistry
Prerequisite: CMY 117 and CMY 127
Contact time: 4 lpw 2 ppw 1 tpw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 12
Module content:
Theory: Atomic structure, structure of solids (ionic model). Coordination chemistry of
transition metals: Oxidation states of transition metals, ligands, stereochemistry, crystal
field theory, consequences of d-orbital splitting, chemistry of the main group elements,
acid-base concepts, non-aqueous solvents, electrochemical properties of transition
metals in aqueous solution, industrial applications of transition metals. Introduction to IR
spectroscopy.

CMY 382 Physical chemistry 382
Academic organisation: Chemistry
Prerequisite: CMY 282, CMY 283, CMY 284 and CMY 285
Contact time: 4 lpw 1 ppw 1 dpw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 18
Module content:
Theory: Molecular quantum mechanics. Introduction: Shortcomings of classical physics,
dynamics of microscopic systems, quantum mechanical principles, translational,
vibrational and rotational movement. Atomic structure and spectra: Atomic hydrogen,
multiple electron systems, spectra of complex atoms, molecular structure, the hydrogen
molecule ion, diatomic and polyatomic molecules, structure and properties of molecules.
Molecules in motion: Viscosity, diffusion, mobility. Surface chemistry: Physisorption and
chemisorption, adsorption isotherms, surface tension, heterogeneous catalytic rate
reactions, capillarity.

CMY 383 Analytical chemistry 383
Academic organisation: Chemistry
Prerequisite: CMY 282, CMY 283, CMY 284 and CMY 285
Contact time: 4 lpw 1 ppw 1 dpw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 18
Module content:
Theory: Separation methods: Extraction, multiple extraction, chromatographic systems.
Spectroscopy: Construction of instruments, atomic absorption and atomic emission
spectrometry, surface analysis techniques. Mass spectrometry. Instrumental electro-
chemistry.

CMY 384 Organic chemistry 384
Academic organisation: Chemistry
Prerequisite: CMY 282, CMY 283, CMY 284 and CMY 285
Contact time: 4 lpw 1 ppw 1 tpw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 18
Module content:
Theory: Aromaticity and aromatic chemistry, synthetic methodology in organic chemistry.
Carbon-carbon bond formation: Alkylation at nucleophilic carbon sites, aldol and related
condensations, Wittig and related reactions, acylation of carbanions (Claisen condensation).

CMY 385 Inorganic chemistry 385
Academic organisation: Chemistry
Prerequisite: CMY 282, CMY 283, CMY 284 and CMY 285
Contact time: 4 lpw 1 ppw 1 dpw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 18
Module content:
Theory: Structure and bonding in inorganic chemistry. Molecular orbital approach, diatomic and polyatomic molecules, three-centre bonds, metal-metal bonds, transition metal complexes, magnetic properties, electronic spectra, reactivity and reaction mechanisms, reaction types, special topics.

DAF 200 Animal anatomy and physiology 200
Academic organisation: Animal and Wildlife Sciences
Prerequisite: CMY 127 or TDH
Contact time: 4 lpw 1 ppw
Period of presentation: Year
Language of tuition: English   **Credits:** 36
Module content:
General structure and plan of the body of livestock. Types and characteristics of cells and tissues. Body water. Anatomy, physiology and histology of systems: Skin; skeleton; muscles, connective tissue, ligaments, joints; nervous system; sensory organs of sight, sound, smell, touch, taste; circulatory system; respiratory system; endocrinology; male and female reproductive systems; digestive system, gastro-intestinal tract, liver, pancreas; kidneys, acid-base balance and homeostasis; lactation; immune system. General species differences.

DAN 310 Animal anatomy 310
Academic organisation: Animal and Wildlife Sciences
Prerequisite: DAF 200
Contact time: 1 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Functional anatomy, growth and development of tissues and organ systems. Changes during maturation, reproduction, the post-partum period and lactation. Ageing and tissue changes with erosion diseases. The influence of hormones, production and reproduction on conformation and a critical evaluation of assessment of animals for functional efficiency.

DFS 311 Animal physiology 311
Academic organisation: Animal and Wildlife Sciences
Prerequisite: DAF 200
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 10
Module content:
Homeostasis and Homeorhesis in animals: Thermoregulation. Adaptation of glucose, lipid and protein metabolism in response to short and long-term changes in the supply and balance of nutrients and to changes in tissue demand for nutrients during different physiological states. Deviations from normal homeostasis, metabolic diseases and the prevention thereof. Pathogenesis of inflammation and infections; immunity.

DFS 320 Growth physiology 320
Academic organisation: Animal and Wildlife Sciences
Prerequisite: DFS 311 and DAN 310
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 10
Module content:
The underlying physiological processes in growth and development. Pre- and postnatal growth and factors which determine growth rate: growth curves, stimulants of growth, age, nutrition, race, gender, et al.

ENV 101 Introduction to environmental sciences 101
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 3 lpw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 8
Module content:
Introducing the basic concepts and interrelationships required to understand the complexity of natural environmental problems, physical and human environment, human induced environmental problems, the ways in which the natural environment affects human society and biodiversity, an introduction to major environmental issues in Southern Africa and sustainable development in the context of environmental issues.

ENV 301 Human environmental interactions 301
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 18
Module content:
The module focuses on contemporary environmental issues in southern Africa. Recent and future impacts of human pressures on natural resources, the state of the environment in South Africa, management of critical resources, population trends, bio-diversity loss, pollution, water scarcity, desertification, climate change, waste accumula-tion and management, environmental management tools, environmental education and environmental management legislation.

ERG 282 Ergonomics 282
Academic organisation: Consumer Science
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 8
Module content:
Study of general ergonomic principles as applied to the design of workplaces, workspaces and ways of performing work. The interaction between the human (user) and his work, workspace (immediate surroundings, including space layout, furniture, movement patterns) and the general environment (climate, lighting, and noise, etc.) serve as a point of reference.

EST 121 Aesthetics 121
Academic organisation: Consumer Science
Prerequisite: OBG 111
Contact time: 1 lpw 1 ppw

Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 9
Module content:
Presentation techniques: story boards and technical drawings. Presentation techniques using CAD.

EST 212 Aesthetics: Product, consumer and environment 212
Academic organisation: Consumer Science
Prerequisite: EST 121
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 10
Module content:
Introduction to aesthetics: framework of approach; physical as premise; role of clothing and clothing environments; perceptual process; factors that influence evaluation. Aesthetics of the product: Design elements in clothing products; visual, tactile, audio and olfactory elements; complexity, order, novelty. Aesthetics of the consumer: figure analysis; colour; design elements: clothing product and figure. Aesthetics of the environment: visual presentation in clothing environments.

FPP 451 Chemical and microbiological aspects of food 451
Academic organisation: Food Science
Prerequisite: Third-year status or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1 or Semester 2
Language of tuition: English   **Credits:** 20
Module content:
Chemical aspects: The role and composition of the major chemical components of food (water, carbohydrates, proteins and lipids). The content and nutritional role of different minor chemical components of food (minerals and vitamins). The principles and control of enzymic and non-enzymic browning. The composition and use of enzymes in food processing. Microbiological aspects: Introduction to micro-organisms. Intrinsic and extrinsic factors that affect growth and survival of micro-organisms. Important microbial groups in food. Microbial spoilage of foods. Determination of micro-organisms and/or their products in foods. The preservation of foods. Microbial indicators of food safety and quality. Food borne diseases and intoxications. The utilisation of micro-organisms in food production.

FSK 116 Physics 116
Academic organisation: Physics
Prerequisite: WTW 114 # and refer to Regulation 1.2
Contact time: 4 lpw 1 ppw 1 dpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Introductory mathematics: Symbols, exponents, logarithms, angles in degrees, radial measure, goniometry, differentiation, and integration. Motion along a straight line: position and displacement, acceleration. Vectors: adding vectors, components, multiplying vectors. Motion in two and three dimensions: projectile motion, circular motion. Force and motion: Newton's Law, force, friction. Kinetic energy and work: work, power. Potential energy: Centre of mass, linear momentum. Collisions: impulse and linear momentum, elastic collisions, inelastic collisions. Rotation: kinetic energy of rotation, torque.

Oscillations and waves: Simple harmonic motion, types of waves, wavelength and frequency, interference of waves, standing waves, the Doppler effect. Temperature, heat and the first law of thermodynamics.

FSK 176 Physics 176
Academic organisation: Physics
Contact time: 4 lpw 1 ppw 1 dpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Introductory mathematics: Symbols, exponents, logarithms, angles in degrees, radial measure, goniometry, differentiation, and integration. Motion along a straight line: position and displacement, acceleration. Vectors: adding vectors, components, multiplying vectors. Motion in two and three dimensions: projectile motion, circular motion. Force and motion: Newton's Law, force, friction. Kinetic energy and work: work, power. Potential energy: Centre of mass, linear momentum. Collisions: impulse and linear momentum, elastic collisions, inelastic collisions. Rotation: kinetic energy of rotation, torque. Oscillations and waves: Simple harmonic motion, types of waves, wavelength and frequency, interference of waves, standing waves, the Doppler effect. Temperature, heat and the first law of thermodynamics.

FST 250 Introduction to food science and technology 250
Academic organisation: Food Science
Prerequisite: CMY 117, CMY 127, PHY 131 and WTW 134 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
Lectures: Food Science as a discipline. Activities of Food Scientists and Nutritionists. How food is produced, processed and distributed (food pipeline). World food problem. Human nutrition and human food requirements. Constituents of foods: Functional properties. Food quality. Food deterioration and control (food preservation). Unit operations in food processing. Food safety, risks and hazards. Principles of food packaging. Food legislation and labelling. Food processing and the environment. Practicals: Group assignments applying the theory in practice; practical demonstrations in pilot plants; guest lecturers on the world of food scientists and nutritionists; factory visit/videos of food processing.

FST 260 Principles of food processing and preservation 260
Academic organisation: Food Science
Prerequisite: CMY 117, CMY 127, MBY 161, PHY 131 and WTW 134 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
Lectures: Food preservation technologies: concept of hurdle technology; heat (blanching, pasteurisation and sterilisation); cold (refrigeration and freezing); concentration and dehydration; food irradiation; fermentation; preservatives; new methods of food preservation. Effect of various food preservation technologies on the microbiological (shelf-life and safety issues), sensory and nutritional quality of foods. Practicals: Practical applications of above processes. Physical, chemical and sensory evaluation of processed foods. Assignment: Application of hurdle technology concept to a specific food product.

FST 350 Integrated food science 350
Academic organisation: Food Science
Prerequisite: Second-year status, FST 250 and FST 260 or TDH
Contact time: 2 lpw
Period of presentation: Year
Language of tuition: English   **Credits:** 18
Module content:
Literature studies and seminar presentations on topics in food science, nutrition and health.

FST 351 Food chemistry (1) 351
Academic organisation: Food Science
Prerequisite: BCM 253 and BCM 254 and BCM 255 and BCM 256and BCM 263 and BCM 264 and BCM 265 and BCM 266 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Lectures – Chemistry of major food components: Carbohydrates. Proteins. Lipids. Water. Chemical and nutritional aspects of food processing: implications of different processing techniques on the major food components. Functional properties of the major food components. Modification of functional properties of the major food components. Food analysis methodology. Practical work: Food analysis.

FST 352 Food chemistry (2) 352
Academic organisation: Food Science
Prerequisite: BCM 253 and BCM 254 and BCM 255 and BCM 256 and BCM 263 and BCM 264 and BCM 265 and BCM 266
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Lectures – Basic food analysis and chemistry of the minor food components: Basic food analysis, vitamins, minerals, additives, contaminants. Chemical and nutritional aspects of food processing: implications of different processing techniques on minor food components. Functional properties of the minor food components. Food analysis methodology. Practical work: Food analysis.

FST 353 Food engineering 353
Academic organisation: Food Science
Prerequisite: FST 260 or TDH
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Lectures: Mass and energy balance. Heat transfer theory: Convection, conduction and radiation. Energy for food processing. Fluid flow and rheology. Unit operations: materials handling, cleaning, sorting, grading, peeling, disintegration, separation (e.g. membrane technology), pumping, mixing and forming, heating, concentration, drying, extrusion, refrigeration, freezing. Tutorials/practicals: Calculations on mass and energy balances, psychrometry, refrigeration and freezing.

FST 360 Principles of the science and technology of plant foods 360
Academic organisation: Food Science
Prerequisite: FST 250, FST 260, FST 351 and FST 352 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Cereal and legume grains, oilseeds and fruits and vegetables: Composition and structure. Quality assessment and grading. Post-harvest storage and physiology.
Cleaning and sorting principles and technologies. Milling – principles and technologies, and their effects on product functionality and nutrient composition. Juice and oil extraction – principles and technologies, and their effects on product functionality and nutrient composition. Bread and baked goods making – principles and technologies, and their effects on product functionality and nutrient composition. Practical work: Laboratory analyses of components and products of cereals, oilseeds, legumes and fruits and vegetables; Determination of quality; Factory visits.

FST 361 Animal food science 361
Academic organisation: Food Science
Prerequisite: FST 250, FST 260, FST 351 and FST 352 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Dairy science: Composition of milk; some physical properties of milk; factors affecting composition of milk; microbiological aspects of milk production; lactation; mechanical milking; milk defects; nutritive value of milk and milk products. Practical work: Chemical and microbiological tests of milk. Demonstration of the cheese-making process. Meat, poultry, fish and egg science: The composition, nutritional value and quality of meat, poultry, fish and eggs; factors affecting quality from slaughter or harvesting to consumption. Practical work: Visits to red meat and poultry abattoirs; quality determinations, egg quality and protein functionality.

FST 400 Research methodology and seminar 400
Academic organisation: Food Science
Prerequisite: Third-year status or TDH
Contact time: 1 workshop of 5 days in semester 1 1 day seminar in semester 2
Period of presentation: Year
Language of tuition: English   **Credits:** 20
Module content:
Lectures and assignments: Research methodology. Literature study and seminar presentations on topics in food science and/or technology. The student must also pass an oral examination at the end of the module.

FST 401 Animal food technology 401
Academic organisation: Food Science
Prerequisite: FST 361 or TDH
Contact time: 9 practical sessions 30 discussion classes
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 20
Module content:
Dairy technology: The technology of fluid, concentrated, dried, frozen and fermented

dairy products and starter cultures. Requirements for milk supply and other ingredients. Principles for the manufacturing of products in this category. Possible defects, causes and prevention. Practical work: Preparation of condensed milk, custard, ready-to-eat milk-based desserts, flavoured milk beverages, dairy-fruit juice mixtures; ice cream and other frozen desserts; yoghurt and cultured milk products; cheeses. Evaluation and analysis of the products. Effect of processing on nutritional value of dairy products. Factory visits. Meat, poultry, fish and egg technology: Meat, poultry, fish and egg processing and equipment. Meat emulsion, curing, dehydration and fermentation technology. Preservation and storage. Packaging. Legislation. Quality control and hygiene. Effect of processing on nutritional value of meat products. Practical work: Manufacturing of dried, cured, fermented and emulsion type products. Visits to processing factories.

FST 402 Advanced plant food science and technology 402
Academic organisation: Food Science
Prerequisite: FST 360 or TDH
Contact time: 5 practical sessions in semester 1, 8 discussion classes in semester 1, 5 discussion classes in semester 2, 3 practical sessions in semester 2
Period of presentation: Year
Language of tuition: English   **Credits:** 20
Module content:
Plant food functionality: Starch, non-starch polysaccharides, protein. Advanced rheology and texture. Malting and brewing. Ready-to-eat (RTE) technologies and their impact on functional and nutritional quality. Plant oil processing. Minimal processing of fruits and vegetables. Practical work: Pasting properties of starch; Dough rheology; Isolation of legume and cereal proteins; SDS-PAGE electrophoreses of legume and cereal proteins; Malting and mashing of sorghum and barley malt; Extraction of essential oils; Extraction and identification of phenolic compounds; Minimal processing of fruits and vegetables.

FST 412 Sensory evaluation 412
Academic organisation: Food Science
Prerequisite: FST 260, FST 351 and FST 352 or TDH
Contact time: 12 discussion classes 6 practical sessions
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 10
Module content:
Principles and applications of sensory evaluation. Types of panels, tests and test conditions and their functions. Selection and training of panellists for descriptive sensory evaluation. Instrumental sensory quality measurements. Statistical analysis and interpretation of data. Practicals: Practical aspects and execution of sensory evaluation techniques, analysis and interpretation of data. Instrumental sensory quality measurements.

FST 413 Product development and quality management 413
Academic organisation: Food Science
Prerequisite: FST 260 and FST 351 and FST 352 or TDH
Contact time: 6 practical sessions 15 discussion classes
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 30
Module content:
Lectures: Principles involved and steps that are followed to develop new food products that are safe, tasty, nutritious and cost effective. Application of the theory of food product development. Quality management systems with specific reference to Good

Manufacturing Practices, HACCP and ISO 9000. National and international standards, Codex Alimentarius, FDA. Application of food legislation. Food packaging. Practicals: A product development project will be planned, conducted and presented. Application and implementation of HACCP.

FST 414 Research methodology 414
Academic organisation: Food Science
Prerequisite: Third-year status or TDH
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Five-day intensive research methodology workshop: Philosophy of research; where to start research – problem statement; role and importance of the literature review; how to formulate hypotheses and objectives; experimental design; the good practical way to do research, including getting the results down; application of statistics to research; writing an honours report/master's dissertation/doctoral thesis; writing a scientific paper; preparing and presenting posters and oral papers.

FST 420 Advanced food science 420
Academic organisation: Food Science
Prerequisite: Third-year status or TDH
Contact time: 12 discussion classes
Period of presentation: Year
Language of tuition: English   **Credits:** 20
Module content:
Discussion classes in advanced level food chemistry, food microbiology, food engineering, food processing and nutrition. Problem solving and literature discussion.

FST 463 Research project 463
Academic organisation: Food Science
Prerequisite: Third-year status in Food Science or TDH
Contact time: 1 ppw
Period of presentation: Year
Language of tuition: English   **Credits:** 40
Module content:
Planning, execution and reporting of a research project on a selected Food Science and/or Technology subject.

GGY 156 Introduction to human geography 156
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 3 lpw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 6
Module content:
Foundations for understanding contemporary human geographic processes. The module will trace the major changes in the economic, political and population geography of southern Africa and beyond.

GGY 158 Geographical skills 158
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 1 ppw
Period of presentation: Semester 1

Language of tuition: English   **Credits:** 4
Module content:
*Does not require mathematical background. (Module for: BA (with Geography), BSc (Environmental Sciences), BSc (Earth Science), BSc (Geography), BSc (Meteorology)
Analysis and interpretation of topographical maps, aerial photographs and satellite imagery. Processes and usefulness of remote sensing and GIS, and basic statistical methods.

GGY 166 Southern African geomorphology 166
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 4 lpw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 8
Module content:
Investigating southern African landscapes and placing them in a theoretical and global context. The geomorphological evolution of southern Africa. Introduction to the concepts of Geomorphology and its relationships with other physical sciences (e.g. meteorology, climatology, geology, hydrology and biology). The processes and controls of landform and landscape evolution. Tutorial exercises cover basic techniques of geomorphological analysis, and topical issues in Geomorphology.

GGY 252 Process geomorphology 252
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: GGY 166 or GLY 155
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 12
Module content:
Physical processes that influence the earth's surface and management. Specific processes and their interaction in themes such as weathering; soil erosion; slope, mass movement and fluvial processes. Practical laboratory exercises are based on the themes covered in the module theory component.

GGY 265 Geomorphology of the built environment 265
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 4 lpw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 12
Module content:
*This module is for Architecture and Landscape Architecture students only.
The theory component covers geomorphological aspects of the built environment including landscape identification; weathering or deterioration of natural stone and application to design and preservation of buildings and monuments; slope hydrology and stability conditions; soil erosion processes and construction impacts; drainage modification in urban areas; wetland identification, human impacts and rehabilitation; recreational impacts and management. In addition to the theory a field-based project is undertaken.

GGY 266 City structure, environment and society 266
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2

Language of tuition: English   **Credits:** 24
Module content:
An urbanising world. Urban structure and land use. Urban processes. The urban environment. Social structure and change in cities. Living in the city. Economy, society and politics in the city. Third-world cities and South African cities. Urban futures.

GGY 283 Introductory geographic information systems 283
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
*This is a closed module, only available to students studying [BT&RP] (12132022), [BSc(Arch)] (12132002), [BSc(LArch)] (12132004), BSc (Meteorology) (02133312), BSc (Geoinformatics) (02133383), BSc (Environmental Science) (02133361), BSc (Earth Sciences) (02133012), BSc (Geography) (02133385), BEd (Further Education and Training) (General) (09133040), BSecEdSci (02135001), BA (01130001) or as approved by the head of department. The content of this module is the same as GIS 221 and students are not allowed to earn credits for both GGY 283 and GIS 221.
Introduction to Geographic Information Systems (GIS), theoretical concepts and applications of GIS. The focus will be on the GIS process of data input, data analysis, data output and associated technologies.

GGY 356 Sustainable development 356
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 3 lpw 1 ppw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 18
Module content:
The module conceptually integrates environmental, economic, and social components of sustainable development. Other topics covered include changing perceptions on development and environment, development paradigms, challenges of sustainable development, actors and actions in sustainable development, rural and urban livelihoods, and a Third World assessment of sustainable development in the developing world.

GGY 361 Environmental geomorphology 361
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: GGY 252
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 18
Module content:
*Note: The module is for BSc (Geography), BSc (Environmental Sciences) and BSc (Geology) students only. The theory content of this module is the same as GGY 363 and students are not allowed to earn credits for both GGY 361 and GGY 363.
Interactions of geomorphic processes within the physical and built environments; themes such as geomorphology and environmental change, slope processes and the environment, geomorphic risks and hazards, soil erosion and conservation, geomorphology in environmental management, applied weathering. Practicals involve fieldwork including sampling and mapping and subsequent laboratory analysis.

GGY 363 Applied geomorphology 363
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: GGY 252
Contact time: 4 lpw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 12
Module content:
*Note: The content of this module is the same as GGY 361 and students are not allowed to earn credits for both GGY 361 and GGY 363.
Interactions of geomorphic processes within the physical and built environments; themes such as geomorphology and environmental change, slope processes and the environment, geomorphic risks and hazards, soil erosion and conservation, geomorphology in environmental management, applied weathering.

GGY 366 Development frameworks 366
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 3 lpw 1 ppw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 18
Module content:
Classic development frameworks. Spatial development history and legacy in South Africa. Overview of contemporary environmental legislation in South Africa. Rural development strategy. Rural and agricultural reconstruction. Land reform. Urban development and strategy. Urban spatial reconstruction. National spatial development frameworks.

GIS 120 Geoinformatics 120
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: GMC 110
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 12
Module content:
The importance of geographical data and an overview of geoinformatics. Cartographic analysis to geoinformatics – a historical perspective. Application fields of geoinformatics. Introduction to geographical information systems (GIS): Components, structure and functionality, GIS visualisation and cartography. Data sources and evaluation: fitness for purpose, factors affecting suitability, quality and uncertainty, sources of analogue and digital data. Map projection choice. Analysis of GIS output.

GIS 220 Geographic data analysis 220
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
The nature of geographical data and measurement. Probability, probability distributions and densities, expected values and variances, Central Limit theorem. Sampling techniques. Exploratory data analysis, descriptive statistics, statistical estimation, hypothesis testing, correlation analysis and regression analysis.

GIS 221 Geographic information systems introduction 221
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
*The content of this module is the same as GGY 283 and students are not allowed to earn credits for both GGY 283 and GIS 221.
Introduction to Geographic Information Systems (GIS), theoretical concepts and applications of GIS. The focus will be on the GIS process of data input, data analysis, data output and associated technologies.

GIS 310 Geographic information systems 310
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: GGY 283 or GIS 221
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 24
Module content:
Advanced theory and practice of Geographic Information Systems; GIS applications; design and implementation of GIS applications.

GIS 320 Spatial analysis 320
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: GIS 310 or TDH
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 24
Module content:
Construction of Raster Geovisualisations, spatial model construction and use, multi-criteria decision analysis. Factor analysis: Principle component analysis. Geostatistics: Spatial dependence modelling, ordinary kriging. Markov chains and cellular Automata, combined models.

GKD 225 General soil science 225
Academic organisation: Plant Production and Soil Science
Contact time: 3 lpw 1 ppw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 12
Module content:
Origin and development of soil, weathering and soil formation processes. Profile differentiation and morphology. Physical characteristics: texture, structure and soil water. Chemical characteristics: Clay minerals, ion exchange, pH and soil fertility. Soil classification. Practical work: Laboratory evaluation of simple soil characteristics. Field practical work on soil formation in the Pretoria area.

GKD 250 Introductory soil science 250
Academic organisation: Plant Production and Soil Science
Prerequisite: CMY 117 GS or TDH
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 12

Module content:
Origin and development of soil, weathering and soil formation processes. Profile differentiation and morphology. Physical characteristics: texture, structure, soil water, atmosphere and temperature. Chemical characteristics: clay minerals, ion exchange, pH, buffer action, soil acidification and salinisation of soil. Soil fertility and fertilisation. Soil classification. Practical work: Laboratory evaluation of simple soil characteristics. Field practicals on soil formation in the Pretoria area.

GKD 320 Soil chemistry 320
Academic organisation: Plant Production and Soil Science
Prerequisite: GKD 250
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
The more exact chemistry of soils systematically explained by understanding the particular chemical principles. Charge origin. Chemical equilibriums. Manifestations of sorption. Ion exchange. Acidic soils, saline soils and the organic fraction of soil. The chemistry of the important plant nutrient elements P, K and N is explained.

GKD 350 Soil classification and surveying 350
Academic organisation: Plant Production and Soil Science
Prerequisite: GKD 250 GS
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
A taxonomic system for South Africa. USDA's Soil Taxonomy. Land suitability evaluation. Optimal resource utilization. The conservation component. Ecological aspects. Ecotype, land types. Soil maps. Practical work: Field practicals and compulsory excursion. Identification of soil horizons, forms and families. Land suitability evaluation. Elementary mapping exercise.

GKD 420 Soil fertility, soil microbiology and plant nutrition 420
Academic organisation: Plant Production and Soil Science
Prerequisite: GKD 250 GS
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 14
Module content:
Soil ultimately controls nutrient supply to plants and organisms. The health and resilience of biota are therefore closely link to the interaction between the pedosphere and the biosphere. This module deals with the availability and uptake of macro and micro nutrients in the plant-microbial-soil system, nutrient deficiencies and toxicities, as well as soil properties and soil environmental conditions that influence soil fertility and its suitability to act as a growth medium. Practical work includes the laboratory evaluation of soil fertility and greenhouse pot trials to investigate nutrient uptake as well as deficiencies and toxicities symptoms in plants.

GLY 155 Introduction to geology 155
Academic organisation: Geology
Prerequisite: Refer to Regulation 1.2

Contact time: 4 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 16
Module content:
Solar system; structure of solid matter; minerals and rocks; introduction to symmetry and crystallography; important minerals and solid solutions; rock cycle; classification of rocks. External geological processes (gravity, water, wind, sea, ice) and their products (including geomorphology). Internal structure of the earth. The dynamic earth – volcanism, earthquakes, mountain building – the theory of plate tectonics. Geological processes (magmatism, metamorphism, sedimentology, structural geology) in a plate tectonic context. Geological maps and mineral and rock specimens.

GLY 161 Historical geology 161
Academic organisation: Geology
Prerequisite: Refer to Regulation 1.2
Contact time: 4 lpw 1 ppw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 8
Module content:
Principles of stratigraphy and stratigraphic nomenclature; geological dating and international and South African time scales; Africa framework and tectonic elements of South Africa; introduction to depositional environments. Overview of the historical geology of South Africa, from the Archaean to the present: major stratigraphic units, intrusions and tectonicmetamorphic events – their rock types, fossil contents, genesis and economic commodities. Principles of palaeontology and short description of major fossil groups: fossil forms, ecology and geological meaning. Geological maps and profiles; rock samples.

GLY 162 Environmental and hazard geology 162
Academic organisation: Geology
Prerequisite: Refer to Regulation 1.2
Contact time: 4 lpw 1 ppw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 8
Module content:
Hazardous exogenic and endogenic geological processes and their influence on the human environment; impact of human activities on the geological environment; natural resource utilisation including materials for construction; natural and mine-induced seismicity; waste disposal; groundwater and environmental pollution. Geological maps; geological profiles; rock specimens; fossil specimens.

GLY 253 Sedimentology 253
Academic organisation: Geology
Prerequisite: CMY 117, GLY 155 and **1 of** GLY 161, GLY 162 and
WTW 114/WTW 158 or PHY 114
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 12
Module content:
Introduction to sedimentology; grain studies; composition and textures of sedimentary rocks; flow dynamics and behaviour of sediment particles in transport systems; description and genesis of sedimentary structures; diagenesis; depositional environ-

ments and their deposits, modern and ancient; chemical sedimentary rocks; economic sedimentology; field data acquisition from sedimentary rocks and writing of reports; sieve analysis; Markov analysis; analysis of palaeocurrent trends; interpretation of sedimentary profiles.

GLY 254 Structural geology 254
Academic organisation: Geology
Prerequisite: CMY117, GLY 155 and **1 of** GLY 161, GLY 162 and
WTW 114 or WTW 158 or PHY 114
Contact time: 4 lpw 1 ppw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 12
Module content:
Integrated theoretical and practical course dealing with the principles of rock deformation and analysis of deformed rocks. Stress, strain and rheology, joints, experimental rock deformation, fault systems and Anderson's theory of faulting. Folds and interference folding, tectonic fabrics, shear zones, progressive deformation. Stereographic projection and structural analysis.

GLY 255 Fundamental and applied mineralogy 255
Academic organisation: Geology
Prerequisite: CMY 117, GLY 155 and 1 of GLY 161, GLY 162 and
WTW 114/WTW 158 or PHY 114
Contact time: 4 lpw 2 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 24
Module content:
Fundamental concepts in mineralogy, and practical applications of mineralogy, including: the basics of crystal structure; the crystallographic groups; the rules of atomic substitution; phase transitions and phase diagrams; the structure and uses of olivine, pyroxene, feldspar, amphibole, mica, aluminosilicates, garnet, cordierite, and more uncommon mineral groups such as oxides, sulphides and carbonates; the calculation of mineral formulae from chemical analyses using various methods. Practical sessions: the basics of optical mineralogy and the use of transmitted light microscopy for thin section examination of minerals and rocks; the practicals will develop mineral identification skills for the minerals covered in the lectures, and cover basic textural identification.

GLY 261 Igneous petrology 261
Academic organisation: Geology
Prerequisite: GLY 255
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 12
Module content:
Classification and nomenclature of igneous rocks. The nature of silicate melts; physical and chemical factors influencing crystallisation and textures of igneous rocks. Phase diagrams, fractional crystallisation and partial melting. Trace elements and isotopes, and their use in petrogenetic studies. Global distribution of magmatism and its origin. Mid-oceanic ridges, active continental margins, intraplate magmatism.

GLY 262 Metamorphic petrology 262
Academic organisation: Geology
Prerequisite: GLY 255
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 12
Module content:
Classification of metamorphic rocks. Anatexis, migmatite and granite; eclogite. Meta-morphic textures. PT-time loops. Metamorphism in various plate tectonic environ-ments.

GLY 265 Groundwater 265
Academic organisation: Geology
Prerequisite: GLY 155 and **1 of** GLY 161, GLY 162 and
WTW 114/WTW 158 and WTW 128/WTW 168 or PHY 114
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 12
Module content:
Origin and classification of groundwater; classification of aquifers; groundwater movement; equations for groundwater flow into boreholes; the La Place equation and solutions for pump tests; execution and interpretation of pump tests. Groundwater flow modelling; classification of aquifers in southern Africa; groundwater exploration and management. Mapping techniques.

GLY 361 Ore deposits 361
Academic organisation: Geology
Prerequisite: Five of the second-year modules: GLY 253, GLY 254, GLY 255, GLY 261, GLY 262, GLY 265
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 18
Module content:
Systematic review of major metallic and non-metallic ore types and examples in South Africa and world-wide; ore type models (grades, tonnages); geometry of ore bodies; mining. Ore samples and ore mineralogy. Mapping techniques.

GLY 362 Geostatistics and ore reserve calculations 362
Academic organisation: Geology
Prerequisite: Six of the second-year modules: GLY 253, GLY 254, GLY 255, GLY 261, GLY 262, GLY 265
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 18
Module content:
Review of classical geostatistical methods; problem evaluation; descriptive statistics, normal, lognormal, three parameter lognormal distributions; confidence intervals; t-test. Sampling; cut-off values; grid generation and trend surface analysis. Semivariogram; error estimation; Kriging (BLUE) techniques. Ore reserve calculations.

GLY 363 Engineering geology 363
Academic organisation: Geology
Prerequisite: GLY 155 and GLY 265 and 4 of the second-year modules: GLY 253, GLY 254, GLY 255, GLY 261, GLY 262

Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 18
Module content:
Definition and scope of engineering geology; engineering geological properties and problems of rocks and soils within different stratigraphic units and climatic regions in southern Africa.

GLY 364 Rock mechanics 364
Academic organisation: Geology
Prerequisite: GLY 254 and 4 of the second-year modules: GLY 255, GLY 253, GLY 261, GLY 262, GLY 265
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 18
Module content:
Strength and failure modes of rock material and rock failure criteria. The characteristics of joints in rock. Joint line surveys and interpretation of data. Characteristics of a rock mass, rock mass classification and determination of strength. Slope stability in surface mines. Induced seismicity due to deep mining and rock bursts.

GMA 220 Remote sensing 220
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 16
Module content:
This module will provide a thorough introduction to the basic scientific principles involved in remote sensing, and some of the applications to studies of the Earth's surface. This include examining the basic physics of electromagnetic radiation and the complex interactions of radiation with the surface and atmosphere (i.e. spectral signatures). In addition, basic concepts of photogrammetry will be discussed. The theoretical background laid out in the first half of the module will provide the tools for examining various remote sensing applications using data obtained in different parts of the electromagnetic spectrum. The applications will include uses of satellite remote sensing data for mapping and monitoring vegetation, soils and minerals, snow and ice, water resources and quality, and urban landscapes. The laboratory section will include hands-on experience with various satellite image data sets.

GMA 320 Remote sensing 320
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: GMA 220 or TDH
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 24
Module content:
This module aims to provide students with a working knowledge and skills to learn methods and techniques for collecting, processing and analysing remotely sensed data. Throughout the module, emphasis will be placed on image processing, image analysis, image classification, remote sensing and applications of remote sensing in geographical analysis and environmental monitoring. The module is composed of lectures, readings, laboratory exercises and research tasks.

GMC 110 Cartography 110
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 12
Module content:
History, present and future of cartography. Introductory geodesy: shape of the earth, graticule and grids, datum definition, elementary map projection theory, spherical calculations. Representation of geographical data on maps: Cartographic design, cartographic abstraction, levels of measurement and visual variables. Semiotics for cartography: signs, sign systems, map semantics and syntactics, explicit and implicit meaning of maps (map pragmatics).

GMC 310 Geometrical and space geodesy 310
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: GMC 110 and WTW 114
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 24
Module content:
Spherical trigonometry. Geometrical geodesy: Datum surfaces and coordinate systems in Geodesy, Calculations on the ellipsoid, Datum transformations. Map projections: Projection principles, distortion determination, construction of conformal, equivalent and equidistant projections, the Transverse Mercator projection and UTM projection of an ellipsoidal earth, projection transformations. Space geodesy: Time systems, Celestial and observer coordinate systems, Global Navigation Satellite Systems (GNSS), Satellite orbits and orbital parameters, 3-D positioning.

GMT 320 Geoinformatics project 320
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: GIS 310 and INF 214 and INF 261 or TDH. Only for Geoinformatics students.
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 24
Module content:
A project which is approved by the lecturer and in which one or more of the studied techniques of data acquisition and processing are used to produce an output of spatially referenced information. The project must be fully described in a project report.

GTS 161 Introductory genetics 161
Academic organisation: Genetics
Prerequisite: MLB 111 GS or TDH
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
Principles of Mendelian inheritance: Concepts such as locus and allele, dominance interactions and epistasis. Introductory cytogenetics, the karyotype and cell division. Probability studies. Genetic linkage and chromosome mapping. Sex determination and sex linked traits. Inheritance of cytoplasmic DNA and cytoplasmic effects.

GTS 251 Gene and chromosome organisation 251
Academic organisation: Genetics
Prerequisite: GTS 161 GS or TDH
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
Introduction to molecular genetics: Gene structure, transcription and translation, gene regulation, DNA replication, mutation, DNA repair and transposition. Extranuclear inheritance. The genetic basis of cancer and immunity.

GTS 261 Genetic analysis and manipulation 261
Academic organisation: Genetics
Prerequisite: GTS 161 GS or TDH
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
Creation of variation in micro-organisms: transformation, conjugation and transduction. Basic concepts of recombinant DNA technology and its applications in gene analysis and manipulation. Introduction to genetic analysis of populations: allele and genotypic frequencies, breeding systems and quantitative inheritance.

GTS 351 Eukaryotic gene control and development 351
Academic organisation: Genetics
Prerequisite: GTS 251 GS and GTS 261 GS or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Regulation of gene expression in eukaryotes: regulation at the genome, transcription, RNA processing and translation levels. Applications of the principles of gene control: cancer, development and differentiation of plants and animals. Aspects of the epigenetic control of gene expression.

GTS 352 Genomes 352
Academic organisation: Genetics
Prerequisite: GTS 251 GS and GTS 261 GS or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Analysis of the genome as central entity in molecular genetics. Comparison of the molecular organisation of prokaryote and eukaryote genomes, nuclear and mito-chondrial genomes. Genome organisation in different organisms; gene families, over-lapping genes, pseudogenes, DNA repeat content. Genetic techniques for genome mapping, physical mapping, genome sequencing and the localisation of genes. Processing of DNA sequencing data using computer technology. Approaches for studying genome function. Functional genomics, transcriptomics and proteomics. Genome evolution.

GTS 353 Advanced population genetics 353
Academic organisation: Genetics
Prerequisite: GTS 251 GS and GTS 261 GS or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Genetic variation and mating systems. Allele frequency change: genetic drift, natural and kin selection, mutation and migration. Molecular evolution: nucleotide substitutions to multigene families, and the neutral theory. Quantitative genetics: analysis of genetic variation, heritability, natural selection and artificial selection of quantitative traits. Identification of quantitative trait loci (QTLs).

GTS 361 Human genetics 361
Academic organisation: Genetics
Prerequisite: GTS 352 GS or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Human karyotype. Pedigree analysis and the inheritance of single gene traits in humans, concepts such as X-chromosome inactivation, variable expressivity, penetrance, locus heterogeneity, genomic imprinting and mosaicism. Developmental genetics. Genetic differentiation of sex and sex chromosome abnormalities. Cytogenetic and molecular basis of genetic diseases. Linkage analysis and the identification of human disease genes. Genetics of the immune system.

GTS 363 Evolutionary and phylo-genetics 363
Academic organisation: Genetics
Prerequisite: GTS 353 GS or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Origin of life's code. Molecular evolution and analytical tools. Determining the molecular ecology and evolutionary history of populations and species, and its applications in conservation, medical sciences and human evolution. Optimality, phylogenetic and molecular studies of adaptation; Evolution of sexual reproduction, resistance and virulence, and its practical applications; Evolutionary arms races.

GTS 365 Applied medical genetics 365
Academic organisation: Genetics
Prerequisite: GTS 251 GS and GTS 261 GS or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
The clinical manifestations of common Mendelian diseases and congenital anomalies; Risk assessment/calculation and genetic counselling; genes and diseases – the use of polymorphisms, gene mapping, gene linkage and association studies in medicine; genetic diagnosis – common molecular and cytogenetic techniques and the applica-tions thereof; carrier detection and predictive testing; population screening – prenatal and neonatal

screening; Treatment of genetic diseases and gene based therapy; pharmacogenetics and cancer genetics. Ethical issues.

GTS 366 Plant genetics and biotechnology 366
Academic organisation: Genetics
Prerequisite: GTS 251 GS and GTS 261 GS or TDH and (GTS 351 and GTS 352 are recommended)
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Plant genetic resources and genetic systems. Plant genome organisation and evolution. Control of gene expression in plants: cis and trans regulation, mRNA stability, gene silencing and RNA signaling, regulation of cytoplasmic genes, light/dark regulation, hormonal control and signal transduction during defense. Protein processing. Developmental genetics: seed/embryo development, control of vascular development and flowering. Genetics of male sterility and selfincompatibility. Plant biotechnology, tissue and cell cultures, plant transformation and regeneration.

GVK 420 Large stock science 420
Academic organisation: Animal and Wildlife Sciences
Prerequisite: RPL 320, VGE 301 and VKU 210
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
Industrial science and management of large stock. Revision of the principles of agricultural management. Aspects of business management of the large stock enterprise. Management programmes, production systems and techniques applicable to beef cattle, dairy cattle and horses. Design and planning of farm buildings and structures. Storage and handling of fodder. The handling and management of refuse. Hygiene and herd health programmes.

HSC 260 Crop propagation 260
Academic organisation: Plant Production and Soil Science
Prerequisite: BOT 161
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Propagation by seed: seed development, including pollination, fertilisation, embryogenesis fruit and seed development; principles and techniques of seed production; seed physiology; principles and practical aspects of seed germination; seed testing and legislation. Vegetative propagation: principles and techniques of rooting of cuttings; budding and grafting; propagation using specialized organs; micro propagation (tissue culturing). Students will get hands-on experience and will visit companies and nurseries.

HSC 351 Nursery management 351
Academic organisation: Plant Production and Soil Science
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 1

Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
The nursery industry in South Africa. Greenhouse environmental control. Requirements for soil-based and soil-less growing media. The production of plants in a nursery. Management, economical and marketing aspects of different nursery operations. Practical experience on the experimental farm or in nurseries of own choice is compulsory for all participants in this module.

HSC 490 Ornamental horticulture 490
Academic organisation: Plant Production and Soil Science
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
Economic importance of cut flowers and pot plants. Taxonomy and plant description. Climatic requirements and production practices including establishing, growth manipulation, nutritional requirements, irrigation, pest and disease control, harvest and post-harvest handling. Identification of ornamental plants for commercial and land-scape use. Climatic, reproduction and maintenance requirements for trees, palms, shrubs, flowering plants, groundcovers, climbers and indoor plants. Functional and aesthetic value of plants in a landscape or indoors. Excursions to nurseries and practical experience on the experimental farm is compulsory for all participants in this module.

IAS 211 Actuarial mathematics 211
Academic organisation: Insurance and Actuarial Science
Prerequisite: Both WTW 114 and WTW 128 60%
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Accumulation functions, interest, time value of money, compounding periods, cashflow models, equations of value, annuities certain, continuous time application, life tables, derivation of contingent probabilities from life tables, contingent payments, fundamentals of survival models, simple laws of mortality, expectation of life, elementary survival contracts, commutation functions, premiums for elementary survival contracts.

IAS 221 Actuarial mathematics 221
Academic organisation: Insurance and Actuarial Science
Prerequisite: IAS 211 GS #
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Select and ultimate life tables, advanced life annuities, accumulation and discounting, life insurance, net and gross premiums, reserves, pension applications, statistical considerations, loan schedules, performance measurement, valuation of fixed interest securities.

IAS 282 Financial mathematics 282
Academic organisation: Insurance and Actuarial Science
Prerequisite: IAS 211 70%
Contact time: 3 lpw

Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
Generalised cash-flow model. The time value of money. Interest rates. Discounting and accumulating. Compound interest functions. Equations of value. Loan schedules. Project appraisal. Investments. Simple compound interest problems. The "No Arbitrage" assumption and forward contracts. Term structure of interest rates. Stochastic interest rate models.

IAS 361 Insurance and actuarial applications 361
Academic organisation: Insurance and Actuarial Science
Prerequisite: IAS 211 GS
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Concepts of risk and insurance, legal aspects, common products, product providers, pricing, reserving, reinsurance, accounting, wider fields, professionalism.

IAS 382 Actuarial modelling 382
Academic organisation: Insurance and Actuarial Science
Prerequisite: IAS 282
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 20
Module content:
Principles of actuarial modelling and stochastic processes. Markov chains and continuous-time Markov jump processes. Simulation of stochastic processes. Survival models and the life table. Estimating the lifetime distribution Fx(t). The Cox regression model. The two-state Markov model. The general Markov model. Binomial and Poisson models. Graduation and statistical tests. Methods of graduation. Exposed to risk. The evaluation of assurances and annuities. Premiums and reserves.

INB 220 Interior planning 220
Academic organisation: Consumer Science
Prerequisite: ERG 282 GS and OBG 111
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 16
Module content:
Advanced colour theory; basic interior planning; visual presentations for clients; including storyboards and computer-aided design. Evaluation of floor plans; arrangement of furniture.

INB 320 Interior planning 320
Academic organisation: Consumer Science
Prerequisite: ITW 311 and OBG 111
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 11
Module content:
The planning and arrangement of existing living and working spaces to provide for the

various needs of the individual, family or group. Evaluation of floor plans; arrangement of furniture.

INB 322 Interior planning 322
Academic organisation: Consumer Science
Prerequisite: ERG 282, ITW 311 and OBG 111
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 11
Module content:
The planning and designing of living and working spaces to provide for the different needs of the client. Visual and oral presentations for clients.

INB 410 Interior planning 410
Academic organisation: Consumer Science
Prerequisite: CIL 122 and INB 322
Contact time: 1 lpw 2 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 23
Module content:
Advanced interior planning.

INK 110 Interior production 110
Academic organisation: Consumer Science
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 9
Module content:
Basic and more advanced construction and sewing techniques; use of various sewing machines and materials in the construction of selected interior products.

INK 210 Interior production 210
Academic organisation: Consumer Science
Prerequisite: INK 110
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 10
Module content:
Evaluation of ready-made interior products; measuring, planning and construction of custom-made interior products: window coverings, upholstery and assorted furnishings.

INK 310 Interior production 310
Academic organisation: Consumer Science
Prerequisite: INK 210
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 11
Module content:
A study of fashion and market trends in interior textile products. Development of a sample file. Exposure to mass production of selected interior products.

IPO 380 Interior experiential training 380
Academic organisation: Consumer Science
Prerequisite: INK 310 and ITW 311
Contact time: 1 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 8
Module content:
Controlled experiential training. During the third year of study, during holidays, weekends and after hours, students must complete a total of 120 hours experiential training in the industry to develop practical and occupational skills. This is equal to 3 weeks x 40 hours (120 hours), according to requirements as determined by the head of department. This exposure must be successfully completed together with a final report before the degree will be conferred.

ITP 481 Project: Interior merchandise 481
Academic organisation: Consumer Science
Prerequisite: Final-year status, INB 322, INB 410 # and SEM 381 GS
Contact time: 1 lpw 1 ppw
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 22
Module content:
Project to illustrate the ability to integrate relevant theory in the planning and presentation of an interior merchandise project for specific clients.

ITW 121 Interior merchandise 121
Academic organisation: Consumer Science
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 8
Module content:
Household material and equipment studies: Metals and non-metals used for the manufacturing of objects, equipment and components of appliances for household use. Study and evaluation of selected non-electrical household equipment in terms of specific end-use situations.

ITW 221 Interior merchandise 221
Academic organisation: Consumer Science
Prerequisite: ITW 121
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 10
Module content:
Equipment studies: study of major and portable electrical household appliances in terms of consumer needs, specific end use situations, running and life cycle costs, sustainability aspects and environmental concerns to facilitate consumer decision making.

ITW 261 Interior merchandise 261
Academic organisation: Consumer Science
Contact time: 2 lpw 1 ppw
Period of presentation: Quarter 3
Language of tuition: Double medium   **Credits:** 5

Module content:
Equipment studies: study of selected major and portable electrical household appliances in terms of consumer needs, specific end use situations, running and life cycle costs, sustainability aspects and environmental concerns to facilitate consumer decision making.

ITW 311 Interior merchandise 311
Academic organisation: Consumer Science
Prerequisite: ITW 121
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 11
Module content:
A study of furniture (case goods and upholstered), floor coverings, wall finishes, lighting and household textile products in terms of construction techniques, composition, properties, quality indicators, advantages and disadvantages, appearance, durability, cost and maintenance and care factors.

KEP 220 Cultural eating patterns 220
Academic organisation: Consumer Science
Prerequisite: VDS 121
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 12
Module content:
Origin and development of food habits; Factors influencing food habits and choice; Dynamics of food habits. Influence of religion on food habits. Food habits of different ethnic groups. The influence of culture on cuisines. Study of the cuisines of selected African, European and Eastern countries.

KEP 261 Cultural eating patterns 261
Academic organisation: Consumer Science
Prerequisite: VDS 121
Contact time: 3 lpw
Period of presentation: Quarter 3
Language of tuition: Double medium   **Credits:** 6
Module content:
Origin and development of food habits; Factors influencing habits and choice; Dynamics of food habits. Influence of religion on food habits. Food habits of different ethnic groups.

KLD 210 Costume and fashion history 210
Academic organisation: Consumer Science
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 12
Module content:
Costume and fashion history: Appearance characteristics of Western dress. Influencing factors. Evolution of styles from Ancient Egyptian up to and including the present.

KLD 222 Fashion forecasting 222
Academic organisation: Consumer Science
Contact time: 3 lpw

Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 12
Module content:
The South African fashion industry: Basic principles of fashion; fashion as a product; and the consumer.
Fashion production: Haute Couture and ready-to-wear clothes. Fashion forecasting and fashion analyses.

KLD 322 Social and cultural aspects of clothing 322
Academic organisation: Consumer Science
Contact time: 4 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 20
Module content:
Social-psychological and cultural aspects of clothing: Development of a framework; Symbolic-interaction as a framework; the cognitive approach. Development of the self: self and self-concept: the body as indicator; personal values and norms. Appearance management and presentation of the self: role acceptance, identity, social control, roles in social cognition. Cultural context and dress: reflection of human adaptation; culture creations (technical, moral and ceremonial patterns); societies and clothing; beauty standards and beauty ideals.
Social context, identity, change and clothing: the family, politics, religion, economy and the role of clothing as a reflection of social and personal identities; mentefacts and identities; social change and clothing.

KLD 410 Clothing retail management 410
Academic organisation: Consumer Science
Prerequisite: Fourth-year status
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 15
Module content:
Clothing retail and marketing aspects: Fashion marketing communication; clothing ranges; textiles, footwear and accessories merchandise characteristics; customer service; packing and packaging. Global interdependence: Appreciation of cultural differences; respect for diversity; trade agreements and implications; understanding of import/export regulations.

KLD 420 Clothing merchandising 420
Academic organisation: Consumer Science
Prerequisite: Fourth-year status
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 15
Module content:
Clothing merchandise managerial aspects: planning, purchasing, control; search for suppliers; relationship with suppliers; management roles and responsibilities; technology; ethical and legal behaviour. Visual merchandising: basic components; tools and techniques; planning. Retail and wholesale: Introduction: factors influencing stock movement; redistribution of stock; merchandising processes. Planning stock movement; factors influencing buying strategies.

KLR 110 Clothing production: Sewing techniques 110
Academic organisation: Consumer Science
Contact time: 1 lpw 1 ppw 1 dpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 9
Module content:
A study of sewing appliances and equipment and the handling and use of different types
of fabric. Functional and creative sewing techniques; grading and quality assurance.

KLR 120 Clothing production: Processes 120
Academic organisation: Consumer Science
Prerequisite: KLR 110
Contact time: 1 lpw 1 ppw 1 dpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 9
Module content:
Processes (collars, pockets, buttonholes, fasteners, belts, hems, etc.)
Application: Unstructured, multi-sized garment.

KLR 211 Flat pattern design 211
Academic organisation: Consumer Science
Prerequisite: KLR 120
Contact time: 2 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 12
Module content:
Flat pattern design. Production design (flat pattern design + CAD).

KLR 221 Pattern use and good fit 221
Academic organisation: Consumer Science
Prerequisite: KLR 211
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 10
Module content:
Pattern use and good fitting.

KLR 311 Tailoring 311
Academic organisation: Consumer Science
Prerequisite: KLR 211 and KLR 221
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 11
Module content:
Tailoring.

KLR 321 Clothing production 321
Academic organisation: Consumer Science
Prerequisite: KLR 221
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 11

Module content:
Small-scale production: Industrial machines, production systems, quality assurance.

KLR 411 Product development 411
Academic organisation: Consumer Science
Prerequisite: KLR 221 and KLR 321
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 19
Module content:
Production: product analysis, planning and execution. Application clothing, textile and consumer knowledge by utilising a CAD-program for planning and assembling apparel. The small business enterprise: Introduction: clothing small business enterprises; types and locations. Marketing aspects: target market selection; product mix; pricing methods; distribution channels; marketing communication mix; financial aspects.

KTP 220 Experiential training 220
Academic organisation: Consumer Science
Contact time: 1 ppw 1 dpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 4
Module content:
Compulsory practical training in the clothing industry during the year, approved in consultation with the head of the department.

KTP 402 Clothing textile project 402
Academic organisation: Consumer Science
Prerequisite: Fourth-year status and SEM 381
Contact time: 1 ppw 1 dpw
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 18
Module content:
Project in field of application: planning and execution.

KVK 420 Small stock science 420
Academic organisation: Animal and Wildlife Sciences
Prerequisite: RPL 320, VGE 301 and VKU 220
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
Small stock management, shearing organisation, sheds and equipment, pens, dipping, drinking and feeding facilities. Preparation and marketing of hides, mohair and karakul. Lambing seasons and herd management. Management programmes for the production of wool, meat, karakul pelt and mohair according to the particular ecological region and for conditions of drought. Herd health programmes.

LBU 260 Agroclimatology 260
Academic organisation: Plant Production and Soil Science
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 12

Module content:
*This module may only be taken by students enrolled for a BSc(Agric) programme
Climate in Southern Africa. Irradiation and energy balance. Hydrological cycle with special reference to downpour and evaporation from vegetative surfaces. Windbreaks and frost control. Influence of climate on farming systems. Instrumentation and measurement of downpour, evaporation, radiation, temperature, humidity and wind.

LEK 220 Agricultural economics 220
Academic organisation: Agricultural Economics, Extension and Rural Development
Prerequisite: [LEK 251 and LEK 252] or [EKN 113 and/or EKN 120]
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 12
Module content:
The agribusiness system; the unique characteristics of agricultural products; marketing functions and costs; market structure; historical evolution of agricultural marketing in South Africa. Marketing environment and price analysis in agriculture: Introduction to supply and demand analysis.
Marketing plan and strategies for agricultural commodities; market analysis; product management; distribution channels for agricultural commodities, the agricultural supply chain, the agricultural futures market.

LEK 251 Introduction to financial management in agriculture 251
Academic organisation: Agricultural Economics, Extension and Rural Development
Contact time: 3 lpw
Period of presentation: Quarter 1
Language of tuition: Double medium   **Credits:** 6
Module content:
Introduction to financial management in agriculture: Farm management and agricultural finance, farm management information; analysis and interpretation of farm financial statements; risk and farm planning. Budgets: partial, break-even, enterprise, total, cashflow and capital budgets. Time value of money.

LEK 252 Introduction to agricultural production economics 252
Academic organisation: Agricultural Economics, Extension and Rural Development
Prerequisite: LEK 251
Contact time: 3 lpw
Period of presentation: Quarter 2
Language of tuition: Double medium   **Credits:** 6
Module content:
Introduction to production and resource use: the agricultural production function, total physical product curve, marginal physical product curve, average physical product curve, stages of production. Assessing short-term business costs; Economics of short-term decisions. Economics of input substitution: Least-cost use of inputs for a given output, short-term least-cost input use, effects of input price changes. Least-cost input use for a given budget. Economics of product substitution. Product combinations for maximum profit. Economics of crop and animal production.

LEK 310 Agricultural economics 310
Academic organisation: Agricultural Economics, Extension and Rural Development
Prerequisite: [LEK 251 or EKN 110] and [LEK 252 or EKN 120]
Contact time: 3 lpw

Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Historical evolution of South African agricultural policy. Agriculture and the state: reasons for government intervention. Theoretical aspects of agricultural policy. Introduction to agricultural policy analysis. Welfare principles, pareto optimality. Macroeconomic policy and the agricultural sector. International agricultural trade.

LEK 320 Agricultural economics 320
Academic organisation: Agricultural Economics, Extension and Rural Development
Prerequisite: LEK 220, LEK 251 and LEK 252
Contact time: 3 lpw 2 ppw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 18
Module content:
The modern food and agribusiness system: The financing decision: capital acquisition, different capital sources, capital structures. The investment decision and working capital management. Strategic marketing. Operational management and human resources management.

LEK 415 Agricultural economics 415
Academic organisation: Agricultural Economics, Extension and Rural Development
Prerequisite: EKN 110, LEK 220 and WTW 134
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 18
Module content:
Derivative instruments in agriculture: To prepare students for taking the SAFEX Agricultural Markets Division brokerage exam. Giving an in-depth knowledge on the importance of hedging. Giving an in-depth knowledge on designing and implementation of low/zero risk hedging strategies. Introduction to the mathematics of portfolio management and mathematical modelling of derivatives. Working knowledge of the mathematical relationships in the management of a hedged portfolio. Working knowledge on the applicable software for managing derivative portfolios. Introduction into the management of option portfolios. To expand the thinking on the uses of derivatives, by also dealing with the hedging of diesel cost, interest rates and weather events.

LEK 421 Agricultural economics 421
Academic organisation: Agricultural Economics, Extension and Rural Development
Prerequisite: LEK 451, STK 210 and STK 281
Contact time: 3 lpw 2 ppw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 24
Module content:
Price and production function analysis. Input-output, input-input and product-product relationships; profit maximization; the production process through time, economies of size; decision making in agriculture under risk and uncertain circumstances; linear programming.

LEK 424 Introduction to resource economics 424
Academic organisation: Agricultural Economics, Extension and Rural Development
Prerequisite: LEK 251 and LEK 252

Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 15
Module content:
This module reviews the origins and evolution of natural and environmental resource economics and its present-day main paradigms. Sources of externalities and causes of environmental degradation are examined. An introduction to the concepts and methods backing the design and implementation of environmental policies are provided. Economic valuation of natural and environmental resources is introduced.

LEK 451 Agricultural demand-and-supply analysis 451
Academic organisation: Agricultural Economics, Extension and Rural Development
Prerequisite: LEK 220, LEK 252 and STK 281
Contact time: 3 lpw 2 ppw
Period of presentation: Quarter 1
Language of tuition: Double medium   **Credits:** 12
Module content:
This module will focus on the demand and supply shifters as well as the elasticities, flexibilities, and impact multipliers. After providing an appropriate background in the theoretical concepts of demand and supply these basics will be applied in the generation of econometric simulation models. Practical experience in the formulation of these models will be attained from practical sessions. The student will submit a project in which he/she must analyse the demand or supply patterns of a commodity of his/her choice by generating an econometric model.

LEK 452 Commodity price analysis 452
Academic organisation: Agricultural Economics, Extension and Rural Development
Prerequisite: LEK 220, LEK 252, LEK 451and STK 281
Contact time: 3 lpw 2 ppw
Period of presentation: Quarter 2
Language of tuition: Double medium   **Credits:** 12
Module content:
This module will focus primarily on price determination under different market structures, which will be followed by practical sessions on measuring market structures in various ways. This will include the calculation of market concentration. Some time will also be spent on measuring price changes by using indexes, and especially seasonal indexing. All of this will be supported by the relevant practical sessions. The relevance of changes to the main macroeconomic indicators will be discussed through out this module.

LKM 450 Environmental biophysics 450
Academic organisation: Plant Production and Soil Science
Prerequisite: WTW 134
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Environmental variables. Quantitative description and measurement of atmospheric environmental variables and water in organisms. Mass and energy fluxes. Quantitative description of energy fluxes in organisms' environments. Energy balances of animals and plant communities will be derived.

LST 133 Language, life and study skills 133
Academic organisation: Natural and Agricultural Sciences Dean's Office
Prerequisite: As for Four-year programme
Contact time: 1 lpw 3 dpw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
In this module students use different information and time management strategies, build academic vocabulary and examine learning styles, multiple intelligences, and memory as well as practise academic reading skills and explore basic research and referencing techniques. The work is set in a science context.

LST 143 Language, life and study skills 133
Academic organisation: Natural and Agricultural Sciences Dean's Office
Prerequisite: LST 133
Contact time: 1 lpw 3 dpw Foundation Course
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
In this module students examine and compare academic and popular writing. Students are taught how to use discourse markers and how to structure their own academic arguments. Students' writing is expected to be rational, clear and concise. As a final assignment all aspects of the LST 133 and LST 143 modules are combined in a research assignment. In this project, students work in writing teams to produce both a chapter on a science career and an oral presentation of aspects of the chapter.

MBY 161 Introduction to microbiology 161
Academic organisation: Microbiology and Plant Pathology
Prerequisite: MLB 111 GS
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
The module will introduce the student to the field of Microbiology. Basic microbiological aspects that will be covered include introduction into the diversity of the microbial world (bacteria, archaea, eukaryotic microorganisms and viruses), basic principles of cell structure and function, microbial nutrition and microbial growth and growth control. Applications in microbiology will be illustrated by specific examples i.e. bioremediation, animal-microbial symbiosis, plant-microbial symbiosis and the use of microorganisms in industrial microbiology. Wastewater treatment, microbial diseases and food will be introduced using specific examples.

MBY 251 Growth diversity and control of bacteria 251
Academic organisation: Microbiology and Plant Pathology
Prerequisite: MBY 161 GS
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
Envelope of gram positive and gram negative rods. Growth of bacteria, replication of the genome, regulation of septum formation, diversity of cell division mechanisms across the prokaryotes, bacterial survival structures. Control of bacterial growth; classes of anti-

bacterial agents, cellular targets for growth inhibition and killing of cells. Energy sources, harvesting from light versus oxidation, regulation of catabolic pathways, chemotaxis. Nitrogen metabolism, iron-scavenging. Alternative electron acceptors: denitrification, sulphate reduction, methanogenesis. Structure and function versus phylogenetics. Biodiversity; bacteria occurring in the natural environment (soil, water and air), associated with humans, animals, plants, and those of importance in foods and in the water industry.

MBY 261 Growth activity and control of fungi 261
Academic organisation: Microbiology and Plant Pathology
Prerequisite: MBY 161
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
Organisation and molecular architecture of fungal thalli, chemistry of the fungal cell. Mechanisms, quantification, regulation of and chemical and physiological requirements for growth, nutrient acquisition, primary metabolism; secondary metabolism; regulation of metabolism; mating and meiosis; spore development; spore dormancy, dispersal and germination. Classes of antifungal agents, cellular targets for inhibition and killing of cells. Fungi as saprobes in soil, air, plant, aquatic and marine ecosystems; role of fungi as decomposers and in the deterioration of materials; fungi as predators and parasites; mycoses, mycetisms and mycotoxicoses; fungi as symbionts of plants, insects and animals. Applications of fungi in biotechnology.

MBY 351 Structure and diversity of viruses 351
Academic organisation: Microbiology and Plant Pathology
Prerequisite: [BCM 253 and BCM 254] and CMY 127 and MBY 161
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Introduction to the viruses as a unique kingdom inclusive of their different hosts, especially bacteria, animals and plants; RNA and DNA viruses; viroids, tumour viruses and oncogenes, mechanisms of replication, transcription and protein synthesis; effect on hosts; viral immunology; evolution of viruses.

MBY 352 Environmental microbiology 352
Academic organisation: Microbiology and Plant Pathology
Prerequisite: MBY 161
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Basic principals in microbial ecology; microbial evolution, microbial interactions, eco-systems and communities, gene transfer, abiotic factors and extreme environments, microbial habitats which include air, water, soil, man, insects, animals and plants. The role of micro-organisms in biogeochemical cycling and microbial food webs. Potential exploitation of extreme environments, organisation of native populations in extreme environments, ecological aspects of deterioration control, soil, waste and water management.

MBY 353 Vertebrate-microbe interaction 353
Academic organisation: Microbiology and Plant Pathology
Prerequisite: MBY 251
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Normal interactions between humans or animals and micro-organisms; Host-pathogen interactions; Principles of pathogenesis; Important infectious diseases of man and animals; Principles of diagnostics; Introduction to epidemiology.

MBY 354 Veterinary virology 354
Academic organisation: Microbiology and Plant Pathology
Prerequisite: [BCM 253 and BCM 254] and CMY 127 and MBY 161
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 9
Module content:
*Capita selecta only for BVSc programme
Introduction to viruses important in veterinary science; mechanisms of virus replication, transcription and protein synthesis; effect on hosts; viral immunology; epidemiology and evolution of viruses; prions; diagnoses and control of viral diseases and viral vaccines.

MBY 361 Trends in microbiology 361
Academic organisation: Microbiology and Plant Pathology
Prerequisite: [BCM 253 and BCM 254] and GTS 261 and MBY 251
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Biotechnological advances and gene-based innovations in microbiology: Microbial diagnostics and epidemiology; microbial biosensors; vaccinology and therapeutic agents; biological control of plant pathogens; microbial diversity and bioprospecting; and bioremediation. Regulation, intellectual property rights and patenting in biotechnology.

MBY 362 Food microbiology 362
Academic organisation: Microbiology and Plant Pathology
Prerequisite: MBY 251
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Food microbiology: different organisms involved, their isolation, screening and improvement. Microbial quality and spoilage of food: meat, poultry, seafood, dairy products, fruits, vegetables and grains. Microbial food safety: foodborne pathogens, microbes and public health. Protective measures: preservation. Food fermentations: fermentation types, principles and organisms involved. Product extraction, downstream processing, examples: dairy, beer, wine, amino acids, enzymes, traditional products. Microbiological examination of foods: Conventional approaches, alternative methods; rapid methods. Controlling food quality: Microbiological criteria, GMPs, HACCP, Risk analysis.

MBY 363 Molecular biology of prokaryotes 363
Academic organisation: Microbiology and Plant Pathology
Prerequisite: [BCM 253 and BCM 254] and CMY 127 and MBY 161
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Modification of genetic material: DNA damage and damage repair, photoreactivation, SOS response. Mobile elements, insertion sequences, transposons. Control of operons and regulons, negative control, positive control, mixed control, regulation by upstream DNA structure, sigma factors, the role of recombination in expression, regulation of translation, DNA-protein interactions. Posttranslational control and modifications of proteins: allosteric control, covalent modifications, posttranslational control by compartmentalisation. Global regulatory networks, carbon catabolyte repression, alarmones, signal transduction, chemotaxis, regulation of fermentation and respiration, stress responses, adaptation to extreme environments. Folding of proteins, protein export, repair of damaged proteins.

MBY 364 Genetic manipulation of microbes 364
Academic organisation: Microbiology and Plant Pathology
Prerequisite: [BCM 253 and BCM 254] and CMY 127 and MBY 161
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Isolation of clonable DNA (genomic libraries, cDNA synthesis) cloning vectors (plasmids, bacteriophages, cosmids) plasmid incompatibility and control of copy number. Ligation of DNA fragments, modification of DNA end and different ligation strategies. Direct and indirect methods for the identification of recombinant organisms. Characterization (polymerase chain reaction, nucleic acid sequencing) and mutagenisis of cloned DNA fragments. Gene expression in Gram negative (E.coli) Gram positive (B.subtilis) and yeast cells (S.cerevisea). Use of Agrobacterium and baculoviruses for gene expression in plant and insect cells respectively. Applications in protein engineering, diagnostics and synthesis of useful products.

MLB 111 Molecular and cell biology 111
Academic organisation: Genetics
Prerequisite: Refer to Regulation 1.2
Contact time: 4 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 16
Module content:
Introductory study of the ultra structure, function and composition of representative cells and cell components. General principles of cell metabolism, molecular genetics, cell growth, cell division and differentiation.

MLB 133 Molecular and cell biology 133
Academic organisation: Plant Science
Prerequisite: As for BSc Four-year programme
Contact time: 2 lpw 2 ppw 2 dpw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8

Module content:
The scientific method, the meaning of life, principles of microscopy, chemistry of the cell, introductory study of the structure, function and composition of akaryotes, HIV/ Aids, the immune system and other health issues, ecosystems and human interference.

MLB 143 Molecular and cell biology 143
Academic organisation: Plant Science
Prerequisite: MLB 133
Contact time: 2 lpw 2 ppw 2 dpw Foundation Course
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Biochemistry of the cell, introduction to the structure, function and composition of prokaryotic and eukaryotic cells, introduction to taxonomy and systematics, energy and cellular metabolism, photosynthesis.

MLB 153 Molecular and cell biology 153
Academic organisation: Genetics
Prerequisite: MLB 143
Contact time: 2 lpw 2 ppw 2 tpw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Cell growth and cell division, Mendelian and human genetics, principles of molecular genetics, principles of recombinant DNA technology and its application.

MTT 210 Furniture and textile history 210
Academic organisation: Consumer Science
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 12
Module content:
Influences of ideologies, social institutions and technology on the development of Western and other material cultures, especially on furniture and textiles. Style periods from Egyptian to the French Revolution.

MTT 220 Furniture and textile history 220
Academic organisation: Consumer Science
Prerequisite: MTT 210 GS
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 12
Module content:
Influences of ideologies, social institutions and technology on the development of Western and other material cultures, especially on furniture and textiles. Style periods from early nineteenth century to the present.

NLB 311 Ecosystems and wildlife management 311
Academic organisation: Animal and Wildlife Sciences
Contact time: 6 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 4

Module content:
NLB 311 and NLB 312 are presented over a period of 21 days as one integrated module. Both modules are aimed at students of wildlife management and veterinary sciences. These study programmes offer an exciting, hands-on, in-depth educational experience, taking students behind the scenes in the wildlife field in Southern Africa.
The training takes part during a camping and lodging expedition. Students interact with wildlife biologists, rangers, veterinarians and researchers working in the field, giving them an insight into the successes and problems associated with conservation from both an ecological and veterinary perspective. Participants also meet and learn from pioneers in game capture and those actively involved in the field of wildlife veterinary science on a day-to-day basis. The students also participate in actual game capture operations. Students also study and observe the role that veterinarians play at a wildlife rehabilitation centre, a reptile park and a rare-species breeding ranch.
Module content:
•   Wildlife management techniques
•   Sustainable resource utilisation
•   Ecosystem and biodiversity conservation
•   Reserve and resort management
•   African local community cultures and conservation perspectives
•   Capture and care of wild animals
•   Wildlife disease management
•   Population dynamics

NLB 312 Participatory nature conservation 312
Academic organisation: Animal and Wildlife Sciences
Contact time: 6 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 4
Module content:
NLB 311 and NLB 312 are presented over a period of 21 days as one integrated module. Both modules are aimed at students of wildlife management and veterinary sciences. These study programmes offer an exciting, hands-on, in-depth educational experience, taking students behind the scenes in the wildlife field in Southern Africa.
The training takes part during a camping and lodging expedition. Students interact with wildlife biologists, rangers, veterinarians and researchers working in the field, giving them an insight into the successes and problems associated with conservation from both an ecological and veterinary perspective. Participants also meet and learn from pioneers in game capture and those actively involved in the field of wildlife veterinary science on a day-to-day basis. The students also participate in actual game capture operations. Students also study and observe the role that veterinarians play at a wildlife rehabilitation centre, a reptile park and a rare-species breeding ranch.
Module content
•   Wildlife management techniques
•   Sustainable resource utilisation
•   Ecosystem and biodiversity conservation
•   Reserve and resort management
•   African local community cultures and conservation perspectives
•   Capture and care of wild animals
•   Wildlife disease management
•   Population dynamics

OBG 111 Design principles 111
Academic organisation: Consumer Science
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 7
Module content:
Introduction to basic concepts in design (design elements and principles) and practical application in interior planning and design, foods and clothing. Theories of colour.

OKW 413 Weed science 413
Academic organisation: Plant Production and Soil Science
Prerequisite: PLG 251
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
Identification of important weeds of crops, gardens and recreational areas.
Identification of alien invasive and indigenous encroaching species. Impacts of weeds on desirable vegetation. Interference between crop and weed species through allelopathy and competition phenomena. Role of weeds in plant-biodiversity and crop production potential. Weeds in annual and perennial crop situations. Weed biology and ecology. Mechanical, cultural, biological and chemical weed management practices. Integrated weed management. Herbicide formulations and application techniques. Modes of action of herbicides, and their behaviour and fate in the environment.

OPI 480 Experiential training in industry 480
Academic organisation: Consumer Science
Contact time: 1 dpw
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 6
Module content:
Experiential training in the industry: During the four years of study, during holidays, weekends and after hours, students must complete a total of 480 hours experiential training in the industry to develop practical and occupational skills. This is equal to 3 weeks x 40 hours (120 hours) per year, according to requirements as determine by the head of department. This training must be successfully completed together with a complete portfolio before the degree will be conferred

PGB 410 Project: Research methodology 410
Academic organisation: Consumer Science
Prerequisite: Final-year status
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 10
Module content:
Research methodology. Planning, executing and reporting a research project in hospitality management.

PGB 420 Project: Hospitality management 420
Academic organisation: Consumer Science
Prerequisite: PGB 410 and Final-year status
Contact time: 4 lpw

Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 20
Module content:
Research methodology. Planning, executing and reporting a research project in Hospitality Management.

PGW 350 Soil-water relationship and irrigation 350
Academic organisation: Plant Production and Soil Science
Prerequisite: GKD 250
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Quantitative description and measurement of soil water content and potential as well as saturated and unsaturated hydraulic conductivity. Modelling water flow in soil (Darcy's law, Richards's equation). Infiltration, redistribution, evaporation, runoff and percolation. Irrigation in South Africa. Modelling and managing the soil water balance. Plant water consumption and the soil-plant-atmosphere continuum. Irrigation scheduling (soil, plant and atmosphere approaches). Managing poor quality water. Irrigation systems. The module includes a field trip to an irrigation scheme.

PGW 400 Seminar 400
Academic organisation: Plant Production and Soil Science
Contact time: 1 lpw 3 spw
Period of presentation: Year
Language of tuition: Both Afr and Eng   **Credits:** 20
Module content:
Basic principles of the scientific process. Literature accessing and article assessment. Manuscript preparation and presentation of seminars. Basic instruction on the use of visual aids, etc. for effective oral presentations.

PGW 421 Experimental design and analysis 421
Academic organisation: Plant Production and Soil Science
Prerequisite: BME 120
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
Basic experimental designs. Measurement and control over experimental error. Factorial experiments and interactions. Analysis of variance (ANOVA) and data interpretation.

PHY 114 First course in physics 114
Academic organisation: Physics
Prerequisite: Refer to Regulation 1. 2
Contact time: 4lpw 1ppw 1bpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 16
Module content:
SI-units. Significant figures. Waves: intensity, superposition, interference, standing waves, resonance, beats, Doppler. Geometrical optics: Reflection, refraction, mirrors, thin lenses, instruments. Physical optics: Young-interference, coherence, diffraction, polarisation. Hydrostatics and dynamics: density, pressure, Archimedes' principle,

continuity, Bernoulli. Heat: temperature, specific heat, expansion, heat transfer. Vectors. Kinematics of a point: Relative, projectile, and circular motion. Dynamics: Newton's laws, friction. Work: point masses, gasses (ideal gas law), gravitation, spring, power. Kinetic energy: Conservative forces, gravitation, spring. Conservation of energy. Conservation of momentum. Impulse and collisions. System of particles: Centre of mass, Newton's laws. Rotation: torque, conservation of angular momentum, equilibrium, centre of gravity.

PHY 124 First course in physics 124
Academic organisation: Physics
Prerequisite: WTW 114 GS and PHY 114 GS
Contact time: 4lpw 1ppw 1 bpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 16
Module content:
Simple harmonic motion and pendulums. Coulomb's law. Electric field: dipoles, Gauss' law. Electric potential. Capacitance. Electric currents: resistance, resistivity, Ohm's law, energy, power, emf, RC-circuits. Magnetic Field: Hall-effect, Bio-Savart. Faraday's and Lenz's laws. Oscillations: LR-circuits. Alternating current: RLC-circuits, power, transformers. Introductory concepts to modern physics. Nuclear physics: Radioactivity.

PHY 131 Physics for Biology students 131
Academic organisation: Physics
Prerequisite: Refer to Regulation 1.2
Contact time: 4lpw 1ppw 1dpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 16
Module content:
Units, vectors, one dimensional kinematics, dynamics, work, equilibrium, sound, liquids, heat, thermodynamic processes, electric potential and capacitance, direct current and alternating current, optics, modern physics, radio activity.

PHY 133 Physics 133
Academic organisation: Physics
Prerequisite: As for BSc Four-year programme
Contact time: 2 lpw 2 ppw 2 dpw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Heat: temperature and scales, the kinetic molecular model, work, energy and heat, calorimetry, specific heat, expansion, heat transfer. Measurements: SI-units, measuring error and uncertainty, (graphs), significant figures, mathematical modelling. Geometrical optics: reflection, refraction, dispersion, mirrors, thin lenses, instruments.

PHY 141 General physics 141
Academic organisation: Physics
Prerequisite: PHY 131 GS as well as 50% minimum for the practical component of PHY 131 or TDH
Contact time: 1 lpw 2 tpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 16
Module content:
*This is an anti-semester presentation of the module PHY 131 General Physics 131.

Refer to PHY 131 for the content description. Students will not be credited for both PHY 131 and PHY 141 for degree purposes.

PHY 143 Physics 143
Academic organisation: Physics
Prerequisite: PHY 133
Contact time: 2 lpw 2 ppw 2 dpw Foundation Course
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Waves: sound, intensity, superposition, interference, standing waves, resonance, beats, Doppler effect. Physical optics: Young-interference, coherence, thin layers, diffraction, gratings, polarisation. Hydrostatics and dynamics: density, pressure, Archimedes' law, continuity, Bernouli.

PHY 144 Physics 144
Academic organisation: Physics
Prerequisite: PHY 133
Contact time: 2 lpw 2 ppw 2 dpw Foundation Course
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
The main topics covered in this module is Mechanics and Thermodynamics. Kinematics: Basic types of motion, one-dimensional motion, two- and three-dimensional motion, linear momentum and its conservation, multi-object systems and the center of mass.
Forces: Types of forces, Newton's Laws of Mechanics and applications, friction.
Energy: Work, heat, conservation of mechanical energy.
Thermodynamics: First law of thermodynamics, empirical gas laws, mechanical model of the ideal gas, energy of the ideal gas, basic thermodynamic processes.

PHY 153 Physics 153
Academic organisation: Physics
Prerequisite: PHY 143
Contact time: 3 lpw 2 ppw 2 dpw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Vectors. Kinematics of a point: relative, projectile, circular motion. Dynamics: Newton's laws, friction. Work: point masses, gases (ideal gas law), gravitation, spring, power. Kinetic energy. Potential energy: conservative forces, gravitation, spring, conservation of mechanical energy and energy, conservation of momentum. Impulse and collisions. System of particles: centre of mass, Newton's laws. Rotation: torque, conservation of angular momentum, equilibrium, centre of gravity.

PHY 154 Physics 154
Academic organisation: Physics
Prerequisite: PHY 143
Contact time: 4 lpw 1 ppw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
The main topic in this module is Electricity, Sound, Optics, and Modern Physics.

Static Electricity: Electric charge and force, electric field, the electric energy, electric potential, conservation of electrical energy.
Flow of charge: Capacitors, application of charge flow to nerves.
Sound: Vibrations, waves in unconfined and confined media, applications to human hearing.
Optics: Reflection, refraction, applications to optometry and ophthalmology.
Atomic physics: Atomic models, x-rays.
Nuclear physics: The stable atomic nucleus, radioactivity, nuclear spin and applications to medical diagnostics.

PHY 163 General physics 163
Academic organisation: Physics
Prerequisite: PHY 153
Contact time: 4 lpw 1 ppw 1 tpw Foundation Course
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 8
Module content:
*This module corresponds with the module PHY 124. The four modules PHY 133, PHY 143, PHY 153 and PHY 163 are equivalent to PHY 114 and PHY 124.
Simple harmonic motion and pendulums. Coulomb's law. Electric field: dipole, Gauss' law. Potential. Capacitance. Electric currents: resistance, resistivity, Ohm's law, energy, power, semiconductors, superconductors, emf, RC-circuits. Magnetism: Hall effect, Biot-Savart law. Faraday's and Lenz's laws. LR-circuits. Alternating current: RLC-circuits, power transformers. Modern physics: Theory of special relativity, wave/particle nature, photoelectric effect, matter waves, quantum theory, infinite potential well, hydrogen atom and spectra, nuclear physics, Rutherford model, nucleons.

PHY 255 Waves, thermodynamics and modern physics 255
Academic organisation: Physics
Prerequisite: [PHY 143, PHY 144 and PHY 153 and PHY 163] of PHY 114 en PHY 124 and WTW 211 # and WTW 218 #
Contact time: 4 lpw 1 ppw 2 dpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 24
Module content:
Vibrating systems and waves (14 lectures)
Simple harmonic motion (SHM). Superposition (different frequencies, equal frequencies). Perpendicular vibrations (Lissajous figures). Damped SHM. Forced oscillations. Resonance. Q-value. Transverse wave motion. Plane wave solution using method of separation of variables. Reflection and transmission at a boundary. Normal and eigenmodes. Wave packets. Group velocity.
Modern physics (30 lectures)
Special relativity: Galilean and Lorentz transformations. Postulates. Momentum and energy. 4 vectors and tensors. General relativity. Quantum physics. Failure of classical physics. Bohr model. Particle-wave duality. Schrödinger equation. Piece-wise constant potentials. Tunneling. X-rays. Laser. Nuclear physics: Fission. Fusion. Radioactivity.
Heat and thermodynamics (12 lectures)
Heat. First Law. Kinetic theory of gases. Mean free path. Ideal, Clausius, Van der Waals and virial gases. Entropy. Second Law. Engines and refrigerators. Third Law. Thermodynamic potentials: Enthalpy Helmholtz and Gibbs free energies, Chemical potential. Legendre transformations (Maxwell relations). Phase equilibrium. Gibbs phase rule.

Modelling and simulation (7 practical sessions)
Introduction to programming in a high level system: Concept of an algorithm and the basic logic of a computer programme. Symbolic manipulations, graphics, numerical computations. Applications: Selected illustrative examples.
Error analysis (7 practical sessions)
Experimental uncertainties. Propagation of uncertainties. Statistical analysis of random uncertainties. Normal distribution. Rejection of data. Least-squares fitting. Covariance and correlation.

PHY 263 Classical mechanics, materials and optics 263
Academic organisation: Physics
Prerequisite: PHY 255 GS, WTW 211 GS, WTW 220 # , WTW 221 # and WTW 248 #
Contact time: 4 lpw 1 ppw 2 dpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 24
Module content:
Classical mechanics (28 lectures)
Fundamental concepts, energy and angular momentum, calculus of variations and Lagrangian mechanics, conservative central forces and two body problems, scattering, mechanics in rotating reference frames, many body systems.
Physical optics (14 lectures)
Maxwell's equations, wave equation and plane wave solution, coherence, interference, diffraction, polarisation.
Physics of materials (14 lectures)
Classification of materials. Atomic bonding. Crystallography. Defects. Matrial strength. Phase diagrammes. Ceramics. Polymers. Composites. Fracture. Electrical and magnetic properties. Semiconductors. Smart materials Nanotechnology.
Experiments (14 sessions)

PHY 353 Physics project 353
Academic organisation: Physics
Prerequisite: TDH
Contact time: 3 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
*Cannot be used as substitute for other Physics 300 modules to obtain admission to the BSc(Hons) in Physics.
A student is required to complete a project under guidance of the lecturer. The nature of the project is determined jointly by the student, lecturer and the head of department.

PHY 356 Electronics, electromagnetism and quantum mechanics 356
Academic organisation: Physics
Prerequisite: PHY 255 GS, PHY 263 GS, WTW 211 GS and WTW 248 GS
Contact time: 4 lpw 1 ppw 2 dpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 36
Module content:
Electronics (14 lectures)
Thévenin and Norton equivalent circuits, superposition principle, RC, LC and LRC circuits. Semiconductor diode. Bipolar transitor. Operational amplifiers. Computer controlled instrumentation.

Electromagnetism (21 lectures)
Electrostatics: Coulomb's law, divergence and curl of E, Gauss' law, Laplace's equation, image charge problems, multipole expansion.
Magnetostatics: Lorenz force, Biot-Savart law, divergence and curl of magnetic field strength, Ampère's law, magnetic vector potential, multipole expansion, boundary conditions.
Electrodynamics: Electromotive force, electromagnetic induction, Maxwell's equations, wave equation.
Electric and magnetic fields in matter: Polarisation, electric displacement and Gauss's law in dielectrics, linear dielectrics. Magnetisation (diamagnets, paramagnets, ferromagnets), auxiliary field H and Ampère's law in magnetised materials, linear and nonlinear media.
Quantum mechanics (28 lectures)
The Schrödinger equation, the statistical interpretation of the wavefunction, momentum, the uncertainty principle, the time-independent Schrödinger equation, stationary states, the infinite square well potential, the harmonic oscillator, the free particle, the Delta-Function potential, the finite square well potential, Hilbert spaces, observables, eigenfunctions of a Hermitian operator, Dirac notation, the Schrödinger equation in spherical coordinates, the hydrogen atom, angular momentum spin.

PHY 363 Physics project 363
Academic organisation: Physics
Prerequisite: TDH
Contact time: 3 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
*PHY 363 cannot be used as substitute for other Physics 300 modules to obtain admission to the BSc(Hons) in Physics.
A student is required to complete a project under guidance of the lecturer. The nature of the project is determined jointly by the student, lecturer and the head of department.

PHY 364 Statistical mechanics, solid state physics and modelling 364
Academic organisation: Physics
Prerequisite: PHY 356 GS, WTW 221 and WTW 248
Contact time: 4 lpw 2 ppw 2 dpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 36
Module content:
Statistical mechanics (28 lectures)
Isolated systems in thermodynamical equilibrium. Systems in equilibrium with a heat bath: the canonical ensemble, Gibbs' entropic formula, classical statistical mechanics, energy equipartition theorem, thermodynamic potentials, paramagnetism.
The classical limit of perfect gases: non-distinguishable character of quantum particles, the equation of state of the classical ideal gas. Quantum perfect gases: Black body radiation, the grand canonical ensemble, Fermi-Dirac distribution, the free electron gas in metals, the Bose-Einstein distribution, Bose-Einstein condensation.
Solid state physics (28 lectures)
Crystal structures, the reciprocal lattice, x-ray diffraction, lattice vibration, the Debye model, characteristics of solids, the free electron model, Pauli paramagnetism, electronic heat capacity, the relaxation time, electrical conduction, the classical Hall effect, thermal conduction in metals, failures of the free electron model, the independent electron model, band theory of solids.

Computational physics and modelling. Assessment will be done through a portfolio of project reports. The topics for the projects will be selected from various subdisciplines of Physics.

PLG 251 Introduction to crop protection 251
Academic organisation: Microbiology and Plant Pathology
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 12
Module content:
Development and importance of crop protection. Basic principles in crop protection ie epidemic development of disease and insect pest populations, ecology of plant diseases and abiotic factors that affect plant health i.e. environmental pollution and pesticides, nutrient deficiencies and extreme environmental conditions. Ecological aspects of plant diseases, pest outbreaks and weed invasion. Important agricultural pests and weeds. Life cycles of typical disease causing organisms. Basic principles of integrated pest and disease management.

PLG 262 Principles of plant pathology 262
Academic organisation: Microbiology and Plant Pathology
Prerequisite: MBY 161
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 12
Module content:
Fundamental principles of plant pathology. The concept of disease in plants. Causes of plant diseases. Stages in development of plant diseases. Disease cycles. Diagnosis of plant diseases.

PLG 351 General plant pathology 351
Academic organisation: Microbiology and Plant Pathology
Prerequisite: MBY 161 and MBY 261 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 18
Module content:
Principles and examples of plant diseases and their socio-economic importance. Introductory aspects of phytobacteriology and plant virology. Current trends in plant pathology such as biosecurity, sanitory and phytosanitary issues of trade. Risk assesment and international food safety standards. The use of global information systems to assess disease spread and impact of global warming. Supply chain analysis, postharvest technology and food trade aspects.

PLG 363 Plant disease control 363
Academic organisation: Microbiology and Plant Pathology
Prerequisite: PLG 251 or PLG 262 or TDH. MBY 261 is recommended
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 18
Module content:
Principles of plant disease control. Non-chemical control including biological control, disease resistance, regulatory measures, cultivation practices, physical methods. Modern

chemotherapy: characteristics, mode of action and application of fungicides, bactericides and nematicides. Principles of integrated disease management.

PLG 364 Host pathogen interactions 364
Academic organisation: Microbiology and Plant Pathology
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Includes fungal, bacterial and viral interactions. Focuses on molecular and cellular events occurring during recognition, during fungal evasion of the host's defence mechanisms and during disease symptom development. Topics discussed will also include cell biology of interactions, systemic acquired resistance and the role of pathogenesis related proteins and toxins in pathogenesis. Basic aspects of plant disease epidemiological theory and concepts. Introduction to equipment and techniques used in epidemiological research as well as practical applications of epidemiology in plant disease management.

PLG 462 Research project 462
Academic organisation: Microbiology and Plant Pathology
Contact time: 1 lpw 1 ppw
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 30
Module content:
A practical research project of limited extent under the supervision of one of the lecturers in plant pathology within the department. Any topic in plant pathology can be selected.

PLG 483 Advanced plant disease control 483
Academic organisation: Microbiology and Plant Pathology
Prerequisite: PLG 363 or TDH
Contact time: 1 ppw 2 dpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 18
Module content:
Advanced aspects of chemical and biological control of plant diseases as well as disease resistance.

PLG 490 Current concepts in plant pathology 490
Academic organisation: Microbiology and Plant Pathology
Prerequisite: Third-year status or TDH
Contact time: 2 lpw 1 dpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 18
Module content:
This module will address the most recent concepts in plant pathology.

PPK 251 Sustainable production systems 251
Academic organisation: Plant Production and Soil Science
Prerequisite: BOT 161
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Sustainability in plant production. Principles and practices of monoculture, crop rotation,

ley cropping and intercropping systems. Organic farming. Precision farming. Concepts such as target yield, maximum economic yield and the farming systems approach. Principles of soil cultivation and conservation.

PVK 420 Poultry science 420
Academic organisation: Animal and Wildlife Sciences
Prerequisite: VGE 301 and VKU 220
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
Industrial science and management of production systems and feeding systems in poultry production units. Applied breeding of poultry. Design and utilisation of equipment and housing facilities. Product quality and marketing of poultry products.
Hygiene and health programmes.

RFI 110 Radiation physics 110
Academic organisation: Physics
Contact time: 4 lpw
Period of presentation: Semester 1
Language of tuition: Afrikaans   **Credits:** 10
Module content:
Units: converting, dimensional analysis. Mechanics: momentum, force, energy, circular motion, moment of inertia, angular momentum, simple harmonic motion.
Electrostatics: Coulomb's law, electric field, potential. Direct currents: resistors, Ohm's law. Capacitors: capacitance, series, parallel energy. Magnetism: force on a moving charge, electric motor. Electromagnetic induction: Faraday's law, Lenz's Law, generators. Alternating currents: average and rms value, three phase, rectification, transformers. Electrical safety. Atomic structure: ionization, excitation.
X-rays: production, absorption.

RFI 210 Radiation physics 210
Academic organisation: Physics
Prerequisite: RFI 110, MTL 180, RAN 100, FSG 161, FSG 162, RAW 182 and RAW 180
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Afrikaans   **Credits:** 7
Module content:
X-ray generator: transformer, energy losses, rectifiers, capacitor-discharge systems, kVp and mA control, high voltage cables. Image intensifiers: design, brightness gain, coupling systems. TV camera and monitor: design, video signal, scanning. Image quality.
Optics: reflection, refraction, total internal reflection, mirrors, lenses, thin lens formula, lens aberrations, fiber optics, lasers, laser camera. Computers: basic hardware, digital principles and terminology, data storage.

RFI 211 Radiation physics 211
Academic organisation: Physics
Prerequisite: RFI 110, RAW 180, RAN 100, FSG 161, FSG 162, RAW 182 and MTL 180
Contact time: 4 lpw
Period of presentation: Semester 2
Language of tuition: Afrikaans   **Credits:** 6

Module content:
Radio-active decay: half-life, alfa decay, beta decay, gamma decay. Production of isotopes cyclotron, nuclear reactor, Van de Graaff accelerator. Absorption: nucleons, alfa particles, beta particles. Dosimetry: exposure, absorbed dose, equivalent dose, effective dose, dose limits. Radiation detectors: Geiger counter, scintillation counter, thermo-luminescent detector, semi-conductor detectors. Radiopharmaceuticals. Biological effects: genetic and somatic effects.

RFI 310 Radiation physics 310
Academic organisation: Physics
Prerequisite: FSG 251, RFI 210, RAW 281, RBG 281, RAN 280, RAW 282, FSG 252, FSG 262, RAW 284 and RFI 211
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Afrikaans   **Credits:** 7
Module content:
Computed tomography: CT generations. Equipment: x-ray tube, collimators, detectors. Image reconstruction: fundamental equations, algorithms.
Image properties: field size, image matrix, voxel, pixel, CT number, window width and height. Image quality: spatial resolution, contrast resolution, quantum mottle, spatial uniformity and frequency. Image processing: edge enhancement, pixel shifting and subtraction. Digital radiography: X-ray, equipment, analog to digital conversion, linear and logarithmic subtraction, image noise. Ultrasound: theory, transducers, piezo-electric crystals, resonant frequency, interaction with matter, acoustic impedance, Doppler techniques. Magnetic resonance: medical applications.

RPL 310 Reproduction science 310
Academic organisation: Animal and Wildlife Sciences
Prerequisite: DAF 200
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Theriogenology, spermatogenesis, zoogenesis, the female sexual cycle. Species differences. Hormonal control of the sexual functions.

RPL 320 Reproduction science 320
Academic organisation: Animal and Wildlife Sciences
Prerequisite: RPL 310
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 10
Module content:
Artificial insemination. Semen collection techniques, the evaluation, dilution and conservation of semen. Collection, conservation and transfer of embryos. Collection of ova and in-vitro fertilization. Handling of apparatus and practical insemination, oestrus observation and determination of gestation.

SCE 171 Religious instruction 171
Academic organisation: Physics
Contact time: 2 lpw
Period of presentation: Semester 1

Language of tuition: English   **Credits:** 8
Module content:
Prominent religions in South Africa, world views associated with these religions, the cultural role of religions, importance of holy days. Mysticism and the occult.

SCE 201 Science education 201
Academic organisation: Physics
Contact time: 2 lpw
Period of presentation: Year
Language of tuition: English   **Credits:** 16
Module content:
An introduction to patterns of scientific thinking. An introduction to science and science literacy. Ethics of science. Using the scientific method to encourage discovery learning. Exploring the concept of knowledge. The Learning Cycle. Principles of curriculum design.

SCE 204 Educational community project 204
Academic organisation: Natural and Agricultural Sciences Dean's Office
Contact time: 2 other per week
Period of presentation: Year
Language of tuition: English   **Credits:** 12
Module content:
*SCE 304 and SCE 204 may not both be taken for credit for degree purposes.
Students must demonstrate the ability to facilitate learning with particular emphasis on the application of team teaching, planning and implementation. Evaluation includes an essay by the student teacher, evaluation reports from a supervisor and participants. Additionally, the student teacher presents a report to peers in the form of a seminar. This contributes two weeks to Teaching Practice.

SCE 301 Educational community project 301
Academic organisation: Natural and Agricultural Sciences Dean's Office
Prerequisite: SCE 303 # or TDH
Contact time: 2 other per week
Period of presentation: Year
Language of tuition: English   **Credits:** 18
Module content:
*SCE 304 and SCE 204 may not both be taken for credit for the degree purposes.
Students must demonstrate the ability to facilitate learning with particular emphasis on the application of team teaching, negotiation for resources, planning and implementation. It is expected that students perform continuous assessment using a variety of methods. Evaluation includes a portfolio and an essay by the student teacher, evaluation reports from a supervisor and participants. Additionally, the student teacher presents a report to peers in the form of a seminar. This contributes two weeks to Teaching Practice.

SCE 303 Science education 303
Academic organisation: Physics
Prerequisite: AIM 101 or AIM 111 and AIM 121 GS
Contact time: 2 lpw 1 ppw
Period of presentation: Year
Language of tuition: English   **Credits:** 36
Module content:
Understanding the application of OBE in the teaching of science. The infusion of scientific thinking into the science curriculum in a developmentally appropriate way. The design of

learning programmes by programme organisers at school level. Macro planning in the natural science learning area. Provincial and national models of assessment. The assessment and implementation of learning programmes. The assessment of learner progress in the context of specific science learning programmes. Introduction to the principles of discipline and motivation. Some aspects of school guidance and career planning. Practical: Practical experience with learning opportunities. Use of computers as a teaching aid.

SCI 154 Exploring the universe 154
Academic organisation: Physics
Contact time: 4 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 16
Module content:
The content of this module is the same as SCI 164 and students are not allowed to register for both SCI 154 and SCI 164.
Students from all faculties are welcome to join us in our exploration of the universe from an earth-bound perspective. We reflect on the whole universe from the sub- microscopic to the vast macroscopic and mankind's modest position therein. To what degree is our happiness determined by stars? Echo's from ancient firmaments – the astronomy of old civilisations. The universe is born with a bang. Stars, milky ways and planets are formed. Life is breathed into the landscape on earth, but is there life elsewhere? The architecture of the universe – distance measurements, structure of our solar system and systems of stars. How does it look like on neighbouring planets? Comets and meteorites. Life cycles of stars. Spectacular exploding stars! Exotica like pulsars and black holes.

SCI 164 Exploring the universe 164
Academic organisation: Physics
Contact time: 4 lpw
Period of presentation: Semester 2
Language of tuition: Afrikaans   **Credits:** 16
Module content:
*This module is presented in Afrikaans only. See SCI 154 for a summary of the module content. The content of this module is the same as SCI 154 and students are not allowed to register for both SCI 154 and SCI 164.

SEM 381 Seminar 381
Academic organisation: Consumer Science
Prerequisite: Third-year status
Contact time: 1 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 5
Module content:
Introduction to research methodology.

SGM 210 Geomaterials and processes 210
Academic organisation: Geology
Contact time: 4 lpw 3 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Solar system; Earth structure and systems; plate tectonics; classification and contextual

setting of rocks and minerals; rock cycle. Internal and external geological processes; landscape formation; influences of geological environment on mankind. Geological time and the Earth's history through time. Practicals involving identification and description of crystals, minerals and rocks.

SUR 210 Surveying 210
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 3 lpw 4 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 16
Module content:
Adjustment and use of following instruments: Plane table, level, compass and theodolite. Elementary site surveying and levelling, tachometry. Definition of survey. Co-ordinate systems and bearing. Connections and polars. Methods of determining points. Elevation. Tachometry.

SUR 220 Surveying 220
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 16
Module content:
Adjustment and use of following instruments: Plane table, level, compass and theodolite. Elementary site surveying and leveling, tachometry. Definition of survey. Co-ordinate systems and bearing. Connections and polars. Methods of determining points. Elevation. Tachometry.

TKS 211 Textiles: Utility 211
Academic organisation: Consumer Science
Contact time: 3 lpw 1 ppw
Period of presentation: Quarter 1
Language of tuition: Double medium   **Credits:** 7
Module content:
Utility aspects: basic components of textiles, consumer decision-making, utility aspects that include durability, comfort, maintenance, health/safety/protection and aesthetic aspects.

TKS 212 Textiles: Utility, fibres and yarns 212
Academic organisation: Consumer Science
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 14
Module content:
Utility aspects: basic components of textiles, consumer decision making, utility aspects that include durability, comfort, maintenance, health/safety/protection and aesthetic aspects. Fibres and yarns: Fibre structure and performance including textile chemistry, fibre morphology and formation, fibre properties, classification and identification. Yarn structure and performance (including spun yarns, filament yarns, compound and novelty yarns).

TKS 222 Textiles: Structures and finishes 222
Academic organisation: Consumer Science
Prerequisite: TKS 212 GS
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 14
Module content:
Fabric structures: Introduction to fabric structures. Woven fabrics, knits, non-woven fabrics and compound fabrics. Finishes and dyeing processes: Introduction to fabric finishing. Preparatory and final finishes. Finishes for special end-uses: durability, comfort and protection; ease of maintenance; aesthetic appeal. Dyed and printed fabrics.

TKS 310 New developments and textiles in use 310
Academic organisation: Consumer Science
Prerequisite: TKS 212 and TKS 222 GS
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 10
Module content:
New developments (apparel textiles). Textile product use. Impact of textiles on ecology and sustainability.

TKS 421 Textiles 421
Academic organisation: Consumer Science
Prerequisite: TKS 212, TKS 222 and TKS 310
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 15
Module content:
Clothing textiles and textile products from a marketing and consumer perspective. Practical project: Project to assess performance properties of textiles for specific end-use by using laboratory tests. A written report of the results is also required.

TLR 320 Animal breeding 320
Academic organisation: Animal and Wildlife Sciences
Prerequisite: GTS 261
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 10
Module content:
Karyotyping of farm animals; breed and specie differences and the influence on classification of breeds. Influence of chromosomal aberrations. Phenotypic expression of genes and gene-interaction in farm animals. Single gene, major genes and polygenes. Variation in traits of economic importance and statistical description. Use of genetic variation. Estimation of breeding values and family indices on traits determined by single genes. Principles of breeding systems.

TLR 411 Animal breeding 411
Academic organisation: Animal and Wildlife Sciences
Prerequisite: TLR 320 and simultaneously register for GVK 420, PVK420, KVK420 and VKD 410
Contact time: 2 lpw fortnightly practicals

Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
Components of animal performance. Sources of variation, population parameters and the estimation thereof. Introduction to matrix algebra for application in animal breeding. Selection indices theory. Statistical models in estimation of breeding values. Application of breeding values and prerequisites for accuracy. Breeding and selection for reproduction and growth. Principles of QTLs.

TLR 420 Animal breeding 420
Academic organisation: Animal and Wildlife Sciences
Prerequisite: TLR 411
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
Formulation and application of breeding objectives. Animal recording systems and international guidelines for evaluation. Specie-specific breeding systems. Traits of economic impotence and the efficiency thereof. Crossbreeding systems in meat producing farm animals. Breed development.

TRN 213 Site surveying 213
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
General surveying; instruments, their handling and adjusting; surveying systems and simple calculations; determining of levels; setting out of the works; tacheometry and plotting; scales, planimetry; areas and volumes; construction surveying; aerial photography.

VBF 411 Consumer facilitation 411
Academic organisation: Consumer Science
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 10
Module content:
Consumer decision making through the family life cycle; determinants of consumer satisfaction. Consumer education; development of consumer skills; less privileged consumers. Expenditure patterns of the diverse South African consumer market. Consumerism. Globalisation.

VDB 321 Food service management 321
Academic organisation: Consumer Science
Prerequisite: Natural and Agricultural Sciences students: VDS 322 #
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 18
Module content:
Planning and layout of food service units for different food service systems. Equipment for food services. Factors influencing the choice and purchasing of equipment for different

food service units. Hygiene and safety in food services. Management in food service systems. Financial management in food services.

VDB 410 Food service management 410
Academic organisation: Consumer Science
Prerequisite: VDB 321 GS
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 24
Module content:
The professional food service manager's roles, responsibilities and characteristics. Contemporary leadership and management styles in food service systems. Professionalism and ethics. Advanced food service systems and production management techniques. Marketing of food services.

VDG 220 Nutrition 220
Academic organisation: Consumer Science
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 12
Module content:
Integration of natural science concepts basic to the study of human nutrition. Cell and tissue; energy metabolism and balance; body temperature; cardiovascular system; kidneys and acid-base equilibrium.

VDG 260 Nutrition 260
Academic organisation: Animal and Wildlife Sciences
Prerequisite: CMY 127
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
Nutrition in the context of growth, development and composition of organisms. Metabolic processes and control in the body. Overview of nutritional processes. The study of the fundamental principles of nutrient metabolism (including macro- and micro-nutrients and water) and digestion physiology. Applications are made regarding man and animals.
Practical work: Experimental work and problem-orientated tasks.

VDG 311 Nutrition 311
Academic organisation: Consumer Science
Prerequisite: [FSG 110 and FSG 120] or VDG 220
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 17
Module content:
The study of nutrients and water regarding their chemical composition, characteristics, basic digestion, absorption, metabolism, functions, food sources and symptoms of deficiency and toxicity. Energy metabolism. Dietary recommendations and guidelines, dietary guides and meal planning. The use and application of food composition tables in dietary analysis.

VDG 321 Nutrition during life cycle 321
Academic organisation: Consumer Science
Prerequisite: VDG 311
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 17
Module content:
The role of nutrition in the life cycle. The role of nutrition in the prevention of lifestyle related diseases – osteoporosis, cancer, coronary heart disease, tooth decay. Vegetarianism. Different conditions of malnutrition: Protein energy malnutrition and obesity.

VDS 111 Basic food preparation 111
Academic organisation: Consumer Science
Contact time: 1 lpw 1 ppw 0.5ppw 1 dpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 6
Module content:
Basic food preparation and food preparation techniques. Weighing and measurement techniques, equipment and terminology as applied in food preparation. Basic food quality control.

VDS 121 Basic food preparation 121
Academic organisation: Consumer Science
Prerequisite: VDS 111
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 6
Module content:
Basic food preparation and food preparation techniques. Weighing and measurement techniques, equipment and terminology as applied in food preparation. Basic food quality control.

VDS 210 Food commodities and preparation 210
Academic organisation: Consumer Science
Prerequisite: VDS 121
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 18
Module content:
The study of different food systems with regard to food preparation. Physical and chemical properties and the influence of the composition in food preparation. Food preparation basics of the following: soups and sauces; fruit and vegetables; salads; frozen desserts; gelatine.

VDS 221 Food commodities and preparation 221
Academic organisation: Consumer Science
Prerequisite: VDS 210
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 18

Module content:
The study of different food systems with regard to food preparation. Physical and chemical properties and the influence of the composition in food preparation. Food preparation basics of the following: meat; poultry; fish, legumes, eggs and milk, starches and cereals; baked products (whole spectrum); leavening agents.

VDS 310 Consumer food research 310
Academic organisation: Consumer Science
Prerequisite: VDS 221
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 21
Module content:
Planning, executing and reporting consumer food research. Food preservation and evaluation techniques. Experiments in food, emphasizing ingredient function and standard preparation methods. Application of experimental methods through which the chemical and physical reactions of food to different food handling, preparation and preservation techniques are illustrated. Quality evaluation and consumer-orientated sensory evaluation of food products.

VDS 322 Large-scale food production and restaurant management 322
Academic organisation: Consumer Science
Prerequisite: Natural and Agricultural Sciences students: [KEP 261 or KEP 220] and VDS 221
Health Sciences students: KEP 261, VDS 210 and VDS 221
Contact time: 3 lpw 3 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 29
Module content:
Module 1 and practical work: Principles of large-scale food preparation and the practical application thereof in a practical restaurant situation. Restaurant management. Recipe formats and adjustment applicable to large-scale food preparation. Work scheduling and the practical exposure to the use of large scale catering equipment in a real life situation.
Module 2: Menu planning for different food service systems and styles of food service.
Module 3: Large scale food procurement, consumption and storage.

VDS 354 Food safety and hygiene 354
Academic organisation: Consumer Science
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 14
Module content:
Principles of food safety and food hygiene. Consumer rights and protection.

VDS 355 Food and beverage service management 355
Academic organisation: Consumer Science
Prerequisite: VDS 221
Contact time: 2 lpw 1 ppw
Period of presentation: Quarter 1
Language of tuition: Double medium   **Credits:** 6
Module content:
Table setting, table serving, wine service, food and wine pairing, beverage management.

VDS 413 Recipe development and standardisation 413
Academic organisation: Consumer Science
Prerequisite: VDS 310 or VDS 322
Contact time: 3 lpw 2 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 30
Module content:
Recipe development process. Development of appropriate recipes and food products for a given situation. Standardisation of recipes. Food styling and food photography.

VDS 414 Culinary art 414
Academic organisation: Consumer Science
Prerequisite: VDS 210 and VDS 221
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 19
Module content:
Advanced food preparation and presentation techniques.

VDS 415 Visual merchandising of foods 415
Academic organisation: Consumer Science
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 15
Module content:
Aspects of food retailing with special emphasis on food packaging and labelling of food products. Aspects of food retailing with regard to display, presentation and shop layout as applied to food products.

VDS 423 Foods 423
Academic organisation: Consumer Science
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 15
Module content:
Factors influencing food consumption, consumer behaviour and food choice. Food product advice. Consumer advice, marketing of food products, consumer education.

VDS 424 Culinary art 424
Academic organisation: Consumer Science
Prerequisite: VDS 221, VDS 322 # and VDS 414
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 19
Module content:
Advanced food preparation and presentation techniques. Event planning and banqueting.

VDS 425 Project: Foods visual merchandising of foods 425
Academic organisation: Consumer Science
Prerequisite: VDS 415 and VDS 423
Contact time: 3 lpw
Period of presentation: Semester 2

Language of tuition: Double medium **Credits:** 15
Module content:
Practical application of the principles in visual merchandising of food and food retailing in the food industry.

VDS 426 Food research project 426
Academic organisation: Consumer Science
Prerequisite: PGB 410 # and VDS 310
Contact time: 1 lpw 2 ppw
Period of presentation: Semester 2
Language of tuition: Double medium **Credits:** 18
Module content:
Planning, executing and reporting a research project in a food related field.

VGE 301 Nutrition science 301
Academic organisation: Animal and Wildlife Sciences
Prerequisite: [BCM 263 and BCM 264] and [BCM 265 and BCM 266] and DAF 200, and VDG 260 and VKU 220
Contact time: 3 lpw fortnightly practicals
Period of presentation: Year
Language of tuition: English **Credits:** 32
Module content:
Digestion and metabolism of feeds. The division of food energy and food energy systems. Protein quality and requirements. Mineral and vitamin requirements. Nutritional standards. Voluntary intake. Characteristics of fodder. Rumen function and microbial fermentation. Practical work: In vivo and in vitro digestibility studies.

VGE 411 Nutrition science 411
Academic organisation: Animal and Wildlife Sciences
Prerequisite: VGE 301
Contact time: 4 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: English **Credits:** 18
Module content:
Specialised nutrition of monogastric animals: poultry, pigs, horses and selected freshwater aquatic organisms. The use of computer systems in feeding management.

VGE 421 Nutrition science 421
Academic organisation: Animal and Wildlife Sciences
Prerequisite: VGE 301
Contact time: 3 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: English **Credits:** 16
Module content:
Specialised small stock and game nutrition. Nutrition of rams, ewes and lambs for optimal production. Principles of creep feeding, drought feeding, winter and supplementary feeding. Feeding pen nutrition and final nutritional preparation of lambs. Influence of nutrition on wood, pelts and Mohair. Fodder flow planning. Practical work: Formulation of lowest cost rations and practical work with ruminants.

VGE 423 Nutrition science 423
Academic organisation: Animal and Wildlife Sciences
Prerequisite: VGE 301
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 16
Module content:
Specialised nutrition of beef and dairy cattle according to production systems. The use of computer systems in feeding management. The practicals will include compiling rations in terms of requirements and least cost formulations, specialised assignments and on-farm experiential training.

VKD 410 Pig science 410
Academic organisation: Animal and Wildlife Sciences
Prerequisite: VGE 301, VKU 220
Contact time: 1 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Industrial science and management of pigs – sow, boar and growing pigs. Production systems and feeding systems. Design and utilisation of housing facilities. Product quality and marketing. Hygiene and herd health programmes.

VKF 411 Animal science pharmacology 411
Academic organisation: Animal and Wildlife Sciences
Prerequisite: DFS 320 and VGE 301
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
The pharmacology, laws, control and use of substances for animal production.

VKU 120 Animal science 120
Academic organisation: Animal and Wildlife Sciences
Contact time: 2 lpw 0.5ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Origin and domestication of farm and companion animals. The ecological environment in which animal production and development is practised. Livestock species, breeds and breed characterisation and genetic variation. Terminology. Practical work includes identification and classification of different breeds of livestock.

VKU 122 Animal Nutrition 122
Academic organisation: Animal and Wildlife Sciences
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 6
Module content:
The chemical composition of fodder. Digestive processes and the digestibility of fodder. The nutrition and nutritional requirements of farm stock. Basic composition of rations. Intensive and extensive feeding.

VKU 210 Animal science 210
Academic organisation: Animal and Wildlife Sciences
Prerequisite: VKU 120 GS
Contact time: 2 lpw 1 ppw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 8
Module content:
Basic principles of nutrition, physiology, breeding and production. Applied principles of livestock production, production management and systems (large livestock, small stock, pigs and poultry). Organisation of the livestock industry and relevant legislation. Animal handling.
Practical work includes the general care and handling of farm stock.

VKU 220 Animal science 220
Academic organisation: Animal and Wildlife Sciences
Prerequisite: VKU 210 GS or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 12
Module content:
Livestock ecology, interaction between genotype and environment. Production regions and systems. Animal ecological factors that influence regional classification. Animal ecological factors to be considered in production factors, planning and management of different livestock production systems. Conservation farming and adapted farming and management systems; environmental conservation. Practical work will consist of compulsory farm practical during vacation after the 1st year and or during the 2nd year of study.

VKU 320 Animal science 320
Academic organisation: Animal and Wildlife Sciences
Prerequisite: VKU 210, VKU 220 and WDE 310
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
Functional management of intensive and extensive beef, dairy, sheep and goat production systems. Discussions and literature studies on applied animal nutrition, breeding production planning and production processes.

VKU 361 Animal ecology 361
Academic organisation: Animal and Wildlife Sciences
Prerequisite: TDH
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Animal ecology, interaction between genotype and environment. Animal ecological factors which influence regional classification. Animal ecological factors which must be taken into consideration in the obtaining of the production factors, planning and management of the cattle farming enterprise. Conservation farming and adapted farming and management systems; environmental conservation.

VKU 362 Animal science biotechnology 362
Academic organisation: Animal and Wildlife Sciences
Prerequisite: GTS 261
Contact time: 1 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Application of biotechnology in farm animals with specific reference to reproductive biotechnology such as AI MOET and sex manipulation, which has an effect on genetic progress. Application of DNA technology such as parentage verifications, identification of genetic defects, QTL's and MAS.

VKU 400 Research methodology 400
Academic organisation: Animal and Wildlife Sciences
Prerequisite: Simultaneously register for GVK 420, PVK 420, TLR 411, VGE 423, VKF 411 and WLK 410
Contact time: 2 lpw 1 spw
Period of presentation: Year
Language of tuition: English   **Credits:** 16
Module content:
Research methodology in animal science: Literature studies and seminars. Introduction to the problem, approach to problem solving, methodology and appropriate reporting. Practice.

VSX 420 Meat and dairy science 420
Academic organisation: Animal and Wildlife Sciences
Prerequisite: DFS 320
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 10
Module content:
Meat industry. Meat species. Composition of carcass and meat, slaughtering process, meat quality, and the consumer. Dairy industry. Composition and nutritional value of milk and factors that influence it. Milk production, milk quality and distribution.

VVW 350 Community nutrition and public health 350
Academic organisation: Human Nutrition
Prerequisite: HNT 210 or TDH and VDG 250 or VDG 260 and VDG 321
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: Both   **Credits:** 21
Module content:
Theory and practice of community nutrition and public health (capita selecta CNT 411). Environmental health issues and health indicators in communities.

VVW 363 Food, nutrition and health 363
Academic organisation: Consumer Science
Prerequisite: HNT 210 or VDG 311 and VDG 321
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 21

Module content:
Scientific foundation of food and nutrition in health promotion and disease prevention. Principles of interpretation of nutritional assessment data.

VVW 364 Food composition and applied nutritional programmes 364
Academic organisation: Food Science
Prerequisite: FST 351 and FST 352 or TDH
Contact time: 2 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Generation, interpretation and application of food composition data in nutrition programmes. Chemical composition of foods: sampling for food analysis, assessing methods of food analysis for inclusion in food composition data. Interpretation of food composition data. Nutritional labelling of food. Use of nutritional data in food formulations. Dietary supplementation, enrichment and fortification of foods.

WDE 253 Basic principles of pasture science 253
Academic organisation: Plant Production and Soil Science
Contact time: 4 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
The influence of biotic and abiotic factors on the productivity of different strata and components of natural and planted pastures. This will enable the student to understand the management, production, appropriate and optimal utilisation as well as the conservation of these pastures. These principles can be used to ensure sustainable animal production and health.

WDE 310 Principles of veld management 310
Academic organisation: Plant Production and Soil Science
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
The influence of biotic and abiotic factors on the productivity of different strata and components of natural pastures. This will enable the student to advise users, with the necessary motivation, on the appropriate use of these strata and components and will form a basis for further research on this system. The principles of veld management and the influence of management practices on sustainable animal production from natural pastures. This will enable the student to advise users on veld management and veld management principles. It will also form a basis for further research on veld management.

WDE 320 Planted pastures and fodder crops 320
Academic organisation: Plant Production and Soil Science
Prerequisite: WDE 310
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
The establishment and use of planted pastures species and fodder crops and the conservation of fodder. This will enable students to advise users on establishment and

utilisation of planted pastures species as well as farmers on the production, conservation and optimum use of fodder. This will also form a basis for further research on planted pastures.

WDE 450 Environmental resource assessment and management 450
Academic organisation: Plant Production and Soil Science
Contact time: 3 lpw fortnightly practicals
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 20
Module content:
Determining the resource potential of land on the basis of botanical composition, vegetation cover, animal grazing and browsing potential, water quality, soil quality, chemical, physical and biological soil degradation, soil erosion and other important environmental processes etc. which are essential for integrated agricultural land use practices. Evaluation of grasses and other vegetation types in terms of environmental adaptation, acceptability and adaptability to a sustainable utilisation system and the management requirements of an integrated and adaptive management system.

WKD 151 Atmospheric processes 151
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 4 lpw 1 ppw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 8
Module content:
Weather and climate. Origin and composition of the atmosphere. Oxygen, carbon and life. Meteorological instruments. Temperature distribution and heat capacity. Atmospheric mass and pressure. Radiation. Zenith angle of the sun. Sunshine variability. The boundary layer. Heat transfer in the boundary layer. Atmospheric heat budget. Urban and rural climates. Equation of state. Air parcel theory. Phases of water and latent heat. Vapour and saturated vapour pressure. Dew point temperature and relative humidity. Dry adiabatic, wet adiabatic and environmental temperature lapse rates. Cloud development. Sensible heat. Comfort zones. Acquisition of data from the South African Weather Bureau: Composition and submission of a report.

WKD 152 Atmospheric circulation and climate 152
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 4 lpw 1 ppw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 8
Module content:
Hadley and Walker (ENSO) cells. Convergence, divergence, convection and subsidence. Polar stratospheric ozone. Air parcel theory. Angular velocity of the earth. Gravitational, centrifugal forces: Gravity force. Pressure gradient force. Coriolis force. Friction force. Rotation of a cyclone and anti-cyclone. Geostrophic wind. Intertropical convergence zone (ITCZ). Monsoon rain. Mid-latitude cyclonic frontal systems. Cut-off low. Coastal lows. Jet streams. Tropical cyclones. Foehn effect. Climate and climate change. Typical circulation patterns over South Africa: Composition and submission of a report.

WKD 162 Dynamic and numerical meteorology 162
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 4 lpw 1 ppw
Period of presentation: Quarter 3

Language of tuition: English   **Credits:** 8
Module content:
Electromagnetic spectrum. Planck's constant. Radiation energy. Irradiance and radiance. Solar or electromagnetic energy and distance. Stefan Boltzman law. Solar constant. Solar energy received and emitted on a spherical Earth. Albedo. Black body radiation. Global energy balance. Equations for the pressure gradient and Coriolis forces. The Geostrophic wind. Introduction to finite difference methods. Numerical estimation of the geostrophic wind, vorticity and divergence. Advection of temperature. Development of a two-dimensional numerical temperature advection model: Composition and submission of a report.

WKD 164 Climate and weather of Southern Africa 164
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 4 lpw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 8
Module content:
The climate of Southern Africa. Synoptic weather systems of Southern Africa. Classification of weather types. Synoptic and METAR messages. Weather data on the internet. Introduction to satellite images and synoptic charts.

WKD 250 Weather forecasting 250
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 4 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 24
Module content:
Understanding of all coded meteorological messages. Basic principles and interpretation of satellite imagery. Interpretation of aerological diagrams, dynamic and thermodynamic variables. Integration of information to describe the current state of the atmosphere and to predict a future state of the atmosphere.

WKD 253 Community project 253
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 2 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Identification and execution of a community project with the aim to provide meteorological information to the general South African public. A project proposal including a budget will be drawn up before the project commences and a project report will be drawn up after completion of the project.

WKD 261 Physical meteorology 261
Academic organisation: Geography, Geoinformatics and Meteorology
Contact time: 4 lpw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 12
Module content:
Conservative forces and conservation laws. Basic thermodynamic laws for dry and humid air. The equation of state. Adiabatic processes and temperature lapse rates. The Clausuis-Claperon equation. Calculation of the wet adiabat.

WKD 351 Atmospheric balance laws 351
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: WTW 248
Contact time: 4 lpw 1 ppw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 18
Module content:
Acceleration in rotating co-ordinates, fundamental forces, momentum equation, one- two- and three-dimensional flow balance, conservation of mass, heat equation, thermo-dynamic energy equation.

WKD 352 Atmospheric vorticity and divergence 352
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: WTW 248
Contact time: 4 lpw 1 ppw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 18
Module content:
Scale analyses and simplification of the basic equations. The geostrophic, thermal and gradient wind. The vorticity equation and divergence.

WKD 361 Quasi-geostrophic analysis 361
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: WKD 351 GS # and WKD 352 GS #
Contact time: 4 lpw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 18
Module content:
Tendency and Omega equations. Model of a boroclinic system. Introduction to numerical models.

WKD 362 Cloud and boundary layer dynamics 362
Academic organisation: Geography, Geoinformatics and Meteorology
Prerequisite: WKD 351 GS #
Contact time: 4 lpw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 18
Module content:
Introduction to cloud dynamics. Classification and development of clouds. Cumulonimbus clouds, super cell storms and tornadoes. Planetary boundary layer, atmospheric turbulence, Reynolds average, turbulent kinetic energy, the Ekman layer, secondary circulation.

WKE 420 Wildlife science 420
Academic organisation: Animal and Wildlife Sciences
Prerequisite: VGE 301 and VKU 361 or TDH
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 10
Module content:
Introductory aspects of wildlife conservation, habitat management, wildlife nutrition and keeping wildlife in zoological gardens.

WLK 410 Wool science 410
Academic organisation: Animal and Wildlife Sciences
Contact time: 1 lpw 0.5 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 8
Module content:
Development of follicles and growth of wool. The morphology, physical and chemical characteristics of wool fibre. The classing, marketing and processing of wool. Physical testing. Regulations with regard to the classing and packaging of wool. Class standards of the NWGA.
Practical: Course in wool classing.

WTW 114 Calculus 114
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: Refer to Regulation 1.2
Contact time: 4 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
*This module serves as preparation for students majoring in Mathematics (including all students who intend to enrol for WTW 218 and WTW 220). Students will not be credited for more than one of the following modules for their degree: WTW 114, WTW 158, WTW 134.
Functions, limits and continuity. Differential calculus of single variable functions, rate of change, graph sketching, applications. The mean value theorem, the rule of L'Hospital. Definite and indefinite integrals, evaluating definite integrals using anti-derivatives, the substitution rule.

WTW 115 Discrete structures 115
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: Refer to Regulation 1.2
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
Propositional logic: truth tables, logical equivalence, implication, arguments. Mathematical induction and well-ordering principle. Introduction to set theory. Counting techniques: elementary probability, multiplication and addition rules, permutations and combinations, binomial theorem, inclusion-exclusion rule.

WTW 123 Numerical analysis 123
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 114 GS
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
Non-linear equations, numerical integration, initial value problems for differential equations, systems of linear equations. Algorithms for elementary numerical techniques are derived and implemented in computer programmes. Error estimates and convergence results are treated.

WTW 126 Linear algebra 126
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: Refer to Regulation 1.2
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
*This module serves as preparation for students majoring in Mathematics (including all students who intend to enrol for WTW 211).
Vector algebra with applications, matrix algebra, systems of linear equations, the vector space Rn, bases, determinants. Mathematical induction. Complex numbers and factorisation of polynomials.

WTW 128 Calculus 128
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 114 GS
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
*This module serves as preparation for students majoring in Mathematics (including all students who intend to enrol for WTW 218 and WTW 220).
Integration techniques. Applications of integration. The formal definition of a limit. The fundamental theorem of Calculus and applications. Parametric and polar equations. Vector functions of one variable, quadratic curves. Introduction to functions of several variables and partial derivatives.

WTW 133 Precalculus 133
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: As for BSc Four-year programme
Contact time: 5 lpw 1 ppw 1 tpw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Real numbers, elementary set notation, exponents and radicals. Algebraic expressions, fractional expressions, linear and quadratic equations, inequalities. Coordinate geometry: lines, circles. Functions: definition, notation, piecewise defined functions, absolute value, domain and range, graphs, transformations of functions, symmetry, even and odd functions, combining functions, one-to-one functions and inverses, polynomial functions and zeros.
Sequences, summation notation, arithmetic, geometric sequences, infinite geometric series, annuities and instalments. Degrees and radians, unit circle, trigonometric functions, fundamental identities, trigonometric graphs, trigonometric identities, double-angle, half-angle formulae, inverse trigonometric functions, trigonometric equations, applications.

WTW 134 Mathematics 134
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: Refer to Regulation 1.2
Contact time: 4 lpw 1 tpw
Period of presentation: Semester 1 or Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16

Module content:
*Students will not be credited for more than one of the following modules for their degree: WTW 134, WTW 114, WTW 158. WTW 134 does not generally lead to admission to Mathematics at 200 level and is intended for students who require Mathematics at 100 level only. WTW 134 can also be taken in the second semester.
Functions, derivatives, interpretation of the derivative, rules of differentiation, applications of differentiation, integration, interpretation of the definite integral, applications of integration. Discrete probability, matrices, solutions of systems of equations. Markov chains.

WTW 143 Calculus 143
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 133
Contact time: 4 lpw 1 ppw 1 tpw Foundation Course
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Functions: exponential and logarithmic functions, natural exponential and logarithmic functions, exponential and logarithmic laws, exponential and logarithmic equations, compound interest.
Limits: concept of a limit, finding limits numerically and graphically, finding limits algebraically, limit laws without proofs, squeeze theorem without proof, one-sided limits, infinite limits, limits at infinity, vertical, horizontal and slant asymptotes, substitution rule, continuity, laws for continuity without proofs.
Differentiation: average and instantaneous change, definition of derivative, differentiation rules without proofs, derivatives of polynomials, chain rule for differentiation, derivatives of trigonometric, exponential and logarithmic functions, applications of differentiation: extreme values, critical numbers, monotone functions, first derivative test, optimisation.

WTW 144: Calculus 144
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 133
Contact time: 4 lpw 1 ppw 1 tpw Foundation Course
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Functions: Rate of change, exponential functions, the natural logarithm, exponential growth and decay, proportionality, power functions, fitting formulas to data.
Rates of change and the derivative: Instantaneous rate of change, the derivative function, interpretations of the derivative, the second derivative.
Differentiation: Formulas and rules, applications, extremes of a function.
Integration: Accumulated change, the definite integral, antiderivatives, definite integrals, the definite integral as an area, interpretations of the definite integral.

WTW 152 Mathematical modelling 152
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: Refer to Regulation 1.2
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
Introduction to the modelling of dynamical processes using difference equations. Curve

fitting. Introduction to linear programming. Matlab programming. Applications to real-life situations in, among others, finance, economics and ecology.

WTW 153 Calculus 153
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 143
Contact time: 4 lpw 1 ppw 1 tpw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Rigorous treatment of limits and continuity. Differential calculus of a single variable with proofs and applications. The mean value theorem, the rule of L'Hospital. Upper and lower sums, definite and indefinite integrals, the fundamental theorem of Calculus, the mean value theorem for integrals, integration techniques, with some proofs.

WTW 154: Finite mathematics
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 144
Contact time: 4 lpw 1 ppw Foundation Course
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Probability theory: Set theory, basic principles and definitions, relative frequencies, probability models for finite sample spaces, experiments with equally likely outcomes, probability formulas, counting methods.
Matrics and systems of linear equations: Matrix addition and scalar multiplication, matrix multiplication, sytems of linear equations.
Markov chains: Transitions matrices and state vectors, regular matrices.

WTW 158 Calculus 158
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: Refer to Regulation 1.2
Contact time: 4 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
*This module is designed for first-year engineering students. Students will not be credited for more than one of the following modules for their degree: WTW 158,
WTW 114, WTW 134.
Introduction to vector algebra. Functions, limits and continuity. Differential calculus of single variable functions, rate of change, graph sketching, applications. The mean value theorem, the rule of L'Hospital. Indefinite integrals, integration.

WTW 161 Linear algebra 161
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: Refer to Regulation 1.2
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
*This module is designed for first-year engineering students. Students will not be credited for more than one of the following modules for their degree: WTW 161, WTW 126.
Vector algebra with applications, matrix algebra, systems of linear equations, the vector

space Rₙ, bases, determinants. Mathematical induction. Complex numbers and factorisation of polynomials. Conic sections. This module also includes a formal technique mastering programme.

WTW 162 Dynamical processes 162
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 114 GS
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Introduction to the modelling of dynamical processes using elementary differential equations. Solution methods for first order differential equations and analysis of properties of solutions (graphs). Applications to real life situations.

WTW 168 Calculus 168
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 114 GS or WTW 158 GS
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
*This module is designed for first-year engineering students. Students will not be credited for more than one of the following modules for their degree: WTW 168, WTW 128, WTW 138.
Integration techniques, improper integrals. The definite integral, fundamental theorem of Calculus. Applications of integration. Elementary power series and Taylor's theorem. Vector functions, space curves and arc lengths. Quadratic surfaces and multivariable functions.

WTW 211 Linear algebra 211
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 126
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
This is an introduction to linear algebra on Rₙ. Matrices and linear equations, linear combinations and spans, linear independence, subspaces, basis and dimension, eigen-values, eigenvectors, similarity and diagonalisation of matrices, linear transformations.

WTW 218 Calculus 218
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 114, WTW 126 and WTW 128
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Calculus of multivariable functions, directional derivatives. Extrema and Lagrange multipliers. Multiple integrals, polar, cylindrical and spherical coordinates.

WTW 220 Analysis 220
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 114 and WTW 128
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Properties of real numbers. Analysis of sequences and series of real numbers. Power series and theorems of convergence. The Bolzano-Weierstrass theorem and the intermediate value theorem. Analysis of real-valued functions on an interval.

WTW 221 Linear algebra 221
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 211
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Abstract vector spaces, change of basis, matrix representation of linear transformations, orthogonality, diagonalisability of symmetric matrices, some applications.

WTW 238 Mathematics 238
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 256 and WTW 258 GS
Contact time: 4 lpw 2 tpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Linear algebra, eigenvalues and eigenvectors with applications to first and second order systems of differential equations. Sequences and series, convergence tests. Power series with applications to ordinary differential equations with variable coefficients. Fourier series with applications to partial differential equations such as potential, heat and wave equations.

WTW 248 Vector analysis 248
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 218
Contact time: 2 lpw 1 dpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 12
Module content:
Vectors and geometry. Calculus of vector functions with applications to differential geometry, kinematics and dynamics. Vector analysis, including vector fields, line integrals of scalar and vector fields, conservative vector fields, surfaces and surface integrals, the Theorems of Green, Gauss and Stokes with applications.

WTW 256 Differential equations 256
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 158, WTW 161 and WTW 168
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 8

Module content:
Theory and solution methods for linear differential equations as well as for systems of linear differential equations. Theory and solution methods for first order non-linear differential equations. The Laplace transform with application to differential equations. Application of differential equations to modelling problems.

WTW 258 Calculus 258
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 158 and WTW 168
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
Calculus of multivariable functions, directional derivatives. Extrema. Multiple integrals, polar, cylindrical and spherical coordinates. Line integrals and the theorem of Green. Surface integrals and the theorems of Gauss and Stokes.

WTW 263 Numerical methods 263
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 161 and WTW 168
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
Numerical integration. Numerical methods to approximate the solution of non-linear equations, systems of equations (linear and non-linear), differential equations and systems of differential equations. Direct methods to solve linear systems of equations.

WTW 285 Discrete structures 285
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 115
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Setting up and solving recurrence relations. Equivalence and partial order relations. Graphs: paths, cycles, trees, isomorphism. Graph algorithms: Kruskal, Prim, Fleury. Finite state automata.

WTW 286 Differential equations 286
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 114, WTW 126 and WTW 128
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Theory and solution methods for ordinary differential equations and initial value problems: separable and linear first-order equations, linear equations of higher order, systems of linear equations. Application to mathematical models. Qualitative analysis of linear systems.

WTW 310 Analysis 310
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 220
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 18
Module content:
Topology of finite dimensional spaces: Open and closed sets, compactness, connectedness and completeness. Theorems of Bolzano-Weierstrass and Heine-Borel. Properties of continuous functions and applications. Integration theory for functions of one real variable. Sequences of functions.

WTW 320 Analysis 320
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 218 and WTW 310
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 18
Module content:
Series of functions, power series and Taylor series. Complex functions, Cauchy-Riemann equations, Cauchy's theorem and integral formulas. Laurent series, residue theorem and calculation of real integrals using residues.

WTW 354 Financial engineering 354
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WST 211, WTW 211 and WTW 218
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 18
Module content:
Mean variance portfolio theory. Market equilibrium models such as the capital asset pricing model. Factor models and arbitrage pricing theory. Measures of investment risk. Efficient market hypothesis. Stochastic models of security prices.

WTW 364 Financial engineering 364
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WST 211, WTW 126, WTW 218 and WTW 286
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Discrete time financial models: Arbitrage and hedging; the binomial model.
Continuous time financial models: The Black-Scholes formula; pricing of options and the other derivatives; interest rate models; numerical procedures.

WTW 381 Algebra 381
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 114 and WTW 211
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 18

Module content:
Group theory: Definition, examples, elementary properties, subgroups, permutation groups, isomorphism, order, cyclic groups, homomorphisms, factor groups. Ring theory: Definition, examples, elementary properties, ideals, homomorphisms, factor rings, polynomial rings, factorisation of polynomials. Field extensions, applications to straight-edge and compass constructions.

WTW 382 Dynamical systems 382
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 218 and WTW 286
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Double medium　　　　　　　　**Credits:** 18
Module content:
Matrix exponential function: homogeneous and non-homogeneous linear systems of differential equations. Qualitative analysis of systems: phase portraits, stability, linearisation, energy method and Liapunov's method. Introduction to chaotic systems. Application to real life problems.

WTW 383 Numerical analysis 383
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 114, WTW 128 and WTW 211
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Double medium　　　　　　　　**Credits:** 18
Module content:
Direct methods for the numerical solution of systems of linear equations, pivoting strategies. Iterative methods for solving systems of linear equations and eigenvalue problems. Iterative methods for solving systems of nonlinear equations. Introduction to optimization. Algorithms for the considered numerical methods are derived and implemented in computer programmes. Complexity of computation is investigated. Error estimates and convergence results are proved.

WTW 386 Partial differential equations 386
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 248 and WTW 286
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 1
Language of tuition: Double medium　　　　　　　　**Credits:** 18
Module content:
Conservation laws and modelling. Fourier analysis. Heat equation, wave equation and Laplace's equation. Solution methods including Fourier series. Energy and other qualitative methods.

WTW 387 Continuum mechanics 387
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 248 and WTW 286
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Double medium　　　　　　　　**Credits:** 18
Module content:
Kinematics of a continuum: Configurations, spatial and material description of motion.

Conservation laws. Analysis of stress, strain and rate of deformation. Linear constitutive equations. Applications: Vibration of beams, equilibrium problems in elasticity and special cases of fluid motion.

WTW 389 Geometry 389
Academic organisation: Mathematics and Applied Mathematics
Prerequisite: WTW 211
Contact time: 2 lpw 1 tpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 18
Module content:
Axiomatic development of neutral, Euclidean and hyperbolic geometry. Using models of geometries to show that the parallel postulate is independent of the other postulates of Euclid.

ZEN 161 Animal diversity 161
Academic organisation: Zoology and Entomology
Prerequisite: MLB 111 GS or TDH
Contact time: 2 lpw fortnightly practicals
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 8
Module content:
Animal classification, phylogeny, organisation and terminology. Evolution of the various animal phyla, morphological characteristics and life cycles of parasitic and non-parasitic animals. Structure and function of reproductive, respiratory, excretory, circulatory and digestive systems.

ZEN 251 Invertebrate biology 251
Academic organisation: Zoology and Entomology
Prerequisite: ZEN 161 GS or TDH
Contact time: 4 lpw 1 ppw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 12
Module content:
Origin and extent of modern invertebrate diversity; parasites of man and domestic animals; biology and medical importance of arachnids; insect life styles; the influence of the environment on insect life histories; insect phytophagy, predation and parasitism; insect chemical, visual, and auditory communication; freshwater invertebrates and their use as biological indicators.

ZEN 261 African vertebrates 261
Academic organisation: Zoology and Entomology
Prerequisite: ZEN 161 GS or TDH
Contact time: 4 lpw 1 ppw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 12
Module content:
Introduction to general vertebrate diversity; African vertebrate diversity; vertebrate structure and function; vertebrate evolution; vertebrate relationships; aquatic vertebrates; terrestrial ectotherms; terrestrial endotherms; vertebrate characteristics; classification; structural adaptations; habits; habitats; conservation problems; impact of humans on other vertebrates.

ZEN 351 Population ecology 351
Academic organisation: Zoology and Entomology
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 18
Module content:
Scientific approach to ecology; evolution and ecology; the individual and its environment; population characteristics and demography; competition; predation; plant-herbivore interactions; regulation of populations; population manipulation.

ZEN 352 Mammalogy 352
Academic organisation: Zoology and Entomology
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 18
Module content:
Mammalian origins and their characteristics: evolution of African mammals; structure and function: integument, support and movement; foods and feeding; environmental adaptations; reproduction; behaviour; ecology and biogeography; social behaviour; sexual selection; parental care and mating systems; community ecology; zoogeography. Special topics: parasites and diseases; domestication and domesticated mammals; conservation.

ZEN 353 Community ecology 353
Academic organisation: Zoology and Entomology
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 18
Module content:
The scientific approach; characteristics of the community; the community as a superorganism; community changes; competition as a factor determining community structure; disturbance as a determinant of community structure; community stability; macroecological patterns and mechanisms.

ZEN 354 Physiology 354
Academic organisation: Zoology and Entomology
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 18
Module content:
The module is designed to promote understanding of animals as integrated systems at every level of organisation. The module focuses on the function of tissues, organs and organ systems of multicellular organisms in chemical and physical terms. Animal physiology is the study of how a living animal functions.
This module adopts a systems-based approach that covers many of the subdisciplines of physiology, ranging from neural physiology and endocrinology to mechanoreception and osmoregulation.

ZEN 355 Insect diversity 355
Academic organisation: Zoology and Entomology
Prerequisite: ZEN 251 GS or TDH
Contact time: 4 lpw 2 ppw

Period of presentation: Quarter 1
Language of tuition: English   **Credits:** 18
Module content:
The extent and significance of insect diversity. Functional insect morphology. The basic principles of taxonomy and the classification of taxa within the Insecta. Insect orders and economically and ecologically important southern African insect families. Identification of insect orders and families using distinguishing characteristics. General biological and behavioural characteristics of each group. Grouping of insects into similar lifestyles and habitats.

ZEN 361 Ecophysiology 361
Academic organisation: Zoology and Entomology
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 18
Module content:
The costs of living; factors affecting metabolic rate; limitations to the acquisition of energy and nutrients; the principles of nutritional ecology; problems associated with herbivorous diets; the effects of temperature on whole organism processes and the response of species to temperature variation; ectothermic and endothermic temperature regulation; animal responses to high and low temperatures; water balance physiology of insects and vertebrates; osmoregulation in aquatic and terrestrial environments; the importance of physiological ecology for understanding geographic variation in body size, range size, and abundance.

ZEN 362 Evolution and phylogeny 362
Academic organisation: Zoology and Entomology
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 3
Language of tuition: English   **Credits:** 18
Module content:
Evolution as a process and pattern, prime movers in evolution: Selection, drift, general population genetics. Population differentiation, clines, subspecies and species, adaptation as a major force in evolution and the panglossian paradigm, molecular evolution. Phylogeography, phylogenetic reconstruction. Evolutionary biogeography. Adaptation, Darwin's formulation, proximate and ultimate causation, genetic and developmental constraints, optimality. Phenotypic models, the comparative method, convergent evolution. Evolution of complex biological systems, origin of life and sex, macro-evolution, punctuated equilibrium, human evolution. Levels of selection. Species concepts.

ZEN 363 Behavioural ecology 363
Academic organisation: Zoology and Entomology
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 18
Module content:
The history of behavioural ecology. A causal, developmental, evolutionary and adaptive approach. Sensory systems and communication. Sexual selection, mate choice and sperm competition. Kin selection and group living. Special reference to social insects. The behavioural ecology of humans. Phylogenetic basis of behavioural analysis. The role of behavioural ecology in conservation planning.

ZEN 364 Conservation ecology 364
Academic organisation: Zoology and Entomology
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 18
Module content:
This module is intended to provide students with skills to undertake field surveys that are essential for research and planning in the conservation of biodiversity. The module has a large fieldwork component. A field trip will be conducted over a ten-day period during the September vacation in the Sani Pass region of the Drakensberg (including South Africa and Lesotho).
The students will be actively involved in planning and executing the field surveys, and will be responsible for analysing and presenting the results. The students will gain valuable practical experience in the field by applying a number of survey techniques and focusing on several different taxa that are relevant to conservation ecology.

ZEN 365 Insect pest management 365
Academic organisation: Zoology and Entomology
Contact time: 4 lpw 2 ppw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 18
Module content:
*It is strongly recommended that students first complete ZEN 355: Insect diversity 355
Definition, classification and characteristics of insect pests. Concepts of economic levels. Monitoring, surveys, sampling and forecasting. Yield loss assessment. Philosophy and context of integrated pest management. Alternative methods of pest control. Insecticide resistance and management. Important pests of South African agricultural crops, gardens and lawns.

Alphabetical list of modules offered by the Faculty of Engineering, Built Environment and Information Technology

AIM 101 Academic information management 101
Academic organisation: School of Information Technology
Period of presentation: Semester 1 or Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 6
Module content:
Find, evaluate, process, manage and present information resources for academic purposes using appropriate technology. Apply effective search strategies in different technological environments. Demonstrate the ethical and fair use of information resources. Integrate 21st-century communications into the management of academic information.

AIM 111 Academic information management 111
Academic organisation: School of Information Technology
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 4
Module content:
Find, evaluate, process, manage and present information resources for academic purposes using appropriate technology.

AIM 121 Academic information management 121
Academic organisation: School of Information Technology
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 4
Module content:
Apply effective search strategies in different technological environments. Demonstrate the ethical and fair use of information resources. Integrate 21st-century communications into the management of academic information.

CIL 122 Visual design (Autocad) 122
Academic organisation: School of Information Technology
Contact time: 1 ppw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 4
Module content:
AUTOCAD 122

COS 133 Introduction to programming 1 133
Academic organisation: Architecture
Prerequisite: Extended programmes only
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
This module introduces imperative computer programming, which is a fundamental building block of computer science. The process of constructing a program for solving a given problem, of editing it, compiling (both manually and automatically), running and debugging it, is covered from the beginning. The aim is to master the elements of a programming language, and be able to put them together in order to construct programs using types, control structures and arrays.

COS 143 Introduction to programming 2 143
Academic organisation: Architecture
Prerequisite: COS 133
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
This module follows on from the previous module and introduces the concepts of functions, memory management and libraries in the imperative programming paradigm. An introduction to object orientation will be given. After completing this module and the module prerequisite, the student should understand the fundamental elements of a program, the importance of good program design and userfriendly interfaces. Students should be able to conduct basic program analysis and write complete elementary programs.

COS 153 Introduction to programming 3 153
Academic organisation: Architecture
Prerequisite: COS 143
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
The module follows a practical programming approach. It will consolidate fundamental prior problem solving and programming knowledge.

SGM 311 Soil mechanics 311
Academic organisation: Civil Engineering
Prerequisite: (SWK 210)
Contact time: 1 tpw 2 ppw 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng **Credits:** 16
Module content:
Introduction to soil mechanics. Introduction to clay mineralogy. Mass, volume relationships and phases of soil. Groundwater flow and permeability. Effective stress principles. Suction pressures in saturated as well as partially saturated soil. The Mohr circle and stresses at a point. The Mohr-Coulomb strength theory and the stress-strain properties of soil. The Boussinesq theory. Consolidation theory and soil settlement.

SWK 122 Mechanics 122
Academic organisation: Civil Engineering
Prerequisite: WTW 158
Contact time: 2 tpw 4 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng **Credits:** 16
Module content:
Equivalent force systems, resultants. Newton's laws, units. Forces acting on particles. Rigid bodies: principle of transmissibility, resultant of parallel forces. Vector moments and scalar moments. Relationship between scalar- and vector moments. Couples. Equivalent force systems on rigid bodies. Resultants of forces on rigid bodies. Equilibrium in two and three dimensions. Hooke's law. Trusses and frameworks. Centroids and second moments of area. Beams: distributed forces, shear force, bending moment, method of sections, relationship between load, shear force and bending moment.

SWK 210 Strength of materials 210
Academic organisation: Civil Engineering
Prerequisite: SWK 122, WTW 168/WTW 128
Contact time: 2 tpw 4 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng **Credits:** 16
Module content:
Stresses, strains and the mechanical properties of materials: Normal stress and shear stress, tension and compression, equilibrium in shear, factor of safety, design, shear strain, stress/strain diagram, Hooke's Law, Poisson's Ratio and the shear stress/strain diagram. Axial loads: Elastic deformation, displacements, statically determinate and indeterminate structures and thermal effects. Torsion: Torsion of circular bars and power transmission bending of straight members and composite beams. Transverse shear: Shear in straight members and shear flow. Combined loads: Thin walled pressure vessels and stresses as a result of combined loads. Stress transformation: Plane stress transformation, principle stresses, maximum values and stress variation in prismatic beams. Strain transformation: Plane strain transformation, principle strains, maximum values, strain gauges and rosettes and the relationship between E, G and υ. Design of beams from section characteristics. Deflection of beams: The elastic curve, integration method, Macaulay's method and superposition.

Alphabetical list of modules offered by the Faculty of Health Sciences

ANA 121 Introduction: Human anatomy and embryology 121
Academic organisation: Anatomy
Prerequisite: MLB111 and CMY117
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 4
Module content:
Terminology, musculo-skeletal system, nervous system, surface anatomy, cardiovascular system, respiratory system, urogenital system, gastro-intestinal system, endocrine system, introductory osteology and joints, introductory embryology.

ANA 122 Human osteology 122
Academic organisation: Anatomy
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 4
Module content:
Introduction to osteology, bone function and classification, humerus, radius, ulna, femur, tibia, fibula, clavicle, scapula, ribs, sternum, vertebrae, pelvis, hand and foot bones, sesamoid bones, skull, mandible, joints.

ANA 126 Basic human histology 126
Academic organisation: Anatomy
Prerequisite: CMY117 and MLB111
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 4
Module content:
General introduction to cells and tissue, terminology, the cell and cytoplasm, organelles and inclusions, surface and glandular epithelium, general connective tissue, specialised connective tissue, namely cartilage, bone, blood and haemopoietic tissue, muscle and nervous tissue.

ANA 214 Human cell and developmental biology 214
Academic organisation: Anatomy
Prerequisite: ANA121 and ANA126 and CMY127
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
Functional review of the cell and cell content. Normal and abnormal cell function in relation to structure. Control of the human cell, heredity and the human genome. Cell communication, growth and development, adhesion and division. Aspects of cellular research. Techniques on how to study cells. Medical cell and molecular biology application. NOTE: This module is not open to all students and may only be taken by BSc (Medical Sciences) students.

ANA 215 Paleoanthropology 215
Academic organisation: Anatomy
Contact time: 1 ppw 2 lpw

Period of presentation: Semester 1
Language of tuition: English   **Credits:** 12
Module content:
Introduction to paleoanthropology, focusing on hominid fossil record, principles of evolution, principles of heredity, human variation, introduction to primatology, hominid taxonomy, time-frames and dating methods, fossilisation and taphonomy, trends in hominid evolution, hominid sites. Australopithecus, homo habilis, homo erectus, homo sapiens neanderthalensis, the origin of anatomically modern human beings, DNA studies, palaeo-environments, hominid diets, introduction to the development of culture, South African populations, human adaptation and modernisation.

ANA 217 Human anatomy 217
Academic organisation: Anatomy
Prerequisite: ANA121 and ANA122 and CMY127
Contact time: 2 lpw 2 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 16
Module content:
Regional approach to human anatomy.
Cadaver dissection of the upper and lower limbs, back, thorax, abdomen, pelvis, perineum and genital area. Anatomical techniques.
NOTE: This module is not open to all students and may only be taken by BSc (Medical Sciences) students.

ANA 226 Human histology 226
Academic organisation: Anatomy
Prerequisite: ANA 126#
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 12
Module content:
General introduction to organ structure.
Terminology. The eye, ear, skin, circulatory system, nervous system, lymphoid system, gastrointestinal tract, gastrointestinal tract glands, respiratory system, urinary system, male and female reproductive systems, endocrine system.
NOTE: This module is not open to all students and may only be taken by BSc (Medical Sciences) students.

ANA 227 Human anatomy 227
Academic organisation: Anatomy
Prerequisite: ANA 217GS#
Contact time: 2 lpw 2 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 16
Module content:
Regional approach to human anatomy.
Cadaver dissection of the head, neck as well as neuro-anatomy. Anatomical techniques.
NOTE: This module is not open to all students and may only be taken by BSc (Medical Sciences) students.

ANA 315 Forensic anthropology 315
Academic organisation: Anatomy
Prerequisite: ANA 122, ANA 215

Contact time: 1 ppw 2 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
Introduction to forensic anthropology, detection of graves, excavation of graves, human vs. animal bone, forensic entomology, osteometry, cranial and post-cranial measurements, non-metric features of the skeleton, age determination, sex determination, race determination, ante-mortem stature, dental analysis, osteopathology, factors of individualisation, measurements of the face, introduction to face mapping and skull-photo superimposition, legal aspects. NOTE: This module is not open to all students and may only be taken by BSc (Medical Sciences) students.

ANA 316 Histology techniques 316
Academic organisation: Anatomy
Prerequisite: ANA 226
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 18
Module content:
General introduction to light and electron microscopic techniques: fixation, processing, imbedding, staining. Principles of different staining techniques for LM and EM: routine stains, proteins, carbohydrates, amino acids, metachromasia, immunocytochemistry, lectin stains, specialised stains. Principles of the operation of LM and EM: general LM, fluorescent microscopy, differential contrast microscopy, dark field microscopy, phase contrast microscopy, transmission and scanning electron microscopy.

ANA 324 Human cell and developmental biology 324
Academic organisation: Anatomy
Prerequisite: ANA 214, ANA 226
Contact time: 3 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Practical aspects of cell biology. Cell, tissue, organ, and organism culture. The biology of the culture environment. Cellular basic of morphogenesis, cleavage patterns and gastrulation. The early vertebrate development; neurilation, ecto-, meso- and endoderm derivatives. Cell destiny and embryonic axis including malformations. Development of the tetrapod limb and cell death. Cell interactions at a distance through hormones and metamorphosis. NOTE: This module is not open to all students and may only be taken by BSc (Medical Sciences) students.

ANA 327 Comparative anatomy 327
Academic organisation: Anatomy
Prerequisite: ANA 121, ANA 122, ANA 217, ANA 227
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 18
Module content:
Introduction to comparative anatomy. Introduction to comparative osteology. Comparative anatomy of the appendicular skeleton. Comparative anatomy of the axial skeleton. NOTE: This module is not open to all students and may only be taken by BSc (Medical Sciences) students.

ANA 328 Applied research techniques 328
Academic organisation: Anatomy
Prerequisite: ANA 315#, ANA 316#
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Introduction to research. Development of research project. Research skills. Completion of literature review. NOTE: This module is not open to all students and may only be taken by BSc (Medical Sciences) students.

FAR 381 Pharmacology 381
Academic organisation: Pharmacology
Prerequisite: FLG 211, FLG 212, FLG 221, FLG 222
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 20
Module content:
Introduction, receptors, antagonism, kinetic principles, drugs that impact upon the autonomic and central nervous system, pharmacotherapy of hypertension, angina pectoris, myocardial infarction, heart failure, arrhythmias, and epilepsy. Diuretics, glucocorticosteroids, local anaesthetics, anaesthetic drugs, analgesics, iron and vitamins, oncostatics and immuno suppressants.

FAR 382 Pharmacology 382
Academic organisation: Pharmacology
Prerequisite: FAR 381, FLG 211, FLG 212, FLG 221, FLG 222
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 15
Module content:
Hormones, drugs that act on the histaminergic, serotonergic, and dopaminergic receptors. Pharmacotherapy of diabetes mellitus, schizophrenia, depression, obesity, anxiety, insomnia, gastro-intestinal diseases. Anticoagulants, antimicrobial drugs.

FLG 211 Introductory and neurophysiology 211
Academic organisation: Physiology
Prerequisite: CMY 117 and CMY 127 and MLB 111 and PHY 131
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 16
Module content:
Orientation in physiology, homeostasis, cells and tissue, muscle and neurophysiology, cerebrospinal fluid and the special senses.
Practical work: Experimental physiology to complement the theory.

FLG 212 Circulatory physiology 212
Academic organisation: Physiology
Prerequisite: CMY 117 and CMY 127 and MLB 111 and PHY 131
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 16

Module content:
Body fluids; haematology; cardiovascular physiology and the lymphatic system. Practical work: Practical exercises and experimental physiology.

FLG 221 Lung and renal physiology, acid-base balance and temperature 221
Academic organisation: Physiology
Prerequisite: FLG 211, FLG 212
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 16
Module content:
Structure, gas exchange and secretory functions of the lungs; build, excretory and non-urinary functions of the kidneys, acid-base balance, as well as the skin and body temperature control. Practical work: Practical exercises and experimental physiology.

FLG 222 Digestion, endocrinology and reproductive system 222
Academic organisation: Physiology
Prerequisite: FLG 211, FLG 212
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 16
Module content:
Nutrition, digestion and metabolism; hormonal control of the body functions and the reproductive systems. Practical work: Experimental physiology.

FLG 311 Applied cellular physiology 311
Academic organisation: Physiology
Prerequisite: BCM 253 GS, BCM 254 GS, BCM 255 GS, BCM 256 GS, BCM 263 GS, BCM 264 GS, BCM 265 GS, BCM 266 GS, FLG 221 and FLG 222
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 14
Module content:
This module comprises studies of the cell cycle, signal transduction pathways involved, cell cycle defects and mutations, cellular radiosensitivity and the physiological role, morphological properties and biochemical mechanisms of apoptosis and autophagy. Practical work: Exposure to applied cellular and in-vitro cell culture techniques.

FLG 312 Developmental physiology 312
Academic organisation: Physiology
Prerequisite: GS for all of BCM 253, BCM 254, BCM 255, BCM 256, BCM 263, BCM 264, BCM 265, BCM 266, FLG 221 and FLG 222
Contact time: 1 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 9
Module content:
Study of the physiological development and adaptations from the foetus through to the aged.

FLG 313 Research methodology and literature studies 313
Academic organisation: Physiology
Prerequisite: BCM 253 GS, BCM 254 GS, BCM 255 GS, BCM 256 GS, BCM 263 GS, BCM 264 GS, BCM 265 GS, BCM 266 GS, FLG 221 and FLG 222

Contact time: 1 dpw 1 lpw 1 ppw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 14
Module content:
Research methodology, career planning, subject orientated literature studies and seminars. Practical work: Preparation of research protocol, gathering of information (literature), writing of seminar.

FLG 314 Immunology 314
Academic organisation: Physiology
Prerequisite: GS for all of BCM 253, BCM 254, BCM 255, BCM 256, BCM 263, BCM 264, BCM 265, BCM 266, FLG 221 and FLG 222
Contact time: 1 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 9
Module content:
Introduction to basic, applied and integrated immunological mechanisms.

FLG 322 Industrial physiology 322
Academic organisation: Physiology
Prerequisite: BCM 253 GS, BCM 254 GS, BCM 255 GS, BCM 256 GS, BCM 263 GS, BCM 264 GS, BCM 265 GS, BCM 266 GS, FLG 221 and FLG 222
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 14
Module content:
Problem-orientated module, with the emphasis on occupational health and safety in the industrial environment. Integration of different physiological systems is required.
Practical work: Exposure to occupational hygiene measurement techniques.

FLG 324 Exercise physiology 324
Academic organisation: Physiology
Prerequisite: BCM 253 GS, BCM 254 GS, BCM 255 GS, BCM 256 GS, BCM 263 GS, BCM 264 GS, BCM 265 GS, BCM 266 GS, FLG 221 and FLG 222
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 14
Module content:
Mechanisms of muscle contraction and energy sources. Cardio-respiratory changes, thermo-regulation and other adjustments during exercise. Use and misuse of substances to improve performance.
Practical work: Applied practical work.

FLG 325 Nutrition physiology 325
Academic organisation: Physiology
Prerequisite: BCM 253 GS, BCM 254 GS, BCM 255 GS, BCM 256 GS, BCM 263 GS, BCM 264 GS, BCM 265 GS, BCM 266 GS, FLG 221 and FLG 222
Contact time: 1 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 9
Module content:
The importance of nutrients and micro nutrients in the composition of a normal diet; the

neuro-endocrine control of food intake and special aspects of function control of the digestive tract.

FLG 327 Higher neurological functions 327
Academic organisation: Physiology
Prerequisite: BCM 253 GS, BCM 254 GS, BCM 255 GS, BCM 256 GS, BCM 263 GS, BCM 264 GS, BCM 265 GS, BCM 266 GS , FLG 221 and FLG 222
Contact time: 2 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 20
Module content:
A module that focuses on the physiology of higher brain functions. Discussions are held on the interactions between the brain, immune and endocrine systems.
NB: Limited choice between this module and others. Consult with the head of department.

FLG 328 Pathophysiology 328
Academic organisation: Physiology
Prerequisite: BCM 253 GS, BCM 254 GS, BCM 255 GS, BCM 256 GS, BCM 263 GS, BCM 264 GS, BCM 265 GS, BCM 266 GS, and FLG 221 and FLG 222
Contact time: 1 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 9
Module content:
Human patho and applied physiology.

FLG 329 Integrated human physiology 329
Academic organisation: Physiology
Prerequisite: BCM 253 GS, BCM 254 GS, BCM 255 GS, BCM 256 GS, BCM 263 GS, BCM 264 GS, BCM 265 GS, BCM 266 GS, FLG 221 and FLG 222
Contact time: 1 ppw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 9
Module content:
Integration of all the human physiological systems.

FSG 110 Physiology 110
Academic organisation: Physiology
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 6
Module content:
Introduction (terminology and anatomical orientation); chemical principles; cytology and histology; neuro-physiology and the senses; haematology and body fluids; cardio-vascular system.

FSG 120 Physiology 120
Academic organisation: Physiology
Prerequisite: FSG 110
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 6

Module content:
Respiratory system; nutrition; digestion and metabolism; kidneys and acid-base equilibrium; endocrinology; reproduction physiology and reproduction; skin and body temperatures.

Alphabetical list of modules offered by the Faculty of Economic and Management Sciences

BDO 181 Industrial and organisational psychology 181
Academic organisation: Human Resource Management
Contact time: 3 lpw
Period of presentation: Quarter 2
Language of tuition: Both Afr and Eng   **Credits:** 5
Module content:
Capita selecta
This module will provide an introduction to personnel psychology, organisational behaviour and labour relations. It will refer to the selection of employees and the training and development of human resources in order to adapt to changing circumstances. The role of leadership in group utilisation and motivation will be treated both theoretically and practically. Labour relations will be studied in terms of institutional processes and the service relationship and will include practical aspects such as the handling of grievances, disciplining and dispute resolution.

BEL 220 Taxation 220
Academic organisation: Taxation
Prerequisite: FRK 111, FRK 121 or FRK 100 or FRK 101
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Introduction to income taxation, gross income, gross income (special inclusions), exempt income, general deduction formula, special deductions for individuals, capital allowances, introduction to fringe benefits, provisional taxation and employees' taxation.

BEM 110 Marketing management 110
Academic organisation: Marketing and Communication Management
Period of presentation: Semester 1
Contact time: 3 lpw
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:
Principles of marketing management and marketing instruments, customer centricity, the process of marketing management, market segmentation, positioning and marketing information systems, environmental analysis, identification of target markets, value creation, positioning strategies, consumer behaviour, relationship marketing, relationship intention, application of product, price, marketing communication and distribution strategies.

BEM 122 Marketing applications 122
Academic organisation: Marketing and Communication Management
Prerequisite: BEM 110 GS
Contact time: 3 lpw

Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:
E-marketing, services marketing, not-for-profit marketing, business-to-business marketing, retailing, global marketing.

BEM 211 Marketing management 211
Academic organisation: Marketing and Communication Management
Prerequisite: BEM 110 or BEM 121/122 with a GS in the other
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Product decisions
Problem statement and concept determination of product decisions, management strategies of the organisation, organisational and product strategy, implementation of the product strategy, product and market development strategy and the product life cycle.
Distribution decisions
The development and management of distribution channels – strategic aims, conventional marketing systems, the main role players, the integration of distribution with the other marketing instruments and relationship marketing; the influence of the external environment on channel design and management; the management of horizontal and vertical marketing systems and the forming of strategic alliances.

BEM 221 Marketing management 221
Academic organisation: Marketing and Communication Management
Prerequisite: BEM 110 or BEM 121/122 with a GS in the other, BEM 211 GS
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Integrated marketing communication decisions
Integrated marketing communication (IMC) approach; objectives and budgets for IMC programmes; management of advertising; sales promotion; personal selling; direct marketing; sponsorship, interactive media and internet marketing. Evaluation of IMC effectiveness.
Pricing decisions
Influence of cost, demand and competition on effective pricing decisions; financial analysis of market-based pricing; value and price sensitivity; competitive influences on price determination; psychological aspects of pricing and strategic pricing decisions.

BEM 311 Marketing management 311
Academic organisation: Marketing and Communication Management
Prerequisite: BEM 211 or BEM 221 with a GS in the other
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 20
Module content:
Brand management
The scope of brand awareness, brand name associations and customer-brand relation-ships. The development of brand name concept management, brand name extensions and co-branding. Exploring direct marketing and brand name management, brand name

architecture and brand name custodianship. The brand name communication process, brand name decisions, brand name identity, brand name loyalty and brand name equity. The design of marketing strategies to establish and extend brand name equity.
Marketing research
The use of marketing research in marketing decision making; the process of marketing research, research designs, random tests, consumer surveys, questionnaires, experimentation, observation, data analysis and analyses of marketing models. Scientific approach to marketing information, the influence of modern trends (computers, Internet). Integrated application of marketing research principles are assessed.

BEM 321 Marketing management 321
Academic organisation: Marketing and Communication Management
Prerequisite: BEM 211 or BEM 221 with a GS in the other, BEM 311 GS
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 20
Module content:
Strategic issues in marketing
Multilevel marketing; relationship marketing; e-marketing; brand loyalty; generation segmentation; knowledge management and ethics in marketing. Case studies, group discussions, seminars, and visits to/by organisations for meaningful integration of the theory and practice.
Strategic marketing
Strategic analysis; customer management; market strategies; globalisation; strategy implementation; marketing planning and strategy evaluation and control. Case studies, group discussions, seminars, and visits to/by organisations for meaningful integration of the theory and practice.

BME 120 Biometry 120
Academic organisation: Statistics
Prerequisite: At least 4 (50-59%) in Mathematics in the Grade 12 examination, or at least 50% in both Statistics 113, 123
Contact time: 1 ppw 4 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Simple statistical analysis: Data collection and analysis: Samples, tabulation, graphical representation, describing location, spread and skewness. Introductory probability and distribution theory. Sampling distributions and the central limit theorem. Statistical inference: Basic principles, estimation and testing in the one- and two-sample cases (parametric and non-parametric). Introduction to experimental design. One- and twoway designs, randomised blocks. Multiple statistical analysis: Bivariate data sets: Curve fitting (linear and non-linear), growth curves. Statistical inference in the simple regression case. Categorical analysis: Testing goodness of fit and contingency tables. Multiple regression and correlation: Fitting and testing of models. Residual analysis. Computer literacy: Use of computer packages in data analysis and report writing.

BME 210 Biometry 210
Academic organisation: Statistics
Prerequisite: BME 120
Contact time: 1 ppw 4 lpw
Period of presentation: Semester 1

Language of tuition: English   **Credits:** 24
Module content:
Analysis of variance: Multi-way classification. Testing of model assumptions, graphics. Multiple comparisons. Fixed, stochastic and mixed effect models. Block experiments. Estimation of effects. Experimental design: Principles of experimental design. Factorial experiments: Confounding, single degree of freedom approach, hierarchical classification. Balanced and unbalanced designs. Split-plot designs. Analysis of covariance. Computer literacy: Writing and interpretation of computer programmes. Report writing.

EKN 110 Economics 110
Academic organisation: Economics
Contact time: 1 dpw 2 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:
Conceptualise the interrelationships of the different sectors in South African economy. The functioning of international trade and policy, government economics and policy, the labour market, monetary economics, economic development and environmental economics with specific reference to the South African context. The impact of national and international decisions and events on the South African economy.

EKN 113 Economics 113
Academic organisation: Economics
Prerequisite: At least 6 (70-79%) in Mathematics in the Grade 12 examination or STK 113 (60%) and STK 123 (60%)
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 15
Module content:
Introduction to economics and principles of microeconomics
The scope of economics; the basic theory of demand and supply; price, income and cross elasticity of demand; consumer utility, the utility function and case studies in terms of the utility function; the theory of the firm in the short and long run; market structures, namely the perfect market, monopoly, oligopoly and monopolistic competition; public sector finances; microeconomics versus macroeconomics and economic statistics.

EKN 120 Economics 120
Academic organisation: Economics
Prerequisite: At least 4 (50-59%) in Mathematics in the Grade 12 examination or STK 113 (60%) and STK 123 (60%)
Contact time: 2 lpw 1 dpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:
The economic environment and problem: working and course of the South African economy; functioning and interrelationships of the different economic sectors. Macroeconomic theory and analysis. Analyse and interpret economic performance criteria: economic growth, inflation, job creation, balance of payments and exchange rate stability, income distribution. Calculate and interpret core economic indicators. Basic microeconomic principles: demand analysis (consumer theory); supply analysis (producer theory). Market analysis: market equilibrium; price determination; market forms; market failure; calculate and interpret price, income and cross elasticities.

EKN 123 Economics 123
Academic organisation: Economics
Prerequisite: At least 6 (70-79%) in Mathematics in the Grade 12 examination or
STK 113 (60%) and STK 123 (60%)
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 15
Module content:
National income and principles of macroeconomics
The mechanics of national income accounts, the Keynesian macroeconomic model, the money market, demand for money and money supply, money and credit creation and the role of the monetary authorities. The IS-LM model of macroeconomic equilibrium and monetary and fiscal policy applications. The aggregate demand and supply models with the debate between the classical school, the monetarists and the Keynesian school. The problems of inflation and unemployment. Macroeconomic issues, namely macroeconomic policy, international trade, the balance of payments and economic growth.

EKN 214 Economics 214
Academic organisation: Economics
Prerequisite: EKN 110 GS and EKN 120 or EKN 113 GS and EKN 123 and STK 110 GS and STK 120 GS
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Macroeconomics
From Wall and Bay Street to Diagonal Street: a thorough understanding of the mechanisms and theories explaining the workings of the economy is essential. Macroeconomic insight is provided on the real market, the money market, two market equilibrium, monetarism, growth theory, cyclical analysis, inflation, Keynesian general equilibrium analysis and fiscal and monetary policy issues. Mathematics for economics and econometric analysis of macroeconomic issues.

EKN 215 Economics 215
Academic organisation: Economics
Prerequisite: EKN 110 GS and EKN 120 or EKN 113 GS and EKN 123, STK 110 GS and STK 120 GS
Contact time: 1 dpw 2 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Monetary economics
The role and elements of the financial system in the economy, economic description, functions, historic development, legal framework and asset and liability structures of financial institutions in South Africa. Financial instruments in the money market, financial instruments in the capital market, fixed interest securities market, variable interest securities market, stock market (shares), capital market instruments, foreign exchange market and instruments, futures market and contracts, options market and contracts.
The meaning and functions of money, understanding interest rates, portfolio choice, the behaviour of interest rates, risk and term structure of interest rates, an economic analysis of the financial structure, multiple deposit creation and the money supply process, determinants of the money supply, the demand for money (different schools of thought)

transmission mechanisms of monetary policy, money and inflation, theory of rational expectations and efficient capital markets, rational expectations and implications for policy.

Global finance and the world economic environment, international monetary system, Eurocurrency market and offshore banking, overview of the global financial markets, the current monetary policy framework and policy process in South Africa, possible future developments (including inflationary targets and modern central banking trends), bank regulation: the key role banks must play in the financial system and the basic reason for bank regulation and electronic banking.

EKN 224 Economics 224
Academic organisation: Economics
Prerequisite: EKN 110 or EKN113, STK 110, EKN 214 GS
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Microeconomics
Microeconomic insight is provided into: consumer and producer theory, general microeconomic equilibrium, Pareto-optimality and optimality of the price mechanism, welfare economics, market forms and the production structure of South Africa. Statistic and econometric analysis of microeconomic issues.

EKN 314 Economics 314
Academic organisation: Economics
Prerequisite: EKN 214, EKN 224 and STK 120
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 20
Module content:
International trade/finance
International economic insight is provided into international economic relations and history, theory of international trade, international capital movements, international trade politics, economic and customs unions and other forms or regional cooperation and integration, international monetary relations, foreign exchange markets, exchange rate issues and the balance of payments, as well as open economy macroeconomic issues.

FBS 110 Financial management 110
Academic organisation: Financial Management
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:
Purpose and functioning of financial management. Basic financial management concepts. Accounting concepts and the use of the basic accounting equation to describe the financial position of a business. Recording of financial transactions. Relationship between cash and accounting profit. Internal control and the management of cash. Debtors and short-term investments. Stock valuation models. Depreciation. Financial statements of a business. Distinguishing characteristics of the different forms of businesses. Overview of financial markets and the role of financial institutions. Risk and return characteristics of various financial instruments. Issuing ordinary shares and debt instruments.

FBS 112 Financial management 112
Academic organisation: Financial Management
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 10
Module content:
Key principles of financial management. Company ownership. Taxation. Introduction to financial statements. Structure of financial statements. Depreciation and reserves. Preparing financial statements. Group financial statements and insurance company financial statements. Interpretation of financial statements. Limitation of financial statements. Issue of share capital.

FBS 120 Financial management 120
Academic organisation: Financial Management
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:
Analysis of financial statements. Budgeting and budgetary control. Tax principles and normal income tax for individuals. Time value of money and its use for financial and investment decisions. Calculating the cost of capital and the financing of a business to maintain the optimal capital structure. Capital investment decisions and a study of the financial selection criteria in the evaluation of capital investment projects. The dividend decision and an overview of financial risk management.

FBS 122 Financial management 122
Academic organisation: Financial Management
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 10
Module content:
Financial instruments. Use of financial derivatives. Financial institutions. Time value of money. Component cost of capital. Weighted average cost of capital. Capital structure and dividend policy. Capital project appraisal. Evaluating risky investments.

FRK 111 Financial accounting 111
Academic organisation: Accounting
Contact time: 4 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:
The nature and function of accounting; the development of accounting; financial position; financial result; the recording process; processing of accounting data; treatment of VAT; elementary income statement and balance sheet; flow of documents; accounting systems; introduction to internal control and internal control measures; bank reconciliations; control accounts; adjustments; financial statements of a sole proprietorship; the accounting framework.

FRK 121 Financial accounting 121
Academic organisation: Accounting
Prerequisite: FRK 111 GS
Contact time: 4 lpw

Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
Property, plant and equipment; intangible assets; inventories; liabilities; presentation of financial statements; enterprises without profit motive; partnerships; companies; close corporations; cashflow statements; analysis and interpretation of financial statements.

INF 112 Informatics 112
Academic organisation: Informatics
Prerequisite: Refer to Regulation 1.2(e); or STK 113, STK 123
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:
Introduction to information systems, information systems in organisations, hardware: input, processing, output, software: systems and application software, organisation of data and information, telecommunications and networks, the Internet and Intranet. Transaction processing systems, management information systems, decision support systems, information systems in business and society, systems analysis, systems design, implementation, maintenance and revision.

INF 153 Informatics 153
Academic organisation: Informatics
Prerequisite: Refer to Regulation 1.2(f)
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 5
Module content:
General systems theory, creative problem solving, soft systems methodology.

INF 154 Informatics 154
Academic organisation: Informatics
Prerequisite: Refer to Regulation 1.2(f)
Contact time: 1 lpw 2 ppw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 5
Module content:
Introduction to programming.

INF 163 Informatics 163
Academic organisation: Informatics
Prerequisite: INF 153; Regulation 1.2(f)
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 5
Module content:
The systems analyst, systems development building blocks, systems development, systems analysis methods, process modelling.

INF 164 Informatics 164
Academic organisation: Informatics
Prerequisite: INF 154; Regulation1.2(f)
Contact time: 1 lpw 2 ppw

Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 5
Module content:
Advanced programming, use of a computer-aided software engineering tool.

INF 214 Informatics 214
Academic organisation: Informatics
Prerequisite: CIL 111 and CIL 121
Contact time: 2 ppw 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
Database design: the relational model, structured query language (SQL), entity relationship modelling, normalisation, database development life cycle; practical introduction to database design. Databases: advanced entity relationship modelling and normalisation, object-oriented databases, database development life cycle, advanced practical database design.

INF 225 Informatics 225
Academic organisation: Informatics
Prerequisite: CIL 111, CIL 121, INF 163 and INF 164
Contact time: 1 lpw 1 ppw 2 dpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 14
Module content:
An overview of systems infrastructure and integration.

INF 261 Informatics 261
Academic organisation: Informatics
Prerequisite: INF 214
Contact time: 1 lpw 1 ppw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 7
Module content:
Database management: transaction management, concurrent processes, recovery, database administration: new developments: distributed databases, client-server databases: practical implementation of databases.

INF 281 Informatics 281
Academic organisation: Informatics
Prerequisite: FRK 121 or FRK 100 or FRK 101
Period of presentation: Semester 1 or Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 3
Module content:
Computer processing of accounting information.

KOB 183 Communication management 183
Academic organisation: Marketing and Communication Management
Contact time: 3 lpw
Period of presentation: Quarter 3
Language of tuition: Both Afr and Eng   **Credits:** 5

Module content:
*Module content will be adapted in accordance with the appropriate degree programme. Only one of KOB 181 - 184 may be taken as a module where necessary for a programme.
Applied business communication skills.
Acquiring basic business communication skills will enhance the capabilities of employees, managers and leaders in the business environment. An overview of applied skills on the intrapersonal, dyadic, interpersonal, group (team), organisational, public and mass communication contexts is provided. The practical part of the module (for example, the writing of business reports and presentation skills) concentrates on the performance dimensions of these skills as applied to particular professions.

OBS 114 Business management 114
Academic organisation: Business Management
Contact time: 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:
Introduction to business management as a science; the environment in which the enterprise operates; the field of business, the mission and goals of an enterprise; management and entrepreneurship. The choice of a form of enterprise; the choice of products and/or services; profit and cost planning for different sizes of operating units; the choice of location; the nature of production processes and the layout of the plant or operating unit.
Introduction to and overview of general management, especially regarding the five management tasks: strategic management; contemporary developments and management issues; financial management; marketing and public relations. Introduction to and overview of the value chain model; management of the input; management of the purchasing function; management of the transformation process with specific reference to production and operations management; human resources management and information management; corporate governance and black economic empowerment (BEE).

OBS 124 Business management 124
Academic organisation: Business Management
Prerequisite: Admission to the examination in OBS 114
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:
The nature and development of entrepreneurship; the individual entrepreneur and characteristics of South African entrepreneurs. Looking at the window of opportunity. Getting started (business start up). Exploring different routes to entrepreneurship: entering a family business, buying a franchise, home-based business and the business buyout. This semester also covers how entrepreneurs can network and find support in their environments. Case studies of successful entrepreneurs – also South African entrepreneurs – are studied.

OBS 210 Business management 210
Academic organisation: Business Management
Prerequisite: OBS 114 or 124 with admission to the examination in the other
Contact time: 3 lpw
Period of presentation: Semester 1

Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Logistics management
The role of logistics in an enterprise; definition and scope of customer service; electronic and other logistics information systems; inventory management; materials management with special reference to Japanese systems; management of the supply chain. Methods of transport and transport costs; types and costs of warehousing; electronic aids in materials handling; cost and price determination of purchases; organising for logistics management; methods for improving logistics performance.

OBS 220 Business management 220
Academic organisation: Business Management
Prerequisite: OBS 114 or 124 with admission to the examination in the other
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Project management: Introduction
Project management concepts; needs identification; the project, the project manager and the project team; types of project organisations; project communication and documentation.
Planning and control: planning, scheduling and schedule control of projects; resource considerations and allocations; cost planning and performance evaluation.

OBS 321 Entrepreneurship 321
Academic organisation: Business Management
Prerequisite: Admission to the examination in OBS 311
Contact time: 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 20
Module content:
*General service module available as elective module for other degree programmes.
Performance motivation: development of positive motives; role models; determining of the level of achievement motivation; reinforcement of the need for performance motivation; strategies and action plans. Creativity, innovation, need for achievement, entrepreneurial role models and the development of risk propensity.

STK 110 Statistics 110
Academic organisation: Statistics
Prerequisite: At least 5 (60-69%) in Mathematics in the Grade 12 examination.
Candidates who do not qualify for STK 110 must register for STK 113
Contact time: 1 ppw 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 13
Module content:
Descriptive statistics:
Sampling and the collection of data; frequency distributions and graphical representations. Descriptive measures of location and dispersion.
Probability and inference:
Introductory probability theory and theoretical distributions. Sampling distributions. Estimation theory and hypothesis testing of sampling averages and proportions (one and two-sample cases). Identification, use, evaluation and interpretation of statistical

computer packages and statistical techniques. This module is also presented as an anti-semester bilingual module.

STK 113 Statistics 113
Academic organisation: Statistics
Contact time: 1 ppw 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 11
Module content:
*On its own, STK 113 and 123 will not be recognised for degree purposes, but in this Faculty, exemption will be granted from the Grade 12 Mathematics admission requirement (i.e. at least 3 (40-49%) and STK 110.
Data operations and transformations:
Introductory concepts, the role of statistic, various types of data and the number system. Concepts underlying linear, quadratic, exponential, hyperbolic, logarithmic transformations of quantitative data, graphical representations, solving of equations, interpretations. Determining linear equations in practical situations. Characteristics of logarithmic functions. The relationship between the exponential and logarithmic functions in economic and related problems. Systems of equations in equilibrium. Additional concepts relating to data processing, functions and inverse functions, sigma notation, factorial notation, sequences and series, inequalities (strong, weak, absolute, conditional, double) and absolute values.
Descriptive statistics – Univariate:
Sampling and the collection of data, frequency distributions and graphical representations. Descriptive measures of location and dispersion. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques. The weekly one hour practical is presented during the last seven weeks of the semester.
This module is also presented as an anti-semester bilingual module.

STK 120 Statistics 120
Academic organisation: Statistics
Prerequisite: STK 110 GS or both STK 113 GS and STK 123 GS
Contact time: 1 ppw 3 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 13
Module content:
Multivariate statistics:
Analysis of variance, categorical data analysis, distribution-free methods, curve fitting, regression and correlation, the analysis of time series and indices.
Statistical and economic applications of quantitative techniques:
Systems of linear equations: drafting, matrices, solving, application. Optimisation; linear functions (two and more independent variables), non-linear functions (one and two independent variables). Marginal and total functions. Stochastic and deterministic variables in statistical and economic context: producers' and consumers' surplus, distribution functions, probability distributions, probability density functions. Identification, use, evaluation, interpretation of statistical computer packages and statistical techniques.
This module is also presented as an anti-semester bilingual module.

STK 123 Statistics 123
Academic organisation: Statistics
Prerequisite: STK 113 GS
Contact time: 1 ppw 3 lpw

Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
*On its own, STK 113 and 123 will not be recognised for degree purposes, but in this Faulty, exemption will be granted from the Grade 12 Mathematics admission requirement (i.e. at least 3 (40-49%) and STK 110.
Optimisation techniques with economic applications: Data transformations and relationships with economic applications, operations and rules, linear, quadratic, exponential, hyperbolic and logarithmic functions; systems of equations in equilibrium, system of linear inequalities, solving of linear programming problems by means of the graphical and extreme point methods. Applications of differentiation and integration in statistic and economic related problems: the limit of a function, continuity, rate of change, the derivative of a function, differentiation rules, higher order derivatives, optimisation techniques, the area under a curve and applications of definite integrals. Probability and inference: Introductory probability theory and theoretical distributions. Sampling distributions. Estimation theory and hypothesis testing of sampling averages and proportions (one-sample and two-sample cases). Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques. The weekly one hour practical is presented during the last seven weeks of the semester.
This module is also presented as an anti-semester bilingual module.

STK 210 Statistics 210
Academic organisation: Statistics
Prerequisite: STK 110, STK 120
Contact time: 1 ppw 3 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 20
Module content:
Probability theory: Univariate probability distributions, expected values and moments. Special probability distributions, binomial, hypergeometric, poison, exponential, gamma, beta and normal distribution. Probability distributions and moments in the bivariate case. The bivariate normal distribution. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.
This module is also presented as an anti-semester bilingual module.

STK 281 Statistics 281
Academic organisation: Statistics
Prerequisite: STK 110, STK 120
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 10
Module content:
Applied regression analysis: simple and multiple regression, nonlinear regression, correlation, the use of dummy variables, heteroscedasticity, serial correlation and lag structures. Applied time series analysis. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

TBE 110 Tourism management 110
Academic organisation: Tourism Management
Contact time: 4 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 10

Module content:
Structure and organisation of the tourism industry
This introductory section provides an introduction to and overview of the tourism industry. Firstly definitions and concepts are explored, thereafter the evolution of tourism through the ages will be addressed. With a sound frame of reference in place, the structure and organisation of tourism at the international, national, provincial and private sector levels are examined.
The tourism system and the key components of tourism
This section provides various perspectives on the tourism system and then focuses on the various components of the tourism system, their relationships and interdependence. Specific attention is given to key aspects such as attractions, transportation, distribution channels, hospitality and related services.

TBE 120 Tourism management 120
Academic organisation: Tourism Management
Prerequisite: TBE 110 GS
Contact time: 4 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 10
Module content:
Tourism demand, consumer behaviour and market research
As the consumer is central to success in the tourism industry, this section addresses tourism demand from both a quantitative and a qualitative perspective. An understanding is provided of tourist behaviour, cultural and international aspects of travel as well as the sociology of tourism. The latter part of this section focuses on the key role of travel and tourism research, particularly the application of research techniques and the interpretation of research results as an aid in tourism planning and decision making.
Tourism supply, planning and development
This section focuses on supply side activities and services that need to be addressed to ensure quality visitor experiences. Particular attention is given to the formulation and implementation of sustainable tourism planning, development and management principles and practices.

TBE 210 Tourism management 210
Academic organisation: Tourism Management
Prerequisite: TBE 110 or TBE 120 with a GS in the other
Contact time: 4 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 16
Module content:
Tourism policy, product development and impacts
In this section the processes and policy issues pertaining to tourism product development are addressed. Specific emphasis is placed on the importance of appropriate product and destination development. Planning concepts at difference scales, development processes as well as the principles and policies that should be followed in the planning of tourism are addressed. This section concludes with a balanced perspective on the social, economic and environmental impacts of tourism.
Tourism focus areas
This section investigates key growth sectors in the tourism industry such as ecotourism, adventure tourism and cultural tourism. Specific attention is given to the nature and extent of these growth sectors and focus areas, their interrelationships, importance and the numerous opportunities they create for entrepreneurs and destinations in general.

TBE 220 Tourism management 220
Academic organisation: Tourism Management
Prerequisite: TBE 210 GS
Contact time: 4 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 16
Module content:
The management of tourism attractions
In this section visitor attractions, which are at the core of successful tourism, will be addressed at three levels. Firstly, the key role of visitor attractions in the tourism industry will be outlined, after which the overall development process (feasibility studies, financial and design aspects, etc.) relating to visitor attractions will receive attention. The last part of this section focuses on the strategic management and operational aspects of visitor attractions.
Strategic destination marketing
This section firstly explores the unique characteristics of and approaches to strategic destination marketing, with particular emphasis on global best practices in this regard. It then provides a management and operational framework for destination marketing. Within this framework new developments, trends, practices and case studies in destination marketing are also addressed.

TBE 310 Tourism management 310
Academic organisation: Tourism Management
Prerequisite: TBE 210 or TBE 220 with a GS in the other
Contact time: 4 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 20
Module content:
Hospitality management 1
This section covers the "guest cycle" and addresses the process and procedures, from the moment a potential guest contacts an accommodation establishment to the time that he or she departs. All the operational and management functions of this process as well as key supportive aspects such as hospitality, social skills and customer care are covered in detail. A distinction is drawn between revenue centres and support centres. All the key support centres such as housekeeping, maintenance and security are covered. This section concludes with a well-rounded overview of the operational and management aspects of the front office and its support units.
Hospitality management 2
This section firstly covers the key operational and management aspects of food and beverage management, which forms a vital part of hospitality management. Industry exposure and practical involvement is an essential ingredient of this section. As financial management and costing is critical to the success of any hospitality organisation, the second part of this section covers all the policies, principles and procedures pertaining to financial operations and financial management in such establishments.

WST 111 Mathematical statistics 111
Academic organisation: Statistics
Prerequisite: At least 5 (60-69%) in Mathematics in the Grade 12 examination
Contact time: 1 ppw 4 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16

Module content:
Characterisation of a set of measurements: Graphical and numerical methods. Random sampling. Probability theory. Discrete and continuous random variables. Probability distributions. Generating functions and moments.

WST 121 Mathematical statistics 121
Academic organisation: Statistics
Prerequisite: WST 111 GS
Contact time: 1 ppw 4 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Sampling distributions and the central limit theorem. Statistical inference: Point and interval estimation. Hypothesis testing with applications in one and two-sample cases. Introductory methods for: Linear regression and correlation, analysis of variance, categorical data analysis and non-parametric statistics. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

WST 133 Mathematical statistics 133
Academic organisation: Statistics
Prerequisite: At least 3 (40-49%) in Mathematics in the Grade 12 examination
To be taken concurrently with WTW133
Contact time: 1 ppw 1 bpw 4 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Descriptive statistics – Univariate:
The role of Statistics, various types of data. Sampling, probability and non-probability sampling techniques and the collection of data. Frequency, relative and cumulative distributions and graphical representations. Additional concepts relating to data processing: sigma notation, factorial notation, sequences and series. Descriptive measures of location,dispersion and symmetry. Exploratory data analysis.
Probability:
Introductory probability theory and applications. Set theory and probability laws. Introduction to random variables. Assigning probabilities, probability distributions, expected value and variance in general. Specific discrete probability distributions (Uniform, Binomial).
Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

WST 143 Mathematical statistics 143
Academic organisation: Statistics
Prerequisite: WTW 133 GS and WST133 GS
To be taken concurrently with WTW143
Contact time: 1 ppw 1 bpw 4 lpw
Period of presentation: Semester 2
Language of tuition: English   **Credits:** 8
Module content:
Probability and inference:
Probability theory and theoretical distributions for continuous random variables (Uniform, Normal and t). Sampling distributions (means and proportions). Estimation theory and hypothesis testing of sampling averages and proportions (one- and two-sample cases).

Optimisation techniques with economic applications:
Applications of differentiation in statistic and economic related problems. Integration and Integration by parts. Applications of integration in statistic and economic related problems. Systems of equations in equilibrium. The area under a curve and applications of definite integrals in Statistics and Economics.
Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

WST 153 Mathematical statistics 153
Academic organisation: Statistics
Prerequisite: WST 133 GS and WST143 GS
Contact time: 1 ppw 1 bpw 4 lpw
Period of presentation: Semester 1
Language of tuition: English   **Credits:** 8
Module content:
Probability distributions:
Introductory distribution theory and special statistical distributions (Binomial, Geometric, Hypergeometric, Poisson, Uniform, Normal, Gamma). Generating functions and moments. Bivariate probability distributions.
Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

WST 211 Mathematical statistics 211
Academic organisation: Statistics
Prerequisite: WST 111, WST 121, WTW 114 GS, WTW 126 GS and WTW 128 GS
Contact time: 2 ppw 4 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 24
Module content:
Set theory. Probability measure functions. Random variables. Distribution functions. Probability mass functions. Density functions. Expected values. Moments. Moment generating functions. Special probability distributions: Bernoulli, binomial, hypergeometric, geometric, negative binomial, Poisson, Poisson process, discrete uniform, uniform, gamma,exponential, Weibull, Pareto, normal. Joint distibutions: Multinomial, extended hypergeometric, joint continuous distributions. Marginal distributions. Independent random variables. Conditional distributions. Covariance, correlation. Conditional expected values. Transformation of random variables: Convolution formula. Order statistics. Stochastic convergence: Convergence in distribution. Central limit theorem. Practical applications. Practical statistical modelling and analysis using statistical computer packages and the interpretation of the output.

WST 221 Mathematical statistics 221
Academic organisation: Statistics
Prerequisite: WST 211 GS
Contact time: 2 ppw 4 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 24
Module content:
Stochastic convergence: Asymptotic normal distributions, convergence in probability. Statistics and sampling distributions: Chi-squared distribution. Distribution of the sample mean and sample variance for random samples from a normal population. T-distribution. F-distribution. Beta distribution. Point estimation: Method of moments. Maximum

likelihood estimation. Unbiased estimators. Uniform minimum variance unbiased estimators. Cramer-Rao inequality. Efficiency. Consistency. Asymptotic relative efficiency.

Bayes estimators. Sufficient statistics. Completeness. The exponential class. Confidence intervals. Test of statistical hypotheses. Reliability and survival distributions. Practical applications. Practical statistical modelling and analysis using statistical computer packages and the interpretation of the output.

WST 311 Multivariate analysis 311
Academic organisation: Statistics
Prerequisite: WST 211, WST 221, WTW 211 GS and WTW 218 GS
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 18
Module content:
Multivariate statistical distributions: Moments of a distribution, moment generating functions, independence. Multivariate normal distribution: Conditional distributions, partial and multiple correlations. Multinomial and multivariate Poisson distributions: Asymptotic normality and estimation of parameters. Distribution of quadratic forms in normal variables. Multivariate normal samples: Estimation of the mean vector and covariance matrix, estimation of correlation coefficients, distribution of the sample mean, sample covariance matrix and sample correlation coefficients. The linear model: Models of full rank, least squares estimators, test of hypotheses. Practical applications: Practical statistical modelling and analysis using statistical computer packages and interpretation of the output.

WST 312 Stochastic processes 312
Academic organisation: Statistics
Prerequisite: WST 211, WST 221, WTW 211GS and WTW 218 GS
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 18
Module content:
Definition of a stochastic process. Stationarity. Covariance stationary. Markov property. Random walk. Brownian motion. Markov chains. Chapman-Kolmogorov equations. Recurrent and transient states. First passage time. Occupation times. Markov jump processes. Poisson process. Birth and death processes. Structures of processes. Structure of the time-homogeneous Markov jump process. Applications in insurance. Practical statistical modelling, analysis and simulation using statistical computer packages and the interpretation of the output.

WST 321 Time-series analysis 321
Academic organisation: Statistics
Prerequisite: WST 211, WST 221, WST 311 GS, WTW 211GS and WTW 218 GS
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 18
Module content:
Stationary and non-stationary univariate time-series. Properties of autoregressive moving average (ARMA) and outoregressive integrated moving average (ARIMA) processes. Identification, estimation and diagnostic testing of a time-series model. Forecasting. Multivariate time-series. Practical statistical modelling and analysis using statistical computer packages.

WST 322 Actuarial statistics 322
Academic organisation: Statistics
Prerequisite: WST 211, WST 221, WTW 211GS and WTW 218 GS
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 2
Language of tuition: Double medium   **Credits:** 18
Module content:
Decision theory. Loss distributions. Reinsurance. Risk models. Ruin theory. Credibility theory. Methods to forecast future claim numbers and amounts. The generalised linear model: Exponential family, mean and variance, link functions, deviance and residual analysis, test statistics, log-linear and logit models. Practical statistical modelling and analysis using statistical computer packages.

WST 362 Mathematical statistics 362
Academic organisation: Statistics
Prerequisite: WST 211, WST 221, WTW 211 GS and WTW 218 GS
Contact time: 1 ppw 2 lpw
Period of presentation: Semester 1
Language of tuition: Double medium   **Credits:** 18
Module content:
Distribution-free methods: One, two and multi-sample rank tests. Linear rank test statistics with applications. Rank correlation. Asymptotic relative efficiency. Student seminars. Identification, use, evaluation and interpretation of statistical computer packages and statistical techniques.

Alphabetical list of modules offered by the Faculty of Law

BER 210 Business law 210
Academic organisation: Mercantile Law
Contact time: 1 dpw 2 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Basic principles of law of contract. Law of sales, credit agreements, lease.

BER 220 Business law 220
Academic organisation: Mercantile Law
Prerequisite: BER 210
Contact time: 1 dpw 2 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 16
Module content:
Labour law. Aspects of security law. Law of insolvency. Entrepreneurial law; company law, law concerning close corporations. Law of partnerships.

Alphabetical list of modules offered by the Faculty of Humanities

EOT 110 Academic literacy (1) 110
Academic organisation: Unit for Academic Literacy
Contact time: 1 other per week 2 lpw
Period of presentation: Semester 1

Language of tuition: Both Afr and Eng   **Credits:** 6
Module content:
An introduction to academic literacy that considers various learning styles and strategies, and provides an initial exploration of the characteristics of academic language. The module focuses initially on academic listening and speaking. Practice in collecting information for academic tasks, as well as in the processing of academic information. In addition, the module has a focus on the enhancement of academic vocabulary, and some initial and elementary academic writing is attempted.

EOT 120 Academic literacy (2) 120
Academic organisation: Unit for Academic Literacy
Contact time: 1 other per week 2 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 6
Module content:
While retaining an emphasis on the collection and processing of academic information, this module also provides sustained practice in academic reading. Similarly, we con-centrate on building up an academic vocabulary specific to certain fields of study. The final part of the module brings together academic listening, reading and writing. The production of academic information in the form of argumentative writing is the focus here, i.e. we concentrate on producing academic discourse that is rational, coherent, clear and precise.

EOT 161 Academic reading skills 161
Academic organisation: Unit for Academic Literacy
Prerequisite: A code 4 or 5 in the test of academic literacy levels (TALL) or EOT 110, EOT 120
Contact time: 3 lpw
Period of presentation: Quarter 1
Language of tuition: Both Afr and Eng   **Credits:** 6
Module content:
Developing academic reading skills in English, including summarizing, vocabulary building and critical reading.

EOT 162 Academic writing skills 162
Academic organisation: Unit for Academic Literacy
Prerequisite: A code 4 or 5 in the test of academic literacy levels (TALL) or EOT 110, EOT 120
Contact time: 3 lpw
Period of presentation: Quarter 2
Language of tuition: Both Afr and Eng   **Credits:** 6
Module content:
Developing academic writing skills in English, including structuring and sustaining arguments, and basic English grammatical and editing skills.

EOT 164 Communication in organisations 164
Academic organisation: Unit for Academic Literacy
Prerequisite: A code 4 or 5 in the test of academic literacy levels (TALL) or EOT 110, EOT 120
Contact time: 3 lpw
Period of presentation: Quarter 4
Language of tuition: English   **Credits:** 6

Module content:

This module focuses on the role of language in organisations. Techniques for persuasion, finding information, conducting interviews, etc. are covered, as well as methods used in advertising and skills needed for public speaking. The criteria for drawing up a successful CV, for conducting meetings successfully, writing letters, agendas, minutes and reports are discussed and practiced.

FIL 155 Science and world views 155
Academic organisation: Philosophy
Contact time: 1 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 6
Module content:

World views in ancient Greece. Socrates. Plato – the founder of Western thought. Aristotle – the foundation of a new tradition. Leonardo da Vinci. The foundation of modern science. The wonder years of the seventeenth century – the flourishing of the sciences and philosophy. The rising of mechanisation. A drastic turn in man's vision – the rise of psychology. How the theory of relativity changed our view of the cosmos. Quantum theory and its implications for the modern world view. The biological sciences and the secrets of life. The rise and role of psychology. The neuro-sciences. The place, role and benefit of philosophical thought in the sciences.

MTL 181 Medical terminology 181
Academic organisation: Ancient Languages
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:

The module entails the acquisition of a basic medical orientated vocabulary compiled from Latin and Greek stem forms combined with prefixes and suffixes derived from these languages. The manner in which the meanings of medical terms can be determined by analyzing the terms into their recognizable meaningful constituent parts is taught and exercised. The functional application of medical terms in context as practical outcome of terminological application is continually attended to.

RES 261 Research 261
Academic organisation: Psychology
Prerequisite: RES 151
Contact time: 2 lpw
Period of presentation: Quarter 1
Language of tuition: Both Afr and Eng   **Credits:** 10
Module content:

Methods of critical thinking and inquiry
The module focuses on different basic methods of inquiry in the humanities. The purpose of this module is to equip students with the necessary competence to:
• select and apply central procedures, operations and techniques;
• identify and solve well-defined problems using relevant methods of inquiry;
• critically analyse and synthesize information, and present the information using skills effectively; and
• present and communicate information coherently and reliably, using academic conventions and formats appropriately.
Students will also develop an awareness of ethically sound research using different approaches.

RES 361 Research 361
Academic organisation: Sociology
Prerequisite: RES 151
Contact time: 2 lpw
Period of presentation: Quarter 2
Language of tuition: English   **Credits:** 15
Module content:
Research methodology and methods
The module is concerned with discussing epistemological questions regarding the meaning of knowledge and how to attain it. In so doing, it is based towards the social sciences and humanities, and will seek specifically to analyse the assumptions upon which scientific methods are based and to relate the latter to concrete investigations.

SLK 110 Psychology 110
Academic organisation: Psychology
Contact time: 2 lpw 1dpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
This module is a general orientation to psychology. An introduction is given to various theoretical approaches in psychology, and the development of psychology as a science is discussed. Selected themes from everyday life are explored and integrated with psychological principles. This module focuses on major personality theories. An introduction is given to various paradigmatic approaches in Psychology.

SLK 120 Psychology 120
Academic organisation: Psychology
Contact time: 2 lpw 1 dpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 12
Module content:
This module introduces the student to a basic knowledge and understanding of the biological basis of human behaviour. The module addresses the key concepts and terminology related to the biological subsystem, the rules and principles guiding biological psychology, and identification of the interrelatedness of different biological systems and subsystems. In this module various cognitive processes are studied, including perception, memory, thinking, intelligence and creativity. Illustrations are given of various thinking processes, such as problem solving, critical, analytic and integrative thinking.

SLK 210 Psychology 210
Academic organisation: Psychology
Prerequisite: SLK 110, SLK 120(GS) and RES 151 are recommended
Contact time: 2 lpw
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 20
Module content:
In this module human development from conception through adolescence to adulthood is discussed with reference to various psychological theories. Incorporated are the developmental changes related to cognitive, physical, emotional and social functioning of the individual and the context of work in adulthood. Traditional and contemporary theories of human development explaining and describing these stages are studied in order to address the key issues related to both childhood and adulthood.

SLK 220 Psychology 220
Academic organisation: Psychology
Prerequisite: SLK 110, SLK 120(GS) and SLK 261 are recommended
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 20
Module content:
This module is a social-psychological perspective on interpersonal and group processes. Themes that are covered include communication, pro-social behaviour, social influence and persuasion, political transformation, violence, and group behaviour.

SLK 310 Psychology 310
Academic organisation: Psychology
Contact time: 2 lpw
Prerequisite: SLK 210(GS), SLK 220(GS) and RES 361 are recommended
Period of presentation: Semester 1
Language of tuition: Both Afr and Eng   **Credits:** 30
Module content:
Identification of abnormal behaviour in children based on knowledge of normal childhood development; introduction to the study of various models pertaining to abnormal behaviour; understanding and application of basic concepts in child psychopathology. This module also provides an introduction to psychopathology and symptomatology of adult abnormal behaviour. Terminology, definitions of abnormal behaviour, problems in diagnosis, labelling, and myths regarding abnormal behaviour are discussed. Neurosis as a specific mental disorder is studied critically from a multidimensional perspective, including intrapsychic, interpersonal and social-cultural explanations.

SLK 320 Psychology 320
Academic organisation: Psychology
Prerequisite: SLK 310(GS)
Contact time: 2 lpw
Period of presentation: Semester 2
Language of tuition: Both Afr and Eng   **Credits:** 30
Module content:
This module deals with a community psychological perspective on human behaviour and psychological interventions and also critically explores the contribution of various perspectives in psychology. The module focuses on themes such as definitions of key concepts, principles and aims of community psychology, and the role of the community psychologist as well as the impact of earlier thought frameworks on contemporary perspectives. The implications of these ideas for practical initiatives focussed on mental health in communities, are discussed.

Alphabetical list of modules offered by the Faculty of Education

VHS 400 Subject didactics of hospitality studies 400
Academic organisation: Humanities Education
Contact time: 32 lpw
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 24
Module content:
The nature and structure of the subject hospitality studies. Basic principles, concepts and

practices in hospitality studies. Facilitating learning in hospitality studies. Design and implementation of supportive learning material.

ASS 400 Assessment 400
Academic organisation: Humanities Education
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 12
Module content:
Theory and practice of teaching assessment. Recording and reporting of assessment. Self-assessment, peer assessment and formal assessment. Accommodations and alternative assessment of learners with a disability. The principles of designing the professional portfolio presentation and using it for assessment.

COE 400 Social context in education 400
Academic organisation: Humanities Education
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 12
Module content:
Contextual understanding of the human and sociological development impacting on education with particular reference to following an asset-based approach to managing a diverse, multicultural, multi-ethnic group of learners often contending with problematic home circumstances and under the threat of HIV/Aids.

FCL 400 Facilitating learning 400
Academic organisation: Humanities Education
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 24
Module content:
Conceptualising changes in education and demonstrating change in education practice. Personal development through reflection. Studying the philosophy and principles of facilitating learning. Explore outcome based education system. Redefine existing teaching strategies in context of the learning paradigm. Designing and operationalising learning tasks for learners. Creating and managing a learning environment in which learners can construct and share meaning. Understand the importance of collaboration, team teaching and networking. Develop an integrated approach supported by ICT pertaining to the seven roles of the teacher.

GPE 400 Global perspectives in education 400
Academic organisation: Humanities Education
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 6
Module content:
Dealing with future scenarios in education emerging from globalisation, world of work and contextual impact on education in South Africa. Interpreting the works of contemporary visionaries on the future education scenarios impacting on education in context of Africa. Creating management strategies in dealing with the age of technology, HIV/Aids, new social structures, gender and racial issues. (ClickUP)

LNT 400 Learning theories 400
Academic organisation: Science, Mathematics and Technology Education
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 12

Module content:
This study focuses on different theories of learning. Students will be challenged to explore most recent research on learning style preferences and motivation, whole-brain learning and multiple intelligences and possible causes of poor and underachievement to enable them to cater for the diversity of learners. Concepts, elements and skills of critical and creative thinking will be dealt with to create challenging learning environments (Web-based).

PEL 400 Professional ethics and law 400
Academic organisation: Humanities Education
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 6
Module content:
This module explores and reflects on human rights, environmental and democratic issues impacting on own practices. Critical analysis of education systems (education policy) and its impact on the micro level (in the classroom) in education. Knowledge of the elements of effective school management, systems of discipline and defining activities that promote an awareness of citizenship, human rights and the principles and values of the Constitution. Interpret educational legislation dealing with HIV/Aids, drugs and violence. Identifying and internalising ethical professional educator behaviour.

PPF 400 Professional portfolio 400
Academic organisation: Humanities Education
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 12
Module content:
End of first semester: progress assessment and feedback. End of the academic year: submission of a prepared professional portfolio as a valid and reliable scientific proof of learning, integrating all modules. Present and defend the professional portfolio to a panel of examiners for final evaluation.

VHT 400 Subject didactics of consumer studies 400
Academic organisation: Science, Mathematics and Technology Education
Contact time: 32 lpy
Period of presentation: Year
Language of tuition: Double medium   **Credits:** 24
Module content:
The nature and structure of the subject hospitality studies. Basic principles, concepts and practices in consumer studies. Facilitating learning in consumer studies. Design and implementation of supportive learning material.

E&OE