BSc (Geography) *Geography and Environmental Science* (02133364)

Department	Geography, Geoinformatics and Meteorology
Minimum duration of study	3 years
Total credits	405
NQF level	07

Programme information

Those students registered for the BSc (Geography and Environmental Science) programme and who have opted to select any of the dual major fields of study offered within this programme must take note of the following:

- Their Academic Record will list all the modules that they have completed towards a second major field of study (based on final year modules completed).
- Their Degree certificate will only print the officially approved programme name:

Bachelor of Science
Geography and Environmental Science

Admission requirements

Important information for all prospective students for 2023

The admission requirements below apply to all who apply for admission to the University of Pretoria with a **National Senior Certificate (NSC) and Independent Examination Board (IEB) qualifications. Click here for this Faculty Brochure.**

Minimum requirements

Achievement level			
English Home Language or English First Additional Language	**Mathematics**	**Physical Sciences**	**APS**
NSC/IEB	NSC/IEB	NSC/IEB	
5	5	5	**34**

Life Orientation is excluded when calculating the APS.

You will be considered for final admission to degree studies if space allows, and if you have a National Senior Certificate (NSC) or equivalent qualification with admission to bachelor's degree studies, and comply with the minimum subject requirements as well as the APS requirements of your chosen programme.

Applicants with qualifications other than the abovementioned should refer to the Brochure: Undergraduate Programme Information 2023: Qualifications other than the NSC and IEB, available at click here.

International students: Click here.

Transferring students

A transferring student is a student who, at the time of applying at the University of Pretoria (UP) is/was a registered student at another tertiary institution. A transferring student will be considered for admission based on NSC or equivalent qualification and previous academic performance. Students who have been dismissed from other institutions due to poor academic performance will not be considered for admission to UP.

Closing dates: Same as above.

Returning students

A returning student is a student who, at the time of application for a degree programme is/was a registered student at UP, and wants to transfer to another degree at UP. A returning student will be considered for admission based on NSC or equivalent qualification and previous academic performance.

Note:

- Students who have been excluded/dismissed from a faculty due to poor academic performance may be considered for admission to another programme at UP, as per faculty-specific requirements.
- Only ONE transfer between UP faculties and TWO transfers within a faculty will be allowed.
- Admission of returning students will always depend on the faculty concerned and the availability of space in the programmes for which they apply.

Closing date for applications from returning students

Unless capacity allows for an extension of the closing date, applications from returning students must be submitted before the end of August via your UP Student Centre.

Candidates who do not comply with the minimum admission requirements for BSc Geography (Geography and Environmental Sciences), may be considered for admission to the BSc – Extended programme – Physical Sciences, which requires an additional year of study.

BSc – Extended Programme – Physical Sciences
Minimum requirements
Achievement level

English Home Language or English First Additional Language	**Mathematics**	**Physical Sciences**	**APS**
NSC/IEB	NSC/IEB	NSC/IEB	
4	4	4	**28**

Note:

*The BSc – Extended programmes are not available for students who meet all the requirements for the corresponding mainstream programme.

*Please note that only students who apply in their final NSC or equivalent qualification year will be considered for admission into any of the BSc – Extended programmes. Students who are upgrading or taking a gap year will not be considered.

Other programme-specific information

1.1 Requirements for specific modules

A candidate who:

a. does not qualify for STK 110, must enrol for STK 113 and STK 123;
b. registers for Mathematical Statistics (WST) and Statistics (STK) modules must take note that WST and STK modules, except for STK 281, may not be taken simultaneously in a programme; a student must take one and only one of the following options:

- WST 111, WST 121, WST 212, WST 211, WST 221, WST 311, WST 312, WST 322, WST 321, and STK 353

  or

- WST 111, WST 121, WST 212, WST 211, WST 221, WST 311, WST 312, WST 322, STK 320, STK 353.

  or

- STK 110, STC 122, STK 210, STK 220, WST 212, STK 310, STK 320, STK 353.

c. registers for a module presented by another faculty must take note of the timetable clashes, prerequisites for that module, subminimum required in examination papers, supplementary examinations, etc.

1.2 Fundamental modules

a. It is compulsory for all new first-year students to satisfactorily complete the Academic orientation (UPO 102) and to take Academic information management modules (AIM 111 and AIM 121) and Language and study skills (LST 110). Please see curricula for details.
b. Students who intend to apply for admission to MBChB or BChD in the second semester, when places become available in those programmes, may be permitted to register for up to 80 module credits and 4 core modules in the first semester during the first year provided that they obtained a final mark of no less than 70% for Grade 12 Mathematics and achieved an APS of 34 or more in the NSC.

Promotion to next study year

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. 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 relevant 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.

- 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 readmission.
- Should the student be readmitted 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 readmitted to further studies by the Admissions Committee, he/she will be informed in writing.
- Students who are not readmitted by the Admissions Committee have the right to appeal to the Senior Appeals Committee.
- Any decision taken by the Senior Appeals Committee is final.

General information

University of Pretoria Programme Qualification Mix (PQM) verification project

The higher education sector has undergone an extensive alignment to the Higher Education Qualification Sub-Framework (HEQF) across all institutions in South Africa. In order to comply with the HEQSF, all institutions are legally required to participate in a national initiative led by regulatory bodies such as the Department of Higher Education and Training (DHET), the Council on Higher Education (CHE), and the South African Qualifications Authority (SAQA). The University of Pretoria is presently engaged in an ongoing effort to align its qualifications and programmes with the HEQSF criteria. Current and prospective students should take note that changes to UP

qualification and programme names, may occur as a result of the HEQSF initiative. Students are advised to contact their faculties if they have any questions.

Curriculum: Year 1

Minimum credits: 128

Fundamental = 14
Core = 66
Elective = 48

Additional Information
Students are advised to choose elective modules based on the requirements for a second major of interest. It is the student's responsibility to ensure that all prerequisites are taken into account. Choose electives according to the combinations below with a view to pursuing specialisation in the relevant field. Continue with the electives pertaining to the specific second major chosen, through to the second and third years of study.

- **Geoinformatics as a second major:** INF 154 (S1, 10), INF 171 (S1 & 2, 10 + 10) INF 164 (S2, 10), INF 112 (S2, 10) [20 + 30 = 50]
- **Plant Science as a second major:** MLB 111 (S1, 16), BOT 161 (S2, 8), CMY 117 (S1, 16), CMY 127 (S2, 16), MBY 161 (S2, 8) [32 + 32 = 64]
- **Soil Science as a second major:** BOT 161 (S2, 8), CMY 117 (S1, 16), CMY 127 (S2, 16), MLB 111 (S1, 16) [32 +24 = 56]
- **Ecology as a second major:** BOT 161 (S2, 8), CMY 117 (S1, 16), CMY 127 (S2, 16), MLB 111 (S1, 16), ZEN 161 (S2, 8) [32 + 32 = 64]
- **Meteorology as second major:** WKD 155, PHY 114. Students doing a second major in meteorology should replace WTW 134 with WTW 114 and WTW 124 (48 credits)

Possibilities for second majors in Social Sciences (two options)

- **Anthropology as a second major:** APL 110 (S1, 12), APL 120 (S2, 12), EFK 110 (S1, 12), EFK 120 (S2, 12) [24 + 24 = 48] – towards BSocSciHons (Anthropology)
- **Heritage and Cultural Tourism as second major:** EFK 110 (S1, 12), EFK 120 (S2, 12), APL 110 (S1,12), APL 120 (S2, 12) = [24 + 24 = 48] – towards BSocSciHons (Heritage and Cultural Tourism)

Fundamental modules

Academic information management 111 (AIM 111)

Module credits	4.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences Faculty of Humanities Faculty of Law Faculty of Health Sciences Faculty of Natural and Agricultural Sciences Faculty of Theology and Religion
Prerequisites	No prerequisites.
Contact time	2 lectures per week
Language of tuition	Module is presented in English

Department	Information Science
Period of presentation	Semester 1

Module content

Find, evaluate, process, manage and present information resources for academic purposes using appropriate technology.

Academic information management 121 (AIM 121)

Module credits	4.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences Faculty of Humanities Faculty of Law Faculty of Health Sciences Faculty of Natural and Agricultural Sciences Faculty of Theology and Religion Faculty of Veterinary Science
Prerequisites	No prerequisites.
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Informatics
Period of presentation	Semester 2

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.

Language and study skills 110 (LST 110)

Module credits	6.00
NQF Level	05
Service modules	Faculty of Natural and Agricultural Sciences Faculty of Veterinary Science
Prerequisites	No prerequisites.
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Unit for Academic Literacy
Period of presentation	Semester 1

Module content
The module aims to equip students with the ability to cope with the reading and writing demands of scientific disciplines.

Academic orientation 102 (UPO 102)

Module credits	0.00
NQF Level	00
Language of tuition	Module is presented in English
Department	Natural and Agricultural Sciences Deans Office
Period of presentation	Year

Core modules

Biometry 120 (BME 120)

Module credits	16.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences Faculty of Veterinary Science
Prerequisites	At least 4 (50-59%) in Mathematics in the Grade 12 examination, or at least 50% in both Statistics 113, 123
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Statistics
Period of presentation	Semester 2

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.

Introduction to environmental sciences 101 (ENV 101)

Module credits	8.00
NQF Level	05

Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Humanities
Prerequisites	No prerequisites.
Contact time	1 practical per week, 3 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 1

Module content

Introducing the basic concepts and interrelationships required to understand the complexity of natural environmental problems, covering an introduction to environmental science and biogeography; including a first introduction to SDGs and Aichi targets.

Aspects of human geography 156 (GGY 156)

Module credits	8.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Humanities Faculty of Health Sciences
Prerequisites	No prerequisites.
Contact time	1 tutorial per week, 3 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 2

Module content

This module begins by fostering an understanding of human geography. Then follows with the political ordering of space; cultural diversity as well as ethnic geography globally and locally; population geography of the world and South Africa: and four economic levels of development. The purpose is to place South Africa in a world setting and to understand the future of the country.

Southern African geomorphology 166 (GGY 166)

Module credits	8.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Humanities Faculty of Health Sciences

Prerequisites	A candidate must have passed Mathematics and Physical Science with at least 60% in the Grade 12 examination OR a candidate must have passed PHY 143 and WTW 143.
Contact time	1 tutorial per week, 3 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 3

Module content

Note: Students cannot register for both GGY 166 and GGY 168.

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.

Cartography 110 (GMC 110)

Module credits	10.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	No prerequisites.
Contact time	1 practical per week, 3 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 2

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). Critique maps of indicators to measure United Nations Sustainable Development Goals in South Africa.

Mathematics 134 (WTW 134)

Module credits	16.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Veterinary Science
Prerequisites	50% for Mathematics in Grade 12

Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 1

Module content

**Students will not be credited for more than one of the following modules for their degree: WTW 134, WTW 165, WTW 114, WTW 158. WTW 134 does not lead to admission to Mathematics at 200 level and is intended for students who require Mathematics at 100 level only. WTW 134 is offered as WTW 165 in the second semester only to students who have applied in the first semester of the current year for the approximately 65 MBChB, or the 5-6 BChD places becoming available in the second semester and who were therefore enrolled for MGW 112 in the first semester of the current year.*
Functions, derivatives, interpretation of the derivative, rules of differentiation, applications of differentiation, integration, interpretation of the definite integral, applications of integration. Matrices, solutions of systems of equations. All topics are studied in the context of applications.

Elective modules

Introduction to social anthropology 110 (APL 110)

Module credits	12.00
NQF Level	05
Prerequisites	No prerequisites.
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Anthropology, Archaeology and Development Studies
Period of presentation	Semester 1

Module content

This introduction to social anthropology introduces basic themes of the discipline including ritual, religion, marriage and sex. It combines classic studies with recent scholarship, and asks the ‘big question’ about human society and human cultures that offer challenging perspectives on the world we live in.

Advanced introduction to social anthropology 120 (APL 120)

Module credits	12.00
NQF Level	05
Prerequisites	No prerequisites.
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Anthropology, Archaeology and Development Studies
Period of presentation	Semester 2

Module content

This module builds on the ethnographic and theoretical themes introduced in APL 110, asking particular questions about how we may think about the relationship between the local and the global; indigenous and universal; public and private; the real and the possible.The module continues in the vein of APL 110, in that it explicitly encourages students to understand the society in which they live through a series of critical anthropological perspectives.

Plants and society 161 (BOT 161)

Module credits	8.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	MLB 111 GS
Contact time	2 lectures per week, fortnightly practicals
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Botanical principles of structure and function; diversity of plants; introductory plant systematics and evolution; role of plants in agriculture and food security; principles and applications of plant biotechnology; economical and valuable medicinal products derived from plants; basic principles of plant ecology and their application in conservation and biodiversity management.
This content aligns with the United Nation's Sustainable Debelopment Goals of No Poverty, Good Health and Well-being, Climate Action, Responsible Consumption and Production, and Life on Land.

General chemistry 117 (CMY 117)

Module credits	16.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Health Sciences Faculty of Veterinary Science
Prerequisites	A candidate must have Mathematics for at least 60% and 60% for Physical Sciences.
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Chemistry
Period of presentation	Semester 1

Module content
General introduction to inorganic, analytical and physical chemistry. Atomic structure and periodicity. Molecular structure and chemical bonding using the VSEOR model. Nomenclature of inorganic ions and compounds. Classification of reactions: precipitation, acid-base, redox reactions and gas-forming reactions. Mole concept and stoichiometric calculations concerning chemical formulas and chemical reactions. Principles of reactivity: energy and chemical reactions. Physical behaviour gases, liquids, solids and solutions and the role of intermolecular forces. Rate of reactions: Introduction to chemical kinetics.

General chemistry 127 (CMY 127)

Module credits	16.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Health Sciences Faculty of Veterinary Science
Prerequisites	Natural and Agricultural Sciences students: CMY 117 GS or CMY 154 GS Health Sciences students: none
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Chemistry
Period of presentation	Semester 2

Module content
Theory: General physical-analytical chemistry: Chemical equilibrium, acids and bases, buffers, solubility equilibrium, entropy and free energy, electrochemistry. Organic chemistry: Structure (bonding), nomenclature, isomerism, introductory stereochemistry, introduction to chemical reactions and chemical properties of organic compounds and biological compounds, i.e. carbohydrates and aminoacids. Practical: Molecular structure (model building), synthesis and properties of simple organic compounds.

Introduction to tourism 110 (EFK 110)

Module credits	12.00
NQF Level	07
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	No prerequisites.
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Historical and Heritage Studies
Period of presentation	Semester 1

Module content
Overview of the origin and nature of tourism development of South African cultural, natural and adventure tourist destinations.

Heritage tourism management 120 (EFK 120)

Module credits	12.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	No prerequisites.
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Historical and Heritage Studies
Period of presentation	Semester 2

Module content
An introductory exploration of the relationship between heritage conservation and tourism.

Informatics 112 (INF 112)

Module credits	10.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences
Prerequisites	A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination; or STK 113 60%, STK 123 60% or STK 110
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Informatics
Period of presentation	Semester 2

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.

Informatics 154 (INF 154)

Module credits	10.00
NQF Level	05

Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences
Prerequisites	A candidate must have passed Mathematics with at least 5 (60-69%) in the Grade 12 examination.
Contact time	1 lecture per week, 2 practicals per week
Language of tuition	Module is presented in English
Department	Informatics
Period of presentation	Semester 1

Module content

Introduction to programming.

Informatics 164 (INF 164)

Module credits	10.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences
Prerequisites	INF 154
Contact time	1 lecture per week, 2 practicals per week
Language of tuition	Module is presented in English
Department	Informatics
Period of presentation	Semester 2

Module content

Programming.

Informatics 171 (INF 171)

Module credits	20.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences
Prerequisites	A candidate must have passed Mathematics with at least 5 (60-69%) in the Grade 12 examination.
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Informatics
Period of presentation	Year

Module content
General systems theory, creative problem solving, the business analyst, systems development building blocks, systems analysis methods, process modelling and data modelling.

Introduction to microbiology 161 (MBY 161)

Module credits	8.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	No prerequisites.
Contact time	2 lectures per week, fortnightly tutorials
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

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.

Molecular and cell biology 111 (MLB 111)

Module credits	16.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Health Sciences Faculty of Veterinary Science
Prerequisites	A candidate who has passed Mathematics with at least 60% in the Grade 12 examination
Contact time	1 practical/tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Introduction to the molecular structure and function of the cell. Basic chemistry of the cell. Structure and composition of prokaryotic and eukaryotic cells. Ultrastructure and function of cellular organelles, membranes and the cytoskeleton. General principles of energy, enzymes and cell metabolism. Selected processes, e.g. glycolysis, respiration and/or photosynthesis. Introduction to molecular genetics: DNA structure and replication, transcription, translation. Cell growth and cell division.

First course in physics 114 (PHY 114)

Module credits	16.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	A candidate must have passed Mathematics and Physical Science with at least 60% in the Grade 12 examination
Contact time	1 discussion class per week, 1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Physics
Period of presentation	Semester 1

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.

Atmospheric structure and processes 155 (WKD 155)

Module credits	16.00
NQF Level	05
Prerequisites	At least 50% for mathematics in grade 12.
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 1

Module content

Introduction to weather and climate. Climate of South Africa. Urban and rural climate. Meteorological instruments. Motion of the earth. Atmospheric mass and pressure. Energy and heat budget. Moisture in the atmosphere. Cloud development. Climate change. ENSO. Electromagnetic spectrum and remote sensing in meteorology. Synoptic weather systems of South Africa.

Calculus 114 (WTW 114)

Module credits	16.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences Faculty of Humanities
Prerequisites	60% for Mathematics in Grade 12
Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 1

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, WTW 165.
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.

Mathematics 124 (WTW 124)

Module credits	16.00
NQF Level	05
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences
Prerequisites	WTW 114
Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 2

Module content

*Students will not be credited for more than one of the following modules for their degree:
WTW 124, WTW 146, WTW 148 and WTW 164. This module serves as preparation for students majoring in Mathematics (including all students who intend to enrol for WTW 218, WTW 211 and WTW 220).

The vector space Rn, vector algebra with applications to lines and planes, matrix algebra, systems of linear equations, determinants. Complex numbers and factorisation of polynomials. Integration techniques and applications of integration. The formal definition of a limit. The fundamental theorem of Calculus and applications. Vector functions and quadratic curves.

Animal diversity 161 (ZEN 161)

Module credits	8.00
NQF Level	05
Service modules	Faculty of Education Faculty of Veterinary Science
Prerequisites	No prerequisites.
Contact time	2 lectures per week, fortnightly practicals
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Semester 2

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 in various animal phyla. In-class discussion will address the sustainable development goals #3, 12, 13, 14 and 15 (Good Health and Well-being. Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land).

Curriculum: Year 2

Minimum credits: 132

Core = 82
Elective = 50

Additional information
Continue with electives pertaining to the second major chosen in the first year of study.

- **Geoinformatics as a second major:** INF 214 (S1, 14), INF 225 (S1, 14), INF 261 (S2, 7), SUR 220 (S2, 14), FIL 252 (10) [28 + 31 = 59]
- **Plant Science as a second major:** BOT 251 (S1, 12), MBY 251 (S1, 12), MBY 261 (S2, 12), GKD 250 (S1, 12), BOT 261 (S2, 12) [36 + 24 = 60]
- **Soil Science as a second major:** GKD 250 (S1, 12), SUR 220 (S2, 14), BOT 251 (S1, 12), BOT 261 (S2, 12), WKD 261 (Q1, 12) [36 + 26 = 62]
- **Ecology as a second major:** BOT 251 (S1, 12), BOT 261 (S2, 12), GKD 250 (S1, 12), ZEN 251 (S1, 12), ZEN 261 (S2, 12) [36 + 24 = 60]
- **Meteorology as second major:** WKD 261, WKD 254, WKD 263 and WKD 265 (50 credits) and one of [WTW 211, WTW 218, WTW 220, WTW 221, WTW 248, WTW 285, WTW 286 PLG 251, PPK 251, SUR 220] (50 credits)

Possibilities for second majors in Social Sciences (two options)

- **Anthropology as a second major:** APL 210 (S1, 20), APL 220 (S2, 20), EFK 210 (S1, 20) or EFK 220 (S2, 20) [20 + 40 = 60]
- **Heritage and Cultural Tourism as second major:** EFK 210 (S1, 20), EFK 220 (S2, 20), APL 210 (S1, 20) or APL 220 (S2, 20) [20 + 40 = 60]

Core modules

Environmental sciences 201 (ENV 201)

Module credits	14.00
NQF Level	06
Prerequisites	ENV 101 or WKD 155 or BOT 161 or ZEN 161.
Contact time	1 practical per week, 3 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 2

Module content

Introduces basic concepts and interrelationships required to understand our atmosphere, with a strong focus on an introduction to weather and climate. A key component of the course is an introduction to climate change, including the science of climate change, introducing climate change projections, and climate change impacts. A key focus of the second part of the course will be climate change implications for the attainment of SDGs and Aichi targets on the African continent, under a range of plausible scenarios.

City, structure, environment and society 201 (GGY 201)

Module credits	14.00
NQF Level	06
Service modules	Faculty of Education Faculty of Humanities
Prerequisites	GGY 156
Contact time	1 practical per week, 3 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 3

Module content

The module introduces students to urban settlement patterns, processes and structures. Using a series of case studies, it aims to develop an understanding of the challenges facing urban areas both in South Africa and globally.

Process geomorphology 252 (GGY 252)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Education Faculty of Humanities
Prerequisites	GGY 166 or GLY 155
Contact time	2 practicals per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 2

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 periglacial processes. Practical laboratory exercises and assignments are based on the themes covered in the module theory component.

Introductory geographic information systems 283 (GGY 283)

Module credits	14.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Humanities
Prerequisites	GMC 110
Contact time	1 practical per week, 2 lectures per week

Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 1

Module content

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. This module provides the foundations for more advanced GIS and Geoinformatics topics. Practical assessments and a mini-project make use of South African and African examples and foster learning and application of concepts aligned to the UN Sustainable Development Goals.

Geographic data analysis 220 (GIS 220)

Module credits	14.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	GMC 110 and (STK 110 OR BME 120)
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 2

Module content

The nature of geographical data and measurement.Application of statistics in the geographical domain. 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. Examples used throughout the course are drawn from South African and African case studies and taught within the framework of the UN Sustainable Development Goals.

Remote sensing 220 (GMA 220)

Module credits	14.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	GMC 110
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 1

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, practical exercises research tasks and a project or assignments of at least 64 notional hours. In particular, the practical exercises and research tasks incorporate South African examples using satellite remotely-sensed data, as well as field spectral data measurements, to promote understanding of the state of land cover and land use types (e.g. spanning agricultural resources, water resources, urbanization) and how changes over time could impact on the changing climate in accordance with the United Nation's Sustainable Development Goals.

Elective modules

Sex, culture and society 210 (APL 210)

Module credits	20.00
NQF Level	06
Prerequisites	APL 110 GS
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Anthropology, Archaeology and Development Studies
Period of presentation	Semester 1

Module content
Cultural constructions of sex and sexuality are the primary building blocks of social organisation. Anthropological discussions of sexuality tend to revolve around the various aspects of social organisation, such as the lifecycle, gendered identities, and personhood. These discussions are informed by the cultural meanings we impute to differences in biological sex and reproduction, and the ways in which these meanings influence social organisation, personhood, and power. In this module, we will consider cultural constructions of sex and sexuality as these inform certain aspects of social organisation such as kinship and marriage. We will attempt to develop an anthropological perspective on the interplay between sex, culture and society. To this end, we will examine the physiology of sexuality, and then consider different theoretical perspectives on human sexuality as reflected in cross-cultural ethnographic case studies.

Anthropology 220 (APL 220)

Module credits	20.00
NQF Level	06
Prerequisites	APL 110, APL 120 GS
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Anthropology, Archaeology and Development Studies
Period of presentation	Semester 2

Module content

Power and wealth
This module explores anthropological perspectives on politics, power and wealth in colonial and postcolonial contexts. Key concepts that are discussed include anthropological approaches to citizenship, cosmopolitanism, hegemony, human rights, neoliberalism, sovereignty, civil society, gender, race and class.

Introduction to proteins and enzymes 251 (BCM 251)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Health Sciences
Prerequisites	CMY 117 GS and CMY 127 GS and MLB 111 GS
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Structural and ionic properties of amino acids. Peptides, the peptide bond, primary, secondary, tertiary and quaternary structure of proteins. Interactions that stabilise protein structure, denaturation and renaturation of proteins. Introduction to methods for the purification of proteins, amino acid composition, and sequence determinations. Enzyme kinetics and enzyme inhibition. Allosteric enzymes, regulation of enzyme activity, active centres and mechanisms of enzyme catalysis. Examples of industrial applications of enzymes and in clinical pathology as biomarkers of diseases. Online activities include introduction to practical laboratory techniques and Good Laboratory Practice; techniques for the quantitative and qualitative analysis of biological molecules; enzyme activity measurements; processing and presentation of scientific data.

South African flora and vegetation 251 (BOT 251)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Education
Prerequisites	BOT 161
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

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 South African biomes and associated key ecological processes; centra of plant endemism; rare and threatened plant species; biodiversity conservation and ecosystem management; invasion biology; conservation status of South African vegetation types.

Plant physiology and biotechnology 261 (BOT 261)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Education
Prerequisites	BOT 161 and CMY 127 GS.
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Nitrogen metabolism in plants; nitrogen fixation in Agriculture; plant secondary metabolism and natural products; photosynthesis and carbohydrate metabolism in plants; applications in solar energy; plant growth regulation and the Green Revolution; plant responses to the environment; developing abiotic stress tolerant and disease resistant plants. Practicals: Basic laboratory skills in plant physiology; techniques used to investigate nitrogen metabolism, carbohydrate metabolism, pigment analysis, water transport in plant tissue and response of plants to hormone treatments.

Tourism and representation 210 (EFK 210)

Module credits	20.00
NQF Level	06
Service modules	Faculty of Education
Prerequisites	EFK 110
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Historical and Heritage Studies
Period of presentation	Semester 1

Module content

A multidisciplinary look at notions of representation and perception as they pertain to the tourism sector.

Community-based tourism 220 (EFK 220)

Module credits	20.00
NQF Level	07
Service modules	Faculty of Education
Prerequisites	EFK 110, EFK 120
Contact time	2 lectures per week
Language of tuition	Module is presented in English

Department	Historical and Heritage Studies
Period of presentation	Semester 2

Module content

An analysis of tourism's history and development theories, focussing on community-based tourism (CBT) and pro-poor tourism (PPT).

Introduction to moral and political philosophy 252 (FIL 252)

Module credits	10.00
NQF Level	06
Prerequisites	No prerequisites.
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Philosophy
Period of presentation	Quarter 2

Module content

In this module students are equipped with an understanding of the moral issues influencing human agency in economic and political contexts. In particular philosophy equips students with analytical reasoning skills necessary to understand and solve complex moral problems related to economic and political decision making. We demonstrate to students how the biggest questions concerning the socio-economic aspects of our lives can be broken down and illuminated through reasoned debate. Examples of themes which may be covered in the module include justice and the common good, a moral consideration of the nature and role of economic markets on society, issues concerning justice and equality, and dilemmas of loyalty. The works of philosophers covered may for instance include that of Aristotle, Locke, Bentham, Mill, Kant, Rawls, Friedman, Nozick, Bernstein, Dworkin, Sandel, Walzer, and MacIntyre.

Introductory soil science 250 (GKD 250)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	CMY 117 GS
Contact time	1 practical per week, 3 lectures per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

Soil is a finite resource and with the global challenges we are facing, it is more important than ever to understand and sustainably manage soil. Our daily lives are impacted by soil in several ways, including the food we eat, the water we drink, and the environment we live in. In this Introductory Soils module, we will look at how basic and more advanced abiotic and biotic soil properties impact us and the larger environment. We will also examine the fundamental principles behind sustainable soil use management.

Informatics 214 (INF 214)

Module credits	14.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences
Prerequisites	A candidate must have passed Mathematics with at least 5 (60-69%) in the Grade 12 examination; AIM 101 or AIM 111 and AIM 121.
Contact time	2 lectures per week, 2 practicals per week
Language of tuition	Module is presented in English
Department	Informatics
Period of presentation	Semester 1

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.

Informatics 225 (INF 225)

Module credits	14.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Natural and Agricultural Sciences
Prerequisites	A candidate must have passed Mathematics with at least 5 (60-69%) in the Grade 12 examination, INF 112, AIM 111 and AIM 121
Contact time	1 lecture per week, 3 practicals per week
Language of tuition	Module is presented in English
Department	Informatics
Period of presentation	Semester 2

Module content

An overview of systems infrastructure and integration.

Informatics 261 (INF 261)

Module credits	7.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Natural and Agricultural Sciences
Prerequisites	INF 214
Contact time	1 lecture per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Informatics
Period of presentation	Semester 2

Module content

Database management: transaction management, concurrent processes, recovery, database administration: new developments: distributed databases, client-server databases: practical implementation of databases.

Bacteriology 251 (MBY 251)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	MBY 161 GS
Contact time	2 lectures per week, fortnightly practicals
Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 1

Module content

Growth, replication and survival of bacteria, Energy sources, harvesting from light versus oxidation, regulation of catabolic pathways, chemotaxis. Nitrogen metabolism, iron-scavenging. Alternative electron acceptors: denitrification, sulphate reduction, methanogenesis. Bacterial evolution, systematic and genomics. 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.

Mycology 261 (MBY 261)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	MBY 161 GS
Contact time	2 lectures per week, Fortnightly practicals/tutorials

Language of tuition	Module is presented in English
Department	Biochemistry, Genetics and Microbiology
Period of presentation	Semester 2

Module content

Organisation and molecular architecture of fungal thalli, chemistry of the fungal cell. Chemical and physiological requirements for growth and nutrient acquisition. Mating and meiosis; spore development; spore dormancy, dispersal and germination. 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.

Introduction to crop protection 251 (PLG 251)

Module credits	12.00
NQF Level	06
Prerequisites	No prerequisites.
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

Development and importance of crop protection. Basic principles in crop protection i.e. 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, globally as well as in African context. Life cycles of typical disease causing organisms. Basic principles of integrated pest and disease management. The importance of crop protection in the context of sustainable development will be highlighted.

Sustainable crop production and agroclimatology 251 (PPK 251)

Module credits	15.00
NQF Level	06
Prerequisites	BOT 161
Contact time	3 lectures per week, fortnightly practicals
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Influence of climate on cropping systems in South Africa. The surface energy balance. Hydrological cycles and the soil water balance. Sustainable crop production. Simple radiation and water limited models. Potential yield, target yield and maximum economic yield. Crop nutrition and fertiliser management. Principles of soil cultivation and conservation. Climate change and crop production – mitigation and adaptation.

Surveying 220 (SUR 220)

Module credits	14.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	WTW 114 GS/WTW 134
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 2

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.

Programming in meteorology 254 (WKD 254)

Module credits	12.00
NQF Level	06
Prerequisites	WKD 155 and WKD 263.
Contact time	1 practical per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 2

Module content

Meteorological data acquisition. Manipulation of multidimensional meteorological data sets. Spatial representation and interpretation of weather data. Application and interpretation of dynamic equations.

Physical meteorology 261 (WKD 261)

Module credits	12.00
NQF Level	06
Prerequisites	(WTW 114 or WTW 158 or WTW 134 or WTW 165) and (WKD 155 or ENV 101)
Contact time	1 tutorial per week, 4 lectures per week

Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 3

Module content

Basic thermodynamic laws for dry and humid air. The equation of state. Adiabatic processes and temperature lapse rates. The Clausius-Clapeyron equation. Cloud microphysics. The physical basis of climate change.

Introduction to dynamic meteorology 263 (WKD 263)

Module credits	14.00
NQF Level	06
Prerequisites	WTW 124
Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 1

Module content

Mathematical methods for meteorology, second law of motion in spherical coordinates. Acceleration in rotating co-ordinates, fundamental forces, momentum equation. Three dimensional flow balance, conservation of mass, heat equation, thermodynamic energy equation. Introduction to finite difference methods. Numerical estimation of the geostrophic wind, vorticity and divergence. Advection of temperature. Development of a two-dimensional temperature advection model.

Satellite meteorology 265 (WKD 265)

Module credits	12.00
NQF Level	06
Prerequisites	WKD 261
Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 4

Module content

Display formats of remote sensed data, projections and color schemes. Active and passive sensing systems, quantitative and qualitative data, atmospheric and surface data observation. Characteristics of geostationary and low-earth orbiting satellites. Common channels available from meteorological satellite sensors, combination of channels and RGB images. Observation of synoptic and mesoscale weather systems, natural hazards and clouds.

Linear algebra 211 (WTW 211)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences
Prerequisites	WTW 124
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 1

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, eigenvalues, eigenvectors, similarity and diagonalisation of matrices, linear transformations.

Calculus 218 (WTW 218)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences
Prerequisites	WTW 114 and WTW 124
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 1

Module content

Calculus of multivariable functions, directional derivatives. Extrema and Lagrange multipliers. Multiple integrals, polar, cylindrical and spherical coordinates.

Analysis 220 (WTW 220)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences
Prerequisites	WTW 114 and WTW 124, WTW 211 and WTW 218

Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 2

Module content

*This module is recommended as an elective only for students who intend to enrol for WTW 310 and/or WTW 320. Students will not be credited for more than one of the following modules for their degree: WTW 220 and WTW 224.

Properties of real numbers. Analysis of sequences and series of real numbers. Power series and theorems of convergence. The Bolzano-Weierstrass theorem. The intermediate value theorem and analysis of real-valued functions on an interval. The Riemann integral: Existence and properties of the interval.

Linear algebra 221 (WTW 221)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Economic and Management Sciences
Prerequisites	WTW 211 and WTW 218
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 2

Module content

Abstract vector spaces, change of basis, matrix representation of linear transformations, orthogonality, diagonalisability of symmetric matrices, some applications.

Vector analysis 248 (WTW 248)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
Prerequisites	WTW 218
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 2

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.

Discrete structures 285 (WTW 285)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	WTW 115
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 2

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.

Differential equations 286 (WTW 286)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Engineering, Built Environment and Information Technology Faculty of Economic and Management Sciences
Prerequisites	WTW 114, WTW 124, WTW 162, WTW 211#
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Mathematics and Applied Mathematics
Period of presentation	Semester 1

Module content

*Students will not be credited for more than one of the modules for their degree: WTW 264, WTW 286
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. Numerical methods applied to nonlinear systems.Qualitative analysis of linear systems.

Invertebrate biology 251 (ZEN 251)

Module credits	12.00
NQF Level	06

Service modules	Faculty of Education
Prerequisites	ZEN 161 GS
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Quarter 1

Module content

Origin and extent of modern invertebrate diversity; parasites of man and domestic animals; biology and medical importance of arachnids and insects; insect life styles; the influence of the environment on insect life histories; insect herbivory; predation and parasitism; insect chemical, visual, and auditory communication. Examples used in the module are relevant to the sustainable development goals of Life on Land and Good Health and Well-being.

African vertebrates 261 (ZEN 261)

Module credits	12.00
NQF Level	06
Service modules	Faculty of Education
Prerequisites	ZEN 161 GS
Contact time	1 practical per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Quarter 3

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. The module addresses the sustainable development goals of Life below Water and Life on Land.

Curriculum: Final year

Minimum credits: 136

Core = 76
Elective = 60

Additional information
Students must choose one of the two geoinformatics modules, GIS 310 or GMA 320, as a core module, except students on the geoinformatics second major who have to complete both modules.

Continue with electives pertaining to the second major chosen in the first and second years of study.

- **Geoinformatics as a second major:** GIS 320 (S1, 22), GMC 310 (S1, 22), GMA 320 (S2, 22) [44 + 22 = 66]
- **Plant Science as a second major:** BOT 356 (S1, 18), BOT 358 (S1 18), BOT 365 (S2, 18), BOT 366 (S2, 18) [36 + 36 = 72]
- **Soil Science as a second major:** BOT 358 (S1, 18), GKD 350 (S1, 14), GKD 320 (S2, 14), BOT 366 (S2, 18), [32 + 32 = 64]
- **Ecology as a second major:** BOT 358 (S1, 18), ZEN 351 (Q1,18), ZEN 364 (Q2, 18), ZEN 353 (Q4, 18) or ZEN 363 (Q4, 18) [36 + 36 = 72]
- **Meteorology as second major:** WKD 352, WKD 361, WKD 315, WKD 316 (72 credits)

Possibilities for second majors in Social Sciences (two options)

- **Anthropology as a second major:** APL 310 (S1, 30), APL 320 (S2, 30) [30 + 30 = 60]
- **Heritage and Cultural Tourism as a second major:** EFK 310 (S1, 30), EFK 320 (S2, 30) [30 + 30 = 60]

Core modules

Human environmental interactions 301 (ENV 301)

Module credits	18.00
NQF Level	07
Service modules	Faculty of Education Faculty of Humanities
Prerequisites	ENV 201
Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 2

Module content

The module serves as an introduction to human-environment relations, on contemporary environmental issues in Africa.
The module begins with different theories and schools of thought in human-environment relations, followed by recent and future impacts of human pressures on natural resources, the state of the environment in South Africa, management of critical resources, population trends, biodiversity loss, pollution, water scarcity, desertification, climate change, waste accumulation and management, environmental management tools, environmental education and environmental management legislation. A key focus here is future scenarios for the African continent in terms of SDGs and Aichi targets; given current and projected driving forces.

Theories and applications of human geography 301 (GGY 301)

Module credits	18.00
NQF Level	07
Prerequisites	GGY 201
Contact time	1 practical per week, 3 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 3

Module content

Classic economic development theories and frameworks. Spatial development history and legacy in South Africa. Rural and agricultural reconstruction. Land reform. Urban development and strategy. Urban spatial reconstruction. National spatial development frameworks. Integration of environmental, economic, and social components of sustainable development, including challenges, actors and actions in sustainable development.

Environmental geomorphology 361 (GGY 361)

Module credits	18.00
NQF Level	07
Service modules	Faculty of Humanities
Prerequisites	GGY 252 and only for students studying BSc (Geography) or BSc (Environmental Sciences).
Contact time	2 practicals per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 4

Module content

*Note: The module is available for BSc (Geography) and BSc (Environmental Sciences) 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.

Geographic information systems 310 (GIS 310)

Module credits	22.00
NQF Level	07
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	GGY 283
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 1

Module content

Advanced theory and practice of Geographic Information Systems; GIS applications; design and implementation of GIS applications. A project or assignments of at least 64 notional hours. Diverse South African examples will be used to expose the students to various data sources, geospatial analyses, and data representation to support the UN Sustainable Development Goals.

Remote sensing 320 (GMA 320)

Module credits	22.00
NQF Level	07
Prerequisites	GMA 220
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 2

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, practical exercises research tasks and a project or assignments of at least 64 notional hours. In particular, the practical exercises and research tasks incorporate South African examples using satellite remotely-sensed data, as well as field spectral data measurements, to promote understanding of the state of land cover and land use types (e.g. spanning agricultural resources, water resources, urbanization) and how changes over time could impact on the changing climate in accordance with the United Nation's Sustainable Development Goals.

Elective modules

Decoloniality, Anthropology and Africa 310 (APL 310)

Module credits	30.00
NQF Level	07
Prerequisites	APL 210 GS
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Anthropology, Archaeology and Development Studies
Period of presentation	Semester 1

Module content

This module considers the colonial histories of anthropology in Africa and their impact on traditions of knowledge production in the discipline to propose a decolonised anthropology. It does so by critically reflecting on old and contemporary ethnographies from and about the African continent and pays particular attention to ethnographic methods, politics of representation, reflexivity, power and identity as pertinent questions to establish a decolonised anthropology. Students in this module are encouraged to imagine a decolonised anthropology in and for Africa.

Anthropology 320 (APL 320)

Module credits	30.00
NQF Level	07
Prerequisites	APL 210, APL 220 GS
Contact time	1 tutorial per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Anthropology, Archaeology and Development Studies
Period of presentation	Semester 2

Module content

Fieldwork, ethnography and theory
This module reviews themes such as conducting fieldwork, writing ethnography and developing theory in anthropology. The module allows the opportunity to gain experience with ethnographic field methods in order to develop insight into the implications of methodological choices and their relationship to research questions and settings.

Plant ecophysiology 356 (BOT 356)

Module credits	18.00
NQF Level	07
Service modules	Faculty of Education
Prerequisites	BOT 161
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

Introduction to plant ecophysiology and plants response to environmental stress. Understanding how various biotic and abiotic factors affect plant metabolic processes, including photosynthesis and respiration. Emphasis is placed on the efficiency of the mechanisms whereby C3-, C4 and CAM-plants bind CO2 and how they are impacted by the environment. To understand the functioning of plants in diverse environments, the relevant structural properties of plants, the impact of soil composition, water flow in the soil-plant air continuum and long distance transport of assimilates will be discussed. Students will research a topic relevant to plant ecophysiology and present this in the form of an oral presentation. Students will conduct a practical project to study the effects of environmental factors on C3 and C4 plant growth and physiology. Students will present the report in a written format according to the guidelines of a relevant scientific journal. Relevant readings will be used to highlight the alignment of the module with the Sustainable Development Goals, with emphasis placed on climate action.

Plant ecology 358 (BOT 358)

Module credits	18.00
NQF Level	07
Prerequisites	BOT 161 and BOT 251.
Contact time	1 practical per week, 2 days field-based practical, 2 lectures per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

Theory of plant community concepts, floristic and structural composition, plant diversity, ecological succession, landscape ecology. Data processing techniques. Species interactions and an evaluation of their effects on interacting species. Fundamentals of plant population biology: life tables; plant breeding systems and pollination; population dynamics; life history strategies; intraspecific competition; interspecific competition and co-existence. There is a compulsory field-based practical run over a weekend in the first month of the first semester.

Phytomedicine 365 (BOT 365)

Module credits	18.00
NQF Level	07
Service modules	Faculty of Education
Prerequisites	BOT 161
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

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, ecological role and toxicity of the three main classes of secondary compounds; terpenoids, phenolics, and alkaloids are discussed. An introduction to the principles and applications of metabolomics is presented. The role of these natural products in defense against microorganisms and herbivores is reviewed during the module. The importance of ethnobotany and phylogenetics in modern drug discovery from biodiversity will presented along with legal and ethical considerations surrounding bioprospecting. This will follow on with modern theories and practices regarding sustainable utilisation and conservation of medicinal plants. The basics of alternative medicines, with an emphasis on traditional African and Chinese medicines, are also discussed as well as current evidence-based research and product development derived from these. Biotechnological approaches to medicinal natural product production, ‘farmer to pharma’, will be covered, including plant cell culture and bioreactors. Practical sessions on drug discovery approaches using chromatographic techniques for phytochemical analysis of secondary metabolites such as tannins, alkaloids, and saponins are conducted. Bioassays on micro-organisms are also done during the practical sessions in order to develop the skills for the potential discovery of new antibiotics.

Plant diversity 366 (BOT 366)

Module credits	18.00
NQF Level	07
Service modules	Faculty of Education
Prerequisites	BOT 161
Contact time	1 practical per week, 2 lectures per week

Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

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 identification. Methods to conduct floristic surveys. Nature and significance of voucher specimens.

The South African tourism product 310 (EFK 310)

Module credits	30.00
NQF Level	07
Service modules	Faculty of Education
Prerequisites	EFK 110, EFK 120; EFK 210, EFK 220
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Historical and Heritage Studies
Period of presentation	Semester 2

Module content

An evaluation of South African cultural activities and heritage sites, with a specific focus on tourism in practice.

Current discourses in tourism 320 (EFK 320)

Module credits	30.00
NQF Level	07
Service modules	Faculty of Education
Prerequisites	EFK 110, EFK 120; EFK 210, EFK 220
Contact time	2 lectures per week
Language of tuition	Module is presented in English
Department	Historical and Heritage Studies
Period of presentation	Semester 1

Module content

A selection of themes in tourism innovation, research and industry.

Geographic information systems 310 (GIS 310)

Module credits	22.00
NQF Level	07
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	GGY 283
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 1

Module content

Advanced theory and practice of Geographic Information Systems; GIS applications; design and implementation of GIS applications. A project or assignments of at least 64 notional hours. Diverse South African examples will be used to expose the students to various data sources, geospatial analyses, and data representation to support the UN Sustainable Development Goals.

Spatial analysis 320 (GIS 320)

Module credits	22.00
NQF Level	07
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	GIS 220 and GGY 283
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 2

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. Examples using data from South Africa are implemented. A project or assignment of at least 64 notional hours.

Soil chemistry 320 (GKD 320)

Module credits	14.00
NQF Level	07
Prerequisites	GKD 250
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English

Department	Department of Plant and Soil Sciences
Period of presentation	Semester 2

Module content

Soil chemistry is the study of the chemical behaviour (precipitation, dissolution, sorption, oxidation, reduction, volatilization etc.) of elements and compounds in the soil. Soil exerts a control on nutrient availability and therefore on nutrient cycling (for example the soil-plant system). The growing anthropogenic pressure on soil and the larger environment means a fundamental understanding of the behaviour of pollutants is an increasingly important skill set required by industry. In this module we will look at the soil solution chemistry, mineral solubility, redox chemistry, as well as the chemistry at the surface of soil minerals, of a wide range of nutrients and pollutants. Soil acidification, weathering and associated chemicalmineralogical transformation, as well as landscape dynamics of carbon, iron and manganese receive special attention in this module.

Soil formation and classification 350 (GKD 350)

Module credits	14.00
NQF Level	07
Prerequisites	GKD 250 GS
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Department of Plant and Soil Sciences
Period of presentation	Semester 1

Module content

Basic concepts of soil classification, soil pedology and pedochemistry. Underlying principles of global soil classification systems. A taxonomic system for South African soils. Identification of soil horizons, forms and families. An introduction to the World Reference Base for Soil Resources. Practical work: Field, laboratory and class practicals.

Remote sensing 320 (GMA 320)

Module credits	22.00
NQF Level	07
Prerequisites	GMA 220
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 2

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, practical exercises research tasks and a project or assignments of at least 64 notional hours. In particular, the practical exercises and research tasks incorporate South African examples using satellite remotely-sensed data, as well as field spectral data measurements, to promote understanding of the state of land cover and land use types (e.g. spanning agricultural resources, water resources, urbanization) and how changes over time could impact on the changing climate in accordance with the United Nation's Sustainable Development Goals.

Geometrical and space geodesy 310 (GMC 310)

Module credits	22.00
NQF Level	07
Prerequisites	GMC 110 and WTW 114/WTW 134
Contact time	1 practical per week, 2 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Semester 1

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. A project or assignments of at least 64 notional hours. Examples using data from South Africa are implemented.

Mid-latitude and polar meteorology 315 (WKD 315)

Module credits	18.00
NQF Level	07
Prerequisites	WKD 261 and WKD 265
Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 1

Module content

Mean state, major patterns of atmospheric variability in the mid-latitudes and polar regions. Air masses. Synoptic scale cold, warm, occluded and quasistationary fronts, frontogenesis. Mid-latitude depressions, Norwegian cyclone model, conveyor belts. Basic cyclone model, Shapiro-Keyser model hybrid models, cyclogenesis. Polar weather systems; katabatic winds, barrier winds, cold-air damming, polar lows. Jet stream and jet streaks. Extreme weather and impacts. Conceptual models.

Tropical meteorology 316 (WKD 316)

Module credits	18.00
NQF Level	07
Prerequisites	WKD 315
Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 2

Module content

Mean state, major patterns of atmospheric variability in the tropics. Tropical weather systems and their temporal variability, inter tropical convergence zone, tropical waves, trade inversions, trade winds, tropical and sub-tropical jet streams, cloud clusters, tropical depressions, Africánes, sub-tropical ridges, upper-level anticyclones. Tropical cyclones and warnings. Analysis techniques. Tropical waves, Kelvin waves, equatorial Rossby waves and Madden Julian Oscillation. Physical and dynamical process in monsoon circulation. Hazardous weather. Conceptual models and case studies.

Synoptic-scale circulation dynamics and vorticity in mid-latitudes 352 (WKD 352)

Module credits	18.00
NQF Level	07
Prerequisites	WKD 261 and WKD 263.
Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 3

Module content

Scale analyses and simplification of the basic equations. The geostrophic, thermal and gradient wind. The vorticity equation and divergence. Potential vorticity. Vertical motion and surface pressure tendency. Vorticity in barotropic fluids. Vorticity and divergence fields in a present and future climate

Quasi-geostrophic analysis 361 (WKD 361)

Module credits	18.00

NQF Level	07
Prerequisites	WKD 352
Contact time	1 tutorial per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Geography Geoinformatics and Meteorology
Period of presentation	Quarter 4

Module content

Tendency and Omega equations. Model of a boroclinic system. Introduction to numerical models. Application in meteorological display and analysis software.Ascending and subsiding motion in a present and future climate.

Population ecology 351 (ZEN 351)

Module credits	18.00
NQF Level	07
Service modules	Faculty of Education
Prerequisites	No prerequisites.
Contact time	2 practicals per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Quarter 1

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, human population. Examples throughout the module are relevant to the sustainable development goals of Life on Land and Good Health and Well-being.

Community ecology 353 (ZEN 353)

Module credits	18.00
NQF Level	07
Service modules	Faculty of Education
Prerequisites	ZEN 351 GS or BOT 358 GS
Contact time	2 practicals per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Quarter 4

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 environmental gradients and communities. A field trip will be conducted during the September vacation to the Sani Pass region of the Maloti- Drakensberg Mountains. The module addresses the sustainable development goals Good Health and Well-being, Sustainable Cities and Communities, Climate Action and Life on Land.

Behavioural ecology 363 (ZEN 363)

Module credits	18.00
NQF Level	07
Service modules	Faculty of Education
Prerequisites	No prerequisites.
Contact time	2 practicals per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Quarter 4

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. The module covers sustainable development goals 1-10 and 12-15.

Conservation ecology 364 (ZEN 364)

Module credits	18.00
NQF Level	07
Service modules	Faculty of Education
Prerequisites	No prerequisites.
Contact time	2 practicals per week, 4 lectures per week
Language of tuition	Module is presented in English
Department	Zoology and Entomology
Period of presentation	Quarter 2

Module content

This module is intended to provide students with the skills and knowledge that are essential for the conservation of biodiversity. The module focuses on conservation theory and practice (e.g. endangered species, habitat loss, overexploitation, climate change), and has a practical component. In addition, students will generate a multi-media project designed to inform the general public about a key conservation issue.Over the course of the module, students will be exposed to a number of issues that link directly to sustainable development goals Clean Water and Sanitation, Affordable and Clean Energy, Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action, Life Below Water & Life on Land, and gain valuable theoretical and practical experience in the field of conservation biology.

Regulations and rules

The regulations and rules for the degrees published here are subject to change and may be amended after the publication of this information.

The General Academic Regulations (G Regulations) and General Student Rules apply to all faculties and registered students of the University, as well as all prospective students who have accepted an offer of a place at the University of Pretoria. On registering for a programme, the student bears the responsibility of ensuring that they familiarise themselves with the General Academic Regulations applicable to their registration, as well as the relevant faculty-specific and programme-specific regulations and information as stipulated in the relevant yearbook. Ignorance concerning these regulations will not be accepted as an excuse for any transgression, or basis for an exception to any of the aforementioned regulations.

University of Pretoria Programme Qualification Mix (PQM) verification project

The higher education sector has undergone an extensive alignment to the Higher Education Qualification Sub-Framework (HEQF) across all institutions in South Africa. In order to comply with the HEQSF, all institutions are legally required to participate in a national initiative led by regulatory bodies such as the Department of Higher Education and Training (DHET), the Council on Higher Education (CHE), and the South African Qualifications Authority (SAQA). The University of Pretoria is presently engaged in an ongoing effort to align its qualifications and programmes with the HEQSF criteria. Current and prospective students should take note that changes to UP qualification and programme names, may occur as a result of the HEQSF initiative. Students are advised to contact their faculties if they have any questions.