

# University of Pretoria Yearbook 2017

## BSc Geography (02133394)

**Duration of study** 3 years

**Total credits** 428

### Admission requirements

- The following persons will be considered for admission: a candidate who is in possession of a certificate that is deemed by the University to be equivalent to the required Grade 12 certificate with university endorsement; a candidate who is a graduate from another tertiary institution or has been granted the status of a graduate of such an institution; and a candidate who is a graduate of another faculty at the University of Pretoria.
- Life Orientation is excluded in the calculation of the Admission Point Score (APS).
- Grade 11 results are used for the provisional admission of prospective students. Final admission is based on the Grade 12 results.

Minimum requirements												
Achievement level												
Afrikaans or English				Mathematics				Physical Science				APS
NSC/IEB	HIGCSE	AS-Level	A-Level	NSC/IEB	HIGCSE	AS-Level	A-Level	NSC/IEB	HIGCSE	AS-Level	A-Level	
5	3	C	C	5	3	C	C	5	3	C	C	32

Candidates who do not comply with the minimum admission requirements for BSc (Geography), may be considered for admission to the BSc - Extended programme for the Physical Sciences. The BSc - Extended programme takes place over a period of four years instead of the normal three years.

Minimum requirements												
Achievement level												
Afrikaans or English				Mathematics				Physical Science				APS
NSC/IEB	HIGCSE	AS-Level	A-Level	NSC/IEB	HIGCSE	AS-Level	A-Level	NSC/IEB	HIGCSE	AS-Level	A-Level	
4	3	D	D	4	3	D	D	4	3	D	D	26

### Other programme-specific information

A student must pass all the minimum prescribed and elective module credits as set out at the end of each year within a programme as well as the total required credits to comply with the particular degree programme. Please refer to the curricula of the respective programmes. At least 144 credits must be obtained at 300-/400-level, or

otherwise as indicated by curriculum. The minimum module credits needed to comply with degree requirements is set out at the end of each study programme. Subject to the programmes as indicated a maximum of 150 credits will be recognised at 100-level. A student may, in consultation with the Head of Department and subject to the permission by the Dean, select or replace prescribed module credits not indicated in BSc three-year study programmes to the equivalent of a maximum of 36 module credits.

It is important that the total number of prescribed module credits is completed during the course of the study programme. The Dean may, on the recommendation of the Head of Department, approve deviations in this regard. Subject to the programmes as indicated in the respective curricula, a student may not register for more than 75 module credits per semester at first-year level subject to permission by the Dean. A student may be permitted to register for up to 80 module credits in the first semester during the first year provided that he or she obtained a final mark of no less than 70% for grade 12 Mathematics and achieved an APS of 34 or more in the NSC.

Students who are already in possession of a bachelor's degree, will not receive credit for modules of which the content overlap with modules from the degree that was already conferred. Credits will not be considered 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 granted.

The Dean may, on the recommendation of the programme manager, approve deviations with regard to the composition of the study programme.

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

It remains the student's responsibility to ascertain, prior to registration, whether they comply with the prerequisites of the modules they want to register for.

The prerequisites are listed in the Alphabetical list of modules.

## 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, 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.

### General promotion requirements in the faculty

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.

## Pass with distinction

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.

# Curriculum: Year 1

**Minimum credits: 140**

**Minimum credits:**

Fundamental = 12

Core = 60

Elective = 68

**Additional information:**

Students who do not qualify for AIM 102 must register for AIM 111 and AIM 121.

Students can take WTW 114 instead of WTW 134 if they meet the entry requirements.

BSc (Geography) and BSc (Environmental Sciences) students may register for WKD 155. Students are not allowed to earn credits for both WKD 155 and WKD 164.

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.

## Fundamental modules

### Academic information management 111 (AIM 111)

**Module credits** 4.00

**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

**Prerequisites** No prerequisites.

**Contact time** MAMELODI, 2 lectures per week

**Language of tuition** Separate classes for Afrikaans and English

**Academic organisation** 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

<b>Service modules</b>	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 Faculty of Veterinary Science
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<b>Prerequisites</b>	No prerequisites.
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<b>Contact time</b>	2 lectures per week, MAMELODI
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<b>Language of tuition</b>	Separate classes for Afrikaans and English
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<b>Academic organisation</b>	Informatics
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<b>Period of presentation</b>	Semester 2
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### 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)

<b>Module credits</b>	6.00
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<b>Service modules</b>	Faculty of Natural and Agricultural Sciences Faculty of Veterinary Science
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<b>Prerequisites</b>	No prerequisites.
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<b>Contact time</b>	2 lectures per week
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<b>Language of tuition</b>	Module is presented in English
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<b>Academic organisation</b>	Unit for Academic Literacy
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<b>Period of presentation</b>	Semester 1
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### 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)

<b>Module credits</b>	0.00
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<b>Language of tuition</b>	Afrikaans and English is used in one class
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<b>Academic organisation</b>	Natural + Agric Sciences Dean
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<b>Period of presentation</b>	Year
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## Academic information management 102 (AIM 102)

<b>Module credits</b>	6.00
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<b>Service modules</b>	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 Faculty of Veterinary Science
<b>Contact time</b>	2 lectures per week
<b>Language of tuition</b>	Separate classes for Afrikaans and English
<b>Academic organisation</b>	Information Science
<b>Period of presentation</b>	Semester 2

#### 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.

## Core modules

### Aspects of human geography 156 (GGY 156)

**Module credits** 8.00

<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Humanities Faculty of Health Sciences
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	1 tutorial per week, 3 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	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



<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Humanities Faculty of Health Sciences
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	Quarter 3

#### 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.

### Cartography 110 (GMC 110)

<b>Module credits</b>	10.00
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	3 lectures per week, 1 practical per week
<b>Language of tuition</b>	Afrikaans and English is used in one class
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	Semester 2

#### 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, and 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.

### Climate and weather of Southern Africa 164 (WKD 164)

<b>Module credits</b>	8.00
<b>Service modules</b>	Faculty of Education Faculty of Humanities
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	4 lectures per week

**Language of tuition** Module is presented in English

**Academic organisation** Geography, Geoinf + Meteor

**Period of presentation** Quarter 4

### Module content

An introduction to the climate and general seasonal climatic circulation patterns of Southern Africa. Basic weather types and weather processes within the Southern African context. Interpretation of synoptic maps and synoptic station reports. Impacts of climate change and extreme climate events on society.

\*BSc (Geography) and BSc (Environmental Sciences) students may register for WKD 155. Students are not allowed to earn credits for both WKD 155 and WKD 164.

## Mathematics 134 (WTW 134)

**Module credits** 16.00

**Service modules** Faculty of Engineering, Built Environment and Information Technology  
Faculty of Education  
Faculty of Veterinary Science

**Prerequisites** Refer to Regulation 1.2: At least 50% for Mathematics in the Grade 12 examination .

**Contact time** 4 lectures per week, 1 tutorial per week

**Language of tuition** Separate classes for Afrikaans and English

**Academic organisation** Mathematics and Applied Maths

**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.

## Introduction to environmental sciences 101 (ENV 101)

**Module credits** 8.00

**Service modules** Faculty of Engineering, Built Environment and Information Technology  
Faculty of Education  
Faculty of Humanities

**Prerequisites** No prerequisites.

**Contact time** 3 lectures per week

**Language of tuition** Module is presented in English



**Academic organisation** Geography, Geoinf + Meteor

**Period of presentation** Quarter 1

### 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.

## Elective modules

### General chemistry 117 (CMY 117)

**Module credits** 16.00

**Service modules** Faculty of Engineering, Built Environment and Information Technology  
Faculty of Education  
Faculty of Health Sciences  
Faculty of Veterinary Science

**Prerequisites** Final Grade 12 marks of at least 60% for Mathematics and 60% for Physical Sciences.

**Contact time** 1 practical per week, 4 lectures per week

**Language of tuition** Separate classes for Afrikaans and English

**Academic organisation** 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

**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** Separate classes for Afrikaans and English



**Academic organisation** 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.

**Informatics 154 (INF 154)**

**Module credits** 10.00

**Service modules** Faculty of Engineering, Built Environment and Information Technology  
Faculty of Education  
Faculty of Natural and Agricultural Sciences

**Prerequisites** Refer to Regulation 1.2(f): A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination

**Contact time** 2 practicals per week, 1 lecture per week

**Language of tuition** Separate classes for Afrikaans and English

**Academic organisation** Informatics

**Period of presentation** Semester 1

**Module content**

Introduction to programming.

**Informatics 164 (INF 164)**

**Module credits** 10.00

**Service modules** Faculty of Engineering, Built Environment and Information Technology  
Faculty of Education  
Faculty of Natural and Agricultural Sciences

**Prerequisites** INF 154; Regulation 1.2(f): A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination; AIM 101 or AIM 102 or AIM 111 and AIM 121

**Contact time** 1 lecture per week, 2 practicals per week

**Language of tuition** Separate classes for Afrikaans and English

**Academic organisation** Informatics

**Period of presentation** Semester 2

**Module content**

Advanced programming, use of a computer-aided software engineering tool.



## Exploring the universe 154 (SCI 154)

<b>Module credits</b>	16.00
<b>Prerequisites</b>	Prohibited combination SCI 164
<b>Contact time</b>	4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Physics
<b>Period of presentation</b>	Semester 1

### Module content

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? Echoes 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.

## Introduction to geology 155 (GLY 155)

<b>Module credits</b>	16.00
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology
<b>Prerequisites</b>	Refer to Regulation 1.2: A candidate must have passed Mathematics with at least 60% in the Grade 12 examination
<b>Contact time</b>	4 lectures per week, 1 practical per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geology
<b>Period of presentation</b>	Semester 1

### 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.

## First course in physics 114 (PHY 114)

<b>Module credits</b>	16.00
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology Faculty of Education

<b>Prerequisites</b>	Refer to Regulation 1.2: A candidate must have passed Mathematics and Physical Science with at least 60% in the Grade 12 examination
<b>Contact time</b>	4 lectures per week, 1 discussion class per week, 1 practical per week
<b>Language of tuition</b>	Separate classes for Afrikaans and English
<b>Academic organisation</b>	Physics
<b>Period of presentation</b>	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.

## First course in physics 124 (PHY 124)

<b>Module credits</b>	16.00
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
<b>Prerequisites</b>	WTW 114 GS and PHY 114 GS
<b>Contact time</b>	4 lectures per week, 1 discussion class per week, 1 practical per week
<b>Language of tuition</b>	Separate classes for Afrikaans and English
<b>Academic organisation</b>	Physics
<b>Period of presentation</b>	Semester 2

### 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.

## Atmospheric structure and processes 155 (WKD 155)

<b>Module credits</b>	16.00
<b>Prerequisites</b>	At least 50% for mathematics in grade 12.
<b>Contact time</b>	1 practical per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	Semester 1

## Module content

\*Students are not allowed to earn credits for WKD 155 and WKD 164

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.

## Informatics 171 (INF 171)

**Module credits** 20.00

**Service modules** Faculty of Engineering, Built Environment and Information Technology  
Faculty of Education  
Faculty of Natural and Agricultural Sciences

**Prerequisites** Regulation 1.2: A candidate must have passed Mathematics with at least 4 (50-59%) in the Grade 12 examination

**Contact time** 2 lectures per week

**Language of tuition** Separate classes for Afrikaans and English

**Academic organisation** Informatics

**Period of presentation** Year

## Module content

General systems theory, creative problem solving, soft systems methodology. The systems analyst, systems development building blocks, systems development, systems analysis methods, process modelling.

## Earth history 163 (GLY 163)

**Module credits** 16.00

**Prerequisites** GLY155 or GLY 151; a special exemption is given to 2nd-year students registered for degrees in Plant Sciences, Entomology, Ecology and Zoology

**Contact time** 1 practical per week, 4 lectures per week

**Language of tuition** Module is presented in English

**Academic organisation** Geology

**Period of presentation** Semester 2

## Module content

This module will give an overview of earth history, from the Archaean to the present. Important concepts such as the principles of stratigraphy and stratigraphic nomenclature, geological dating and international and South African time scales will be introduced. A brief introduction to the principles of palaeontology will be given, along with short descriptions of major fossil groups, fossil forms, ecology and geological meaning. In the South African context, the major stratigraphic units, intrusions and tectonic/metamorphic events will be detailed, along with related rock types, fossil contents, genesis and economic commodities. Practical work will focus on the interpretation of geological maps and profiles.

## Curriculum: Year 2

**Minimum credits: 144**

**Minimum credits:**

Core = 84

Elective = 60

### Core modules

#### Process geomorphology 252 (GGY 252)

<b>Module credits</b>	12.00
<b>Service modules</b>	Faculty of Education Faculty of Humanities
<b>Prerequisites</b>	GGY 166 or GLY 155
<b>Contact time</b>	4 lectures per week, 2 practicals per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	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 fluvial processes. Practical laboratory exercises are based on the themes covered in the module theory component.

#### Introductory geographic information systems 283 (GGY 283)

<b>Module credits</b>	14.00
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Humanities
<b>Prerequisites</b>	GMC 110
<b>Contact time</b>	2 lectures per week, 1 practical per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	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.

## Geographic data analysis 220 (GIS 220)

<b>Module credits</b>	14.00
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology
<b>Prerequisites</b>	GMC 100 AND (STK 110 OR BME120)
<b>Contact time</b>	1 practical per week, 2 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	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.

## City structure, environment and society 266 (GGY 266)

<b>Module credits</b>	24.00
<b>Service modules</b>	Faculty of Education Faculty of Humanities
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	1 practical per week, 3 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	Semester 2

### 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.

## Elective modules

### Physical chemistry 282 (CMY 282)

<b>Module credits</b>	12.00
<b>Service modules</b>	Faculty of Education
<b>Prerequisites</b>	CMY 117 and CMY 127
<b>Contact time</b>	4 lectures per week, 1 tutorial per week, 2 practicals per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Chemistry



**Period of presentation** Quarter 2

**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.

**Analytical chemistry 283 (CMY 283)**

**Module credits** 12.00

**Service modules** Faculty of Education

**Prerequisites** CMY 117 and CMY 127

**Contact time** 2 practicals per week, 4 lectures per week, 1 tutorial per week

**Language of tuition** Module is presented in English

**Academic organisation** Chemistry

**Period of presentation** Quarter 3

**Module content**

Theory: Statistical evaluation of data, gravimetric analysis, aqueous solution chemistry, chemical equilibrium, precipitation-, neutralisation- and complex formation titrations, redox titrations, potentiometric methods, introduction to electrochemistry.

**Organic chemistry 284 (CMY 284)**

**Module credits** 12.00

**Service modules** Faculty of Education

**Prerequisites** CMY 117 and CMY 127

**Contact time** 4 lectures per week, 2 practicals per week, 1 tutorial per week

**Language of tuition** Module is presented in English

**Academic organisation** Chemistry

**Period of presentation** Quarter 1

**Module content**

Theory: Resonance, conjugation and aromaticity. Acidity and basicity. Introduction to  $^{13}\text{C}$  NMR spectroscopy. Electrophilic addition: alkenes. Nucleophilic substitution, elimination, addition: alkyl halides, alcohols, ethers, epoxides, carbonyl compounds: ketones, aldehydes, carboxylic acids and their derivatives.

**Inorganic chemistry 285 (CMY 285)**

**Module credits** 12.00

**Service modules** Faculty of Education

**Prerequisites** CMY 117 and CMY 127

**Contact time** 2 practicals per week, 1 tutorial per week, 4 lectures per week

**Language of tuition** Module is presented in English





**Academic organisation** Chemistry

**Period of presentation** Quarter 4

**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, electrochemical properties of transition metals in aqueous solution, industrial applications of transition metals. Fundamentals of spectroscopy and introduction to IR spectroscopy.

## Geographic information systems introduction 221 (GIS 221)

**Module credits** 12.00

**Prerequisites** Prohibited combination GGY 283

**Contact time** 2 lectures per week, 1 practical per week

**Language of tuition** Module is presented in English

**Academic organisation** Geography, Geoinf + Meteor

**Period of presentation** Semester 2

**Module content**

\*GIS 221 does not lead to admission to any module at 300 level.

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 teaches students to use GIS as a tool.

## Introductory soil science 250 (GKD 250)

**Module credits** 12.00

**Service modules** Faculty of Engineering, Built Environment and Information Technology

**Prerequisites** CMY 117 GS or TDH

**Contact time** 1 practical per week, 3 lectures per week

**Language of tuition** Separate classes for Afrikaans and English

**Academic organisation** Plant and Soil Sciences

**Period of presentation** Semester 1

**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.

## Remote sensing 220 (GMA 220)

**Module credits** 14.00

<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology
<b>Prerequisites</b>	GMC 110
<b>Contact time</b>	2 lectures per week, 1 practical per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	Semester 1

#### 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 includes 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.

### Informatics 214 (INF 214)

**Module credits** 14.00

<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Natural and Agricultural Sciences
<b>Prerequisites</b>	AIM 101 or AIM 111 and AIM 121
<b>Contact time</b>	2 lectures per week, 2 practicals per week
<b>Language of tuition</b>	Afrikaans and English is used in one class
<b>Academic organisation</b>	Informatics
<b>Period of presentation</b>	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

<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Natural and Agricultural Sciences
<b>Prerequisites</b>	INF 164 and INF 171; AIM 101 or AIM 102 or AIM 111 and AIM 121

**Contact time** 1 lecture per week, 3 practicals per week

**Language of tuition** Afrikaans and English is used in one class

**Academic organisation** Informatics

**Period of presentation** Semester 2

**Module content**

An overview of systems infrastructure and integration.

## Informatics 261 (INF 261)

**Module credits** 7.00

**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 practical per week, 1 lecture per week

**Language of tuition** Afrikaans and English is used in one class

**Academic organisation** 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.

## Surveying 220 (SUR 220)

**Module credits** 14.00

**Service modules** Faculty of Engineering, Built Environment and Information Technology

**Prerequisites** WTW 114 GS/WTW 134

**Contact time** 2 lectures per week, 1 practical per week

**Language of tuition** Afrikaans and English is used in one class

**Academic organisation** Geography, Geoinf + Meteor

**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.

## Physical meteorology 261 (WKD 261)

**Module credits** 12.00

**Prerequisites** WTW 114

**Contact time** 4 lectures per week, 1 tutorial per week

**Language of tuition** Module is presented in English

**Academic organisation** Geography, Geoinf + Meteor

**Period of presentation** Quarter 1

#### 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 Clausius-Clapeyron equation. Calculation of the wet adiabatic.

### Introduction to dynamic meteorology 263 (WKD 263)

**Module credits** 12.00

**Prerequisites** WTW 126 and WTW 128 (students should simultaneously be enrolled for WTW 218).

**Contact time** 1 tutorial per week, 4 lectures per week

**Language of tuition** Module is presented in English

**Academic organisation** Geography, Geoinf + Meteor

**Period of presentation** Quarter 2

#### Module content

Vector algebra, curl of a vector, total and partial derivatives, second law of motion. 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.

## Curriculum: Final year

**Minimum credits: 144**

**Minimum credits:**

Core = 120

Elective = 24

### Core modules

#### Environmental geomorphology 361 (GGY 361)

<b>Module credits</b>	18.00
<b>Service modules</b>	Faculty of Humanities
<b>Prerequisites</b>	GGY 252 and only for students studying BSc (Geography) or BSc (Environmental Sciences).
<b>Contact time</b>	4 lectures per week, 2 practicals per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	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)

<b>Module credits</b>	24.00
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology
<b>Prerequisites</b>	GGY 283 or GIS 221
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	Semester 1

##### Module content

Advanced theory and practice of Geographic Information Systems; GIS applications; design and implementation of GIS applications.

## Spatial analysis 320 (GIS 320)

<b>Module credits</b>	22.00
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology
<b>Prerequisites</b>	GIS 220 and GGY 283
<b>Contact time</b>	3 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	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. A project or assignments of at least 64 notional hours.

## Sustainable development 356 (GGY 356)

<b>Module credits</b>	18.00
<b>Service modules</b>	Faculty of Education Faculty of Humanities
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	3 lectures per week, 1 practical per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	Quarter 1

### 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.

## Development frameworks 366 (GGY 366)

<b>Module credits</b>	18.00
<b>Service modules</b>	Faculty of Education Faculty of Humanities
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	3 lectures per week, 1 practical per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	Quarter 3

## 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.

## Human environmental interactions 301 (ENV 301)

**Module credits** 18.00

**Service modules** Faculty of Education  
Faculty of Humanities

**Prerequisites** No prerequisites.

**Contact time** 4 lectures per week, 1 practical per week

**Language of tuition** Module is presented in English

**Academic organisation** Geography, Geoinf + Meteor

**Period of presentation** Quarter 2

## 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, biodiversity loss, pollution, water scarcity, desertification, climate change, waste accumulation and management, environmental management tools, environmental education and environmental management legislation.

## Elective modules

### Soil chemistry 320 (GKD 320)

**Module credits** 14.00

**Prerequisites** GKD 250

**Contact time** 2 lectures per week, 1 practical per week

**Language of tuition** Separate classes for Afrikaans and English

**Academic organisation** Plant and Soil Sciences

**Period of presentation** Semester 2

## 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.

### Soil classification and surveying 350 (GKD 350)

**Module credits** 14.00

**Prerequisites** GKD 250 GS

<b>Contact time</b>	2 lectures per week, 1 practical per week
<b>Language of tuition</b>	Separate classes for Afrikaans and English
<b>Academic organisation</b>	Plant and Soil Sciences
<b>Period of presentation</b>	Semester 1

#### 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.

### Remote sensing 320 (GMA 320)

<b>Module credits</b>	22.00
<b>Prerequisites</b>	GMA 220
<b>Contact time</b>	2 lectures per week, 1 practical per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	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, laboratory exercises and research tasks. A project or assignments of at least 64 notional hours.

### Geometrical and space geodesy 310 (GMC 310)

<b>Module credits</b>	22.00
<b>Prerequisites</b>	GMC110 and WTW 114/WTW 134
<b>Contact time</b>	2 lectures per week, 1 practical per week
<b>Language of tuition</b>	Afrikaans and English is used in one class
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	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.



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## Geoinformatics project 320 (GMT 320)

<b>Module credits</b>	22.00
<b>Prerequisites</b>	GIS 310 and GIS 311. Only for Geoinformatics students.
<b>Contact time</b>	2 lectures per week, 1 practical per week
<b>Language of tuition</b>	Module is presented in English
<b>Academic organisation</b>	Geography, Geoinf + Meteor
<b>Period of presentation</b>	Semester 2

### 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.

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The information published here is subject to change and may be amended after the publication of this information. The [General Regulations \(G Regulations\)](#) apply to all faculties of the University of Pretoria. It is expected of students to familiarise themselves well with these regulations as well as with the information contained in the [General Rules](#) section. Ignorance concerning these regulations and rules will not be accepted as an excuse for any transgression.