



# University of Pretoria Yearbook 2023

## BSc (Geology) (02133023)

**Department** Geology

**Minimum duration of study** 3 years

**Total credits** 428

**NQF level** 07

### Programme information

Those students registered for the BSc (Geology) 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  
Geology

### 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

NSC/IEB

5

##### Mathematics

NSC/IEB

5

##### Physical Sciences

NSC/IEB

5

##### APS

**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 (Geology), 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

NSC/IEB

4

#### Mathematics

NSC/IEB

4

#### Physical Sciences

NSC/IEB

4

#### APS

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, STK 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, unless the Dean on the recommendation of the relevant 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 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.

### 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 Senate Appeals Committee.
- Any decision taken by the Senate 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: 144**

Fundamental = 14

Core = 130

### 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

### 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



<b>Prerequisites</b>	A candidate must have Mathematics for at least 60% and 60% for Physical Sciences.
<b>Contact time</b>	1 practical per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Chemistry
<b>Period of presentation</b>	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)

<b>Module credits</b>	16.00
<b>NQF Level</b>	05
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology Faculty of Education Faculty of Health Sciences Faculty of Veterinary Science
<b>Prerequisites</b>	Natural and Agricultural Sciences students: CMY 117 GS or CMY 154 GS Health Sciences students: none
<b>Contact time</b>	1 practical per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Chemistry
<b>Period of presentation</b>	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 geology 155 (GLY 155)

<b>Module credits</b>	16.00
<b>NQF Level</b>	05
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology



<b>Prerequisites</b>	A candidate must have passed Mathematics with at least 60% in the Grade 12 examination.
<b>Contact time</b>	1 practical per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</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. Interaction between man and the environment, and nature of anthropogenic climate change.

## Earth history 163 (GLY 163)

<b>Module credits</b>	16.00
<b>NQF Level</b>	05
<b>Prerequisites</b>	GLY 155
<b>Contact time</b>	1 practical per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geology
<b>Period of presentation</b>	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. Anthropogenic effects on the environment and their mitigation. Practical work will focus on the interpretation of geological maps and profiles.

## First course in physics 114 (PHY 114)

<b>Module credits</b>	16.00
<b>NQF Level</b>	05
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology Faculty of Education
<b>Prerequisites</b>	A candidate must have passed Mathematics and Physical Science with at least 60% in the Grade 12 examination





---

<b>Contact time</b>	1 discussion class per week, 1 practical per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</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.

## 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.



## Curriculum: Year 2

**Minimum credits: 134**

Core = 94

Elective = 40

### Additional information:

Students must select at least 40 credits of electives, bearing the following in mind: To be eligible for Chemistry or Hydrogeology Honours, CMY 282, CMY 283, CMY 284, CMY 285 (48 credits) are required.

## Core modules

### 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.

### 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.

## Sedimentology 253 (GLY 253)

<b>Module credits</b>	12.00
<b>NQF Level</b>	06
<b>Prerequisites</b>	CMY 117, CMY 127, GLY 155, GLY 163, WTW 114/WTW 158 and PHY 114
<b>Contact time</b>	2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geology
<b>Period of presentation</b>	Quarter 2

## Module content

Introduction to sedimentology; grain studies; composition and textures of sedimentary rocks; flow dynamics and behaviour of sediment particles in transport systems; description and genesis of sedimentary structures; diagenesis; depositional environments and their deposits, modern and ancient; chemical sedimentary rocks; economic sedimentology; field data acquisition from sedimentary rocks and writing of reports; sieve analysis; Markov analysis; analysis of palaeocurrent trends; interpretation of sedimentary profiles.

## Fundamental and applied mineralogy 255 (GLY 255)

<b>Module credits</b>	12.00
<b>NQF Level</b>	06
<b>Prerequisites</b>	CMY 117, CMY 127, GLY 155, GLY 163, (WTW 158 or WTW 114) and PHY 114
<b>Contact time</b>	2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geology
<b>Period of presentation</b>	Quarter 1

## Module content

Fundamental concepts in mineralogy, and practical applications of mineralogy, including: the basics of crystal structure; the crystallographic groups; the rules of atomic substitution; phase transitions and phase diagrams; the structure and uses of olivine, pyroxene, feldspar, amphibole, mica, aluminosilicates, garnet, cordierite, and more uncommon mineral groups such as oxides, sulphides and carbonates; the calculation of mineral formulae from chemical analyses using various methods. Practical sessions: the basics of optical mineralogy and the use of transmitted light microscopy for thin section examination of minerals and rocks; the practicals will develop mineral identification skills for the minerals covered in the lectures, and cover basic textural identification.



## Igneous and metamorphic petrology 263 (GLY 263)

<b>Module credits</b>	24.00
<b>NQF Level</b>	06
<b>Prerequisites</b>	GLY 255
<b>Contact time</b>	2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geology
<b>Period of presentation</b>	Semester 2

### Module content

Classification and nomenclature of igneous rocks. The nature of silicate melts; physical and chemical factors influencing crystallisation and textures of igneous rocks. Phase diagrams, fractional crystallisation and partial melting. Trace elements and isotopes, and their use in petrogenetic studies. Global distribution of magmatism and its origin. Mid-oceanic ridges, active continental margins, intraplate magmatism. Classification of metamorphic rocks. Anatexis, migmatite and granite; eclogite. Metamorphic textures. PT-time loops. Metamorphism in various plate tectonic environments.

## Geological field mapping 266 (GLY 266)

<b>Module credits</b>	6.00
<b>NQF Level</b>	06
<b>Prerequisites</b>	GLY 253
<b>Contact time</b>	7 days full-time block week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geology
<b>Period of presentation</b>	Year

### Module content

Introduction to field mapping techniques.

## Remote sensing 220 (GMA 220)

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

### Physical chemistry 282 (CMY 282)

**Module credits** 12.00

**NQF Level** 06

**Service modules** Faculty of Education

**Prerequisites** CMY 117 and CMY 127

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

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

**Department** 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

**NQF Level** 06

**Service modules** Faculty of Education

**Prerequisites** CMY 117 and CMY 127

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

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

**Department** Chemistry

**Period of presentation** Quarter 3



## Module content

Statistical evaluation of data in line with ethical practice, gravimetric analysis, aqueous solution chemistry, chemical equilibrium, precipitation-, neutralisation- and complex formation titrations, redox titrations, potentiometric methods, introduction to electrochemistry. Examples throughout the course demonstrate the relevance of the theory to meeting the sustainable development goals of clean water and clean, affordable energy.

### Organic chemistry 284 (CMY 284)

<b>Module credits</b>	12.00
<b>NQF Level</b>	06
<b>Service modules</b>	Faculty of Education
<b>Prerequisites</b>	CMY 117 and CMY 127
<b>Contact time</b>	1 tutorial per week, 2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Chemistry
<b>Period of presentation</b>	Quarter 1

## Module content

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 Training in an ethical approach to safety that protects self, others and the environment is integral to the practical component of the course.

### Inorganic chemistry 285 (CMY 285)

<b>Module credits</b>	12.00
<b>NQF Level</b>	06
<b>Service modules</b>	Faculty of Education
<b>Prerequisites</b>	CMY 117 and CMY 127
<b>Contact time</b>	1 tutorial per week, 2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Chemistry
<b>Period of presentation</b>	Quarter 4



## Module content

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. During practical training students learn to acquire and report data ethically. Practical training also deals with the misuse of chemicals and appropriate waste disposal to protect the environment and meet the UN sustainable development goals.

## 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.



## Surveying 220 (SUR 220)

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





## Curriculum: Final year

### Minimum credits: 144

Core = 78

Elective = 66

### Additional information:

Students must select 72 credits of electives, bearing in mind the following:

- CMY 382, CMY 383, CMY 384, CMY 385 (72 credits) are required to be eligible for Chemistry Honours
- GKD 320, GKD 350 and PGW 350 (42 credits) are required to be eligible for Soil Science Honours
- CMY 385, CMY 383, and GLY369 (72 credits) are required to be eligible for Hydrogeology Honours - GGY 361 or GGY 301, and GIS 310 or GMA 320 are required to be eligible for Geography and Environmental Science Honours

## Core modules

### Structural geology 365 (GLY 365)

**Module credits** 18.00

**NQF Level** 07

**Prerequisites** GLY 263

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

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

**Department** Geology

**Period of presentation** Quarter 1

#### Module content

Integrated theoretical and practical course dealing with the principles of rock deformation and analysis of deformed rocks. Stress, strain and rheology, joints, experimental rock deformation, fault systems and Anderson's theory of faulting. Folds and interference folding, tectonic fabrics, shear zone, progressive deformation. Stereographic projection and structural analysis.

### Groundwater 366 (GLY 366)

**Module credits** 18.00

**NQF Level** 07

**Prerequisites** GLY 263

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

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

**Department** Geology

**Period of presentation** Quarter 2



## Module content

The hydrological cycle, water resources and water usage; porosity and permeability, heterogeneity and isotropy; the occurrence of groundwater, vadose and phreatic zones; aquifer types, relations and groundwater flow; hydrostratigraphy, surface water and groundwater interaction, springs; water balance, water flow, recharge and baseflow; Darcy's Law, hydraulic conductivity and subsurface flow; capillarity, hydraulics, Bernoulli's equation and the continuity principle; hydraulic parameters and their derivation from aquifer pumping tests, including Theis, Cooper-Jacob and other modifications; water quality, solubility, natural waters, ionic balance and plotting water chemistry data; groundwater mining, aquifer compaction and subsidence; saline intrusion, dryland salinity, pollution, NAPLs; site remediation and toxicology.

## Economic geology 367 (GLY 367)

<b>Module credits</b>	36.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	GLY 365
<b>Contact time</b>	2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geology
<b>Period of presentation</b>	Semester 2

## Module content

This module details the genesis and exploitation of major ore deposits, with an emphasis on South African examples. The processes through which ore deposits are formed and modified will be discussed, highlighting the relevance of sedimentary, metamorphic and igneous processes in the genesis of world-class ore bodies. The module will also address the methods of mining commonly used, and the international commodity market, including a brief introduction to ore reserve estimation and the evaluation of potential ore deposits. The section of the module involving mineral exploration and mining will emphasize the need of pursuing a sustainable mineral resources development mindset, by addressing and sharing ideas on the impact that mining has on environmental, social and economic issues including community welfare, impact of mining on land use, and rehabilitation post mining.

## Advanced Geological field mapping 368 (GLY 368)

<b>Module credits</b>	6.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	GLY 263
<b>Contact time</b>	7 days full-time block week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geology
<b>Period of presentation</b>	Year

## Module content

Advanced field mapping techniques.



## Elective modules

### Physical chemistry 382 (CMY 382)

<b>Module credits</b>	18.00
<b>NQF Level</b>	07
<b>Service modules</b>	Faculty of Education
<b>Prerequisites</b>	CMY 282, CMY 283, CMY 284 and CMY 285
<b>Contact time</b>	1 discussion class per week, 2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Chemistry
<b>Period of presentation</b>	Quarter 4

#### Module content

Theory: Molecular quantum mechanics. Introduction: Shortcomings of classical physics, dynamics of microscopic systems, quantum mechanical principles, translational, vibrational and rotational movement. Atomic structure and spectra: Atomic hydrogen, multiple electron systems, spectra of complex atoms, molecular structure, the hydrogen molecule ion, diatomic and polyatomic molecules, structure and properties of molecules. Molecules in motion: Viscosity, diffusion, mobility. Surface chemistry: Physisorption and chemisorption, adsorption isotherms, surface tension, heterogeneous catalytic rate reactions, capillarity.

### Analytical chemistry 383 (CMY 383)

<b>Module credits</b>	18.00
<b>NQF Level</b>	07
<b>Service modules</b>	Faculty of Education
<b>Prerequisites</b>	CMY 282, CMY 283, CMY 284 and CMY 285
<b>Contact time</b>	1 discussion class per week, 2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Chemistry
<b>Period of presentation</b>	Quarter 1

#### Module content

Separation methods: Extraction, multiple extraction, chromatographic systems. Spectroscopy: Construction of instruments, atomic absorption and atomic emission spectrometry, surface analysis techniques. Mass spectrometry. These techniques are discussed in terms of their use in environmental analysis and the value they contribute to meeting the UN sustainable development goals (#3,6 & 11). Instrumental electrochemistry. The relevance of electrochemistry to providing affordable and clean energy (UN SDG#7) is addressed.

### Organic chemistry 384 (CMY 384)

<b>Module credits</b>	18.00
<b>NQF Level</b>	07



---

<b>Service modules</b>	Faculty of Education
<b>Prerequisites</b>	CMY 282, CMY 283, CMY 284 and CMY 285
<b>Contact time</b>	1 discussion class per week, 2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Chemistry
<b>Period of presentation</b>	Quarter 3

### Module content

Theory: NMR spectroscopy: applications. Aromatic chemistry, Synthetic methodology in organic chemistry. Carbon-carbon bond formation: alkylation at nucleophilic carbon sites, aldol and related condensations, Wittig and related reactions, acylation of carbanions (Claisen condensation). Practical: Laboratory sessions are designed to develop the rational thinking behind the design of organic chemistry experiments. An industrial project specifically prepares students for work in SA industry context and honours projects. As part of this practical programme the UN sustainable development goals must be considered in evaluating the best industrial process.

## Inorganic chemistry 385 (CMY 385)

<b>Module credits</b>	18.00
<b>NQF Level</b>	07
<b>Service modules</b>	Faculty of Education
<b>Prerequisites</b>	CMY 282, CMY 283, CMY 284 and CMY 285
<b>Contact time</b>	1 discussion class per week, 2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Chemistry
<b>Period of presentation</b>	Quarter 2

### Module content

Theory: Structure and bonding in inorganic chemistry. Molecular orbital approach, diatomic and polyatomic molecules, three-centre bonds, metal-metal bonds, transition metal complexes, magnetic properties, electronic spectra, reactivity and reaction mechanisms, reaction types, acid-base concepts, non-aqueous solvents, special topics.

## Theories and applications of human geography 301 (GGY 301)

<b>Module credits</b>	18.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	GGY 201
<b>Contact time</b>	1 practical per week, 3 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	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.

### 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 chemical/mineralogical transformation, as well as landscape dynamics of carbon, iron and manganese receive special attention in this module.



## Soil formation and classification 350 (GKD 350)

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

## Economic geology 367 (GLY 367)

<b>Module credits</b>	36.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	GLY 365
<b>Contact time</b>	2 practicals per week, 4 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Geology
<b>Period of presentation</b>	Semester 2

### Module content

This module details the genesis and exploitation of major ore deposits, with an emphasis on South African examples. The processes through which ore deposits are formed and modified will be discussed, highlighting the relevance of sedimentary, metamorphic and igneous processes in the genesis of world-class ore bodies. The module will also address the methods of mining commonly used, and the international commodity market, including a brief introduction to ore reserve estimation and the evaluation of potential ore deposits. The section of the module involving mineral exploration and mining will emphasize the need of pursuing a sustainable mineral resources development mindset, by addressing and sharing ideas on the impact that mining has on environmental, social and economic issues including community welfare, impact of mining on land use, and rehabilitation post mining.

## Engineering geology and rock mechanics 369 (GLY 369)

<b>Module credits</b>	36.00
<b>NQF Level</b>	07
<b>Prerequisites</b>	GLY 365
<b>Contact time</b>	2 practicals per week, 4 lectures per week



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

**Department** Geology

**Period of presentation** Semester 2

### Module content

Definition and scope of engineering geology; engineering geological properties and problems of rocks and soils within different stratigraphic units and climatic regions in southern Africa. Strength and failure modes of rock material and rock failure criteria. The characteristics of joints in rock. Joint line surveys and interpretation of data. Characteristics of a rock mass, rock mass classification and determination of strength. Slope stability in surface mines. Induced seismicity due to deep mining and rock bursts. This is in support of United Nations Sustainable Development Goals dealing with clean water, sanitation, infrastructure development.

## 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.

## Soil-water relationship and irrigation 350 (PGW 350)

**Module credits** 14.00

**NQF Level** 07

**Prerequisites** GKD 250

**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 1





---

## Module content

Quantitative description and measurement of soil water content and potential as well as saturated and unsaturated hydraulic conductivity. Modelling water flow in soil (Darcy's law, Richards's equation). Infiltration, redistribution, evaporation, runoff and percolation. Irrigation in South Africa. Modelling and managing the soil water balance. Plant water consumption and the soil-plant-atmosphere continuum. Irrigation scheduling (soil, plant and atmosphere approaches). Managing poor quality water. Irrigation systems. The module includes a field trip to an irrigation scheme.

---

## 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.