



Faculty of Natural and
Agricultural Sciences

Fakulteit Natuur- en Landbouwetenskappe
Lefapha la Disaense tša Tlhago le Temo

Departmental Handbook

Geology Department

Guidelines for Current and Prospective Students

BSc and BSc (Hons)

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Table of Contents

1	Introduction	1
1.1	Welcome	1
1.2	Macro-alignment	3
1.3	Graduate Attributes.....	4
1.4	Educational Approach	4
1.5	Responsibilities of the Student.....	5
1.6	About this Document	5
2	Administrative Information	5
2.1	Lecturing Staff.....	5
2.2	Part-time Lecturers, Demonstrators and Tutors	6
2.3	Course Coordinators, Class Guardians and General Queries	6
2.4	Timetable and Contact Sessions	7
2.5	Class Representatives	7
2.6	Code of Conduct	7
2.6.1	Communication via email	7
2.6.2	Compliments and complaints	8
2.6.3	Ethical conduct	8
2.6.4	Disruptions and access to campus.....	9
3	Study Material and Purchases.....	9
4	Admission and Re-registration	9
4.1	Admission	9
4.1.1	BSc programmes.....	9
4.1.2	BSc (Hons) programmes	10
4.2	Re-registration and Repetition	10
4.2.1	BSc programmes.....	10
4.2.2	BSc (Hons) programmes	11
4.2.3	Repetition of modules passed	11
4.3	Academic Progression	11
4.4	Class Attendance	12
4.5	Timetable Clashes	12
4.6	Prerequisites.....	12
4.7	Completion	12
5	Absence and Late Submission	13
5.1	Documents Proving Absence.....	13
5.2	Absence from Module Tests and Practical Tests	13
5.3	Absence from Mapping Camps, Excursions and Practical Field Days	13

5.4	Absence from the Exam Period	14
5.5	Absence from Sick, Aegrotat, Special (including Deans') and Deferred Tests and Examinations	14
5.6	Late Submissions of Written Assignments	14
5.7	Absence of Lecturer	14
6	Assessment.....	15
6.1	Assessment Criteria	15
6.1.1	Mathematical problems	15
6.1.2	Short theory questions	15
6.1.3	Essay questions.....	15
6.1.4	Addressing the question.....	15
6.2	Policy on Plagiarism	16
6.3	Referencing Norms	17
7	Marks and Examination	17
7.1	Submission of assignments	17
7.2	Module Marks	18
7.3	Examinations	18
7.4	Sick, Aegrotat, Special and Deferred Tests and Examinations	18
7.5	Special Dean's (and Chancellor's) Examinations	19
7.6	Contesting of Marks.....	20
7.7	Perusal and Remarking	20
8	Undergraduate Programmes.....	20
8.1	Annual Learning Outcomes	21
8.1.1	First year – GLY 100	21
8.1.2	Second year – GLY 200.....	21
8.1.3	Third year – GLY 300.....	21
8.2	Core Module Descriptions.....	22
8.3	Field Work Modules.....	24
9	Honours Programmes	24
10	Student Support	24
APPENDIX A.	DECLARATION ON PLAGIARISM	27
APPENDIX B.	UNDERGRADUATE MODULES	28

1 Introduction

1.1 Welcome

Welcome to the Department of Geology. The Department is housed in the Faculty of Natural and Agricultural Sciences on the Hatfield Campus of the University of Pretoria. Offices of lecturers and support staff are mainly situated in the Mineral Sciences Building, Natural Sciences 2 Building, and Stoneman Building. An interactive campus map is available on the University's homepage for directions.

Our research focus areas of the Department are:

- Engineering Geology and Hydrogeology
- Carbon Capture and Storage
- Precambrian Geology and Sedimentology
- Igneous Petrology, Volcanology and Geochemistry
- Structural Geology
- Unconventional and Renewable Energy Resources.

Energy, water and environment – these are the challenging topics for geoscientists in the 21st century on a regional to global scale. South Africa's energy and mineral resources need to be addressed in the context of global resource management to ensure sustainability. This is an introduction of yourself and the module in a paragraph or two.

Career options are mostly focused around the two broad fields of mining and mineral processing, and environmental resilience and sustainable development. Within these themes, careers are possible in a variety of disciplines and industries.

Geology

Geology as an academic pursuit is concerned with the formation of the Earth and the evolution of the natural world. Geology is an empirical science at heart, concerned with making observations on all scales from microscopic through macroscopic to continental scale, and makes use of chemistry, physics and mathematics in striving to understand the world around us. Geology is split into a host of sub-disciplines, including, but not limited to, mineralogy (the study of rock-forming minerals), petrology (the study of rock formation), sedimentology (the study of water-based systems of sediment transport), and structural geology (the deformation and behaviour of rock under stress).

Mining Geology

Many geologists work for large mining companies across the globe. A mining geologist is responsible for both short-term and long-term operations on the mine. From day to day, the geologist will work to identify geological hazards (through visiting the working areas or examining borehole cores), ensure the correct material is being mined, and liaise with both the miners and the senior executives on the mine. A geologist is also involved in the long-term planning for the mine, estimating the available resources and planning the best way to exploit these resources. Some mine geologists become specialists in ore resource estimation, while others may eventually work as mine managers.

Exploration Geology

Before a mine can be built, an ore deposit must be located and assessed. The exploration geologist is responsible for identifying potential ore deposits, assessing their economic value and planning the exploitation of such deposits. A variety of techniques are used in exploration geology, including geophysical and geochemical surveys, but most exploration involves a large amount of time out

exploring the wilderness on foot. Once a potential deposit has been located, borehole drilling and other methods are used to investigate the deposit, and the ore resource is modelled statistically. Some exploration geologists specialise in only one part of the process, whereas others are involved at all stages. With the recent developments around unconventional and renewable energy resources, novel career opportunities in exploration geology may become increasingly prominent.

Engineering Geology

Engineering Geology is somewhat different to applied geology in that additional knowledge, education and training is required in the problems of the ground for engineering works, site investigation methods and the classification and behaviour of soils and rocks in relation to civil engineering, and therefore includes practical knowledge of soil mechanics, rock mechanics and hydrogeology (fluid mechanics). Applications of engineering geology generally relate to construction on and in (i.e. founding or excavation) or with (i.e. construction materials) geological materials, as well as the influences of geological, geomorphological and hydrological processes on construction and development.

Hydrogeology

Groundwater hydrology or geohydrology refers to the occurrence, distribution and movement of water below the Earth's surface, whereas hydrogeology is that subdivision of hydrology referring to water below the Earth's surface with the emphasis on the geological aspects. The study of groundwater, therefore, should incorporate both the fluid (water) and the medium through which it is flowing (rock, soil or any other geological material). Groundwater – as opposed to surface water – refers to all the water occupying all the voids in the subsurface and is subdivided into the saturated or phreatic zone and the unsaturated, aeration or vadose zone. The relevance of the study of groundwater is generally quantitative (e.g. water supply, safe abstraction, influences of pumping) and qualitative (e.g. contamination, remediation, drinking water).

Environmental Geology

Environmental geology is a generic term related to two distinct subdisciplines. Firstly, environmental can be seen to indicate the interaction between processes and Man, and include, for instance, risk induced by subsidence, slope movements, seismic events, hydrometeorology, and so forth. A second possible definition of environmental relates more to the field of contaminant transport and focuses around chemical, physical, microbiological, radioactive, endocrine disruptive, organic and other forms of water and soil contamination. Specialisation in these fields are offered within the context of Engineering Geology or Hydrogeology, and often involves specialist input from Geology (e.g. quantitative mineralogy, economic geology, etc.), the Water Institute (surface hydrology, soil science, meteorology, zoology, ecology, virology, etc.) and the UP Natural Hazard Centre (e.g. risk assessment, geostatistics, seismology, etc.).

Engineering Hydrogeology and Vadose Zone Hydrology

A developing strength in the department is focused around unsaturated or vadose zone hydrology. The area between the Earth's surface and the groundwater table is characterised by pore spaces occupied with both air and water, and these dual-flow systems influence the movement of contaminants to the aquifer, water seepage through buildings and excavations, and govern the important interaction between surface water and groundwater as a fundamental component of the water cycle. Although included in the separate fields of engineering-, hydro- or environmental geology, the tendency is towards considering these as new disciplines focused around the application of water-air systems to development and the environment.

Other Options

Geologists often work in many other fields. Some forensic scientists are geologists by training, as are some metallurgists and mineralogists. Banks and insurance companies use geologists as risk analysts for business loans and policies, and some geologists end up working as stock brokers at the stock exchange. Geology at its core is about evaluating evidence and making the best logical decision based on the evidence, and this skill can be transferred to many other fields. But in general, geologists are present everywhere in the professional world. Imagine a world without energy resources, water, building materials and without mining! All this needs geologists and other geoscientists.

1.2 Macro-alignment

The Department of Geology acknowledges the vision of the University of Pretoria and aims to train students at all levels to be internationally competent and locally relevant. The Department therefore focuses on a strong fundamental background applied to global and local issues of relevance.

The South African Qualifications Authority (SAQA) published “*Level Descriptors for the South African National Qualifications Framework*” (November 2012), summarised for the bachelor’s, honours, master’s and doctoral qualifications in **Table 1**. The bachelor’s degrees offered in the Department are level 7 according to the South African Qualification Authority’s (SAQA’s) Higher Qualification and Education Sub Framework (HQESF). Each subsequent honours programme comprises 135 credits amounting to 1350 notional hours. The honours programmes are level 8, master’s programmes level 9, and doctoral programmes level 10.

Table 1. Criteria used to assess NQF level (SAQA).

Criteria
Scope of knowledge
Knowledge literacy
Method and procedure
Problem solving
Ethics and professional practice
Assessing, processing and managing information
Producing and communicating information
Context and systems
Management of learning
Accountability

All degrees offered prepare the student for the honours degrees in Geology or Engineering and Environmental Geology. These honours degrees allow for professional registration with the South African Council for Natural Scientific Professions (SACNASP).

The bachelor’s degrees offered in the department prepare the students for entry into the honours degrees in Geology, Engineering Geology, or Hydrogeology. All these honours degrees comply with the academic requirements of the South African Council for Natural Scientific Professions (SACNASP), allowing for eventual professional registration as a natural scientist (Pr.Sci.Nat.) on proving vocational competence.

Students are advised to be cautious of BSc Hons degrees offered in faculties other than that Science Faculty, seeing that postgraduate qualifications in other faculties should be professionally registered with their professional bodies. BSc Honours degrees not offered in Science Faculties rarely comply with the academic requirements for professional registration as natural scientists and will also typically not be adequate for registration in the professional bodies of the faculties offering the degree programmes.

1.3 Graduate Attributes

The University of Pretoria aspires to produce graduates with attributes that will enable them to develop further as individuals, members of different communities of practice and citizens of their own countries and the world. The depth of student engagement and the level of a qualification will influence the degree to which attributes are realised. At the highest level, the following are aspirational characteristics of University of Pretoria graduates:

- **Basic values, skills and orientation to the world**

University of Pretoria graduates:

- Conduct themselves ethically and with integrity
- respect the humanity and dignity of others and eschew all forms of unfair discrimination
- value cultural diversity, social equality, social justice and social responsibility
- value transformation for the betterment of society
- respect the environment and value the sustainable use of environmental resources
- are adaptable self-directed lifelong learners, who function autonomously and confidently as individuals and take responsibility for their own decisions and development
- have an entrepreneurial orientation to life

- **Social skills**

University of Pretoria graduates:

- have good interpersonal skills
- are able to communicate well with a range of people and communities in diverse social and cultural settings
- are able to work collaboratively and cooperatively in teams

- **Cognitive skills**

University of Pretoria graduates:

- are creative problem-solvers, displaying critical thinking and multi-disciplinary approaches in pursuit of solutions to problems
- are cyber literate and able to find, evaluate and use information appropriately

- **Career-related skills**

University of Pretoria graduates:

- have a sound foundational knowledge of their field of specialisation
- are able to use work-related technology effectively and can efficiently adjust to and use new technologies
- are able to assume leadership roles in the workplace
- can work productively under pressure
- promote and adhere to high standards of professional conduct
- can work collaboratively and co-operatively in multidisciplinary and multicultural team contexts
- use and provide opportunities to develop individuals, teams and networks

1.4 Educational Approach

In the educational policy of the University it is accepted that “a student should undergo an academic-scientific moulding as to later be able in professional context to function as an independent scientist and to contribute to the creative development of the chosen profession... In effect this refers to a purposeful and pro-active education approach which brings with it a change in emphasis from the traditional lecturer-centred teaching approach to a more dynamic student-centred learning

approach.” (A new approach, Tukkie-onderrig, Vol. 1(2), 1986). A syllabus for this programme has accordingly been developed as worded in this study guide.

1.5 Responsibilities of the Student

The Department expects students to attend contact sessions and to participate in classroom activities. You are to arrive to classes prepared and should respect the other students and their rights to attend classes.

Each individual module will detail expectations in terms of self-study and compulsory sessions. Students should adhere to the requirements to pass the module in terms of individual effort and attendance.

1.6 About this Document

This document, the **Departmental Handbook**, is to be used in conjunction with the University of Pretoria’s regulations, the Faculty of Natural and Agricultural Science’s yearbook, and the individual module study guides.

Separate study guides are available for all undergraduate modules and postgraduate courses, and additional information is available on the departmental homepage at www.up.ac.za/geology. The contents of this document, however, apply to all individual modules and the contents throughout the undergraduate and honours studies, unless stipulated otherwise in the respective module studyguide.

This document is updated continuously, and students are required to obtain the latest version:



Homepage:	Select:	Select:
www.up.ac.za/geology	About Us	I am looking for...

2 Administrative Information

ClickUP and the appropriate notice boards in the foyer to the Mineral Sciences Building will be used for official communication.

Student matters are handled by the departmental administrator, Mrs Lucia Moyo, in room 3-51 of the Mineral Sciences Building. All queries can be directed to her during her office hours.

Note that all queries regarding SWK and SGM modules have to be directed to the EBIT Faculty.

General queries regarding University life and study programmes can be directed to the Student Service Centre (ssc@up.ac.za, or housed in the Humanities Building ground floor level).

2.1 Lecturing Staff

Details and short curriculum vitae of all lecturing staff are available on the departmental homepage under Staff. Contact details and field of expertise are listed in Table 2. Staff members are available only by appointment made via email, or at the times stipulated on their office doors for consulting.

Table 2. Lecturing staff.

<i>Staff member</i>	<i>Office *</i>	<i>Email</i>	<i>Description</i>
Prof Adam Bumby	MS 4-24	adam.bumby@up.ac.za	Head of Department Structural Geology
Prof Louis van Rooy	NS II 4-25	louis.vanrooy@up.ac.za	Engineering Geology & Rock Mechanics
Prof Matthys Dippenaar	NS II 4-34	matthys.dippenaar@up.ac.za	Engineering Geology & Hydrogeology
Dr Lorenzo Milani	MS 3-50	lorenzo.milani@up.ac.za	Economic Geology
Dr Roger Diamond	NS II 4-28	roger.diamond@up.ac.za	Hydrogeology & Geochemistry
Dr James Roberts	MS 4-41	james.roberts@up.ac.za	Igneous & Metamorphic Petrology
Dr Nils Lenhardt	MS 4-38	nils.lenhardt@up.ac.za	Physical Volcanology & Sedimentology
Dr Ansie Smit	MS	ansie.smit@up.ac.za	Geostatistics
Mr Zakhele Nkosi	MS 4-25	zakhele.nkosi@up.ac.za	Mineralogy
Ms Mampho Maoyi	NS II 4-32		Rock Mechanics
Vacant post			
Vacant post			

* MS – Mineral Sciences Building; NS II – Natural Sciences 2 Building

2.2 Part-time Lecturers, Demonstrators and Tutors

Demonstrators and tutors and temporary and contract lecturers are used to improve contact during practical sessions. For a given module, the demonstrators and tutors compliment the functions of the lecturer and all work covered form part of the learning outcomes for the course.

These are available by appointment only, or during contact sessions stipulated in the study guide.

2.3 Course Coordinators, Class Guardians and General Queries

Lecturers can be contacted directly regarding modules presented. All contact details are available under Staff on the departmental homepage. Class Guardians for the respective years of study are:

- First year Geology Dr RJ Roberts
- Second year Geology Dr L Milani
- Third year Geology Dr N Lenhardt
- Engineering faculty students (civil & mining) Prof JL van Rooy
- Engineering and Environmental Geology Honours Prof MA Dippenaar
- Geology Honours Dr RJ Roberts
- Geology MSc's and PhD's Dr RE Diamond
- Engineering Geology and Hydrogeology MSc's and PhD's Dr RE Diamond

Specific queries related to the academic programme and learning materials can be communicated to the following persons:

- Overall curriculum coordinator Dr RJ Roberts
- Academic queries: Geology Dr RJ Roberts
- Academic queries: Engineering and Environmental Geology Prof MA Dippenaar
- Prerequisites Dr RJ Roberts
- Dean's exams Prof MA Dippenaar
- Second year mapping module Dr N Lenhardt
- Third year mapping module Dr L Milani
- Microscopy laboratories Dr RJ Roberts
- Hard copy and digital maps Prof MA Dippenaar
- Field equipment Prof AJ Bumby
- Hydrogeological equipment Dr RE Diamond

- | | |
|--|-------------------|
| • Engineering geological equipment | Prof JL van Rooy |
| • This document (Departmental Handbook) | Prof MA Dippenaar |
| • Department colloquia and research seminars | Dr RE Diamond |
| • Research output | Dr N Lenhardt |

2.4 Timetable and Contact Sessions

Timetables and lecture venues are available for each individual module. It is your responsibility to ensure that there are no timetable clashes.

In certain instances, the system assigned practical sessions, not allowing you to make your own selection. As this is done to minimise chances of clashes, the department will not intervene with motivations to shift sessions centrally assigned.

Lecturers provide study material and guidance, but expect, especially at honours level, students to participate more actively. During later years of study, it becomes your prerogative to communicate issues and concerns with the lecturers and to discuss course content with the class and lecturer at prearranged times. Discussions should be the student's incentive and not the lecturer's duty.

The lecturer is there to provide course contents, to guide you through self-study, and/ or to supervise research project work.

2.5 Class Representatives

It is the duty of the class as a whole to elect (by majority vote of those present) a class representative to act as mediator between the lecturer and the class. Communication is preferred through this pathway and the class representative will serve to communicate important notifications during lecture sessions.

The class representative will be appointed based on evaluation of their academic record. It is expected that a class representative performed academically and has, at the time of appointment, passed all previous academic semester modules, and has registered for all geology modules within a given academic year (e.g. all 100, 200 or 300 level modules) within the same calendar year.

2.6 Code of Conduct

We are not only facilitating learning in a module, we are also preparing you for the world of work. We expect you to adhere to the code of conduct as elaborated below.

2.6.1 Communication via email

When you send an email to your lecturer, you have to use a respectful tone and include all the following aspects:

- A clear and explanatory subject line (e.g. "Submission of sick note – P Mduli")
- Your full name and surname at the end of the mail
- Your student number
- The module involved
- Short and clear message.

2.6.2 Compliments and complaints

You are more than welcome to express your appreciation to your lecturer or tutor and supply feedback about aspects of the course that you enjoy and find valuable.

If you have a query or complaint, you have to submit it in writing with specifics of the issue or the nature of the complaint. It is imperative that you follow the procedure outlined below in order to resolve your issues:

- i) Consult the lecturer concerned about your complaint/concerns. If the matter has not been resolved:
- ii) Consult the class representative (the primary function of the Class Representative is to serve as a two-way communication channel between the class and the lecturer). If the matter has not been resolved:
- iii) Consult the class guardian (academic staff member in charge of the relevant academic year). If the matter has not been resolved:
- iv) Consult the Head of Department. If the matter has still not been resolved:
- v) Consult with the Dean of the Faculty.

2.6.3 Ethical conduct

It is expected from students to behave in an ethical and considerate manner. For this purpose, the following should be noted:

- Lecturers supply their personal contact details for communication pertaining to the study programme. Standard office hours apply and no telephone calls will be answered outside of these times or when the lecturer is not available. No text messages or instant messages will be answered and only telephone calls at reasonable times will be responded to.
- Email is still the preferred mode of communication. Given present technology, response via email can be traced and can be within reasonable time. All queries should be directed to the lecturer's official University of Pretoria email address and reasonable time should be allowed for response.
- Lecturers will not be available for consultation directly prior to tests, seminars or other official meetings. Ample time is available for interaction and last-minute queries may result in bias with respect to the other students in the class. Lecturers should not be contacted at night and no rude comments about non-response will be tolerated.
- Students are under no circumstances allowed to mention or post comments or images of lecturers or fellow students on the internet or on any social medium (e.g. Facebook, Twitter, LinkedIn, YouTube, etc.). Failure to comply with this will be acted on as it may compromise the image of the individuals or the University in general. The UP Social Media Policy (Rt 38/14) states that "personal use of social media must be conducted in a manner that indicates no link or association with the University. For this reason personal use is not covered in this policy..." and that the "... University will ... take necessary steps should users make use of social media in a manner that has a direct, indirect or potential impact on the University's reputation or interests.
- The only instance in which lecturers may be recorded during any contact sessions is when done so by themselves for the purpose of online supplementary media. Students are not allowed to record or photograph the lecturer without written consent.
- Any other ethical misconduct, including for instance prejudice or plagiarism, will be submitted to the University's office responsible for conflict resolution and they will decide the outcome.
- Grievances can be aired to the class guardian or course programme supervisor. This will be escalated to the head of the department if required, who will guide the student regarding the proper channels towards resolution.

2.6.4 Disruptions and access to campus

In order to finish the degree programme within the timeframes, illegal disruptions cannot be tolerated. In the event that campus is being closed for students, alternative arrangements will be made to move lectures off-site. By enrolling for this course, the student abides by this principle and is required to be available for possible off-campus contact self-study and increased online lecturing and assessment.

In the event of closure of campus due to legitimate and/ or legal reasons, arrangements will be made to move important contact sessions and/ or assessments, if applicable.

3 Study Material and Purchases

Prescribed and recommended textbooks form the basis of most of the relevant course contents. It is the students' prerogative to acquire these vital references or to peruse the materials in the library.

Class notes are a privilege offered by the lecturing staff. Students should realise that it is their duty to take notes and to use the prescribed and recommended study materials to compliment lecture presentations, and to take notes during the contact sessions, even if the lecture presentations are not made available. Lecturers by no means are required to make lecture presentations available and are free to deviate from prepared lectures to better cover topics of interest or areas of concern raised by students. A student cannot expect to study solely from the lecture presentations, and the lecturer has the right to examine topics covered in the classes but not provided in the lecture notes.

Standard geology materials for field work have to be obtained by the student. These include, for instance, a geological hammer (pick), magnifying glass and tape measure. Compasses and handheld GPS devices are available in the department.

The textbook published jointly by the GSSA and the CGS on "The Geology of South Africa" supplies vital background to all students enrolled for programmes in the department.

4 Admission and Re-registration

The following definitions apply:

- **Admission:** into the programme, following completion of secondary education, as per University and Faculty requirements
- **Re-registration:** into the same programme in a subsequent calendar year for the same or following academic year
- **Progression:** into the same programme in a subsequent calendar year for the subsequent academic year (e.g. from 200-level to 300-level).

4.1 Admission

4.1.1 BSc programmes

Admission procedures are documented in regulation G.1 and are administrated by the Faculty front desk and the Student Service Centre. On successful registration, the student will be informed on the arrangements and schedules for the first meetings.

The Department has no authority over admissions into the first year of the programmes.

4.1.2 BSc (Hons) programmes

Entry requirements for the honours programmes, as per Faculty Yearbook, are detailed below. Note that spaces available are maximum and fewer students may be allowed into the honours programmes in the events of staff shortages, inadequate academic performance of the applicants, and other reasons as may be relevant.

BSc (Hons) Geology: A BSc degree in Geology with an average of 60% for all the geology modules on third year level. In the selection procedure the candidate's complete undergraduate academic record will be considered. The positions available are limited to 25 and candidates who have progressed faster through their undergraduate degree will take preference. Outside applicants and those with unusual degree structures may be admitted after examination of their academic records and at the discretion of the head of department.

B.Sc. Hons. Engineering and Environmental Geology including the options in **Engineering Geology** and **Hydrogeology:** A BSc degree in Geology or Environmental and Engineering Geology with an average of 60% for all the modules in applied geology at second year and third year level. These modules should preferably include soil mechanics, rock mechanics, engineering geology and hydrogeology. In the selection procedure the candidate's complete undergraduate academic record will be considered. The positions available are limited to 15 and candidates who have progressed faster through their undergraduate degree will take preference. Outside applicants and those with unusual degree structures may be admitted after examination of their academic records and at the discretion of the head of department. Note that candidates will not be considered for engineering geology without all four of the applied geology modules. For hydrogeology, chemistry or mathematics will be considered in lieu of soil mechanics, but the other three applied geology modules are compulsory.

4.2 Re-registration and Repetition

Admissions (first registrations) and re-registrations are not the prerogative of the Department of Geology. These matters are referred to the Student Service Centre or the Faculty of Natural and Agricultural Sciences.

Should repetition of one or more modules be allowed, all aspects of such a module need to be repeated (Regulation G.11.2.a) and no exemption will be granted and no absence from contact sessions will be tolerated. The same applies to the project module, for which all the credits need to be repeated. Given that failure to pass a module proves lack of thorough understanding of the module contents, no exemption to class attendance, tests, assignments, practicals, field excursion or other components of study will be granted.

UP General regulation G3.2 under the heading Renewal of registration states that re-registration is permitted only "...in the case of full-time students, if the student completes the degree for which he or she is still registered within the prescribed minimum period plus two years and, in the case of after-hours students, distance education students and students who follow an approved extended programme, if such students still complete their studies within the prescribed minimum period plus three years: provided that faculty boards may stipulate other requirements for progress that students must comply with in order to be readmitted."

4.2.1 BSc programmes

Re-registration is permitted only "if the student has passed at least the equivalent of four semester modules in a particular year of study" (regulation G.3.2.a) and "if the student completes the degree for which he or she is still registered within the prescribed minimum period plus two years" (regulation G.3.2.b). This implies that students will not be allowed to re-register for a programme in the Department of Geology if:

- Four semesters or eight quarters weighted according to the credits of the annual geology modules are not passed in a given year (i.e. 64 at 100-level or 96 at 200-level in a given academic year)
- The student fails to be promoted to a subsequent academic year following the fifth year of enrolment (given the generic first year, academic performance from all programmes within the Faculty of Natural Sciences and EBIT will be considered), including the extended programme.

4.2.2 BSc (Hons) programmes

If allowed, a maximum of 35 combined module credits may be repeated. Note that only one such an opportunity will be allowed and that failing any of the relevant modules a second time will result in no further admission into any part of the honours programme. Modules repeated will also have to be taken in the year directly following the year of failure.

Given the integrated approach followed in the course, failure of more than 35 credits will result in the student being failed the complete honours course. In exceptional circumstances, the student may be allowed to enrol for the entire programme for the following year. However, readmission is competitive with the new enrolments, and a student having failed more than 35 credits may be refused re-entry into the honours programme as strong candidates obtaining bachelor's degrees with all prerequisites in place have the preferential right to programme positions.

4.2.3 Repetition of modules passed

Students are not permitted to repeat modules that they have already passed. This applies also to the instances where module codes have changed. Students cannot repeat modules to attempt to achieve higher marks; the GPA will still be calculated using the first mark obtained in the module. Students can also not repeat the same content to make up for additional credits.

4.3 Academic Progression

Additional to being allowed to re-register into the study programme, a student will only be allowed to promote to the following academic year if passing more than 100 credits for a particular year of study (Faculty yearbook regulation Sc. 3) as well as all core modules of the preceding year.

Lack of prerequisites and poor academic performance may result in reapplications being denied. In the event that courses are oversubscribed, students with poor academic records and continuous poor academic performance will not be allowed back into a particular year of study.

Should a student fail to progress to a subsequent year of study for any reason whatsoever (including failure to re-register, failure of modules, non-compliance with minimum requirements), the student is considered to have interrupted his or her studies and forfeits the right to continue studies according to the regulations and requirements set in the first year of study. Such students may be expected to redo any modules no longer offered or in which the content has changed without credit to modules no longer accepted in the programme (regulation G.5).

A student will not be informed of his/ her marks, allowed perusal, or have the credits allocated, if a student cannot provide proof of registration and/ or if tuition fees are outstanding (Faculty yearbook regulation 5).

A student will, furthermore, be refused to progress academically if any study materials are outstanding, including but not limited to: library materials, lecturer's books or articles, maps, GPSs, and so forth.

4.4 Class Attendance

According to University policy, “a student may register for a module only if the official class timetable allows the student to attend all the classes” (regulation G.2.3). Clickers, roll call, practical submissions, or other means may be employed to guarantee acceptable class attendance.

Lecture and practical attendance is compulsory. For this reason, no lectures or practical sessions will be repeated as this negatively impacts on the rest of the students in the class. Absence from lectures and practical sessions without proper reason will require from the student to obtain the information and announcements from the relevant session. Timetable clashes will not be acceptable as an excuse.

Saturdays are also available for academic purposes and students may be expected to be available on weekends.

All field schools, field trips and excursions are compulsory and will comprise the majority of the practical components of the modules covered and will integrate practical knowledge with field knowledge.

Students should not query whether appointments are compulsory, nor should their work (if applicable) interfere with attendance of compulsory sessions. All field schools, field trips and excursions are compulsory and will comprise the majority of the practical components of the modules covered and will integrate practical knowledge with field knowledge.

Practicals for large groups are allocated automatically on registration. The Geology Department does not have the authority to support requests for alternative practical sessions for modules in other departments.

Each credit allocated to a module amounts to ten hours of learning. This implies that all modules require extensive self-study as well as preparation for tests and examinations.

The teaching environment is created to the benefit of students in attendance. Arriving late is to the detriment of their learning environment and will therefore not be tolerated.

4.5 Timetable Clashes

In the event of timetable clashes due to, for instance, repetition of modules or choices of electives, the student will be expected to prioritize lower level academic major subjects at the expense of higher level subjects or electives. Courses offered during the same timetable sessions cannot be enrolled for simultaneously as no exemption or alternative sessions will be arranged.

4.6 Prerequisites

Prerequisites are enforced rigidly and under no circumstances will students be allowed to progress to a subsequent module or year of study when all prerequisites are not met. Apart from the lack of adequate understanding of principles when such modules are failed, the work load becomes too high and compromises academic performance in other modules. For this reason, the “dean may ... cancel the registration of a student or the registration for a module during an academic year if the student fails to comply with the minimum requirements determined by the faculty board with regard to tests, examinations or any other work” (regulation G.4).

4.7 Completion

Final marks will be submitted following the final examinations. Students are required to ensure that they are (a) enrolled for the correct academic programme and (b) registered for the appropriate modules making up the required credit requirements prior to commencement of the examination.

Lecturers or academic administration cannot accept any responsibility for mistakes in enrolment, and final marks will not be submitted in the event that an examination was completed for a module that the student is not registered for. The degree can only be awarded if the appropriate modules were completed as per annual yearbook.

5 Absence and Late Submission

Where applicable, the following applies to absence from scheduled contact sessions and evaluation opportunities and will be applied strictly and without exception.

5.1 Documents Proving Absence

If you are absent as a result of illness, a medical certificate must be handed in within 72 hours after the test or practical. If you are absent for other legitimate reasons, the reasons must be provided in the form of an affidavit or sworn statement within 72 hours of the formal test date. Note should, however, be taken that a medical certificate is the only accepted reason for absence according to the University of Pretoria's regulations and any other reasons are within the prerogative of the lecturer and Head of Department, or the Dean of the Faculty concerned. Learners are urged to not miss tests for any reason other than illness, or to discuss other issues not relating to health with the lecturer prior to the test date.

Medical certificates and sworn statements (affidavits) may require supplementary material before being accepted. You are urged to ensure that you have the case number and such other required documentation in place prior to submitting your reason for absence.

Valid original sick notes are accepted if issued by a medical doctor registered at the Health Professions Council of South Africa (HPCSA). The only other type of sick note that is accepted are those issued by an Advanced Practice Nurse (a registered nurse with a postgraduate qualification) as determined by the South African Nursing Council who has a BHCF practice number, provided that the diagnosis falls only within their specific field of specialisation.

An affidavit will only be accepted if supported by substantiating documentation, e.g. case report or criminal charge with case number obtained from a police station, valid medical certificate for injuries, a death certificate for a funeral, etc. Please note that submission of fraudulent sick notes and affidavits is a criminal offense, which will lead to disciplinary action and may result in dismissal.

5.2 Absence from Module Tests and Practical Tests

Official test dates are set in the test timetable or are announced during lectures and/ or practicals.

In the event of semester or module tests, documents (§5.1) have to be submitted to the departmental administrator and not the lecturer within 72 hours of the scheduled test time. A decision will then be taken whether the reason is valid and a time for the re- or sick test will be set for the group as a whole. If the reason for absence is not accepted by the lecturer, the decision is final and no alternative arrangements will be made.

In the event of more than one module or practical tests in a given module, it is acceptable that the lecturer offers a single opportunity following the second test. In the event of absence from both tests, this sick test will count towards the test contributing the greatest proportion to the final module mark. In such instances, a zero mark will be allocated for the other test missed.

5.3 Absence from Mapping Camps, Excursions and Practical Field Days

No excuses will be accepted for absence from the excursion and practical field days as attendance of these sessions are vital to the contents of the relevant course. In the event of absence from any of these compulsory activities, the prerequisites for passing the module will not be met and the excursions and/ or practical field days will have to be repeated in a later year. Note that weekends form part of the academic week and students are expected to arrange availability on such days.

The field modules (GLY 266 and GLY 368) are offered only once per academic year during the June or October recess. If enrolled for these modules, the student has to attend. No excuses or alternative submissions will be accepted for absence.

As geology requires a substantial knowledge of field relationships, alternative options cannot be considered as the exposure to field geology is fundamental in establishing the knowledge for the qualification.

A student will not be allowed to graduate with a degree in geology or engineering and environmental geology without attendance of both these field modules. Marks from these modules will also be used in determining the average mark for the degree, for consideration of special examinations, and for admission into the honours programme.

5.4 Absence from the Exam Period

Documents (§5.1) have to be submitted to the Faculty Administration directly as the lecturer cannot approve sick exams or supplementary exams. No sick exams will be granted by the Faculty Administration unless the documentation was submitted to the Faculty directly within 72 hours of the official exam period. The lecturer does not have the right to grant supplementary exams and this has to be discussed with the Faculty. The lecturer also will not mediate between the learner and the Faculty regarding these matters. As per University regulations, no supplementary or ancillary examinations will be granted on sick exams.

5.5 Absence from Sick, Aegrotat, Special (including Deans') and Deferred Tests and Examinations

No excuses will be accepted for absence from any second opportunities of assessment. Given that all of these represent second opportunities, absence from these assessments will not be discussed or reconsidered.

5.6 Late Submissions of Written Assignments

Late submissions (if applicable) are inexcusable as ample time is supplied for timeous submission via ClickUP. Late submissions will result in a zero mark for this component. The deadlines supplied for written assignments should be viewed as the absolute latest submission time, and learners are urged to submit assignments well in advance.

5.7 Absence of Lecturer

In the event that a lecturer – due to unforeseen circumstances known in advance – is not able to present a lecture or practical session, this will be made known via ClickUP before 16:00 on the day prior to the contact session. If the lecturer is not able to attend such contact sessions at short notice, a replacement lecturer will be arranged if possible, or alternatively the class representative will be informed of the cancellation of the lecture or practical. It is then the responsibility of the class representative to announce this at the beginning of the contact session or to post a notice at the entrance to the venue. Where possible and necessary, the lecturer will arrange for an additional session to catch up on the lost course contents.

The class representative will have the lecturer's contact details to ensure continuous communication in such instances.

6 Assessment

6.1 Assessment Criteria

In terms of module tests and examinations, answers should be relevant, concise and properly formulated. Guidelines on answering of mathematical problems, short theory questions and essays are supplied below. The percentage contributions should only serve as an indication and lecturers may change the criteria or weightings as deemed fit.

6.1.1 *Mathematical problems*

- An applicable method was applied.
- The steps are clearly shown and are logical.
- The answer is correct to the indicated significance.
- The units are correct and correctly indicated.
- The graphical representation is correct and labelled.
- The correct deductions or conclusions are made.
- It is presented in a legible, comprehensible manner.

6.1.2 *Short theory questions*

- The answer is relevant to the question.
- The answer is factually correct.
- The answer is short, concise and realistic with respect to the allocated maximum marks.
- There are not any redundant, irrelevant, contradictory or incorrect statements in the answer.
- The verb in question was addressed, i.e. discuss, list, define, complete, elaborate, etc.

6.1.3 *Essay questions*

- The essay is opened with an introductory paragraph.
- The essay ends with a conclusion paragraph which does not introduce any new data.
- The body of the essay structured into logical paragraphs with core concepts.
- The language, grammar and punctuation are proper and of acceptable standard and readability.
- The contents of the essay are relevant to the question asked as well as correct.
- The verb in question is addressed, i.e. discuss, list, define, complete, elaborate, etc.
- The answer is presented in a legible, comprehensible manner.
- The answer is short, concise and realistic with respect to the allocated maximum marks.
- Figures, schematic diagrams and/ or tables are used appropriately.
- The answer supplied is in the student's own words and is not plagiarised.
- Generally for essay questions - ~70% for answer; ~10% for grammar and language; ~10% for structure of the essay; ~10% for addressing the topic.

6.1.4 *Addressing the question*

Note the verb in question as per the following definitions from Google.com:

- **Assess:** evaluate or estimate the nature, ability, or quality of
- **Calculate:** determine (the amount or number of something) mathematically
- **Define:** state or describe exactly the nature, scope, or meaning of

- **Describe:** give an account in words of (someone or something), including all the relevant characteristics, qualities, or events
- **Determine:** ascertain or establish exactly, typically as a result of research or calculation
- **Discuss:** talk or write about (a topic) in detail, taking into account different ideas and opinions
- **Distinguish:** perceive or point out a difference; recognize or treat ... as different
- **Elaborate:** involving many carefully arranged parts or details; detailed and complicated in design and planning
- **Evaluate:** form an idea of the amount, number, or value of; assess
- **Explain:** make (an idea, situation, or problem) clear ... by describing it in more detail or revealing relevant facts or ideas; account for (an action or event) by giving a reason as excuse or justification
- **Outline:** give a summary of (something)
- **Relate:** give an account of (a sequence of events); narrate
- **Summarize:** give a brief statement of the main points of (something).

6.2 Policy on Plagiarism

Plagiarism is a serious form of academic misconduct. It involves both appropriating someone else's work and passing it off as one's own work afterwards. Thus, you commit plagiarism when you present someone else's written or creative work (words, images, ideas, opinions, discoveries, artwork, music, recordings, computer-generated work, etc.) as your own. Only hand in your own original work. Indicate precisely and accurately when you have used information provided by someone else. Referencing must be done in accordance with a recognised system. Indicate whether you have downloaded information from the Internet. For more detail, visit the following websites: <https://www.up.ac.za/en/about-up/article/2013215/why-learn-about-plagiarism>. Please download a QR code reader on your cellphone. To download a QR code reader open your mobile app store (App Store, Google Play or Windows Marketplace) and search for QR code readers.

Why learn about plagiarism?



What is plagiarism?



How do I avoid plagiarism?



Overstepping the mark



For more information, see <http://upetd.up.ac.za/authors/create/plagiarism.htm> and APPENDIX A.

Plagiarism for written assignments is evaluated through Turnitin. Turnitin is a powerful antiplagiarism tool, but it does require some thought in using it properly. Basically, the system runs a piece of work against its database, and highlights all cases where a sequence of words matches a previously published work (the length of the sequence can be set by the user – default is 3 words in a row). The system then collates the number of words taken from a certain work, and compares this word count to the total word count in the paper to calculate a percentage (i.e. 300 words out of 3000 words = 10% for that source). The system will then calculate a gross plagiarism score, the Similarity Index, from the sum of all the different sources. Thus, 50 different sources each with 1% plagiarised will yield a Similarity Index of 50%, but so will 2 sources of 25% each. Thus, a lecturer cannot simply make judgements based on the Similarity Index- the plagiarism counts for individual sources must be examined.

Therefore the following values will be used to judge plagiarism in the Geology Department:

- Turnitin will be set to look for matching sequences of 3 or more words
- The bibliography/references will be excluded from the match
- The student may be allowed to run each piece of work through Turnitin ahead of the submission date, according to the lecturer's discretion.
- No individual source may contribute more than 3% to the total
- The overall similarity index must be 25% or less, unless all individual sources contribute less than 1% each to the total.

Contravention of these guidelines will result in legal action. In the event that legal action is avoided and that a zero mark is not awarded, resubmission prior to the newly established deadline will result in a maximum mark of 50%.

6.3 Referencing Norms

Unless noted otherwise or discussed with the relevant lecturer(s), the following are almost always considered unacceptable references:

- Class notes
- Google search and Wikipedia results
- Any other improperly referenced website
- Verbal communication from persons who are not an expert related to the topic
- Unpublished and/ or anonymous reports
- Topical textbooks (i.e. your first year textbooks)
- Technical consulting reports (although these are allowed in special circumstances)
- News items and popular media (i.e. newspapers, magazine, Discovery Channel, etc.).

Note also that, when specific referencing requirements are given, the following definitions apply:

- **Recent publications** refer to those published in internationally recognised journals within the past 5 years.
- **Classical texts** incorporate fundamental concepts from the most important defining literature sources (typically the first important concepts defined by the first scientist in that particular subdiscipline, and not merely generic collation of principles of a topic).
- **Topical textbooks**, on the other hand, supply broad, generic overviews of a subdiscipline, often inadequate for postgraduate purposes, and typically as prescribed or recommended for undergraduate courses.

7 Marks and Examination

7.1 Submission of assignments

The lecturer will specify the format of submissions for assignments. Unless specified otherwise, the following are acceptable formats of submission (all in accordance with general reporting guidelines of the department):

- Hard-copy printed and stapled or ring-bound
- Electronic emailed or submitted via ClickUP as a Word document with an extension “.docx” (not “.dot”, “.doc”, “.rtf”, “.txt”, or any other format)
- Portable digital file emailed or submitted via ClickUP with an extension “.pdf”.

Electronic files have to be named in the following manner: MODULE_YEAR_SURNAME_ASSIGNMENT (e.g. GLY369_2020_Smith_Prac03). If these requirements are not met, the assignment will not be assessed.

In the instance of group work, the Group Number replaces the surname and all group members' names should be indicated on the front page of the submission (e.g. GLY369_2020_Group03_Prac03).

Refrain from using generic file names such as DOCUMENT1, ASSIGNMENT1 or GLY369 as duplicate names make appropriation of assignments difficult.

In the event of submitting Word documents, refer to the style sheet and formatting guidelines used in the department. It is important to align all images with the text (i.e. do not place in front of the text) and to compress all images prior to submission.

7.2 Module Marks

Calculation of module marks will be documented in the relevant module study guides. Students cannot contest module marks after the last day of the module. Lecturers cannot and will not change any marks, even if mistakes were made, as these have to be finalised during the course of a module. It is the student's duty to ensure that marks made available by the Faculty is correct before commencement of subsequent modules or examinations.

7.3 Examinations

Examination dates are set and no dates will be moved. No alternative dates will be made where clashes occur or where more than one paper is written on the same day. Students are not allowed to register for modules where clashes in the timetable occur, and examination dates will not clash if students register early on. No notes from other lecturers will be accepted as reason to grant special examinations at other dates and times, and no extracurricular activities will be acceptable reason for absence.

A student can only pass a given module if both the year (module) mark and the examination mark are above 40% and if the final mark, calculated as per relevant module study guide, is above 50% (Faculty regulation 6.2).

Entrance to examinations may be refused without, but not limited to: (1) proof of a valid student card, (2) failure of prerequisites (e.g. prerequisite module not passed), and/ or subminimum requirements (e.g. practical marks, module marks, absence from excursions). The following module mark subminima have to be met in order to sit for an examination:

- 100-level year 1st semester (e.g. GLY 155) – 30%
- 100-level 2nd semester; all 200-level and 300-level modules – 40%
- 700-level (honours) modules – 40%
- Practical marks of 50% for all modules
- Acceptable class attendance (at least 90%) based on spot roll calls and/ or using clickers throughout the module.

7.4 Sick, Aegrotat, Special and Deferred Tests and Examinations

Entry into sick tests are subject to §5, unless noted otherwise in the module study guide.

Entry into **sick examinations** is approved by the Faculty based on timeous submission of required documentation (i.e. medical certificate within 72 hours of official exam time). The mark calculated in the event of a sick examination takes into consideration the module mark, and the sick exam covers

the exact same content as the initial exam. If a student has sat for an examination, s/he is not liable to sit for a sick or special examination based on (a) undisclosed illness at the time of the examination, (b) having been underprepared, or (c) any other undisclosed special circumstances (Regulation G12.7).

Entry into **special examinations** (including supplementary, ancillary, aegrotat and/ or re-) is approved by the Faculty and/ or Department and is based on marks obtained for the preceding assessment of the module (i.e. examination). A maximum final mark of 50% can be achieved (Faculty yearbook regulation 6.5).

Supplementary examinations are usually written and cover the same subject matter as for the examination. Examination marks are submitted to the Faculty and the student will be informed of a supplementary examination by the Faculty. Module marks are not taken in consideration for supplementary examinations.

Ancillary examinations are used to adjust examination marks and such examinations are taken prior to submission of the marks to the Faculty. The final mark is based on the adjusted examination mark and the module mark.

Where sick or special examinations are not made known by the Faculty, the student will be informed directly by the lecturer regarding the time, date and scope. This information is also fixed and cannot be debated.

Absence from any sick or special exam results in a zero mark and no alternatives are available.

Requirements for supplementary and ancillary examinations are as follows:

- 100-level modules – final mark between 40% and 49% AND module and practical marks above the subminimum of 40% (or 30% for GLY 155)
- 200-level, 300-level and honours (700-level) modules – final mark between 45% and 49% AND 40% subminimum for the module mark AND 50% subminimum for the practical component.

7.5 Special Dean's (and Chancellor's) Examinations

In the event of a student requiring only one semester course or two quarter courses amounting to no more than 36 credits combined to graduate, a written request can be submitted to the Faculty Administration regarding **Dean's special examinations**. These have to be approved by the relevant lecturers and will not be allowed if the number of modules or credits exceed those stipulated above. A single date is scheduled during the following January for all such examinations for GLY modules.

For all modules offered in the Department of Geology (i.e. all GLY-modules), these exams will be written on the third Monday of the following year at 09:00-12:00 in room 4-1 of the Natural Sciences II Building. No alternative dates will be offered, even if the student does comply with the requirements following the June examination period. Students should attend this session even if approval has not yet been obtained. Forms can be finalized before this date or, in exceptional circumstances, on this date.

It is the student's responsibility to contact Prof Dippenaar or Dr Roberts well in advance regarding their intention to sit for a Dean's special examination. This should be done before 15 December of the relevant year in order to sit for this exam during January of the following year.

Students sitting for more than one module in the Dean's examinations for geology will write all during the same special session. In the event that one of the field modules are outstanding, the special exam

will not be supported by the department, given that the degree cannot and will not be awarded without having attended these field modules.

7.6 Contesting of Marks

The lecturer(s), tutor(s) and demonstrator(s) will not enter into discussions related to improving poor marks, remarking assignments or scripts, or adjusting marks without discreet proof of error in assessment. A student may only contest marks if it can be proven – at the hand of model answers, memoranda, lecture notes, textbooks or counting errors – that a mistake was made in the calculation of the mark. Where mistakes are encountered, the complete script may be subjected to remarking.

7.7 Perusal and Remarking

Students have the right to perusal of examination scripts within the period announced by the relevant lecturer. Minor mark changes will not be submitted to the Faculty. Only the following result changes will be submitted:

- Exam mark below 40% becoming 40%
- Exam mark below 50% becoming 50%
- Exam mark below 75% becoming 75%
- Mark changes resulting in a final pass mark as opposed to a fail or a special exam
- Mark changes resulting in granting a special exam as opposed to a fail
- Mark changes resulting in final cum laude mark
- Mark changes resulting in a final mark of 60% as required for entry into the honours programmes.

Should the student wish to have minor changes submitted to Faculty, or if the student is still not content with the marks, a remark can be requested from the Faculty where an independent lecturer (moderator) will remark the script.

Note that a single perusal session will be announced and that no alternative arrangements will be made, regardless of reason for absence from perusal.

Given the privilege of being able to contest marks, the student should acknowledge that the lecturer reserves the right to submit lower marks to the Faculty as well following perusal or remarking. Both perusal and remarking open re-evaluation of marks to all parties, and students are not allowed to contest lower marks submitted by the lecturer or moderator.

Rules for perusal are the same as for examinations. No stationary or mobile phones are allowed; no extension will be given to perusal outside of announced sessions; and these sessions do not serve to contest marks.

Requests for remarking have to be submitted to the Faculty within 14 calendar days of commencement of the following semester, accompanied by proof of payment of the prescribed fee (Faculty regulation 6.4).

8 Undergraduate Programmes

Two undergraduate programmes are offered, each comprising a minimum of 120 credits or 1 200 notional hours per year for a minimum period of three years. The B.Sc. Geology progresses to a B.Sc. (Hons.) Geology, but Honours programmes in Applied Science, Metallurgy and Mining Engineering are also offered by the Engineering Faculty. Note should, however, be taken that honours degrees offered

in other faculties will very likely not constitute professional degrees, and candidates will not be eligible for professional registration.

The B.Sc. Engineering and Environmental Geology, which requires an additional major in mechanics, continues in B.Sc. (Hons.) Engineering and Environmental Geology (Engineering Geology) or B.Sc. (Hons.) Engineering and Environmental Geology (Hydrogeology) with options in B.Sc. (Hons.) Environmental Soil Science.

Given the vocational opportunities, students are exposed to a minimum of one year of fundamental science (mathematics, chemistry and physics) and three years of geology as a major. A second major is recommended in chemistry, mathematics, physics, statistics or engineering mechanics (offered through the EBIT Faculty), or in exceptional circumstances, geography, soil science, geoinformatics or any other module relevant to geology.

With the opportunities for a double major at third year level, interested students should explore possible alternative honours possibilities during the undergraduate programme to ensure that they comply with the required prerequisites.

8.1 Annual Learning Outcomes

The characteristics of the cognitive domain (according to DS Bloom's *Taxonomy of Educational Objectives* and DR Krathwohl's *Taxonomy of educational objectives. Handbook 1. Cognitive domain*) lists assessment sequentially as (1) remembering, (2) understanding, (3) applying, (4) analysing, (5) evaluating, and (6) creating.

8.1.1 First year – GLY 100

GLY 100 gives the student a broad theoretical background of the subject of geology and its most fundamental sub-disciplines. Concepts of physical geology, stratigraphy, mineralogy, petrology and environmental geology are taught at a first-principles basis with applications to the South African context, where ever possible. Following completion of the first year, the student should know what geology is, how the planet works, how minerals and rocks are formed and identified from hand specimens, how geological maps and stratigraphic sequences work, and should be able to collate these principles into a generic understanding of geology as a subject.

8.1.2 Second year – GLY 200

GLY 200 gives detailed theory and practical assessment of specific sub-disciplines in geology. GLY200 involves integrating the chemistry, physics and mathematics learnt in first year within a geological framework. The second year focuses on the chemical-mineralogical topics of crystal optics, mineralogy, and igneous and metamorphic petrology. Following successful completion of the second year, the student should be able to appraise theoretical topics in-depth and understand the intricate reasons for the behaviour of the Earth as a whole and to integrate concepts from fundamental science into understanding of geological subject matter.

8.1.3 Third year – GLY 300

GLY 300 forms the applications of geology and includes Structural Geology, Hydrogeology, Engineering Geology and Rock Mechanics, and Mining Geology. All these modules are applicable to notably the mining environment and supply very important developing applications of geology and prepare students for the honours-level expectations. Following the third year, students should be able to integrate knowledge from the preceding modules as well as all elective modules into in-depth discussions on the applications of geology in given environments such as mining, infrastructure development, natural hazards and so forth.

Requirements for the cognitive domains are summarised in **Figure 1** and annual learning outcomes, based on this, are simplified in **Table 3**.

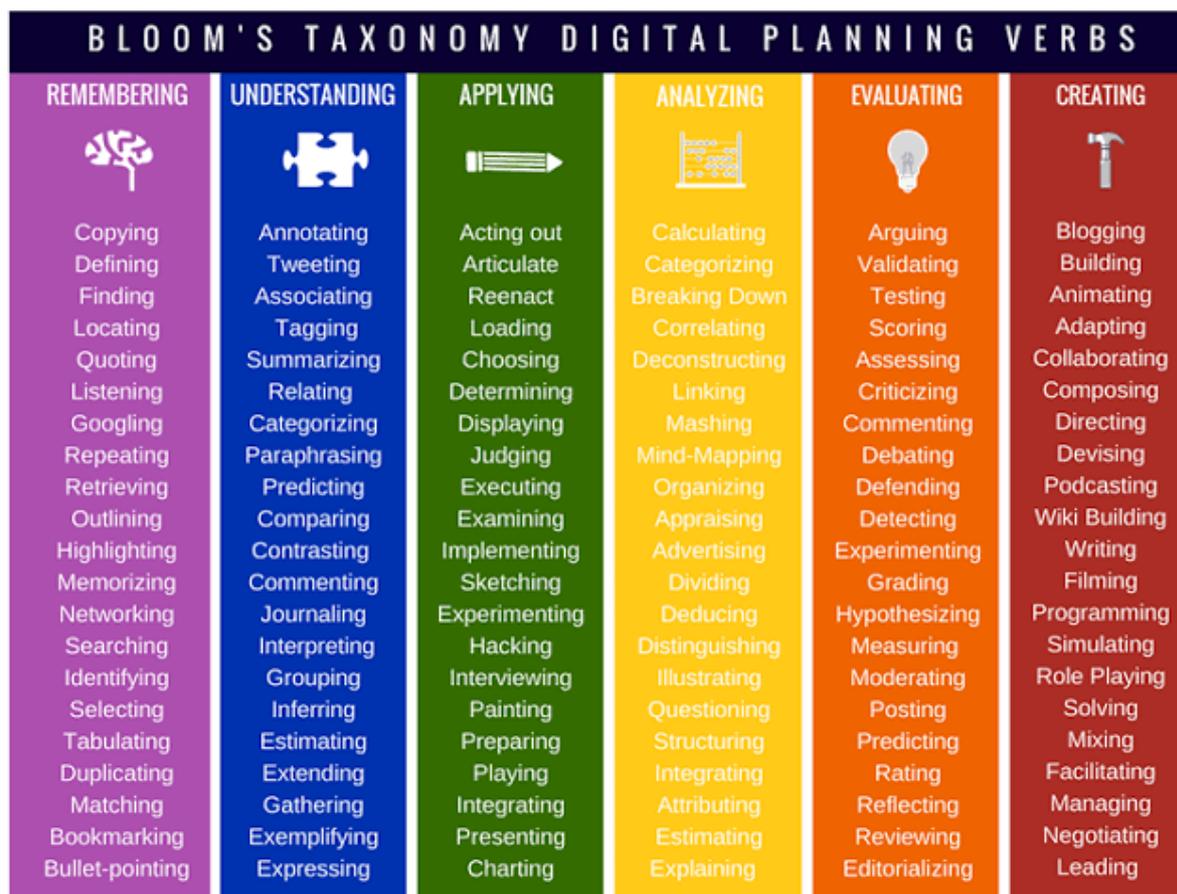


Figure 1. Characteristics of cognitive domains (Bloom's taxonomy) (teachthought.com).

Table 3. Annual expected learning outcomes.

Study Component	GLY 100	GLY 200	GLY 300
Outcomes	Introducing geological concepts	Integrating fundamental science	Integrating sub-disciplinary & fundamental theory & practice
Theory	Defining	Explaining	Appraising
Practical	Identifying	Deducing	Assessing
Understanding	Conceptual	Detailed	Applied
Thinking	Fundamental	Integrated	Holistic
Knowledge	Knowing	Understanding	Interpreting
Assessment	Single word or sentence	Essays, calculations	Debate data

8.2 Core Module Descriptions

The distribution of core modules for both undergraduate programmes is shown in Table 4. Both the undergraduate programmes in Geology and Engineering and Environmental Geology require fixed electives. Note that the official online yearbook and information are more accurate and should be used above those presented in this section. Taking GLY 363, 364 and 367 simultaneously is possible.

The individual GLY-modules described in **Figure 2** and Table 5 (**APPENDIX B**) are compulsory for all students in the Department of Geology and under no circumstances can the bachelor's degree in Geology or in Engineering and Environmental Geology be completed without successful completion

of all these modules. You should attempt to take both GLY 367 and GLY 369 in the second semester of the third year.

QUARTER 1	QUARTER 2	QUARTER 3	QUARTER 4	GUARDIAN
GLY 155 Introduction to Geology (Part 1: Prof Dippenaar) (Part 2: Prof Bumby)		GLY 163 Earth History (Part 1: Mr Nkosi) (Part 2: Dr Lenhardt)		YEAR 1 Dr Roberts
GLY 255 Fundamental and Applied Mineralogy (Mr Nkosi)	GLY 253 Sedimentology (Dr Lenhardt)	GLY 263 Igneous and Metamorphic Petrology (Part 1: Dr Roberts) (Part 2: Dr Roberts)		YEAR 2 Dr Milani
GLY 365 Structural Geology (Prof Bumby)	GLY 366 Groundwater (Dr Diamond)	GLY 266 Geological Field Mapping		YEAR 3 Dr Lenhardt
GLY 368 Advanced Geological Field Mapping		GLY 367 Economic Geology (Part 1: Dr Milani) (Part 2: Dr Milani)		
		GLY 369 Engineering Geology and Rock Mechanics (Part 1: Prof Dippenaar) (Part 2: Prof van Rooy)		

Figure 2. Lecturers, class guardians, and modules in the Geology Department.

Table 4. Undergraduate programmes in the Department of Geology (credits; confirm).

Term	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Core Modules (124)	CMY 117(16)		CMY 127 (16)	
	GLY 155 (16)		GLY 163 (16)	
	LST 110 (6)		AIM 102 (6)	
	PHY 114 (16)			
	WTW 158/ WTW 114 (16)		WTW 164/ WTW 124 (16)	
Electives (16)	None		PHY 124/ GMC 110 & GGY 166 (16) SWK 122* (16)	
Term	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Core Modules (48)	GLY 255 (12)	GLY 253 (12)	GLY 261 (12)	GLY 262 (12)
Field Modules (6)	GLY 266 (6; October recess)			
Electives	88/96 required; Appl. Maths. Needed for Physics			
Chemistry (48)	CMY 282 (12)	CMY 283 (12)	CMY 284 (12)	CMY 285 (12)
Mathematics (48)	WTW 211 (12)	WTW 218 (12)	WTW 248 (12)	WTW 286 (12)
Appl. Maths. (48)	WTW 211 (12)	WTW 218 (12)	WTW 214 (12)	WTW 286 (12)
Physics (96)	PHY 263 (24)		PHY 255 (24)	
Eng & Soil (40)*	GKD 250 (12); SWK 210 (12)		GIS 221 (16)	
GIS & Geogr. (48)*	GGY 252 (xx); GIS 220 (xx)		GMA 220 (xx); GGY 266 (xx)	
Term	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Core Modules (36)	GLY 365 (18)	GLY 366 (18)		
Field Modules (6)	GLY 368 (6; June recess)			
Electives	66 required; Physics options does not allow entry into the Physics honours programme; Eng and Soil option does not allow entry into BEng programmes; GIS options do not allow entry into GIS honours programmes			
Economic geo. (36)			GLY 367# (36)	
Applied geo. (36)			GLY 363 (18)*	GLY 364 (18)*
Chemistry (72)	CMY 382 (18)	CMY 383 (18)	CMY 384 (18)	CMY 385 (18)
Mathematics (72)	WTW 310 (18)	WTW 320 (18)	WTW 381 (18)	WTW 389 (18)
Appl. Maths. (72)	WTW 382 (18)	WTW 383 (18)	WTW 386 (18)	WTW 387 (18)
Physics (72)	PHY 364 (36)		PHY 356 (36)	
Astrophysics (82)	PHY 300 (xx); GMA 320 (xx)		GIS 320 (xx)	
Eng & Soil (66)*	GKD 350 (xx); SGM 311 (xx)		GLY 369 (36)*	
GIS & Geogr. (72)	GIS 310 (xx)		GIS 320 (xx); GMA 320 (xx)	
Core modules in Geology AND Engineering and Environmental Geology				

**Core modules in Geology
elective options

*Core modules for Engineering and Environmental Geology
* and # may be taken as electives in other programmes

Additional module contents for those offered through the EBIT Faculty and pertaining to the Engineering and Environmental Geology programme are shown in Table 6 (**APPENDIX B**).

Elaborations on module descriptions and expected outcomes are detailed in the relevant module study guides. Presentation times are fixed according to the year book and timetable, unless a notice is posted on the notice board in the foyer of the Mineral Sciences building.

8.3 Field Work Modules

GLY 266 and GLY 368 are compulsory modules in field mapping presented in the second and third years respectively. These modules are reserved only for students studying geology or engineering and environmental geology with the prospect of an honours degree in Geology, Engineering Geology or Hydrogeology. Students taking geology as an elective are not admitted.

Honours applications will not be considered without successful completion of both these modules. As they are presented only once a year during recess periods, students should ensure that they are able to attend. For these modules, attendance is compulsory, implying that absolutely no excuses can be accepted, and the two modules cannot be completed in the same calendar year.

9 Honours Programmes

The Department of Geology offers two programmes at honours level. The honours programmes consist of theoretical modules as well as substantial practical and project work components.

The honours degree in **Geology** (code 02240141) follows on the undergraduate study programme in Geology and employment is generally within the mining industry with additional options in forensic geology, exploration geology and **analytical** services.

The **Engineering Geology** and **Hydrogeology** options for specialisation of the honours degree **Engineering and Environmental Geology** follow on the undergraduate study programme in Engineering and Environmental Geology. Two fields of specialization are offered within the honours programme, namely **Engineering Geology** (code 02240370) and **Hydrogeology** (code 02240373). Employment is generally within private consulting firms supplying services to governmental departments, municipalities, mine houses, oil companies, town planners, engineers and private developers. Employment may also be directly into the government sector (e.g. Department of Water and Sanitation) or parastatal institutions (e.g. Council for Geoscience; Council for Scientific and Industrial Research). There is presently a strong demand in both the engineering geology and hydrogeology fields for graduates in the mining, groundwater as well as in the construction/ civil engineering sectors.

Note that entry into the BSc. (Hons.) Engineering Geology, Environmental Geology and Hydrogeology options will not be considered if you did not do GLY 369 (or GLY 363 and GLY 364). Similarly, entry into the BSc. (Hons.) Geology degree will not be considered if you did not do GLY 367. You are strongly encouraged to do a double geology second semester in the third year.

10 Student Support

The University of Pretoria supports you in various ways free of charge. For academic support contact the tutors allocated to the module (see section 2.1), and/or the Faculty Student Advisor (see section

2.1). Please download a QR code reader on your cell phone. To download a QR code reader open your mobile app store (App Store, Google Play or Windows Marketplace) and search for QR code readers.

Faculty student advisors	<p>Academic support</p> <p>Goal setting & motivation</p> <p>Adjustment to university life</p> <p>Test/Exam preparation</p> <p>Stress management</p> <p>Career exploration</p>	<p>Individual consultations and workshops about</p> <p>- time management</p> <p>- study methods</p>	
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FLY@UP:	Think carefully before dropping modules (after the closing date for amendments or cancellation of modules).	www.up.ac.za/fly@up	
The Finish Line is Yours	<p>Make responsible choices with your time and work consistently.</p> <p>Aim for a good semester mark. Don't rely on the examination to pass.</p>	email: fly@up.ac.za	

For e-learning support

Report a problem you experience to the Student Help Desk.

Approach the assistants at the help desks (adjacent to the Student Computer Laboratories in IT Building, NW2, CBT, etc).

Visit the open labs in the Informatorium Building to report problems at the offices of the Student Help Desk.

Call 012 420 3837.

Email studenthelp@up.ac.za

Safety in the evening: Green Route

From 18:00 till 06:00 Security Officers are available to escort you (on foot) to and from your residence or campus anywhere east of the Hatfield campus through to the LC de Villiers terrain.

Departure point is between the Merensky Library and Old Chemistry Building.

Phone the Operational Management Centre if you need a Security Officer to accompany you from your residence to campus.

Student Counselling Unit	Provides counselling and therapeutic support to students.	012 420 2333	
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Student Health Services	Promotes and assists students with health and wellness.	012 420 5233 012 420 3423	
The Careers Office	Provides support for UP students and graduates as they prepare for their careers.	careerservices@up.ac.za 012 420 2315	
Department of Security Services	24-hour Operational Management Centre 24-hour Operational Manager cell Crisis Line	012 420-2310 012 420-2760 083 654 0476 0800 006 428	
Department of Student Affairs	Enquiries concerning studies, accommodation, food, funds, social activities and personal problems.	012 420 2371/4001 Roosmaryn Building, Hatfield campus	
Centre for Sexualities, AIDS and Gender	Identifies and provides training of student peer counsellors.	012 420 4391	
Disability Unit	Ensure an integrated and inclusive learning experience for students with disabilities.	012 420 2064	
Fees and funding	http://www.up.ac.za/enquiry www.up.ac.za/fees-and-funding	012 420 3111	
IT Helpdesk	For student IT related queries	012 420 3051 studenthelp@up.ac.za	

APPENDIX A. DECLARATION ON PLAGIARISM

The Department of Geology (University of Pretoria) places great emphasis upon integrity and ethical conduct in the preparation of all written work submitted for academic evaluation. While academic staff teaches you about referencing techniques and how to avoid plagiarism, you too have a responsibility in this regard. If you are at any stage uncertain as to what is required, you should speak to your lecturer before any written work is submitted.

You are guilty of plagiarism if you copy something from another author's work (e.g. a book, an article or a website) without acknowledging the source and pass it off as your own. In effect you are stealing something that belongs to someone else. This is not only the case when you copy work word-for-word (verbatim), but also when you submit someone else's work in a slightly altered form (paraphrase) or use a line of argument without acknowledging it. You are not allowed to use work previously produced by another student. You are also not allowed to let anybody copy your work with the intention of passing it off as his/her work.

Students who commit plagiarism will not be given any credit for plagiarised work. The matter may also be referred to the Disciplinary Committee (Students) for a ruling. Plagiarism is regarded as a serious contravention of the University's rules and can lead to expulsion from the University.

The declaration, which follows, must accompany all written work submitted while you are a student of the Department of Geology (University of Pretoria). No written work will be accepted unless the declaration has been completed and attached.

I, the undersigned, declare that:

- i) I understand what plagiarism is and am aware of the University's policy in this regard.
- ii) I declare that this assignment (e.g. essay, report, project, assignment, dissertation, thesis, etc.) is my own original work. Where other people's work has been used (either from a printed source, Internet or any other source), this has been properly acknowledged and referenced in accordance with Departmental requirements.
- iii) I have not used work previously produced by another student or any other person to hand in as my own.
- iv) I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.
- v) I understand the Department of Geology's policy on plagiarism and the criteria set for using Turnitin by the Department.
- vi) I acknowledge that I am allowed to use Turnitin to evaluate my own work prior to submission.

Full names:

Student number:

Date submitted:

Topic of work:

Signature:

Supervisor:

APPENDIX B. UNDERGRADUATE MODULES

Table 5. Description of undergraduate modules presented in the Department of Geology.

<i>Module</i>	<i>Year book Description (Prerequisites)</i>	<i>Credits</i>
GLY 155 Introduction to Geology (Prof Dippenaar & Prof Bumby)	<i>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. Geological processes (magmatism, metamorphism, sedimentology, structural geology) in a plate tectonic context. Interaction between the above internal and external forces of the earth and field practicals as well as practicals in geological maps and mineral and rock specimens are part of this course.</i>	16 (Q1+Q2)
GLY 163 Earth History (Dr Lenhardt & Mr Nkosi)	<i>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 and evolution 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. (Prerequisite is GLY 155/ GLY 151/ special exemption to 2nd year Biological Science students)</i>	16 (Q3+Q4)
GLY 253 Sedimentology (Dr Lenhardt)	<i>Introduction to sedimentology; composition, textures and classification of sedimentary rocks; flow dynamics and behaviour of sediment particles in transport systems; description and genesis of sedimentary structures; diagenesis; modern and ancient depositional environments and their deposits; economic sedimentology; field data acquisition from sedimentary rocks and writing of reports; sieve analysis; Markov analysis; analysis of palaeocurrent trends; interpretation of sedimentary successions from outcrops and boreholes. (CMY 117, CMY 127, GLY 155, GLY 163, WTW 114/WTW 158 and PHY 114)</i>	12 (Q2)
GLY 255 Fundamental and Applied Mineralogy (Mr Nkosi)	<i>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. (CMY 117, CMY 127, GLY 155, GLY 163, WTW 158 and PHY 114 OR SWK 211)</i>	12 (Q1)
GLY 263 Igneous and Metamorphic Petrology (Dr Roberts)	<i>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. (GLY 255)</i>	12 (Q3+Q4)
GLY 266 Geological Field Mapping	<i>Introduction to field mapping techniques. (CMY 117, CMY 127, GLY 155, GLY 163, WTW 158 and PHY 114/ SWK 122)</i>	6 (October Recess)
GLY 365 Structural Geology (Prof Bumby)	<i>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, prograssive deformation. Stereographic projection and structural analysis. (Three of the second-year modules: GLY 255, GLY 261, GLY 262, GLY 253)</i>	18 (Q1)
GLY 366 Groundwater (Dr Diamond)	<i>Origin and classification of groundwater; classification of aquifers; groundwater movement; equations for groundwater flow into boreholes; the La Place equation and solutions for pump tests; execution and interpretation of pump tests; contaminant transport; low temperature aqueous geochemistry; groundwater exploration and</i>	18 (Q2)

<i>Module</i>	<i>Year book Description (Prerequisites)</i>	<i>Credits</i>
	<i>management. (Three of the second-year modules: GLY 255, GLY 261, GLY 262, GLY 253)</i>	
GLY 367 Economic Geology (Dr Milani)	<i>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. (GLY 365 and GLY 366)</i>	36 (Q3+Q4)
GLY 369 Engineering Geology and Rock Mechanics (Prof van Rooy & Prof Dippenaar)	<i>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. (GLY 365)</i>	36 (Q3+Q4)
GLY 368 Advanced Geological Field Mapping	<i>Advanced field mapping techniques. (GLY 266; Three of the second-year modules: GLY 255, GLY 261, GLY 262, GLY 253)</i>	6 (July Recess)

Table 6. Description of modules presented in the EBIT Faculty.

<i>Module</i>	<i>Year book Description (Prerequisites)</i>	<i>Credits</i>
SWK 122 Mechanics	<i>Equivalent force systems, resultants. Newton's laws, units. Forces acting on particles. Rigid bodies: principle of transmissibility, resultant of parallel forces. Vector moments and scalar moments. Relationship between scalar- and vector moments. Couples. Equivalent force systems on rigid bodies. Resultants of forces on rigid bodies. Equilibrium in two and three dimensions. Hooke's law. Trusses and frameworks. Centroids and second moments of area. Beams: distributed forces, shear force, bending moment, method of sections, relationship between load, shear force and bending moment. (WTW 158)</i>	16 (Q3+Q4)
SWK 210 Strength of Materials	<i>Stresses, strains and the mechanical properties of materials: normal stress and shear stress, tension and compression, equilibrium in shear, factor of safety, design, shear strain, stress/strain diagram, Hooke's law, Poisson's ratio and the shear stress/ strain diagram. Axial loads: elastic deformation, displacements, statically determinate and indeterminate structures and thermal effects. Torsion: torsion of circular bars and power transmission beding of straight members and composite beams. Transverse shear: shear in straight members and shear flow. Combined loads: thin walled pressure vessels and stresses as a results of combined loads. Stress transformation: plane stress transformation, principle stresses, maximum values and stress variation in prismatic beams. Strain transformation: plane strain transformation, principle strains, maximum values, strain gauges and rosettes and the relationship between E, G and u. Design of beams from section characteristics. Deflection of beams: the elastic curve integration method, Macauly's method and superposition. (SWK 122; WTW 168/ WTW 128)</i>	16 (Q1+Q2)
SGM 311 Soil Mechanics	<i>Introduction to soil mechanics. Introduction to clay mineralogy. Mass, volume relationships and phases of soil. Groundwater flow and permeability. Effective stress principles. Suction pressures in saturated as well as partially saturated soil. The Mohr circle and stresses at a point. The Mohr-Coulomb strength theory and the stress-strain properties of soil. The Boussinesq theory. Consolidation theory and soil settlement. (SWK 210)</i>	16 (Q1+Q2)