University of Pretoria Yearbook 2017

BEngHons Geotechnical Engineering (12240215)

Duration of study	1 year
Total credits	128

Programme information

The curriculum is determined in consultation with the relevant heads of departments. A student is required to pass modules to the value of at least 128 credits.

The degree is awarded on the basis of examinations only.

Admission requirements

Subject to the stipulations of Reg. G.1.3 and G.54, a BEng degree or equivalent qualification is required for admission.

Examinations and pass requirements

i. The examination in each module for which a student is registered, takes place during the normal examination period after the conclusion of lectures (i.e. October/November or May/June).
ii. A student registered for the honours degree must complete his or her studies within two years (full-time), or within three years (part-time) after first registration for the degree: Provided that the Dean, on recommendation of the relevant head of department, may approve a stipulated limited extension of this period.
iii. A student must obtain at least 50% in an examination for each module where no semester or year mark is required. A module may only be repeated once.
iv. In modules where semester or year marks are awarded, a minimum examination mark of 40% and a final mark of 50% is required.
v. No supplementary or special examinations are granted at postgraduate level.

Pass with distinction

A student passes with distinction if he or she obtains a weighted average of at least 75% in the first 128 credits for which he or she has registered (excluding modules which were discontinued timeously). The degree is not awarded with distinction if a student fails any one module (excluding modules which were discontinued timeously).

Curriculum: Final year

Minimum credits: 128

SSC 780 compulsory module / verpligte module

Core modules

Analytical soil mechanics 787 (SGS 787)

Module credits	24.00
Prerequisites	No prerequisites.
Contact time	20 Contact hours
Language of tuition	Module is presented in English
Academic organisation	Civil Eng
Period of presentation	Year

Module content

A research term paper will be prepared.

Solution of confined and unconfined seepage problems using the methods of fragments, finite differences and finite elements. Numerical solutions of consolidation problems and secondary compression. Slope stability analysis methods. The point estimate method. Monte Carlo simulation.

Theoretical soil mechanics 788 (SGS 788)

Module credits	24.00
Prerequisites	No prerequisites.
Contact time	20 Contact hours
Language of tuition	Module is presented in English
Academic organisation	Civil Eng
Period of presentation	Year

Module content

A research term paper will be prepared.

Introduction to critical state soil mechanics. Stress and strain invariants. Stress paths. State boundary surfaces including Roscoe and Hvorslev surfaces. Cam clay model. Application of geotechnical constitutive models in finite element analysis.

Specialised geotechnical testing 789 (SGS 789)

Module credits	24.00
Prerequisites	No prerequisites.
Contact time	32 Contact hours
Language of tuition	Module is presented in English

Academic organisation	Civil Eng
Period of presentation	Year

Module content

A research term paper will be prepared.

Test procedures and interpretation of; Standard Penetration Test (SPT), Cone Penetration Test (CPT), Piezocone (CPTU) and seismic methods. Theory, application and interpretation of advanced geotechnical laboratory tests. Laboratory Instrumentation and calibration. Stress and strain conditions for laboratory tests. Triaxial stress space, stress paths. Triaxial tests, direct shear tests, oedometer test and Rowe cell test.

Civil research 780 (SSC 780)

Module credits	32.00
Language of tuition	Module is presented in English
Academic organisation	Civil Eng
Period of presentation	Year

Module content

*This is a compulsory module.

The course will require all honours students to conduct research in an appropriate field of civil engineering, linked to the main discipline in which the student specializes for their honours degree.

Elective modules

Engineering geology 703 (IGL 703)

Module credits	16.00
Service modules	Faculty of Engineering, Built Environment and Information Technology
Prerequisites	No prerequisites.
Contact time	20 Contact hours
Language of tuition	Separate classes for Afrikaans and English
Academic organisation	Geology
Period of presentation	Semester 1

Applied statistical methods and optimisation 798 (SHC 798)

Module credits	24.00
Prerequisites	No prerequisites.
Contact time	40 Contact hours
Language of tuition	Module is presented in English
Academic organisation	Civil Eng
Period of presentation	Year

Module content

A research term paper will be prepared.

The course will apply some of the basics theories and methodologies in statistics and operations research to solve common civil engineering problems. The course seeks to demonstrate the use and application in the civil engineering field. Each of the applications seeks to determine how best to design and operate a system, usually under conditions requiring the allocation of scarce resources. Emphasis will be on the applications of these methods in common civil engineering practice. Some of the applications will include; optimum network design, maximum flow problem, project scheduling, queuing theory, probabilistic analysis, Markov chain applications, etc.

Numerical methods and finite element applications for Civil Engineers 790 (SIK 790)

Module credits	24.00
Contact time	40 contact hours
Language of tuition	Module is presented in English
Academic organisation	Civil Eng
Period of presentation	Year

Module content

In the first part of this course, numerical procedures and some underlying theory for solving systems of equations, eigenvalue problems, integration, approximation and boundary value problems will be discussed. The second part of the course covers general finite element theory, discretization aspects related to geometry, nodes and numbering, element type and shape, interpolation functions, formulation of element characteristic matrices and vectors for elasticity problems, assembly and solution of the finite element equations, modelling procedures and results processing. The student will use Finite Element software to apply the theory that was covered in the course for solving typical Civil Engineering problems.