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# University of Pretoria Yearbook 2016

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## BScHons Applied Science Applied Science: Geotechnics (12243019)

**Duration of study** 1 year

**Total credits** 128

### Programme information

The BScHons (Applied Science) degree is conferred by the following academic departments:

- Chemical Engineering
- Civil Engineering
- Industrial and Systems Engineering
- Materials Science and Metallurgical Engineering
- Mechanical and Aeronautical Engineering
- Mining Engineering

Any specific module is offered on the condition that a minimum number of students are registered for the module, as determined by the head of department and the Dean. Students must consult the relevant head of department in order to compile a meaningful programme, as well as on the syllabi of the modules. The relevant departmental postgraduate brochures must also be consulted.

### Admission requirements

An appropriate bachelor's degree, a BTech degree or equivalent qualification.

### Other programme-specific information

The remainder of the credits to be chosen from the modules prescribed for the BEngHons (Geotechnical Engineering) programme, as approved by the head of department, and after completion of the appropriate modules as listed.

The modules CPB 410, CBI 410 and CSS 420 do not form part of the postgraduate block presentations. Individual arrangements have to be made with the relevant lecturer regarding attendance of lectures, study material, tests and assignments.



## Curriculum: Final year

**Minimum credits: 128**

### Core modules

#### Analytical soil mechanics 787 (SGS 787)

**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.

<b>Module credits</b>	24.00
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	20 Contact hours
<b>Language of tuition</b>	English
<b>Academic organisation</b>	Civil Eng
<b>Period of presentation</b>	Year

#### Theoretical soil mechanics 788 (SGS 788)

**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.

<b>Module credits</b>	24.00
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	20 Contact hours
<b>Language of tuition</b>	English
<b>Academic organisation</b>	Civil Eng
<b>Period of presentation</b>	Year

#### Specialised geotechnical testing 789 (SGS 789)

**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.

<b>Module credits</b>	24.00
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	32 Contact hours
<b>Language of tuition</b>	English
<b>Academic organisation</b>	Civil Eng
<b>Period of presentation</b>	Year

## Elective modules

### Engineering geology 703 (IGL 703)

<b>Module credits</b>	16.00
<b>Service modules</b>	Faculty of Engineering, Built Environment and Information Technology
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	20 Contact hours
<b>Language of tuition</b>	Both Afr and Eng
<b>Academic organisation</b>	Geology
<b>Period of presentation</b>	Semester 1

### Basic statistical methods 797 (SHC 797)

#### Module content:

Basic mathematical methods. Algebra. Matrices and matrix algebra. Series expansions. Differentiation and integration. Probability theory. Graphic analysis. Discrete and continuous probability distributions. Moments and expectation. Statistical sampling and experimental design. Parameter estimation. Confidence intervals. Hypothesis testing. Regression analysis.

<b>Module credits</b>	24.00
<b>Prerequisites</b>	No prerequisites.
<b>Contact time</b>	40 Contact hours
<b>Language of tuition</b>	English
<b>Academic organisation</b>	Civil Eng
<b>Period of presentation</b>	Year

### Finite element applications in Civil Engineering 780 (SIR 780)

#### Module content:

A research term paper will be prepared.



This 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. More advanced applications of finite elements such as non-linear static elasticity, buckling, dynamics and transient thermal problems will be covered. In terms of the application of the Finite Element method, the student will choose a specific field (e.g. structures, geotechnical, transportation or water/hydrology) to apply the theory that was covered in the course to solve typical Civil Engineering problems.

**Module credits** 24.00

**Prerequisites** No prerequisites.

**Language of tuition** English

**Academic organisation** Civil Eng

**Period of presentation** Year

## Numerical methods for Civil Engineers 780 (SIK 780)

### Module content:

A research term paper will be prepared.

In this course, numerical procedures for solving complex engineering systems with the aid of linear equations, eigenvalue procedures, numerical integration, finite differences analyses, finite elements review, Fourier transformation and optimization will be reviewed and discussed.

Some underlying theory for these numerical algorithms will be demonstrated and applicable and relevant problems associated with the use of these algorithms in the field of Civil Engineering will be covered.

**Module credits** 24.00

**Prerequisites** No prerequisites.

**Language of tuition** English

**Academic organisation** Civil Eng

**Period of presentation** Year

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