



Faculty of Engineering,  
Built Environment and  
Information Technology

School of Engineering  
Department of Civil Engineering

## Brochure for 2015

Post-Graduate studies in:

- Geotechnical Engineering
- Structural Engineering
- Transportation Engineering
- Water Resource Engineering

University of Pretoria  
Tel: +27 (0)12 420 2925

## **FOREWORD**

Welcome to the post-graduate programme in the Department of Civil Engineering at the University of Pretoria. We are fortunate in having the critical mass of teaching staff and associates in the profession to be able to offer doctoral, masters and honours programmes in four engineering disciplines; namely Geotechnical, Structural, Transportation and Water Resources Engineering. We do not only cater for civil engineering graduates, but past students have also included graduates from other disciplines (e.g., town planners, geographers, geologists, environmental scientists, hydrologists as well as BTech graduates from the Universities of Technology, former Technikons).

During the last ten years, over 450 post-graduate students have graduated through this department and are held in high esteem in the industry.

The post-graduate degree programmes of the School of Engineering were redesigned in the course of 2003 to meet the requirements of the Department of Education and Higher Education and Training. All students who want to study towards a masters degree must first complete the honours degree. The South African Qualifications Authority (SAQA) credits for the honours degree are calculated separately from that of the masters degree. Credits cannot be transferred between the two degrees. Following the completion of the course work based honours degree the masters degree can be done as a fully fledged research degree. Logistics and staffing has necessitated the discontinuation of the taught masters degree.

The flexible learning mode used in the offering of these post-graduate modules includes block-week presentations of course work. This format enables short course presentation in these various areas of specialisation and can be taken for non-degree purposes for Continued Professional Development (CPD) points.

A number of our modules are already in digital format that provides you with greater flexibility in your learning. We are in the process of expanding the use of web- and CD-based education for your benefit and to stay at the cutting edge of education innovation.

With all these study opportunities to increase your knowledge and skills in contributing to the growth of our country and continent I hope to see you at registration punctually at **08:00 on Saturday 24 January 2015**. If you are registering for the first time for post-graduate studies, please submit a completed application form before 31 October 2014. (Application forms available on the website [www.up.ac.za](http://www.up.ac.za), or from the Client Service Centre at [csc@up.ac.za](mailto:csc@up.ac.za)). Students writing final examinations at year end must apply by 31 October 2014 and submit final exam results by 10 December 2014 for study in 2015.



Prof. Elsabe Kearsley PrEng  
Head of Department

September 2014



<b>FOREWORD</b>		<b>Page</b>
<b>1</b>	<b>OVERVIEW</b>	<b>1</b>
<b>1.1</b>	<b>The University and the Department of Civil Engineering</b>	<b>1</b>
	Access routes	2
	Map of main campus	3
<b>1.2</b>	<b>The Disciplines</b>	<b>4</b>
<b>1.3</b>	<b>The Degree Structure</b>	<b>5</b>
<b>1.4</b>	<b>Registration, Fees and Regulations</b>	<b>5</b>
1.4.1	Application process	5
1.4.1	Registration process	5
1.4.2	Registration fees	6
1.4.3	Study fees	6
1.4.4	Bursaries and grants	7
1.4.5	Rules and regulations	7
1.4.6	Doctoral studies	8
1.4.7	Study arrangements	9
1.4.8	Important dates	12
<b>2.</b>	<b>POST GRADUATE PROGRAMMES</b>	<b>13</b>
<b>2.2</b>	<b>Geotechnical Engineering</b>	<b>13</b>
2.2.1	The Discipline	13
2.2.2	BEng (Hons) (Geotechnical Engineering)	13
2.2.3	BSc (Hons) (Applied Science)	14
2.2.4	MEng (Geotechnical Engineering)	14
2.2.5	MSc (Applied Science)	14
2.2.6	Doctoral studies	14
<b>2.3</b>	<b>Structural Engineering</b>	<b>15</b>
2.3.1	The Discipline	15
2.3.2	BEng (Hons) (Structural Engineering)	15
2.3.3	BSc (Hons) (Applied Science)	16
2.3.4	MEng (Structural Engineering)	16
2.3.5	MSc (Applied Science)	16
2.3.6	Doctoral studies	16
<b>2.4</b>	<b>Transportation Engineering</b>	<b>17</b>
2.4.1	The Discipline	17
2.4.2	BEng (Hons) (Transportation Engineering)	18
2.4.3	BSc (Hons) (Applied Science)	19
2.4.4	MEng (Transportation Engineering)	20
2.4.5	MSc (Applied Science)	20
2.4.6	Doctoral studies	20
2.4.7	Financial support for studies and research	20



<b>2.5</b>	<b>Water Resources Engineering</b>	<b>21</b>
2.5.1	The Discipline	21
2.5.2	BEng (Hons) (Water Resources Engineering)	22
2.5.3	BSc (Hons) (Applied Science)	23
2.5.4	MEng (Water Resources Engineering)	23
2.5.5	MSc (Applied Science)	23
2.5.6	Doctoral studies	24
<b>2.6</b>	<b>Specialist Study areas</b>	<b>25</b>
2.6.1	Concrete materials	25
<b>2.7</b>	<b>Short Courses in Railway Engineering</b>	<b>26</b>
2.7.1	General Information	26
2.7.2	Short Courses on offer	26
<b>2.8</b>	<b>Modules offered by other departments and universities</b>	<b>28</b>
<b>ANNEXURES</b>		
A	Curricula for post-graduate modules	
B	2015 Study programme planner	
C	Calendar: 2015	
D	Preparation of reports, dissertations and theses	



## 1. OVERVIEW

### 1.1 The University and the Department of Civil Engineering

The University is located in Hillcrest Pretoria, 6 km from the CBD of Pretoria and 50 km from the Johannesburg International Airport (Figure 1). Within walking distance is the Hatfield commercial complex with its many shops, restaurants, entertainment venues and of course bookshops, and the Hatfield Gautrain station.

The University was established in 1908 as the Transvaal University College (that is why it is commonly referred to as TUKKIES). In October 1930, the independent University of Pretoria came into being. Since then it has grown to have a resident student population in excess of 50 000, the largest student population of any residential university in South Africa. This student population is made up of over 40 000 undergraduate students and nearly 10 000 post-graduate students.

The School of Engineering, which forms part of the Faculty of Engineering, Built Environment and Information Technology, has a student population of almost 7 000; of whom 1 200 are post-graduate students.

The Department of Civil Engineering, headed by Prof Elsabe Kearsley, has a teaching staff of 24 and in 2014 had a student population in excess of 1100 students of which more than 200 were post-graduate students.

During the last 10 years, the University of Pretoria has conferred over 700 undergraduate degrees and over 450 post-graduate degrees in the Department of Civil Engineering.

The department is housed in the Engineering 1 Building (often referred to as the Engineering Tower Building) and its location on the main Campus is shown in Figure 2.

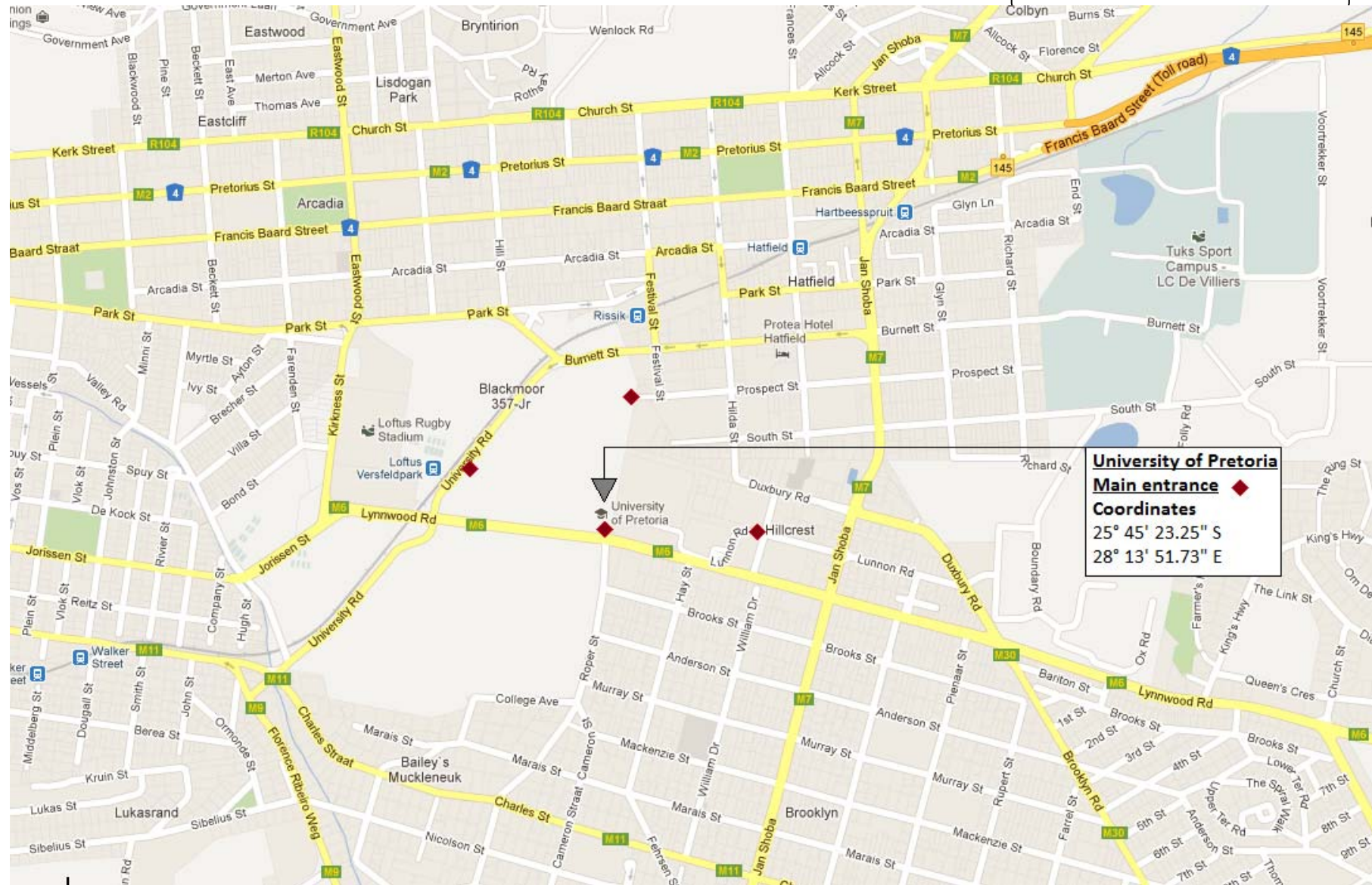


Figure 1: The location of the University of Pretoria

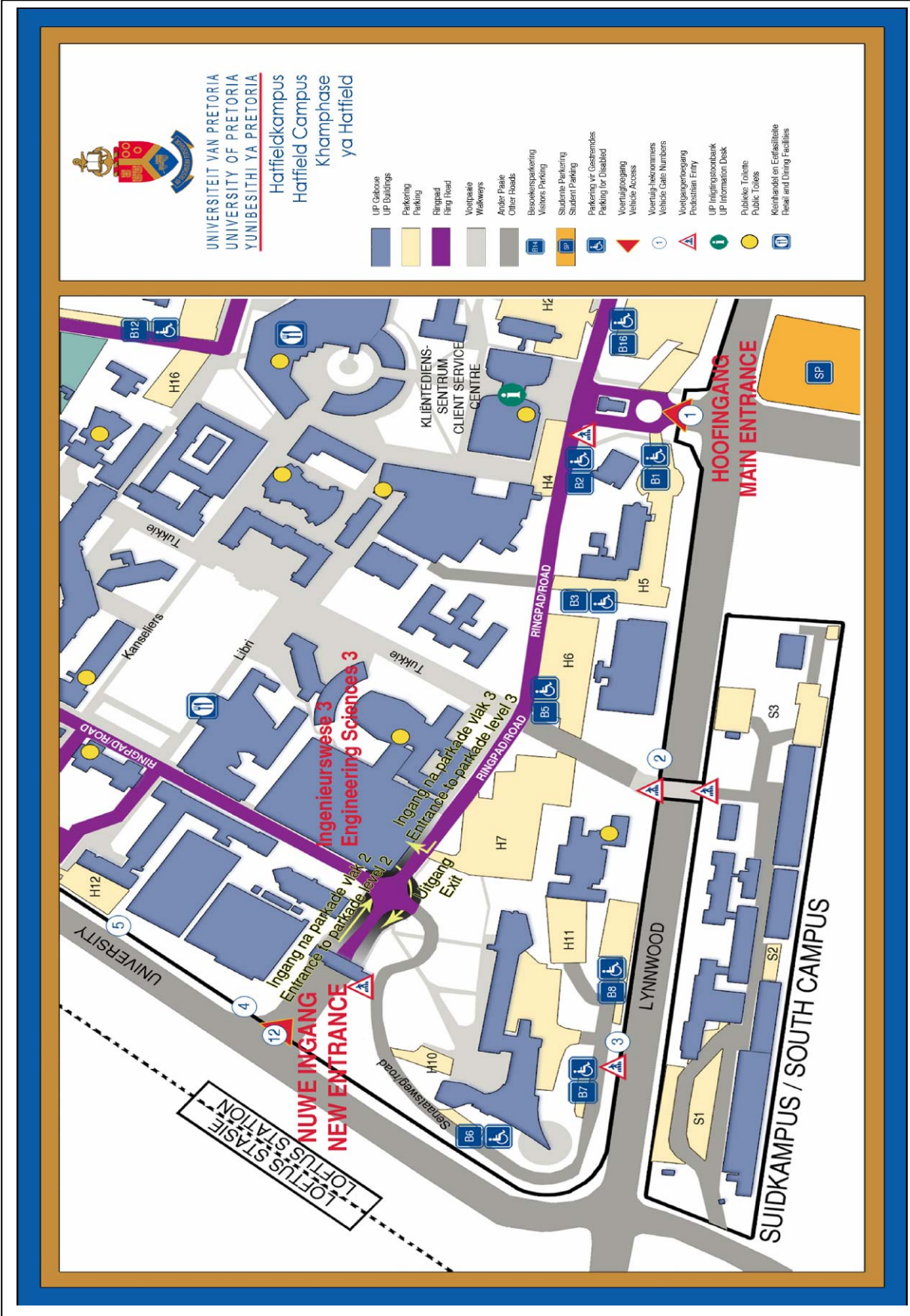


Figure 2: Map of the Main Campus of the University of Pretoria



## 1.2 THE DISCIPLINES

The Department of Civil Engineering offers post-graduate courses in four disciplines. These are shown below together with the name and contact details of the person responsible for each discipline.

- **Head of Department of Civil Engineering**  
Prof EP Kearsley  
Room 11-7 Eng 1; Phone: (012) 420 2429; fax: (012) 362 5218;  
e-mail: [elsabe.kearsley@up.ac.za](mailto:elsabe.kearsley@up.ac.za)
- **Geotechnical Engineering**  
Prof G Heymann  
Room 11-18 Eng 1; Phone (012) 420 3627; fax: (012) 362 5218  
e-mail: [gerhard.heyman@up.ac.za](mailto:gerhard.heyman@up.ac.za)
- **Structural Engineering**  
Prof C.P. Roth  
Room 12-13 Eng 1; Phone (012) 420 2185;  
e-mail: [chris.roth@up.ac.za](mailto:chris.roth@up.ac.za)
- **Transportation Engineering**  
Prof WJvdM Steyn  
Room 13-5 Eng 1; Phone (012) 420 2171; fax: (012) 362 5218  
e-mail: [wynand.steyn@up.ac.za](mailto:wynand.steyn@up.ac.za)  
Prof C Venter  
Room 13-9 Eng 1; Phone (012) 420 2184; fax: (012) 362 5218  
e-mail [christo.venter@up.ac.za](mailto:christo.venter@up.ac.za)
- **Water Resources Engineering**  
Prof SJ van Vuuren  
Room 12-21 Eng 1; Phone (012) 420 2438; fax: (012) 362 5218  
e-mail: [fanie.vanvuuren@up.ac.za](mailto:fanie.vanvuuren@up.ac.za)





### 1.3 THE DEGREE STRUCTURE

In each of the four disciplines of Civil Engineering, the University of Pretoria offers the following post-graduate degrees:

- ✧ BSc (Hons)(Applied Sciences) for students who have obtained a relevant 3-year University degree or a BTech degree from a former Technikon, or a 4-year degree not recognised by the Engineering Council of South Africa for PrEng registration.
- ✧ BEng (Hons) for students who have obtained an ECSA accredited university engineering degree.
- ✧ MSc (Applied Science) for students who have obtained a BSc (Hons) (App Science) degree.
- ✧ MEng for students who have obtained a BEng (Hons) or equivalent.
- ✧ PhD for students who have obtained a relevant Masters degree.

A minimum of 128 SAQA credits needs to be obtained to complete the honours degree. The modules described later in detail per specialization area are mostly 24 SAQA credits per module or in some cases 16 or 32 SAQA credits. A further minimum 128 SAQA credits need to be completed to obtain the masters degree that follows the honours degree. No credits can be transferred from the honours degree to the masters degree as they are coded at separate levels and are mutually exclusive. The masters degree is a full research (dissertation only) degree (See 1.4.5 for rules and regulations applicable to post-graduate studies). Fulltime Master's studies are encouraged and those interested should contact the Head of the Department as early as possible.

### 1.4 APPLICATION, REGISTRATION, FEES AND REGULATIONS

#### 1.4.1 Application Process

Applications from persons who are registering for post-graduate study for the first time should be submitted on the University's web page [www.up.ac.za/apply](http://www.up.ac.za/apply) or the prescribed form obtainable from the Client Service Centre at [www.csc.up.ac.za](http://www.csc.up.ac.za) by **31 October 2014**.

Students completing their undergraduate degree in 2014 and whose complete academic record is not available by the closing date, must submit the academic record to the Engineering Administration ([eng@up.ac.za](mailto:eng@up.ac.za), quoting reference/student number) by **10 December 2014**, in order to be reviewed for admission. Results received after this date cannot be processed and candidates will have to re-apply for the 2016 study year.

#### 1.4.2 Registration Process

A special registration session will be held in **Lecture hall 3-6, Engineering 3, on Saturday, 24 January 2015, promptly at 08:00.** Note that the appropriate Discipline Head must sign the subject form of students enrolling for a degree in a speciality field. Study material for the modules offered during the first semester will generally be available at registration and students must obtain these from the head of the discipline.

**N.B. Students are no longer able to commence studies and register in mid-year.**

It is most important to attend the registration session on **Saturday 24 January 2015.**



No registration will take place after 1 February 2015.

The listing of a module on the subject form does not constitute a guarantee that the module will be offered. Students should note that even if a module is listed on the timetable, only those modules for which there is sufficient demand will be offered each year.

Students must also ascertain during registration whether the modules are being offered and that there are no clashes on the timetable.

First-time students for doctoral degrees may register at any time during the academic year, but before 31 May if wished to be considered for a post-graduate bursary.

### **1.4.3 Registration Fees**

Please refer to the “Postgraduate Fees and Funding 2014/2015” ([www.up.ac.za/feesfunding](http://www.up.ac.za/feesfunding)), which gives details regarding tuition fees and payment.

A deposit or registration fee is payable at registration. It is, however, permissible to pay the remainder of the tuition fees in two instalments, namely a deposit at registration and one subsequent payment.

The applicable initial payment that is due before or during registration is as follows:

- Post-graduate students who are registering for the first time for a particular field of study will be required to pay an amount of R7 500 towards their tuition fees before or during registration.
- Post-graduate students who are renewing their registration will be required to pay an amount of R7 500 towards their tuition fees before or during registration.
- Post-graduate students who need to renew their registration in order to submit a dissertation/thesis for examination will, subject to the examination being completed before 31 January, be required to pay an initial registration fee of R7 500. If the examination extends beyond 31 January the full annual fee of R14 000 must be paid.

### **1.4.4 Study fees**

The exact fees payable for each module can be ascertained from the Client Services Centre, but are in the order of R5 000 per 24 SAQA credits.

A registration fee of R7 500 is payable in the beginning of each year as a re-registration fee for doctoral degrees as part of the annual fee of R15 000.

Fees for the Masters degree dissertation are R14 000 per year, for a PhD R15 000 per year including the registration fee. Consult the “Postgraduate Fees and Funding 2014/2015”.

The student’s registration must be renewed annually until such time as the degree requirements have been complied with. Candidates who fail to renew their registration or who interrupt their studies are liable for the annual registration fees when the study is resumed. International students may be charged different fees, obtainable from the Client Services Centre or consult “Postgraduate Fees and Funding 2014/2015”.



### 1.4.5 Bursaries and grants

The University of Pretoria places a high premium on post-graduate study and accordingly supports full-time and part-time post-graduate students by making available bursaries and loans. Further details may be obtained from Head (Study Financing) Tel (012) 420 5100 on:

- The value of bursaries available for full-time and part-time post-graduate students;
- The submission of applications;
- The basis of allocation;
- Loans;
- NRF post-graduate bursaries

From time to time student assistantship positions also become available. Interested persons should contact Prof Elsabe Kearsley, Head of the Department of Civil Engineering Tel: (012) 420 2429; fax: (012) 362 5218; e-mail: [elsabe.kearsley@up.ac.za](mailto:elsabe.kearsley@up.ac.za).

Aurecon has sponsored full-time post-graduate bursaries in all of the civil engineering disciplines for black South Africans. The first round of applications closes on 31 October 2014 for 2015. Interested prospective students may apply with the Head of the Department of Civil Engineering Tel: (012) 420 2429; fax: (012) 362 5218; e-mail: [elsabe.kearsley@up.ac.za](mailto:elsabe.kearsley@up.ac.za).

For possible financial assistance in any discipline please contact the relevant Head of the Discipline; or consult the last section of the discipline related sections in Chapter 2.

### 1.4.6 Rules and Regulations

For the rules and regulations relevant to post-graduate study, students should refer to:

- Regulations and Syllabi 2015, available on the UP Homepage under “Yearbooks”.
- The Student Guide of the University of Pretoria.
- Timetable.
- General Regulations and Information 2015 Section B.

Irrespective of any comments contained in this brochure the Regulations and Syllabi 2015 and Student Guide will apply. These documents can be obtained from the Student Administration Offices.

### Entry Requirements

Table 1 summarizes the entry requirements for the post-graduate degrees offered by the Department of Civil Engineering.

**Table 1 : Entry requirements**

POST-GRADUATE DEGREE	ENTRY REQUIREMENTS
BEng (Hons)	A BEng degree from the University of Pretoria or equivalent; with no courses failed in and at least 60% average in the final year. If this requirement is not complied with, the candidate may apply after registering as a Professional Engineer.
BSc (Hons) (Applied Science)	An appropriate 3-year university degree or BTech degree. No courses failed in and at least 60% average in the BTech or final academic year for four or more year degrees. Applicants must apply on the official application form available on-line or hardcopy for admission to this study programme.
MEng	A BEng(Hons) degree from the University of Pretoria or equivalent; with at least 65% average. Exceptions to these requirements will be considered by the Head of Department and the Dean.
MSc (Applied Science)	A BSc(Hons) (Applied Science) degree from the Department of Civil Engineering of the University of Pretoria or equivalent; with at least 65% average. An entrance examination may be required.
PhD or PhD(Eng)	A master's degree from the University of Pretoria or equivalent and be a mature professional, preferably with professional registration. Exceptions to these requirements will be considered by the Head of Department and the Dean. The PhD(Eng) degree requires a Masters degree in engineering.

**Note** that Regulation G3 section 2 will be strictly enforced. This section states that “in the case of part-time students, unless at least two equivalent semester modules are passed in a year, re-registration will not be permitted”. A semester module is considered to be 24 SAQA credits. Furthermore, a post-graduate module may only be repeated once.

#### 1.4.6. Doctoral Studies

##### **Admission requirements for PhD (Eng), PhD, PhD (Applied Sciences)**

An appropriate master's degree is required for admission to the PhD programme. An engineering master's degree is required for admission to the PhD (Eng) programme, an MSc for the PhD programme and an MSc (Applied Science) for the PhD (Applied Science) programme. (Refer to the General Regulations G.45 - G.61 part 1). The academic status of degrees obtained at other universities needs to be clarified with the Student Administration Offices.

##### **Degree requirements**

The PhD-degree is awarded on the basis of a thesis and an examination in the field of study, although no specialty designation e.g. Transportation, etc. is indicated on the degree certificate.



It is required of a candidate to present proof by means of a thesis of INDEPENDENT ADVANCED ORIGINAL RESEARCH and/or CREATIVE work, which makes a SUBSTANTIAL CONTRIBUTION TO THE KNOWLEDGE OF ENGINEERING SCIENCE and/or PRACTICE.

The thesis, or part thereof, MUST be publishable and the candidate must submit and have accepted at least two peer-reviewed articles for publication in a recognized INTERNATIONAL professional journal, prior to or concurrently with the submission of the thesis.

#### **1.4.7. Study arrangements**

Modules are offered either as block week modules, evening class modules or full-day modules. Some of the modules can be taken as continuing education courses. Students would register for non-degree purposes and 6 hours of lectures are equivalent to one ECSA CPD day. Attendance of lectures is mandatory.

##### **Block week modules**

Modules are offered as 2 or 3 lectures per day (depending on the module credit) during the block weeks during the year. Students will also be required to complete assignments and examinations.

Study material for block week modules is available in advance and students should ensure that they obtain this material, as admission to the module may be refused if inadequate preparation has been made for the first lectures. The official arrangements are as follows:

- **For all modules** the material is generally available during registration in January. (Students are requested to contact the Head of the Discipline for this material that must be collected at least 4 weeks before the course and no later than 1 February 2015).

##### **Evening class modules**

Evening class modules comprise the following:

- Evening lectures throughout the academic year or semester, as the case may be.
- Reading, study and project assignments as well as tests.
- An examination at the end of the semester or year, as the case may be.

##### **Full day modules/Short course modules**

These modules are presented over a number of days. The number of days depends on the module credits. The workload is as for the other modules; i.e. lectures, assignments and examinations.

##### **Workload for module credits**

Each module is assigned a number of SAQA credits. Approximately 10 hours of study are required per SAQA credit.

A Master's dissertation will entail about 1 200 hours of research and study.

**Maximum number of credits for which students may enrol.**

Full-time honours students shall not enrol for more than 128 SAQA credits per year, distributed in relation to the examination period, without the approval of the Head of Department. Full-time students shall submit a complete work programme to the Head of Department via the relevant Head of Discipline. These students will also be expected to assist in general research and/or academic activities.

Part-time students shall not enrol for more than 72 SAQA credits per year without the written approval of the Head of the Department.

**Examinations**

Examinations in post-graduate modules take place during November. Enrolment for examinations coincides with enrolment for modules. The exact dates will be provided by the lecturer of each module and are posted either on the post-graduate notice board in the basement of Engineering 1 or on ClickUP. There are no out-of-town examination centres and all examinations are taken at the University.

**Pass requirements**

The pass requirement is a final mark of 50% for each module. In those modules where a semester grade is given, a minimum mark of 40% is required in the examination and a final mark of 50% is required.

**No supplementary tests, examinations or reassessments are allowed in respect of any post-graduate modules. Should a student fail a module, no exemption from attendance of lectures will be considered when the module is repeated. A post-graduate module may only be repeated once.**

**Module changes**

Should a student decide during the academic year to discontinue certain modules for which he/she enrolled, the student is required to complete and submit the relevant form to the Student Administration Offices. (Tel: (012) 420 5316). A student should confirm closing dates for module cancellations as late cancellation will result in payment of full fees.

To discontinue studies, a student should contact the Client Service Centre ([csc@up.ac.za](mailto:csc@up.ac.za)) and inform the relevant lecturers.

A student wishing to change modules after registration must complete the official "Change of Subject" form, which must be approved by the Head of the Discipline and Head of Department, and submitted to the Student Administration. The closing dates for these changes are shown in the TUKS CALENDAR. (Available from the Student Administration Offices or on the website at <http://www.up.ac.za/calendars/calendarget.html> ).



In case of change of address, the student is required to inform the Head of Department as well as the Student Administration immediately, and modify the information on Students-Online-Services (SOS).

### **Transitional measures**

Any module passed more than 7 years ago or where the syllabus has changed, will not be taken into account when determining the credits passed for a particular degree.

### **Co-operation with other universities**

With a view to eliminating unnecessary overlap and duplication, active co-operation between universities at post-graduate level is being pursued:

- a) Post-graduate modules passed at another university may be recognised in terms of the stipulations of General Regulation G.23 and G.37.
- b) Students enrolled at one university may be permitted to take limited modules at another university.

Students affected by, or interested in such arrangements may contact the Head of Department for further details.







## 2. POST GRADUATE PROGRAMMES

This section briefly describes each of the disciplines within the Department of Civil Engineering in which post-graduate programmes are offered and the modules that make up the post-graduate programmes.

### GEOTECHNICAL ENGINEERING

#### 2.2.1 The Discipline

Geotechnical Engineering is a specialist field of research and application within the larger framework of Civil Engineering. All engineering aspects of soil and rock fall within this discipline. The courses presented cover the highly specialized theoretical Soil Mechanics and Geotechnical Engineering as well as the specialist fields of laboratory and in situ testing.

The discipline is staffed by:

Prof G Heymann Tel: (012) 4203627; Fax: (012) 362 5218; e-mail [gerhard.hey mann@up.ac.za](mailto:gerhard.hey mann@up.ac.za)

Prof SW Jacobsz Tel: (012) 420 3124; Fax: (012) 362 5218; e-mail: [sw.jacobsz@up.ac.za](mailto:sw.jacobsz@up.ac.za)

Prof E Rust Tel: (012) 420 3286; Fax: (012) 362 5218; e-mail: [eben.rust@up.ac.za](mailto:eben.rust@up.ac.za)

Specialists in the field of geotechnical engineering that assist the discipline include Prof CRI Clayton (Southampton).

At present the research in the discipline is focused on centrifuge modelling, advanced geotechnical laboratory testing, geotechnical, geo-environmental and in-situ testing.

The entry requirements for the degrees that are obtainable in this discipline are described in Section 1.4.5. The descriptions of the curricula for each of the modules are outlined in Annexure A.

#### 2.2.2 BEng (Hons)(Geotechnical Engineering)(12240212)

Students who have obtained a BEng degree or equivalent and comply with the requirements in Table 1 may apply for admission to this post-graduate programme.

To obtain this degree, students will be required to obtain a minimum 128 SAQA credits from the list below. Core modules are compulsory.

Core Modules:	Code	Credits
Analytical Soil Mechanics 787	SGS 787	24
Theoretical Soil Mechanics 788	SGS 788	24
Specialized geotechnical testing 789	SGS 789	24
<b>Electives:</b>		
Engineering Geology 703	IGL 703	16
Applied Statistical Methods and Optimisation 798	SHC 798	32
Finite Element Applications in Civil Engineering 780	SIR 780	24
Numerical Methods for Civil Engineers 780	SIK 780	24



### 2.2.3 BSc(Hons)(Applied Science) (12243019)

#### Specialization in **Geotechnics**

Students who have obtained a relevant three-year university degree or BTech degree and comply with the requirements in Table 1 may apply for admission to this post-graduate programme. To obtain this degree, students will be required to obtain a minimum 128 SAQA credits from the list below. Core modules are compulsory.

Core modules	Code	Credits
Basic Statistical Methods 797	SHC 797	24
Analytical Soil Mechanics 787	SGS 787	24
Theoretical Soil Mechanics 788	SGS 788	24
Specialized geotechnical testing 789	SGS 789	24
<b>Electives:</b>		
Engineering Geology 703	IGL 703	16
Finite Element Applications in Civil Engineering 780	SIR 780	24
Numerical Methods for Civil Engineers 780	SIK 780	24

Students with a BTech degree must attend the undergraduate lectures and complete the examination for Soil Mechanics SGM311 and Geotechnical Engineering SGM323 before enrolment for the other geotechnical modules will be approved.

### 2.2.4 MEng (Geotechnical Engineering)(12250212)

A student who has obtained a BEng (Hons) degree or equivalent with an average of at least 65% may apply for admission to this post-graduate programme. A total of 128 SAQA credits must be obtained:

Module name	Code	Credits
Dissertation 890	SGI 890	128

### 2.2.5 MSc (Applied Sciences) (12253019)

#### Specialization in **Geotechnics**

A total of 128 SAQA credits must be obtained. A student who has obtained a BSc (Hons) (Applied Science) degree with an average of at least 65% may apply for admission to this post-graduate programme.

Module name	Code	Credits
Dissertation 890	SST 890	128

### 2.2.6 Doctoral Studies

Information on doctoral degrees is given in Section 1.4.6.



## 2.3 STRUCTURAL ENGINEERING

### 2.3.1 The Discipline

A wide spectrum of modules is presented, including more analytical subjects such as structural analysis and structural mechanics as well as design courses in reinforced concrete, steel and timber.

The discipline is staffed by:

Prof C.P. Roth	Tel: (012) 420 2185;	e-mail: <a href="mailto:chris.roth@up.ac.za">chris.roth@up.ac.za</a>
Dr A. Roux	Tel: (012) 420 2186;	e-mail: <a href="mailto:anneke.roux@up.ac.za">anneke.roux@up.ac.za</a>
Ms S. Skorpen	Tel: (012) 420 2196	e-mail: <a href="mailto:sarah.skorpen@up.ac.za">sarah.skorpen@up.ac.za</a>
Prof B.W.J. van Rensburg	Tel: (012) 420 2439;	e-mail: <a href="mailto:ben.vanrensburg@up.ac.za">ben.vanrensburg@up.ac.za</a>
Prof W.M.G. Burdzik	Tel: (012) 420 2746;	e-mail: <a href="mailto:walter.burdzik@up.ac.za">walter.burdzik@up.ac.za</a>
Prof N.W. Dekker	Tel: (012) 420 2179;	e-mail: <a href="mailto:nick.dekker@up.ac.za">nick.dekker@up.ac.za</a>

At present the research of the discipline is focused on:

- Advanced structural analysis and structural reliability
- Reinforced concrete
- Structural steel
- Structural timber

Recent examples of research output include papers in recognised local and international journals and presentations at international conferences.

The requirements for the degrees that are obtainable in this discipline are described in the following sections. The descriptions of the curricula for each of the modules are outlined in Annexure A.

### 2.3.2 BEng (Hons)(Structural Engineering) (12240121)

Students who have obtained an engineering degree or equivalent may apply for admission to this post-graduate programme.

To obtain this degree, students will be required to obtain a minimum of 128 SAQA credits from the following modules:

*At least 96 credits from the following:*

Module name	Code	Credits	Prerequisite*
Concrete Technology 794	SGC 794	24	
Prestressed Concrete Design 791	SIN 791	24	SIC 793
Reinforced Concrete Design 778	SIN 778	24	SIC 793
Steel Design 776	SIN 776	24	SIC 793
Structural Analysis 790	SIN 790	24	SIC 790
Structural Mechanics 777	SIN 777	24	SIC 790
Timber Design 779	SIN 779	24	
Numerical Methods for Civil Engineers 780	SIK 780	24	
Finite Element Applies in Civil Engng 780	SIR 780	24	

\* applies to Applied Science students



**and** the remainder of the credits from the following:

Applied Statistical Methods and Optimisation 798	SHC 798	32
Infrastructure Management 790	SSI 790	24
An approved module from the Department of Mathematics and Applied Mathematics		
An approved module from the Department of Mechanical Engineering.		

### 2.3.3 BSc (Hons)(Applied Science) (12243031)

#### Specialization in **Structures**

Students who have obtained a relevant three-year university degree or BTech degree may apply for admission to this post-graduate programme. As for the other Honours degrees, a minimum 128 SAQA credits are required. The modules to select from are as follows:

Module Name	Code	Credits
Basic Structural Analysis 790	SIC 790	24
Basic Structural Design 793	SIC 793	24

**and** the remainder of the credits chosen from the modules prescribed for the BEng(Hons)(Structural Engineering) programme, as approved by the Head of the Department, and after completion of the appropriate modules from the list above.

### 2.3.4 MEng (Structural Engineering) (12250121)

A student who has obtained a BEng (Hons) degree or equivalent with an average of at least 65% may apply for admission to this post-graduate programme.

Module Name	Code	Credits
Dissertation: Structural Engineering 890	SIN 890	128

### 2.3.5 MSc (Applied Science) (12253036)

#### Specialization in **Structural Technology**

A student who has obtained a BSc (Hons) (Applied Science) degree with an average of at least 65% may apply for admission to this post-graduate programme:

Module Name	Code	Credits
Dissertation 890	SST 890	128

### 2.3.6 Doctoral Studies

Information on doctoral degrees is given in Section 1.4.6.



## 2.4 TRANSPORTATION ENGINEERING

### 2.4.1 The Discipline

The economic and social well-being of our country is significantly influenced by the efficient movement of persons, goods and services. To this end, the discipline includes the study of pavement engineering, geometric design, railway engineering, traffic engineering, traffic safety and transportation planning.

The postgraduate programme in Transportation Engineering offers three focus areas around which teaching and research activities are organised:

Focus Area	Responsible staff member
Pavement Engineering	Prof WJ vdM Steyn Tel: (012) 420 2171 e-mail <a href="mailto:wynand.steyn@up.ac.za">wynand.steyn@up.ac.za</a> Prof James Maina e-mail <a href="mailto:james.maina@up.ac.za">james.maina@up.ac.za</a>
Transport Planning and Traffic Engineering	Prof C Venter Tel: (012) 420 2184 e-mail <a href="mailto:christo.venter@up.ac.za">christo.venter@up.ac.za</a>
Railway Engineering	Prof PJ Gräbe Tel: (012) 420 4723 e-mail <a href="mailto:hannes.grabe@up.ac.za">hannes.grabe@up.ac.za</a>

Specialists in the field of transportation engineering that assist the discipline include Prof C Bester, Dr P Pretorius, Dr Bridget Ssamula, Prof G Jordaan and Dr H Ribbens.

At present the research of the discipline is focused on public transport, land use and transport modelling, traffic safety, railway engineering and pavement research. Recent examples of this research include:

- Travel behavior impacts of open-road tolling.
- Integrated land use transport models for strategic planning.
- Evaluation of vehicle-pavement interaction.
- Evaluating the new South African design method for various materials.

The requirements for the degrees that are obtainable in this discipline are described in the following sections. Note that the selection of modules would be based on the particular focus area as described above.

The descriptions of the curricula for each of the modules are outlined in Annexure A.



## 2.4.2 BEng (Hons)(Transportation Engineering) (12240111)

Students who have obtained an engineering degree or equivalent may apply for admission to this post-graduate programme.

A minimum of 128 SAQA Credits must be obtained from the following:

<b>Core Modules (compulsory):</b>	<b>Code</b>	<b>Credits</b>
Applied Statistical Methods and Optimisation 798	SHC 798	32
<b>Electives:</b>		
Transportation Planning 789	SVC 789	24
Concrete Technology 794	SGC 794	24
Finite Element Applications in Civil Engineering 780	SIR 780	24
Geometric Design and Safety 791	SVV 791	24
Infrastructure Management 790	SSI 790	24
Multimodal Transport 788	SVV 788	24
Numerical Methods for Civil Engineers 780	SIK 780	24
Pavement Design 793	SGC 793	24
Road Rehabilitation Technology 797	SGC 797	24
Traffic Engineering 792	SVC 792	24
Transportation Special 791	SVC 791	24
Transportation Studies 790	SVC 790	24

It is strongly recommended that students identify one of the three focus areas within Transportation Engineering before commencing their studies. Within each focus area, the following course combinations are typical. Well-motivated requests for deviations from these combinations will be considered on an ad hoc basis.

<b>Focus Area:</b>	<b>Transport Planning &amp; Traffic Engineering</b>	<b>Pavement Engineering</b>	<b>Railway Engineering</b>
<b>Core modules</b>	<ul style="list-style-type: none"> <li>Applied Statistical Methods and Optimisation 798</li> </ul>	<ul style="list-style-type: none"> <li>Applied Statistical Methods and Optimisation 798</li> </ul>	<ul style="list-style-type: none"> <li>Applied Statistical Methods and Optimisation 798</li> </ul>
<b>Electives: Any 4 of:</b>	<ul style="list-style-type: none"> <li>Geometric Design and Safety 791</li> <li>Multimodal Transport 788</li> <li>Traffic Engineering 792</li> <li>Transportation Planning 789</li> <li>Transportation Studies 790</li> <li>Infrastructure Management 790</li> <li>Numerical Methods 780</li> <li>Transportation Special 791</li> </ul>	<ul style="list-style-type: none"> <li>Pavement Design 793</li> <li>Road Rehabilitation Technology 797</li> <li>Concrete Technology 794</li> <li>Transportation Special 791</li> <li>Infrastructure Management 790</li> <li>Transportation Planning 789</li> <li>Numerical methods 780</li> <li>Geometric Design and Safety 791</li> <li>Finite Element Applications in Civil Engineering 780</li> </ul>	<ul style="list-style-type: none"> <li>Pavement Design 793</li> <li>Transportation Special 791*</li> <li>Finite Element Applications in Civil Engineering 780</li> <li>Concrete Technology 794</li> <li>Infrastructure Management 790</li> <li>Transportation Planning 789</li> <li>Numerical methods 780</li> </ul>

\* See Section 2.7



### 2.4.3 BSc (Hons) (Applied Science) (12243028)

#### Specialization in Transportation Planning

Students who have obtained a relevant three-year university degree or B Tech degree may apply for admission to this post-graduate programme. As for the other Honours degrees, a minimum of 128 SAQA credits are required from the following:

Core Modules	Code	Credits
Basic Statistical Methods 797	SHC 797	24
Basic Pavements and Transportation 787	SGM 787	24

**and** the remainder of the credits chosen from the modules prescribed for the BEng(Hons)(Transportation Engineering) programme, as approved by the Head of the Department. The Basic courses must preferably be taken before proceeding to the other modules. **Note** that Basic Pavement Materials and Design 786 and Basic Transport and Traffic Engineering 789 were combined to become Basic Pavements and Transportation in 2013. Students who failed one of these two subjects pre-2013 will need to repeat the Basic Pavements and Transportation.

It is strongly recommended that students identify one of the three focus areas within Transportation Engineering before commencing their studies. Within each focus area, the following course combinations are recommended. Well-motivated requests for deviations from these combinations will be considered on an ad hoc basis.

Focus Area:	Transport Planning & Traffic Engineering	Pavement Engineering	Railway Engineering
<b>Core modules</b>	<ul style="list-style-type: none"> <li>Basic Statistical Methods 797</li> <li>Basic Pavements and Transportation 787</li> </ul>	<ul style="list-style-type: none"> <li>Basic Statistical Methods 797</li> <li>Basic Pavements and Transportation 787</li> </ul>	<ul style="list-style-type: none"> <li>Basic Statistical Methods 797</li> <li>Basic Pavements and Transportation 787</li> </ul>
<b>Electives: Any 4 of:</b>	<ul style="list-style-type: none"> <li>Transportation Planning 789</li> <li>Geometric Design and Safety 791</li> <li>Multimodal Transport 788</li> <li>Traffic Engineering 792</li> <li>Transportation Studies 790</li> <li>Infrastructure Management 790</li> </ul>	<ul style="list-style-type: none"> <li>Pavement Design 793</li> <li>Concrete Technology 794</li> <li>Transportation Special 791*</li> <li>Infrastructure Management 790</li> <li>Geometric Design and Safety 791</li> <li>Transportation Planning 789</li> </ul>	<ul style="list-style-type: none"> <li>Pavement Design 793</li> <li>Transportation Special 791*</li> <li>Concrete Technology 794</li> <li>Infrastructure Management 790</li> <li>Transportation Planning 789</li> </ul>

\* See Section 2.7



#### 2.4.4 MEng (Transportation Engineering) (12250111)

A student who has obtained a BEng (Hons) degree or equivalent with an average of at least 65% may apply for admission to this post-graduate programme. A total of 128 SAQA credits must be obtained.

Module Name	Code	Credits
Dissertation 890	SVI 890	128

#### 2.4.5 MSc (Applied Science) (12253028)

##### Specialization in Transportation Planning

Students who have obtained a BSc (Hons) (Applied Science) (Transportation Technology) degree or equivalent with an average of at least 65% may apply for admission to this post-graduate programme. A total of 128 SAQA credits must be obtained.

Module Name	Code	Credits
Dissertation 890	SST 890	128

#### 2.4.6 Doctoral studies

Information on doctoral degrees is given in Section 1.4.6.

#### 2.4.7 Financial support for studies and research

The Department of Transport, through the Centre for Transport Development at the University of Pretoria, provides substantial support for full-time post-graduate studies.

Enquires: Prof Wynand Steyn or Prof Christo Venter.

Other sources of financial support include:

- AUTOMOBILE ASSOCIATION OF SOUTH AFRICA. Bursaries for tuition fees are awarded annually. The closing date for applications is 30 April in the preceding year. For details and application forms, write to The Director-General, Automobile Association of South Africa, P O Box 596, JOHANNESBURG, 2000)
- THE SOUTH AFRICAN ROAD FEDERATION A bursary is awarded annually for post-graduate study at a South African university. The closing date for applications is 31 August for the following year of study. Application forms are available from Ms Angie Gouws, South African Road Federation, P O Box 31577, BRAAMFONTEIN, 2017. Tel: (011) 403 5603; Fax: (011) 403 7736; email: [sarfuse1@acenet.co.za](mailto:sarfuse1@acenet.co.za)





## 2.5 WATER RESOURCES ENGINEERING

### 2.5.1 The Discipline

Water Resources Engineering encompasses various elements of the natural and man-made water cycle. Civil engineers' input in creating sustainable development that requires safe water supply to all consumers and protect the natural resources is based on an understanding of the natural hydrological cycle, physical principles and the effect of human interference with these fields.

The subjects that are presented are aimed at broadening the understanding of different aspects of hydrological and hydraulic phenomena and the application thereof in the design of pipelines, pump stations, open channels, hydraulic structures and the assessment of the yield from surface water resources. The lecture material is presented in such a format that it enhances the skills of the student to undertake real problems.

The discipline is headed by:

Prof SJ van Vuuren Tel: (012) 420 2438; Fax: (012) 362 5218

e-mail: [fanie.vanvuuren@up.ac.za](mailto:fanie.vanvuuren@up.ac.za)

He is supported by:

Mr M van Dijk Tel: (012) 420 3176; Fax: (012) 362 5218; e-mail: [marco.vandijk@up.ac.za](mailto:marco.vandijk@up.ac.za)

Ms I Loots Tel: (012) 420 5484; Fax: 012 362 5218; e-mail: [ione.loots@up.ac.za](mailto:ione.loots@up.ac.za)

The research focus of the group is on the evaluation of the prevention of cavitation in control valves, operating conditions on the roughness in pipelines, the application of Genetic Algorithms in the optimisation of water systems, and energy generation from water distribution systems.

#### **Recent publications and research projects include:**

- *“Quantifying the influence of air on the capacity of large diameter, water pipelines and developing provisional guidelines for effective de-aeration” Volume 1 and 2. WRC Report 1177/1/04 and 1177/2/04.*
- *“Factors influencing the friction loss in pipelines and the relationship between water quality, operating conditions and the performance of liner systems”. WRC Report TT278/06*
- *“Grouted lining systems for the renovating of old steel pipelines and design of new pipelines”. WRC K5/1448.*
- *“Inverse transients to determine deficiencies in pipelines”. WRC K5/1721*
- *“Influence of catchment development on peak urban run-off”. WRC K5/1752*
- *“Waterborne sanitation design guide”. WRC Report TT481/11 and “Waterborne sanitation, operation and maintenance guide”. WRC Report TT482/11*
- *“Determination of the change in hydraulic capacity in pipelines”. WRC K5/1820*
- *“Energy generation from water distribution systems”. WRC Reports TT596/14 and TT597/14*
- *“The development of small-scale hydropower for rural electrification”.*



➤ *Books and journal papers:*

Kruger, E.J. (Editor), Rooseboom, A. Van Vuuren, S.J., Van Dijk, M., Jansen van Vuuren, A.M., Pienaar, W.J., Pienaar, P.A., James, G.M., Maastricht, J. and Stipp, D.W. (2013). *Drainage Manual*. 6<sup>th</sup> Edition. The South African National Roads Agency SOC Ltd (SANRAL).

Van Dijk, M., Van Vuuren, S.J. and Van Zyl, J.E. (2008). *Optimising Water Distribution Systems using a weighted penalty in a Genetic Algorithm*. Water SA. Vol 34, No 5 pp 537-548.

Van Dijk, M. & van Vuuren, S.J. (2009). *Destratification induced by bubble plumes as a means to reduce evaporation from open impoundments*. Water SA Vol 35, No 2 (Special WISA 2008 edition). pp 158 – 167.

Van Vuuren, S.J., Blersch, C.L. and Van Dijk, M. (2011). *Modelling the feasibility of retrofitting hydropower to existing South African dams*. Water SA Vol 37 No. 5, WRC 40-Year Celebration Special Edition 2011. pp 679 – 692.

Focus areas applicable for a masters' degree, dissertation or project report.

- Cavitation prevention in control valves.
- Spillway design.
- Reduction in evaporation from reservoirs.
- Inverse transients to determine deficiencies in pipelines.
- Influence of catchment development on urban run-off.
- Hydraulic capacity of pipelines.
- Energy generation from water distribution systems.
- Low head hydro-power installations.
- Rural electrification using small-scale hydropower.

Rand Water is supporting the Water Division in research in pipeline design and flow. This provides opportunities for funded Master's degree studies in this field. Contact the Rand Water Chair Prof Fanie van Vuuren, see above for details.

The requirements for the degrees that are obtainable in this discipline are described in the following sections. The descriptions of the curricula for each of the modules are outlined in Annexure A.

Most of the Water Resources Engineering courses will be presented as short courses in the beginning of the year open to persons from industry to attend for non-degree purposes. Students enrolled for a degree will be required to submit assignments and write an exam at the end of the year.

Feedback sessions will be organized before the end of the year, where students can discuss any problems with the lecturer, and obtain feedback on their assignments.

### **2.5.2 BEng (Hons)(Water Resources Engineering) (12240161)**

Students who have obtained an engineering degree or equivalent may apply for admission to this post-graduate programme.



To obtain this degree, students will be required to obtain a minimum of 128 SAQA credits of the following modules: *At least 72 credits from the following core modules:*

Core Module	Code	Credits
Flood Hydrology 792	SHC 792	24
Free Surface Flow 794	SHC 794	24
Pipe Flow 795	SHC 795	24
Pump Systems 785	SHW 785	24

**and** the remainder of the credits from the following:

Hydraulic Design 793	SHC 793	24
Water Resource Analysis and Management 796	SHC 796	24
Concrete Technology 794	SGC 794	24
Applied Statistical Methods and Optimisation 798	SHC 798	32
Finite Element Applications in Civil Engineering 780	SIR 780	24
Numerical Methods for Civil Engineers 780	SIK 780	24
Infrastructure Management 790	SSI 790	24

Modules offered by the Department of Chemical Engineering (See paragraph 2.9)

### 2.5.3 BSc (Hons) (Applied Science) (12243030)

#### Specialization in **Water Resources**

Students who have obtained a relevant three-year university degree or BTech degree may apply for admission to this post-graduate programme. A minimum of 128 SAQA credits need to be obtained from the following modules:

Core Modules (Compulsory 48 credits)	Code	Credits
Basic Hydraulics 788	SHW 788	24
Basic Statistical Methods 797	SHC 797	24

**and 24 credits from the following:**

Basic Structural design 793	SIC 793	24
Basic Structural Analysis 790	SIC 790	24
Basic pavements and transportation 787	SGM 787	24

**and** the remainder of the credits chosen from the modules prescribed for the BEng(Hons)(Water Resource Engineering) listed below as approved by the Head of the Department, and after completion of the appropriate modules from the list above.

Flood Hydrology	SHC 792	24
Pump Systems	SHW 785	24
Free Surface Flow	SHC 794	24
Pipe Flow	SHC 795	24
Hydraulic Design	SHC 793	24
Water Resources Analysis & Management	SHC 796	24
Concrete Technology	SGC 794	24

### 2.5.4 MEng (Water Resources Engineering) (12250161)

A student who has obtained a BEng (Hons) degree or equivalent with an average of at least 65% may apply for admission to this post-graduate programme.

Module name	Code	Credits
-------------	------	---------



Dissertation: Water Resources Engineering 890

WBK 890

128

### 2.5.5 MSc (Applied Science) (12253031)

#### Specialization in **Water Resources**

Students who have obtained a BSc (Hons)(Applied Science) degree or equivalent with an average of at least 65% may apply for admission to this post-graduate programme.

<b>Module Name</b>	<b>Code</b>	<b>Credits</b>
Dissertation 890	SST 890	128

### 2.5.6 Doctoral Studies

Information on doctoral degrees is given in Section 1.4.6.



## 2.6 SPECIALIST STUDY AREAS

### 2.6.1 Concrete materials

As design techniques become more sophisticated safety margins are reduced and the actual behaviour of the construction materials over the design life of infrastructure becomes more important. The *Concrete Materials* group aims to improve the understanding of the short and long term behaviour of cementitious materials through teaching and research.

The concrete materials group currently presents a post graduate course:

- Concrete Technology (SGC794)

Researchers in the concrete materials group include Prof Elsabe Kearsley, Dr Maxim Kovtun, Mr Derek Mostert (Concrete Technologist) and full time post-graduate research students. From time to time funding is available to support students who are interested in doing research masters or doctorates.

Some of our recent research topics include investigations into:

- The use of waste materials in concrete.
- Alternative sources of fly ash.
- Effect of aggregate and cement type on long term deformation of concrete.
- The effect of material types on the rebound and properties of shotcrete.
- The use of fibre reinforcing in structural and pavement applications.
- Material properties of foamed concrete.
- High strength concrete.

Further Information on the programme can be obtained from

Prof E Kearsley – Tel: (012) 420 2429; Fax: (012) 362 5218; e-mail [elsabe.kearsley@up.ac.za](mailto:elsabe.kearsley@up.ac.za)



## 2.7 SHORT COURSES IN RAILWAY ENGINEERING

### 2.7.1 General Information

The department is privileged to have the Transnet Freight Rail Chair in Railway Engineering. Various short courses are offered to industry and students can include these courses into their study programmes as credit bearing post-graduate modules. Modules in Railway Engineering are offered as full day blocks (usually 5 days) as detailed below. The necessary credits and assessment criteria will be identified per individual course.

Students who have chosen Railway Engineering as their focus area should select two courses from the list below and need to register these under the module SVC 791 (Transportation Special). The course “Introduction to Multi-Disciplinary Concepts in Railway Engineering” is a pre-requisite for doing any of the other Railway Engineering courses and should therefore be one of the two courses that are elected. Civil Engineering students are encouraged to do “Geotechnical Aspects of Railway Engineering” as their second course.

For enquiries and course dates contact Prof Hannes Gräbe Tel: (012) 420 4723

e-mail: [hannes.grabe@up.ac.za](mailto:hannes.grabe@up.ac.za)

### 2.7.2 Short Courses

#### **Introduction to Multi-Disciplinary Concepts in Railway Engineering**

**Brief description:** The course provides an introduction to the multi-disciplinary aspects of railway engineering. **Outline of course:** It covers the principles applicable to each railway engineering field as well as a general background on how a railway transport system operates. **Learning outcomes:** An appreciation for the complexities of and multi-disciplinary inter relationships of the railway system.

#### **Geotechnical Aspects for Railway Engineering**

**Brief description:** The course provides an introduction to railway track substructure fundamentals. **Outline of course:** It covers the principles and functions of the layered track foundation system, its drainage and failure modes and how it relates to track performance. Various case studies are included. **Learning outcomes:** An appreciation for the railway track substructure fundamentals and problems and solutions related to its interaction with the track.

#### **Railway Infrastructure Maintenance Management**

**Brief description:** The course provides an introduction to the general principles of railway asset management. **Outline of course:** It covers the key facets of the management of a railway asset having a life cycle and the relationship between railway asset management as part of a system and of the business plan. **Learning outcomes:** An understanding of the appropriateness of the design of the railway system as related to the prevailing and future business needs and coupled to the development of life cycle maintenance plans and the ability to adapt it to changing business circumstances.



**Best Practice for Wheel and Rail Management Brief description:** The course provides an understanding of the interaction between wheel and rail. **Outline of course:** It is based on the manual published by the International Heavy Haul Association (IHHA) in 2001. It draws on information presented at 16 international IHHA conferences and technical sessions between 1978 and 2000. **Learning outcomes:** An understanding of the wheel/rail system and the root causes of wheel and rail damage. A systems approach to wheel and rail management is provided.

**Other courses presented by the Chair in Railway Engineering (but not suitable as credit-bearing modules), include the following:**

- **Locomotive Systems, Performance and Maintenance**
- **Management of Continuously Welded Rails**
- **Introduction to Railway Projects and Processes**
- **Railway Safety Investigation Course**
- **Railway Asset Management**

The courses listed above are presented throughout the year and specific dates can be obtained from Prof. Gräbe or on the departmental website under Railway Engineering. As the courses start early in the year, and are open to industry, students should contact Nocwaka Combo ([nocwaka.combo@ce.up.ac.za](mailto:nocwaka.combo@ce.up.ac.za), 012 434 2690) during November 2014 to ensure a place on the course. Part-time students will receive a 50% discount when registering for the short courses while full-time students will register free of charge.



## 2.8 MODULES OFFERED BY OTHER DEPARTMENTS AND UNIVERSITIES

### Department of Chemical Engineering – Water Utilisation and Environmental Engineering

Mrs E. Otto: [elmarie.otto@up.ac.za](mailto:elmarie.otto@up.ac.za) Tel: (012) 420 3824 South Campus: Building 2, Rm1-26.

**2015 - First Semester – for modules and dates enquire at the department (details will be available on the website of the Department of Chemical Engineering, [www.up.ac.za/chemeng](http://www.up.ac.za/chemeng) )**

Chemical Water Treatment WCW780	32 SAQA credits
Water Quality Management WQB 780	32 SAQA credits

**2015 - Second Semester – for dates enquire at the department**

Biological Water Treatment WBW780	32 SAQA credits
Industrial Waste Engineering WAI780	32 SAQA credits

### Department of Mathematics and Applied Mathematics

Enquire at this Department.

### Department of Mechanical and Aeronautical Engineering

Prof N J Theron Tel: (012) 420 3309; Fax: (012) 362 5087; e-mail: [nico.theron@up.ac.za](mailto:nico.theron@up.ac.za)

Ms N Mnyamana, Tel: (012) 420 5367

Advanced Heat and Mass Transfer MHM 780	16 SAQA credits
Numerical Methods MWN 780	16 SAQA credits
Finite Element Methods MEE 780	16 SAQA credits
Fatigue MSV 780	16 SAQA credits

### UNISA Department of Transport Economics, Logistics and Tourism

Prof A. Brits Tel: (012) 429 4027 Fax: (012) 429 4678; e-mail: [britsa@unisa.ac.za](mailto:britsa@unisa.ac.za)

Integrated Logistic Management (TRILOM-G)	24 SAQA credits
Transport Finance and Marketing (TREFEB-N)	24 SAQA credits
Transport Management (TRAMAN-J)	24 SAQA credits





## ANNEXURE A: CURRICULA FOR POST-GRADUATE MODULES

### A1 PREREQUISITES:

For certain modules prerequisites are indicated. The system of coding is as follows:

AAAnnn: An ordinary module code means that the module should previously have been passed.

(AAAnnn): A module code in parentheses means that lecture attendance should have been satisfactory.

AAAnnn: Underlining means that at least simultaneous enrolment will be required. Satisfactory attendance as well as a pass will therefore also be acceptable.

### A2 MODULES PRESENTED WITHIN THE DEPARTMENT OF CIVIL ENGINEERING

#### Analytical Soil Mechanics SGS 787 24 SAQA credits

Introduction to elasticity and plasticity theory in geomechanics. Solution of confined and unconfined seepage problems using the method 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.

#### Applied Statistical Methods and Optimisation SHC 798 32 SAQA credits

The course will apply some of the basic theories and methodologies in statistics and modelling to solve common civil engineering problems. The course seeks to demonstrate the theory, applicability and use of statistical and modelling in the civil engineering field. Emphasis will be on the applications of these methods in common civil engineering practice. Some of the applications will include; demand forecasting, optimum network design, statistical sample analysis, maximum flow problems, project scheduling, queuing theory, Markov chain, Probability theory, discrete and continuous probability distribution, reliability and decision analysis, Monte Carlo simulation, etc.

#### Basic Hydraulics SHW 788 24 SAQA credits

This course covers the basic hydraulic principles and their application. Fluid characteristics, hydrostatics, fluid kinematics will be used to consider pipe flow phenomena, pipe network analyses and review of municipal services. An introduction to pumps and design of hydraulic structures and storm water drainage systems and culverts, the assessment of the hydrological cycle (precipitation, infiltration, and run-off) for flood estimation form part of this course.

#### Basic Pavements and Transportation SGM 787 24 SAQA credits

Pavements: The geological cycle and origin of road building materials, soil testing and classification systems, compaction, stabilization, bitumen, introduction to pavements, principles of pavement design and management.

Transportation: Introduction to traffic analysis techniques, capacity and level of service concepts, traffic signal design. Road geometric design. Road safety engineering.

#### Basic Soil Mechanics SGM 785 24 SAQA credits

Introduction to soil mechanics, classification of soil characteristics, seepage and permeability, stress and strain in saturated and partially saturated soils, Mohr's circle applications

#### Basic Statistical Methods SHC 797 24 SAQA credits

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.

#### Basic Structural Analysis SIC 790 24 SAQA credits

Virtual work and influence lines, analysis of statically indeterminate structures (two and three-dimensional), slope-deflection, superposition, stiffness and flexibility methods, matrix and computer methods, plastic analysis of portal frames.



### Basic Structural Design SIC 793 24 SAQA credits

This course comprises two sections: reinforced concrete design and structural steel design.

Reinforced concrete design covers the design of beams; behaviour and design of slabs; design of slender columns and columns subjected to bi-axial bending; design of simple and combined footings; staircase design; and an introduction to prestressed concrete.

Structural steel design covers the characteristics of steel; design of structural steel members including elements in bending, and bending combined with tension and compression; design of portal frames; composite construction and the bending resistance of composite sections, and plastic design.

### Concrete Technology SGC 794 24 SAQA credits

Properties of concrete and concrete mixes. Characteristics of Portland cement and supplementary cementitious materials. Aggregates, admixtures and practical design of mixes. Manufacture, curing and testing, including non-destructive methods. Statistical approach to quality control. Time-dependent behaviour and durability of concrete. The principles for appropriate selection of materials and techniques for repair, maintenance and strengthening of civil engineering structures. Investigation and diagnosis. Corrosion of reinforcement. Alkali-aggregate reaction, sulphate attack. Physical degradation. Repair materials. Protective systems. Systems for repair.

### Finite Element applications in Civil Engineering – SIR 780 24 SAQA credits

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.

### Flood Hydrology SHC 792 24 SAQA credits

This course entails the calculation of design flows for different return periods, using the statistical, deterministic - and empirical methods. Dambreak analyses is included in this course as well as channel and level pool routing. The design of stormwater systems for flood events are also dealt with in this course.

### Free Surface Flow SHC 794 24 SAQA credits

This course covers the theory of open channel flow as well as analytical and numerical procedures to analyse three dimensional flow conditions. Furthermore the procedures to determine flood lines and identify hydraulic controls are also covered.

### Geometric Design and Traffic Safety SVV 791 24 SAQA credits

Prerequisite: SGM787 or equivalent

A selection of topics from the following: Rural/Peri-urban road networks: transportation policy, standards and safety, environmental quality, capacity, design, interchanges. Urban street networks: functional classes, town planning considerations, capacities, environment, safety, standards design, evaluation of road networks.

Traffic safety in global and national content, Road Safety Engineering and the assessment and interpretation of accident information, reactive and proactive identification of remedial measures, traffic safety strategies: 3E model and Haddon matrix.

### Hydraulic Design SHC 793 24 SAQA credits

This course covers the hydraulic aspects associated with the design of hydraulic structures for dams, road drainage, and other conveyance systems. The hydraulic considerations for the selection and design of energy dissipation structures are assessed in this course.

### Infrastructure Management SSI 790, 24 SAQA credits

This module will cover the following topics: Asset Management principles, Maintenance Management principles, Maintenance strategies and philosophies, Condition based Maintenance, Reliability Centred Maintenance (RCM), Resource Management, Maintenance Management Systems, Total Productive Maintenance (TPM) and Risk Management. Travel demand management and Intelligent Transport Systems as management strategies. Lifecycle economic evaluation. Maintenance management of the following disciplines will be studied in detail: Road infrastructure, Railway infrastructure, Airport infrastructure, Buildings and other structures, Water resources and water supply.



### Multimodal Transport SVV 788 24 SAQA credits

The role of public transport in cities; theory and principles of public transport network design, scheduling and operations; terminals; public transport modes; costs, fares and subsidies; contemporary issues and approaches to public transport restructuring and formalisation in South Africa, including Bus Rapid Transit (BRT). Planning and designing for non-motorised transport, including pedestrians, bicyclists, and animal-drawn transport.

### Numerical Methods for Civil Engineers SIK 780 24 SAQA credits

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.

### Pavement Design SGC 793 24 SAQA credits

Design philosophy in First and Third World environments; characterising and use of pavement materials; drainage; systems approach to layout, geometric and pavement design; stresses and strains in pavements; mechanistic design methods and elasto-plastic behaviour; economic analysis; designing pavements for streets, gravel and paved roads, runways, and industrial areas.

### Pipe Flow SHC 795 24 SAQA credits

The focus in this course will be on the practical aspects of pipeline design. The theoretical background to pipeline hydraulics will be covered and practical examples will be assessed. The following specific aspects such as pipeline hydraulics induced dynamic pressures, pipeline component selection and design, pipeline installation and the testing and operation of pipelines will be covered in this course

### Pre-stressed Concrete Design SIN 791 24 SAQA credits

Prerequisite: SIC 793 or equivalent

Material properties; prestressing systems; flexural design; losses; effects of continuity; shear; deflections; anchorage; cracking; prestressed concrete slabs and detailing

### Pump Systems SHW 785 24 SAQA credits

The background theory and design practice of pumping station design will be highlighted. Various hydraulic problems associated to the inlets as well as the planning and design aspects of pump stations will be discussed. Pump selection, dimensioning of the layout to accommodate components required in a pump station (sump design, good design practice, superstructure, lighting ventilation and control, inlet design, switch gear, pump control, surge protection and optimal scheduling of pumping) are some of the aspects that will be evaluated during the course.

### Reinforced Concrete Design SIN 778 24 SAQA credits

Prerequisite: SIC 793 or equivalent

Material properties. Behaviour and analysis of reinforced concrete members for flexure, axial loads, flexure plus axial load and shear. Cracking and deflection (short- and long-term) of flexural members. Plasticity in flexural members. Braced and unbraced slender columns

### Road Rehabilitation Technology SGC 797 24 SAQA credits

Development of road management systems and application to existing street and road networks. Evaluation of, and measurements on existing facilities. Maintenance management. Recycling of materials. Design methods for upgrading, re-construction and strengthening of the existing road infrastructure. Prerequisite: Pavement Design SGC 793.

### Specialised Geotechnical Testing SGS 789 24 SAQA credits

Theory, application and interpretation of geotechnical laboratory and in-situ tests. Laboratory instrumentation and calibration, stress and strain conditions for laboratory tests. Triaxial stress space and stress paths. Triaxial tests, Direct shear tests, Oedometer test and Rowe cell test. Standard Penetration Test (SPT), Cone Penetration Test (CPT), Piezocone (CPTU), Continuous surface wave test, Borehole seismic tests and Seismic cone test.

**Steel Design SIN 776** 24 SAQA credits

Prerequisite: SIC 793 or equivalent

Introduction to structural reliability, tension elements, buckling of plates in compression elements, compression elements, beams and plate girders, plastic analysis and design of structures and structural elements, connections, composite design and steel-framed structures.

**Structural Analysis SIN 790** 24 SAQA credits

Prerequisite: SIC790 or equivalent

Matrix methods: direct stiffness method for plane and three-dimensional structures. Stability: in-plane stability of beam-columns and frames; effective lengths and lateral torsional instability of beams. Dynamics: free and forced, undamped and damped framed systems and mass matrices and natural frequencies, earthquake response spectra.

**Structural Mechanics SIN 777** 24 SAQA credits

Prerequisite SIC790 or equivalent

Elasticity theory. Failure criteria. Beams on elastic foundations. Classical and numerical (finite difference, Rayleigh-Ritz and finite element) solutions for plane and plate structures. Theory of plates and shells.

**Theoretical Soil Mechanics SGS 788** 24 SAQA credits

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.

**Timber Design SIN 779** 24 SAQA credits

Timber properties, grading, treatment, structural form, element design and bracing of structures. Analysis of I-beams, composite beams, frames and connections. Research project.

**Traffic Engineering SVC 792** 24 SAQA creditsPrerequisite: SGM787 or equivalent

Part 1: Traffic flow theory: Traffic and vehicle characteristics. Traffic flow studies. Traffic interactions. Traffic flow analysis and queuing theory. Traffic flow models. Traffic control theory. Part 2: Traffic studies and facility design: Transportation and land use. Traffic impact studies. Site planning and design. Determination of demand. Traffic control investigations. Intersection design. Internal circulation. Parking areas.

**Transportation Planning SVC 789** 24 SAQA credits

Integrated land use and transport planning in urban areas: legal and policy frameworks, problems in urban areas of developing countries, metropolitan interventions (restructuring, spatial initiatives, smart growth, Transit Oriented Development). Linkages between transport planning and social and economic development. Coordinating land use and transport interventions. (Note: this course is co-taught with the Department of Town and Regional Planning).

**Transportation Special SVC 791** 24 SAQA credits

Module specially compiled to satisfy specific needs

**Transportation Studies SVC 790** 24 SAQA credits

Basic transportation relationships, land use, data collection and surveys. Four step transportation model, trip generation, trip distribution, modal split, trip assignment, advanced modelling approaches. Introduction to discrete choice models, econometrics, and stated preference analysis. Role of transport modelling in developmental context.

**Water Resources Analysis & Management SHC 796** 24 SAQA credits

In this course students will be familiarized with the background and procedures used in the creation of flow records and the use of the WRSM2005 model. Surface water systems will be analysed and gross yields will be determined. In the second part of the course the theory and procedures required for the yield determination of surface water resources will be discussed.

**A3 MODULES PRESENTED BY OTHER DEPARTMENTS WITHIN THE UNIVERSITY OF PRETORIA****A3.1 Department of Chemical Engineering****CHEMICAL WATER TREATMENT WCW780****32 SAQA credits**

Water quality standards: drinking water quality standards (chemical), performance evaluation for drinking water treatment systems

Basic water chemistry: Acid-base and solubility equilibrium chemistry; Chemistry of the carbonate system



Conventional drinking water treatment: coagulation/flocculation; sedimentation, flotation; sand filtration; chlorination; chemical stabilisation

Advanced drinking water treatment: activated carbon adsorption; ozone and ultra-violet disinfection; enhanced coagulation; membrane processes; softening; iron and manganese removal

Industrial water treatment: chemical precipitation; neutralisation; oxidation-reduction; desalination processes; ion exchange

### **BIOLOGICAL WATER TREATMENT WBW780**

32 SAQA credits

Composition and characterisation of sewage; Basic design principles of: Simple sewage treatment systems – night soil, pit latrines, septic tanks; Small scale sewage works – oxidation dams, biological filters and reed beds; Anaerobic digestion; Suspended – and Attached growth processes; Sludge handling and treatment. The module includes training and practice for simulation software for wastewater treatment processes.

### **INDUSTRIAL WASTE ENGINEERING WAI 780/787**

32 SAQA credits

Identify source materials, physical and chemical properties of waste; Release and transport mechanisms from source to air, groundwater, soil; Primary pathways of contaminants including sorption, volatilisation, biotic and abiotic transformations; Toxicology: absorption, distribution, biochemical transformation, and secretion of chemicals; Acute and chronic toxicity quantification and evaluation of risk; Hazard identification, exposure assessment, toxicity assessment, risk assessment and approaches to hazardous waste minimisation, treatment and disposal; The handling, classification and disposal of hazardous waste; Disposal of waste by landfill; Water monitoring at waste management facilities; Recycling and resource management; Waste prevention, minimisation and optimisation.

### **WATER QUALITY MANAGEMENT WQB 780**

32 SAQA credits

Water quality parameters: physical, chemical, biological, microbiological. Units of expression. Evaluation of parameters. Methods of analysis and practical laboratory analyses; Water quality interpretation, evaluation and assessment, water quality guidelines and requirements for domestic, industrial, agricultural, ecological, recreational requirements; Limnology and water quality in rivers and lakes. Ground water quality and assessment; Regulatory aspects including all relevant legislation; Integrated environmental management, integrated pollution control; Procedures to assess effluent discharge impacts; Water quality management; policies and procedures, role of catchment management agencies, catchment management plans.

## **A3.2 Department of Earth Sciences**

### **ENGINEERING GEOLOGY IGL 703**

16 SAQA credits

Introduction to Geology, S A stratigraphy and the engineering geology of South Africa. The application of engineering geology in urban and regional development, dams, roads, slopes and tunnels.

## **A3.3 Department of Town and Regional Planning**

### **METROPOLITAN AND URBAN AREA-BASED INTERVENTIONS TPI 811**

20 credits

2 blocks, 14 weeks

Scope, nature and rationale of metropolitan and urban area-based interventions; unique problems in metropolitan areas, for example inner city decay, fringe development, housing, services backlog, the dysfunctional apartheid cityscape and dependency on private transport; types of intervention (inter alia institutional, spatial, economic and social) in order to accomplish restructuring and development in metropolitan areas in South Africa in a relevant, social and environmentally accountable way; policy and legislation regarding urban restructuring and development in South Africa; international and local case studies; impact of globalisation on South African metropolitan areas and major cities; simulated metropolitan and urban area-based intervention exercise.

### **INTEGRATED DEVELOPMENT PLANNING TPD 820**

20 credits

2 blocks, 14 weeks,

Introduction to development and development planning theories; the integrated development planning process; legal, institutional and policy frameworks in which integrated planning functions in South Africa; implementation of integrated development plans; case studies of integrated development planning; simulations of integrated development planning exercises.



## **A4 MODULES PRESENTED OUTSIDE THE UNIVERSITY OF PRETORIA**

### **A4.1 Transportation related modules presented by UNISA**

TRANSPORT FINANCE AND MARKETING (TREFEB-N) 24 SAQA credits  
Costing as a Basis of Tariff Quoting; Finance and Financial Management; Financial Planning and Control; Investment Decision Making; Marketing Communications Policy and Public Relations; Marketing Research and Market Segmentation; Market-orientated Strategic Planning; Principles of Price Theory; Product and Distribution Policy; Sources of Financing; Tariff Policy; Transport Investment Practice

TRANSPORT LOGISTICS (TRALOG-6) 24 SAQA credits  
Conceptual Framework and Structure; control of Logistics Costs; Customer Service and Marketing Strategy (including Distribution Policy); handling and packaging; inventories; location of nodes; logistics control; Logistics Information Systems; planning for Transport Logistics; Strategic Transport Decisions in Logistics; the Structuring and Integrated Management of Logistics; the Transport System; the Warehousing Function; Transport Logistic Operations Management; Transport Logistic Requirements Planning

TRANSPORT MANAGEMENT (TRAMAN-J) 24 SAQA credits  
Effective Implementation of the Operations Function; fleet Planning; introduction of Transport Management; schedule of Transport Services; Service Planning; Strategic Management; the Task of Transport Management; the Transport Management Environment; Transport Enterprise Management.

The equivalence of these three UNISA modules, equivalent to 24 credits each are:

Integrated Logistic Management (TRILOM-G)	= Transport Logistics SVV 787
Transport Management (TRAMAN-J)	= Transport Management SVV 786
Transport Finance and Marketing (TREFEB-N)	= Transport Economics SVV 782



## ANNEXURE B - 2015 STUDY PROGRAMME PLANNER

The pages in this annexure are provided to assist the student in planning his/her study programme. (They also mirror a form that is to be completed at registration).

The next page (page B2) is primarily administrative in that it records the study direction and degree for which the student is registered, the post-graduate modules for which credits have already been obtained and personal particulars required for the registration process.

Page B3 shows the modules that are compulsory for each specific discipline. Those shown as 'B' are compulsory for BSc (Hons)(Applied Science) and MSc(Applied Science) students and those shown as 'C' are compulsory for all honours and masters students. The years in which the module will be presented are also shown. If the module is presented in the block week it is shown with 'X' in the year ('1' following the 'D' indicates a first semester module and a '2' indicates a second semester module). A 'D' symbol is shown that the module is presented as a "block day" module and an 'E' symbol shows that it is presented in the evenings. A column is provided for the student to check the module/credits that have already been obtained by the student.

Page B4 shows the modules and presented during the year. Modules that are 'recommended' for each discipline.

When selecting a set of modules for a year of study, students must ensure that:

- ✧ The module is being presented in that year.
- ✧ The module times do not clash with other modules the student intends taking (Check the block week time table (pg B6) and the calendar (Annexure C)).
- ✧ Modules being selected take into account the requirements of the discipline in respect of the "compulsory" and "recommended" module.
- ✧ If specified, the prerequisite course has already been passed.



### Registration: Department of Civil Engineering 2015

DESCRIPTION	STUDY CODE	DESCRIPTION	STUDY CODE
<b>GEOTECHNICAL</b>		<b>TRANSPORTATION</b>	
BEng(Hons) (Geotechnical Engineering)	12240212	BEng(Hons) (Transportation Engineer)	12240111
BSc(Hons)(Applied Sc)(Geotechnics)	12243019	BSc(Hons)(Appl Sc)(Transport Planning)	12243028
MEng (Geotechnical Engineering) Research	12250212	MEng (Transportation Engineering) Res	12250111
MSc(Applied Science) (Geotechnics) Res	12253019	MSc (App Sc) (Transport Planning) Res	12253028
<b>STRUCTURAL</b>		<b>WATER RESOURCES</b>	
BEng(Hons) (Structural Engineering)	12240121	BEng(Hons) (Water Resources Engineering)	12240161
BSc(Hons)(Applied Science)(Structures)	12243031	BSc(Hons)(App Sc) (Water Resources)	12243030
MEng (Structural Engineering) Research	12250121	MEng (Water Resources Engineering) Res	12250161
MSc(Applied Science) (Structures) Research	12253036	MSc(Applied Sc) (Water Resources) Res	12253031
Engineering Special (P.G)			12280001
PhD Civil Engineering			12263071
PhD Civil			12263221

### Student information

SURNAME		STUDENT NO		
FIRST NAMES		FULL TIME	YES	NO
TITLE		PART TIME	YES	NO
STUDY YEAR				
MODULES ALREADY PASSED				





**ALL COURSES (all modules are registered as year modules)**

Module Code	Module Name	SAQA Credits	Geotechnical	Structure	Transport	Water	2015	2016	2017
SGS 787	Analytical Soil Mechanics	24	C				X	X	X
SHC 798	Applied Statistical Methods and Optimizt'n	32	X	X	X	X	X	X	X
SHW 788	Basic Hydraulics	24				B	W2	W2	W2
SGM 787	Basic Pavements and Transportation	24			B		X	X	X
SHC 797	Basic Statistical Methods	24		X	B	B	X	X	X
SIC 790	Basic Structural Analysis	24		B			X	X	X
SIC 793	Basic Structural Design	24		B			X	X	X
WBW780	Biological Water Treatment	32				X	S2C		S2C
WCW 780	Chemical Water Treatment	32				X	S1C		S1C
SGC 794	Concrete Technology	24		X	X	X	D1		D1
IGL 703	Engineering Geology	16	X		X		X	X	X
SIR 780	Finite Element Applications in Civil Eng'gn	24	X	X	X	X	X	X	X
SHC 792	Flood Hydrology	24				X		W1	
SHC 794	Free Surface Flow	24				X	W1		W1
SVV 791	Geometric Design and Safety	24			X		X		X
SHC 793	Hydraulic Design	24				X			
SSI 790	Infrastructure Management	24			X	X	X	X	X
SVV 788	Multimodal Transport	24			X		X		X
SIK 780	Numerical Methods for Civil Engineers	24	X	X	X	X	X	X	X
SGC 793	Pavement Design	24			X		X	X	X
SHC 795	Pipe Flow	24				X		W3	
SIN 791	Prestressed Concrete Design	24		X				X	
SHW 785	Pump Systems	24				X	W3		W3
SIN 778	Reinforced Concrete Design	24		X			X		X
SGC 797	Road Rehabilitation Technology	24			X		X	X	X
SGS 789	Specialised Geotechnical Testing	24	C				X	X	X
SIN 776	Steel Design	24		X			X		X
SIN 790	Structural Analysis	24		X			X		X
SIN 777	Structural Mechanics	24		X				X	
SGS 788	Theoretical Soil Mechanics	24	C				X	X	X
SIN 779	Timber Design	24		X					
SVC 792	Traffic Engineering	24			X			X	
SVC 789	Transportation Planning	24			X		D1		D1
SVC 791	Transportation Special	24			X				
SVC 790	Transportation Studies	24			X			X	
WAI 780	Industrial Waste Engineering	32				X	S2C		S2C
WQB 780	Water Quality Management	32					S1C		S1C
SHC 796	Water Resource Analysis and Managem't	24				X			

X Recommended

D1 and D2 First and second semester full day block

C Compulsory

B Compulsory for Applied Science students

S1C and S2C Chemical Engineers block week, first and second semester

W Water Resources Engineering (outside normal block week) See paragraph 1.4.8



## Schedule of Lectures

The planned block week schedule is shown below. When choosing modules, students should ensure that their choices fit in with the timetable. No clashes are allowed, as these may also affect the examination timetable.

### BLOCK 1: 9 – 13 March 2015:

Time	Geotechnics	Structures	Transportation	Water
07:30 - 08:20	SHC798 Applied Stats	SHC798 Applied Stats	SHC798 Applied Stats	SHC798 Applied Stats
08:30 – 09:20	SHC797 Basic Statistics	SHC797 Basic Statistics	SHC797 Basic Statistics	SHC797 Basic Statistics
09:30 - 10:20	SIK780 Num'cal Methods	SIN778 Reinforced Conc Des	SSI790 Infrastr Mgmt SIK780 Num'cal Methods	SIK780 Num'cal Methods
10:30 - 11:20		SIK780 Num'cal Methods		
11:30 - 12:20	SIR780 Finite Elements	SIC790 Basic Struc Anal	SGM787 Basic Pavt & Transp SIR780 Finite Elements	SIR780 Finite Elements
12:30 – 13:20		SIR780 Finite Elements		
13:30 - 14:20		SIC793 Basic Struc Des	SGC793 Pavt Design* SGC797 Road Rehab	
14:30 - 15:20		SIN 776 Steel Des		
15:30 - 16:20		SIN790 Structural Analysis	SVV788 Multimodal Tr	
16:30 - 17:20				

\*SGC793/SGC797 Monday and Tuesday and 2 hours Friday, SVV788 Wednesday and Thursday and 2 hours Friday

### BLOCK 2: 4 – 8 May 2015:

Time	Geotechnics	Structures	Transportation	Water
07:30 - 08:20	SHC798 Applied Stats	SHC798 Applied Stats	SHC798 Applied Stats	SHC798 Applied Stats
08:30 – 09:20	SHC797 Basic Statistics	SHC797 Basic Statistics	SHC797 Basic Statistics	SHC797 Basic Statistics
09:30 - 10:20	IGL703 Eng Geology	SIN778 Reinforced Conc Des SIK780 Num'cal Methods	SSI790 Infrastr Mgmt SIK780 Num'cal Methods	SIK780 Num'cal Methods
10:30 - 11:20	SIK780 Num'cal Methods			
11:30 - 12:20	SIR780 Finite Elements	SIC790 Basic Struc Anal	SGM787 Basic Pavt & Transp SIR780 Finite Elements	SIR780 Finite Elements
12:30 – 13:20		SIR780 Finite Elements		
13:30 - 14:20		SIC793 Basic Struc Des	SGC793 Pavt Design* SGC797 Road Rehab	
14:30 - 15:20		SIN 776 Steel Des		
15:30 - 16:20		SIN790 Structural Analysis	SVV788 Multimodal Tr	
16:30 - 17:20				

\*SGC793/SGC797 Monday and Tuesday and 2 hours Friday, SVV788 Wednesday and Thursday and 2 hours Friday



**BLOCK 3 24 – 28 August 2015:**

Time	Geotechnics	Structures	Transportation	Water
07:30 - 08:20	SHC798 Applied Stats	SHC798 Applied Stats	SHC798 Applied Stats	SHC798 Applied Stats
08:30 – 09:20	SHC797 Basic Statistics	SHC797 Basic Statistics	SHC797 Basic Statistics	SHC797 Basic Statistics
09:30 - 10:20	SIK780 Num'cal Methods	SIN778 Reinforced Conc Des	SSI790 Infrastr Mgmt	SIK780 Num'cal Methods
10:30 - 11:20		SIK780 Num'cal Methods	SIK780 Num'cal Methods	
11:30 - 12:20	SIR780 Finite Elements	SIC790 Basic Struc Anal	SGM787 Basic Pavt & Transp	SIR780 Finite Elements
12:30 – 13:20		SIR780 Finite Elements	SIR780 Finite Elements	
13:30 - 14:20		SIC793 Basic Struc Des	SGC793 Pavt Design* SGC797 Road Rehab	
14:30 - 15:20		SIN 776 Steel Des		
15:30 - 16:20		SIN790 Structural Analysis	SVV788 Multimodal Tr	
16:30 - 17:20				

\*SGC793/SGC797 Monday and Tuesday and 2 hours Friday, SVV788 Wednesday and Thursday and 2 hours Friday

**BLOCK 4: 12 – 16 October 2015:**

Time	Geotechnics	Structures	Transportation	Water
07:30 - 08:20	SHC798 Applied Stats	SHC798 Applied Stats	SHC798 Applied Stats	SHC798 Applied Stats
08:30 – 09:20	SHC797 Basic Statistics	SHC797 Basic Statistics	SHC797 Basic Statistics	SHC797 Basic Statistics
09:30 - 10:20	IGL703 Eng Geology	SIN778 Reinforced Conc Des	SSI790 Infrastr Mgmt	SIK780 Num'cal Methods
10:30 - 11:20	SIK780 Num'cal Methods	SIK780 Num'cal Methods	SIK780 Num'cal Methods	
11:30 - 12:20	SIR780 Finite Elements	SIC790 Basic Struc Anal	SGM787 Basic Pavt & Transp	SIR780 Finite Elements
12:30 – 13:20		SIR780 Finite Elements	SIR780 Finite Elements	
13:30 - 14:20		SIC793 Basic Struc Des	SGC793 Pavt Design* SVV791 Geom Des & Safety	
14:30 - 15:20		SIN 776 Steel Des		
15:30 - 16:20		SIN790 Structural Analysis	SGC797 Road Rehab	
16:30 - 17:20				

\*SGC793 Monday, SGC797 Monday and Tuesday and 2 hours Friday, SVV791 Tuesday to Friday

**19 January – 23 January 2015:**

Time	Geotechnical Engineering
08:30 - 10:20	Theoretical Soil Mechanics SGS 788
10:30 - 12:20	Analytical Soil Mechanics SGS 787
13:00 - 15:00	Specialised Geotechnical Testing SGS 789

**26 January – 30 January 2015:**

Time	Geotechnical Engineering
08:30 - 10:20	Specialised Geotechnical Testing SGS 789
10:30 - 12:20	Analytical Soil Mechanics SGS 787
13:00 - 15:00	Theoretical Soil Mechanics SGS 788



The allocation of lecture halls as well as examination timetable is displayed on the post-graduate notice board in the basement of Engineering 1 at the start of a particular block week.

**BLOCK WEEKS IN 2015 FOR MODULES OFFERED BY DEPT OF CIVIL ENGINEERING**

All modules are offered over the full year 9 - 13 March, 4 - 8 May, 24- 28 August and 12 – 16 October 2015; except

Water Resources Engineering 2 – 5 February 2015 (W1)  
3 – 6 March 2015 (W2)  
24 – 27 March 2015 (W3)

Geotechnical Engineering 19 January – 30 January 2015  
Concrete Technology (08:00 – 17:00) 20/21 April, 18/19 May and 1/2 June 2015

Structural Engineering (SIN779 Timber Design) TBA

Transportation Planning SVC789 March and May 2015 (Dates to be advised)

Final examinations (all modules) 8 – 12 June and 9- 20 November 2015

Date	Geotechnics	Structures	Transportation	Water
8 June	Theoretical Soil Mechanics			
12 June	Specialised Geotechnical Testing			
17 June		SGC794 Concrete Technology	SGC794 Concrete Technology	SGC794 Concrete Technology
June (TBA)			SVC789 Transportation Planning	
9 Nov	SHC798 Applied Stats SHC797 Basic Statistics	SHC798 Applied Stats SHC797 Basic Statistics	SHC798 Applied Stats SHC797 Basic Statistics	SHC798 Applied Stats SHC797 Basic Statistics
11 Nov	IGL703 Eng Geology SIK780 Num'cal Methods	SIN778 Reinforced Conc Des SIK780 Num'cal Methods	SSI790 Infrastr Mgmt SIK780 Num'cal Methods	SIK780 Num'cal Methods SHW788 Basic Hydraulics
13 Nov	SIR780 Finite Elements	SIC790 Basic Struc Anal SIR780 Finite Elements	SGM787 Basic Pavt & Transp SIR780 Finite Elements	SIR780 Finite Elements
16 Nov	SGS787 Analytical Soil Mechanics	SIC793 Basic Struc Des SIN 776 Steel Des	SGC793 Pavt Design* SGC797 Road Rehab	
18 Nov		SIN790 Structural Analysis	SVV788 Multimodal Tr	SHC794 Free Surface Flow
20 Nov		SIN779 Timber Design	SVV791 Geom Des & Safety	SHW785 Pump Systems



### ANNEXURE C: 2015 CALENDAR

	January	February	March	April	May	June
Thu	1 New Year					
Fri	2 Public Holiday				1 Workers Day	
Sat	3				2	
Sun	4	1	1		3	
Mon	5	2	2		4	1
Tues	6	3	3		5	2
Wed	7	4	4	1	6	3
Thurs	8	5	5	2	7	4
Fri	9	6	6	3 Good Friday	8	5
Sat	10	7	7	4	9	6
Sun	11	8	8	5	10	7
Mon	12	9	9	6 Family Day	11	8
Tues	13	10	10	7	12	9
Wed	14	11	11	8	13	10
Thurs	15	12	12	9	14	11
Fri	16	13	13	10	15	12
Sat	17	14	14	11	16	13
Sun	18	15	15	12	17	14
Mon	19	16	16	13	18	15
Tues	20	17	17	14	19	16 Youth Day
Wed	21	18	18	15	20	17
Thurs	22	19	19	16	21	18
Fri	23	20	20	17	22	19
Sat	24	21	21 Human R Day	18	23	20
Sun	25	22	22	19	24	21
Mon	26	23	23	20	25	22
Tues	27	24	24	21	26	23
Wed	28	25	25	22	27	24
Thurs	29	26	26	23	28	25
Fri	30	27	27	24	29	26
Sat	31	28	28	25	30	27
Sun			29	26	31	28
Mon			30	27 Freedom Day		29
Tues			31	28		30
Wed				29		
Thurs				30		



	July	August	September	October	November	December
Tues			1			1
Wed	1		2			2
Thurs	2		3	1		3
Fri	3		4	2		4
Sat	4	1	5	3		5
Sun	5	2	6	4	1	6
Mon	6	3	7	5	2	7
Tues	7	4	8	6	3	8
Wed	8	5	9	7	4	9
Thurs	9	6	10	8	5	10
Fri	10	7	11	9	6	11
Sat	11	8	12	10	7	12
Sun	12	9 Women's Day	13	11	8	13
Mon	13	10 Public Holiday	14	12	9	14
Tues	14	11	15	13	10	15
Wed	15	12	16	14	11	16 Day of Reconc
Thurs	16	13	17	15	12	17
Fri	17	14	18	16	13	18
Sat	18	15	19	17	14	19
Sun	19	16	20	18	15	20
Mon	20	17	21	19	16	21
Tues	21	18	22	20	17	22
Wed	22	19	23	21	18	23
Thurs	23	20	24 Heritage Day	22	19	24
Fri	24	21	25	23	20	25 Christmas Day
Sat	25	22	26	24	21	26 Goodwill Day
Sun	26	23	27	25	22	27
Mon	27	24	28	26	23	28
Tues	28	25	29 PG Block week	27	24	29
Wed	29	26	30 PG Block week	28	25	30
Thurs	30	27		29	26	31
Fri	31	28		30	27	
Sat		29		31	28	
Sun		30			29	
Mon		31			30	
Tues						
Wed						



## ANNEXURE D - PREPARATION OF REPORTS, DISSERTATIONS AND THESES

Students registering for Masters degrees are required to have identified a suitable research topic in consultation with the head of discipline prior to registration.

Before starting their research, Masters students are required to prepare a planning report, which covers the following aspects:

- Proposed title of the project report
- Introduction and background to the study
- Problem statement
- Objectives of the study
- Scope and extent of the study
- Provisional format of the report in the form of an index
- Detailed work program, including a bar chart.

In the case of doctoral students, the planning report must also have a section discussing the contribution that the research will make to the state of knowledge on the topic and be accompanied by a 3-page CV of the student, (including a list of previous publications and experience) and a copy of the student's Master's dissertation or research report. These are submitted by the Head of Division to the Department's Review Committee in support of the student's application for admission to the doctoral programme.

All students must prepare their project reports, dissertations or theses in accordance with the "*Guidelines for reports, dissertations and theses*" prepared by the department, which is available on [www.ais.up.ac.za/ebit/guides/siviel.pdf](http://www.ais.up.ac.za/ebit/guides/siviel.pdf) and the latest version is also on ClickUp.