

# CIVIL ENGINEERING & GEOMATICS (DBN)



**2022**  
**HANDBOOK**



**FACULTY OF  
ENGINEERING  
& THE BUILT  
ENVIRONMENT**

# HANDBOOK FOR 2022

## FACULTY of ENGINEERING AND THE BUILT ENVIRONMENT

**DEPARTMENT of  
CIVIL ENGINEERING  
and GEOMATICS  
(Steve Biko Campus)**

## **MISSION STATEMENT**

As a progressive department, our mission is to contribute innovatively to the socio-economic development of South Africa by:

- Offering a portfolio of relevant programmes
- Producing well-rounded graduates who are attuned to the needs of the profession
- Generating, integrating and applying knowledge to stimulate socio-economic development
- Partnering stake holders in sustainable development
- Acting as an incubator for advanced study in clearly defined areas of strength
- Being student centered and quality driven
- Providing an enabling environment for continued staff development.

## **VISION OF THE DEPARTMENT OF CIVIL ENGINEERING AND GEOMATICS**

To be a quality driven department of Civil Engineering and Geomatics that provides a well-rounded, professional education that ensures that graduates are innovative and have a competitive edge.

## **What is a University of Technology?**

A university of technology is characterized by being research informed rather than research driven where the focus is on strategic and applied research that can be translated into professional practice. Furthermore, research output is commercialized thus providing a source of income for the institution. Learning programmes, in which the emphasis on technological capability is as important as cognitive skills, are developed around graduate profiles as defined by industry and the professions.

## **QUALIFICATION PURPOSE**

***The purpose of the Bachelor of Engineering Technology in Civil Engineering BEngTech (Civil)*** is for students to acquire knowledge, understanding, abilities and skills of civil engineering. This combined with a period of post qualification mentored work experience will enable them to become competent practicing civil engineering technologists, able to apply engineering judgment and work independently and responsibly. To provide students with the preparation required for careers in civil engineering, the ability to make a contribution to the economy and national development, the educational base required for registration with ECSA as a Professional Engineering Technologist in civil engineering and with entry to NQF level 8 programmes, e.g. honours and masters programmes. To contribute to the critical mass of civil engineering technologists educated specifically for the world of work and research, and who also play a pivotal role in the infrastructure development of our country. The duration of these modules is 3 years of full-time study. The programmes will prepare students for further post graduate studies and research.

### ***The purpose of the Bachelor of the Built Environment in Geomatics***

***BBE (Geomatics)*** is for students to assimilate the necessary knowledge, understanding, abilities and skills in geomatics. This combined with a period of post qualification mentored work experience will enable them to become competent practicing engineering surveying technologists (engineering surveyors), able to apply geomatics knowledge to make judgment, work independently and responsibly. To provide students, with the preparation required for careers in geomatics, the ability to make a contribution to the economy and national development, the educational base required for registration with the South African Geomatics Council (SAGC) as an engineering surveyor and entry to NQF level 8 programmes, i.e. honours and masters programmes. To contribute to the critical mass of engineering surveyors educated specifically for the world of work and research, and who also play a pivotal role in the infrastructure development of our country. The duration of these modules is 3 years of full-time study. The programmes will prepare students for further post graduate studies and research.

***The purpose of the Bachelor of Engineering Technology Honours in Civil Engineering (BET Hons) (Civil Engineering)*** is to consolidate and deepen the student's

expertise in either urban, structural or water engineering. To engage the student theoretically and intellectually at a high level, in either one of the above sub-disciplines. To develop research capacity in civil engineering. In combination with the 3 year DUT Bachelor of Engineering Technology in Civil Engineering programme and to satisfy the educational base for registration as a candidate civil engineer with ECSA. In terms of the generic ECSA E-09-PT standard for a bachelor of engineering technology honours programme, the honours degree may form part of a combination of qualifications that meet the educational requirements for registration as a candidate engineer.

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## IMPORTANT NOTICE

The departmental rules in this handbook must be read in conjunction with the Durban University of Technology's General Rules contained in the current General Handbook for Students

## NOTE TO ALL REGISTERED STUDENTS

Your registration is in accordance with all current rules of the Institution. If, for whatever reason, you do not register consecutively for every year/semester of your programme, your existing registration contract with the Institution will cease. Your re-registration anytime thereafter will be at the discretion of the Institution and, if permitted, will be in accordance with the rules applicable at that time.

## **I. CONTACT DETAILS**

### **All departmental queries to:**

Secretary:	Ms Pauline Steel
Telephone No:	031 373 2224
Email address:	<a href="mailto:pauline@dut.ac.za">pauline@dut.ac.za</a>
Location of Department:	Block S6 Level 3, Steve Biko Campus (Civil Engineering & Geomatics)

### **All Faculty queries to:**

Faculty officer:	Mrs Neetha Singh
Telephone No:	031 373 2718
Fax No:	031 373 2719
Location of Faculty office:	Block S4 Level 3, Steve Biko Campus
Executive Dean:	Prof B Twala
Telephone No:	031 373 2762
Fax No:	031 373 2668
Location of Executive Dean's office:	Block S6 Level 5, Steve Biko Campus

## 2. STAFFING

<b>Head of Department</b>	Dr M Seyam, PhD (UM, Malaysia); MSc (IUG, Palestine); BSc (CE) (IUG, Palestine), WISA.
<b>Associate Professor</b>	Prof D Allopi, Pr.Tech. (Eng); D.Tech (CE) (MLST); M.Dip.Tech (CE) (TN); Postgrad. Dip. Eng. GDE (UN); Dip Datametrics (cum Laude) (Unisa); FSAICE; MIPET; MSAT; MCITSA.
<b>Associate Director</b>	Mr G K Parrott, PR.Tech (Eng); M.DIP. Tech (CE) (TN); FSAICE
<b>Senior Lecturers</b>	Mr R Govender, Pr Tech (Eng) M.Dip.Tech (CE) (MLST) Mr G M Hoosen, M.Dip.Tech. (CE) (MLST) Mr Y S Vahed, M.Dip.Tech (MLST); NHD Post School Education (MLST) Mr Y M Vawda, Pr.Tech. (Eng); M.Dip.Tech. (CE) (MLST); BSc (Hons) (UP); MSc (APP SC) STRUCTURAL
<b>Lecturers</b>	Mr J Gwena, MSc (GISc) (UFH); BScHons (Sur) (UZ); PGD (Project Management) (MGSB) Mr S Hariparsad, MEng (DUT); B.Sc. (Eng) (UDW); Mr S Jairam, Pr Tech (Eng) MEng (CE) (DUT); B.Tech (CE) (TN), MSAICE Mr HA Jajbhay, Pr.Techni. (Eng); MEng (CE) (DUT); BSc Hons (App Sc. - Structures) (UP); B.Tech (DUT) Mr B Khuzwayo, Pr Tech (Eng) MEng (DUT); B.Tech Mr M Phiri, MSc.Eng *Mr B J Saane, M.EnvDev (UKZN); B.Tech (Sur) (MLST); N.Dip (Civil) (MT); AMSAGI, ST (SA) Mr C Singh, MSc (GISc)(Manchester); Med (UDW); Pr GISc (SA); Pr S(SA); Dip Data (UNISA); B.Tech (Man) (MLST); ACE (Maths) (UNISA); PGD (NMMU) Mrs G Singh, MSc (GISc) (MMU,UK); MApping (USQ); PgD (GISc) (MMU,UK); GradCert (TSL) (USQ) Ms S Vahed, Pr.Tech (Eng); M.Tech. (CE) (DUT) Ms X Feikie, MEng; B.Tech (CE) (CUT)
<b>nGap Lecturer</b>	
<b>Senior Technician</b>	Mr K M Paul, B.Tech Mangement (DUT); MSAT
<b>Technicians</b>	Mr W Kinghorn, N.Dip (Sur) (TN) Mr S Rampursad, B.Tech (Sur) (TN) Mr A S Sewpal, MSAT
<b>Senior Technical Asst</b>	Mr A Chetty, B.Tech (Sur) (DUT)

\*Geomatics Head of Programme



### 3. PROGRAMMES OFFERED BY THE DEPARTMENT

Programmes are offered in this Department which, upon successful completion, lead to the award of the following qualifications:

Qualification	SAQA NLRD Number
Bachelor of Engineering Technology in Civil Engineering	98956
Bachelor of the Built Environment in Geomatics	101432
Bachelor of Engineering Technology Honours in Civil Engineering	
Master of Engineering	96827
Master of the Built Environment	96844
Doctor of Engineering	96812
Doctor of Philosophy in the Built Environment	96821

### 4. PROGRAMME INFORMATION AND RULES

#### 4.1 PHASE OUT RULES FOR THE BACCALAUREUS TECHNOLOGIAE: ENGINEERING: CIVIL

**Important information for current and prospective students (effective from 2019).**

The last cohort of first-time entering students admitted to the Baccalaureus Technologiae qualification was in July 2019.

Notwithstanding all the current rules (both General rules and Departmental rules) that regulate this degree, the last semester in which any student may register for each of the subjects is listed as follows:

#### **Baccalaureus Technologiae: Engineering: Civil**

**Disciplines : Construction Management, Transport, Urban, Structures and Water options.**

Module Name	Last Possible Semester of Registration
Contract Management IV	January 2022
Construction Materials Technology IV	January 2022
Foundation Engineering IV	January 2022
Structural Timber Design IV	January 2022
Solid Waste Management IV	January 2022
Water Treatment Technology IV	January 2022
Management Principles & Practice IV	January 2022
Transport Technology IV	January 2022

Structural Analysis IV	January 2022
Theory of Structures IV	January 2022
Geometric Design IV	January 2022
Hydraulics IV	January 2022

## **4.2 PHASE OUT RULES FOR THE BACCALAUREUS TECHNOLOGIAE: SURVEYING**

**Important information for current and prospective students (effective from 2019).**

The last cohort of first-time entering students admitted to the Baccalaureus Technologiae qualification was in July 2019.

Notwithstanding all the current rules (both General rules and Departmental rules) that regulate this degree, the last semester in which any student may register for each of the subjects is listed as follows:

### **Baccalaureus Technologiae: Surveying**

<b>Module Name</b>	<b>Last Possible Semester of Registration</b>
Survey Project IV	January 2022
Geodesy IV	January 2022
Geometric Design IV	January 2022
Practice Management IV	January 2022

## **MINIMUM ADMISSION REQUIREMENTS**

### **BACHELOR OF ENGINEERING TECHNOLOGY IN CIVIL ENGINEERING – BEngTech (Civil)**

### **BACHELOR OF THE BUILT ENVIRONMENT IN GEOMATICS BBE (Geomatics)**

In addition to the relevant General Rules pertaining to Registration (e.g. Rules G3, G4, G5, G6, G7, G8, G9 & G10).

School leaving applicants who wish to enrol for the programme must apply through the CAO system by no later than 30 September of the previous year. The number of students enrolled in the program is determined by the University and departmental growth policies and a ranking system is used to determine the number of applicants as required.

The minimum admission requirement is the National Senior Certificate, Senior Certificate or the National Certificate (Vocational) with appropriate module

combinations and levels of achievement as defined in the *Government Gazette*, Vol. 751, No. 32131 of 11 July 2008, and in the *Government Gazette*, Vol. 533, No. 32743, November 2009.

In addition to the above, the following is required for admission

Compulsory Modules	NSC	SC		NCV Level 4
	Rating	HG	SG	
English	4	E	C	60%
Mathematics	4	E	C	70%
Physical Science	4	E	C	70%
Life Orientation				60%
				+ 2 vocational subs (70%)

The module NSC Mathematical Literacy will not be accepted as a substitute for the module NSC Mathematics.

The exit certificate of the applicant must qualify the applicant for degree study at an institution of higher learning.

Applicants with a NSC will be ranked according to the sum of their scores for Mathematics and Physical Science, module to a minimum combined score of 120.

Prospective applicants may also present an NQF level 6 Diploma in Engineering for entry into the degree programme. A possibility of transfer of credits for cognitive previous studies would be considered dependant on the discipline nature of the Diploma being presented.

**Note: This Department only considers First and Second choice for BEng Tech (Civil) and First – Fourth choice for BBE (Geomatics) CAO applicants.**

## MINIMUM ADMISSION REQUIREMENTS

### BACHELOR OF ENGINEERING TECHNOLOGY HONOURS IN CIVIL ENGINEERING (BET Hons) (Civil Engineering)

No person shall be registered for this qualification unless that person is:

- In possession of a Bachelor of Engineering Technology in Civil Engineering degree or,
- Has in accordance with the DUT General Rules been granted status or advanced standing (Rule G10 refers) and complies with Rules G3 and G4, and the rules of the academic department offering the qualification.

## EC2 GENERAL RULES

Except where otherwise laid down in Rules EC3 to EC9 and in the rules for specific

instructional programmes, the General Rules for all courses shall apply to instructional programmes in this department.

### **EC3 REGISTRATION**

In addition to the General Rules pertaining to Registration a student whose fees are being paid by an employer shall provide a letter of authority to this effect.

### **EC4 ENTRANCE REQUIREMENTS**

In addition to the General Rules pertaining to Entrance Requirements specific requirements apply to both of the revised instructional programmes offered in this department and these are set out in the rules for the instructional programmes.

### **EC5 WORK DONE DURING THE SEMESTER**

In addition to Rule G12 the following specific rules apply to all modules:

1. The determination of the year/semester mark, where applicable, for each module for the purpose of issuing a certificate in terms of the General Rules is indicated with the syllabus for each module.
2. A student who for any reason is absent from a particular practical or laboratory practical/test, must provide proof of his/her reason for absence to the particular lecturer concerned in accordance with Rule EC10. Failure to do so will result in a zero mark being recorded for the practical or laboratory practical/test.
3. In the case where a module is evaluated by a continuous or 100% course work system, then any student failing to obtain a final result of 50% or higher, and any sub-minimum stipulated for such module, will have to repeat that module.
4. Where a module year mark has a project or practical component, then the mark for such component may not be carried over to a subsequent semester where the module is failed, unless the project is a separate registered module.

### **EC6 CONDUCT OF STUDENTS IN LABORATORY**

Rules of conduct pertaining to the specific laboratory, as approved by the department, shall apply to all students registered for the particular module.

### **EC7 SUPPLEMENTARY EXAMINATIONS**

The provisions as contained in the General Rules will apply to all examinable modules in this department.

### **EC8.1 PROMOTION TO A HIGHER LEVEL / PROGRESSION RULES BEngTech (Civil) and BBE (Geomatics)**

Engineering students completing this qualification shall demonstrate competence in all the following Graduate Attributes (GA) indicated below, as required by the Accrediting body – the Engineering Council of South Africa (ECSA) / South African Geomatics Council (SAGC). Assessment of these GA's are embedded in the modules of the degree. In modules where Graduate Attributes (GAs) are assessed, the student must meet both the academic and the GA requirements, as specified in the relevant study guide, to pass the module.

In modules where Graduate Attributes are assessed, the student needs to achieve a minimum final mark of 50% as well as satisfy the Graduate Attributes outcome. A student that achieves a minimum final mark of 50% but fails to achieve the outcome would fail the module. In addition, students must achieve sub-minimum marks for practicals, tests or other assessments.

### **Graduate Attribute 1: Problem Solving**

Students will be required to identify, formulate, analyse and solve broadly-defined problems.

### **Graduate Attribute 2: Application of scientific and engineering knowledge**

Students will be required to apply knowledge of mathematics, natural sciences, engineering fundamentals and an engineering speciality to solve broadly-defined engineering problems.

### **Graduate Attribute 3: Engineering Design**

Students will be required to perform creative, procedural and non-procedural design and synthesis of components, systems, engineering works, products or processes.

### **Graduate Attribute 4: Investigations, experiments and data analysis**

Students will demonstrate competence to design and conduct investigations and experiments.

### **Graduate Attribute 5: Engineering methods, skills, tools, including Information technology.**

Students will demonstrate competence to use appropriate engineering methods, skills and tools, including those based on information technology.

### **Graduate Attribute 6: Professional and Technical Communication**

Students will demonstrate competence to communicate effectively, both orally and in writing, with engineering audiences and the community at large.

### **Graduate Attribute 7: Sustainability and Impact of Engineering Activity**

Students will demonstrate critical awareness of the sustainability and impact of engineering activity on the social, industrial and physical environment.

### **Graduate Attribute 8: Individual, Team and multidisciplinary working**

Students will demonstrate competence to work effectively as an individual, in teams and in multidisciplinary environments.

### **Graduate Attribute 9: Independent learning ability**

Students will demonstrate competence to engage in independent learning through well-developed learning skills.

### **Graduate Attribute 10: Engineering Professionalism**

Students will demonstrate critical awareness of the need to act professionally and ethically and to exercise judgement and take responsibility within own limits of competence.

## **Graduate Attribute 11: Engineering Management**

Demonstrate knowledge and understanding of engineering management principles and economic decision making.

***In addition to the requirements of the General Rules no student shall be permitted to register:***

- ***for any second year modules when more than six modules from the first year module combination are outstanding;***
- ***for any third year modules when more than twelve modules from the first and second year module combination are outstanding.***
- ***for any third year modules (2<sup>nd</sup> semester) when any first, second and third year (1<sup>st</sup> semester) module combinations are outstanding.***

## **EC8.2 PROMOTION TO A HIGHER LEVEL (BET Hons) (Civil Engineering)**

Engineering students completing this qualification shall demonstrate competence in all the following Graduate Attributes (GA) indicated below, as required by the Accrediting body – the Engineering Council of South Africa (ECSA). Assessment of these GA's are embedded in the modules of the degree. In modules where Graduate Attributes (GAs) are assessed, the student must meet both the academic and the GA requirements, as specified in the relevant study guide, to pass the module.

In modules where Graduate Attributes are assessed, the student needs to achieve a minimum final mark of 50% as well as satisfy the Graduate Attributes outcome. A student that achieves a minimum final mark of 50% but fails to achieve the outcome would fail the module. In addition, students must achieve sub-minimum marks for practicals, tests or other assessments.

### **Graduate Attribute 1: Problem Solving**

Students will be required to identify, formulate, analyse and solve complex engineering problems.

### **Graduate Attribute 2: Application of scientific and engineering knowledge**

Students will be required to apply knowledge of mathematics, natural sciences, engineering fundamentals and an engineering speciality to solve complex engineering problems.

### **Graduate Attribute 3: Engineering Design**

Students will be required to perform creative, procedural and non-procedural design and synthesis of components, systems, engineering works, products or processes.

### **Graduate Attribute 4: Investigations, experiments and data analysis**

Students will demonstrate competence to design and conduct investigations and experiments.

### **Graduate Attribute 5: Engineering methods, skills, tools, including Information technology.**

Students will demonstrate competence to use appropriate engineering methods, skills and tools, including those based on information technology.

### **Graduate Attribute 6: Professional and Technical Communication**

Students will demonstrate competence to communicate effectively, both orally and in writing, with engineering audiences and the community at large.

### **Graduate Attribute 7: Sustainability and Impact of Engineering Activity**

Students will demonstrate critical awareness of the sustainability and impact of engineering activity on the social, industrial and physical environment.

### **Graduate Attribute 8: Individual, Team and multidisciplinary working**

Students will demonstrate competence to work effectively as an individual, in teams and in multidisciplinary environments.

### **Graduate Attribute 9: Independent learning ability**

Students will demonstrate competence to engage in independent learning through well-developed learning skills.

### **Graduate Attribute 10: Engineering Professionalism**

Students will demonstrate critical awareness of the need to act professionally and ethically and to exercise judgement and take responsibility within own limits of competence.

### **Graduate Attribute 11: Engineering Management**

Demonstrate knowledge and understanding of engineering management principles and economic decision making.

## **EC9 MINIMUM INSTRUCTIONAL PROGRAMME**

Notwithstanding anything to the contrary in the General Rules, the minimum instructional programme for each qualification in this department shall be as set out under the rules for that instructional programme.

## **EC10 SPECIAL TESTS**

A special test may be granted by the Head of Department to a student who has been prevented from taking a test:

- (1) by illness on the day of the test or immediately before it, provided that he submits a medical certificate on **the prescribed form** on which a medical practitioner, registered by the Health Professions Council of SA, homoeopath or chiropractor, registered with the South African Associated Health Board, specifies the nature and duration of the illness and that for health reasons it was impossible or undesirable for the student to sit for the test, and that he submits such certificate to the head of department on the day as determined by the practitioner that the student should return to lectures immediately following such illness, or on one of the two following working days;

or

- (2) by circumstances which in the opinion of the head of department were beyond his control at the time of the test provided that satisfactory evidence of such circumstances is provided. Such circumstances shall not include:
- (i) any misinterpretation by him of the date, time or venue of the test,
  - (ii) transportation difficulties, where his residential term time address is within the area serviced by a scheduled bus or commuter train service to the central Durban area, and provided otherwise that he informs the head of department of such difficulty prior to the time of commencement of the test,
  - (iii) failure by him to bring to the test venue any equipment normally required for that module as specified in the study guide for the particular module.
- For the purpose of this rule test shall mean any written, oral or practical test, set for the purpose of determining or contributing towards a semester mark for a module, and shall include tests set for modules which are evaluated by continuous evaluation.

Any student who misses a test and who does not qualify for a special test, and any student who qualifies for a special test but fails to write it, shall be awarded a zero mark for the missed test.

Special tests for all modules shall be written within the last two weeks of official lectures of each semester and may be based on the entire semesters work.

## **EC11 REFUSAL OF RE-REGISTRATION**

- 11.1 A student who has not successfully completed a module after two periods of registration for that module shall only be permitted to re-register full-time for that module at the discretion of the Departmental Appeal.
- 11.2 A student who has been refused permission to re-register for a module in terms of Rule 11.1 will not be permitted to register for any other module in that qualification. A student will thereby be unable to complete the qualification unless the outstanding modules are attended and passed at another institution, approved by the Department, and exemptions granted in accordance with the General Rules.
- 11.3 A student who has not completed the Bachelor of Engineering Technology in Civil Engineering or the Bachelor of the Built Environment in Geomatics within five years of the first registration, may, at the discretion of the Departmental Appeal Committee, be refused permission to re-register, or may be accepted module to special conditions.
- 11.4 A student wishing to appeal to the Faculty Board of Engineering and the Built Environment against the application of this rule must submit to the Faculty Officer a statement in which he/she explains the reasons for his/her appeal. This appeal must be submitted to the Faculty Officer within five (5) University working days of being officially notified in writing that he/she has not been



permitted to re-register. No appeals will be considered after this.

- 11.5 Where a student has appealed against exclusion in terms of these rules or rule G17, and such appeal has been refused, then said student may not submit a further appeal until the conditions of the refused appeal have been fully complied with.

**11.6 EXCLUSION DUE TO LACK OF PROGRESS (applicable to BEng Tech (Civil) and BBE (Geomatics))  
(UNSATISFACTORY ACADEMIC PROGRESS)**

Further to Rule G17, a student will be excluded if the student fails to:

- Pass at least half, by credit value, of their first year modules by the end of their first year of registration;
- Pass all first year modules by the end of their second year of registration;
- Pass all second year modules by the end of their third year of registration;
- Pass at least half of the third year modules by the end of their fourth year of registration;
- Complete the qualification by the end of five years of registration.

**EC12 LATE REGISTRATION**

- 13.1 No student will be permitted to register for any module offered by this department later than one week after the official commencement of full-time semester lectures.
- 13.2 No student will be permitted to add or delete any module later than one week after the official commencement of full-time semester lectures, except where the result of a supplementary examination has delayed such change or addition.

**EC13 TIMETABLE CLASHES**

No student will be permitted to register for any module combination where there will be any timetable or test clashes. In the event of there being a clash then the student will be required to register for the module from the lowest level of the qualification for which they are registering. Furthermore, it is the students' responsibility to check prior to registration that there are no clashes as no special arrangements will be made to accommodate such instances. In the event of a student missing a test/practical/deadline as a result of a clash a zero mark will be awarded.

**EC14 STUDENT DRESS**

Students must be neat and tidy at all times. Closed shoes and protective clothing must be worn for the duration of the time spent in any departmental laboratory. Appropriate safety equipment needs to be worn where applicable, or as detailed in the laboratory practical manual.

**EC15 ACCESS TO DEPARTMENTAL COMPUTER LABORATORIES**

No student is permitted to have access to any of the dedicated departmental computer laboratories unless he/she has been granted the necessary authority to do so, and:

- 16.1 the module lecturer or an approved departmental tutor is present;  
**or**

16.2 the Departmental Computer Technician is present;

**or**

16.3 the necessary authentication has been done to your active student card by the departmental technician. Your activated card may not be used by any student other than the student to whom the card belongs. Should an activated student card be found in the possession of anyone other than the authorised user then such student card shall be confiscated and invalidated.

### **EC16 COMPETENCY MODULES**

Where a module comprises more than one module, and one of the modules includes a competency based assessment, then such competency module must also be passed before a student will be permitted to register for any module for which the modularized module is a prerequisite.

### **EC17 AWARDING OF DEGREE**

- 18.1. Degrees are not automatically awarded to candidates who have satisfied all of the requirements for each instructional programme. The onus is on the student to apply to the University for the Award of the Degree. In this regard the candidate should obtain the necessary forms from the Secretary of the Department.
- 18.2. A certified copy of a valid identity document must be attached to the diploma application.

### **EC18 LINKING OF MODULES**

The following modules are linked as per G1 and G14 (3) (approved by Senate on 14 March 2018) of the general handbook. As such, where the credit-weighted average of all the modules in the linked group is 50% or more, the result of those modules with less than 50% will be recorded as a PASS, with no mark indicated.

Engineering Mathematics 1A and Engineering Mathematics 1B  
Engineering Mathematics 2A and Engineering Mathematics 2B

## 5. PROGRAMME STRUCTURE

### 5.1 BACHELOR OF ENGINEERING TECHNOLOGY IN CIVIL ENGINEERING.

All modules in the programme are compulsory, offered on a full time basis and require attendance to lectures. There are no electives given for the programme.

Name of module	Code	Study Level	NQF Level	Module Credits	C/E*	Pre-Requisite Modules
<b>Year 1 Semester 1</b>						
Engineering Mathematics 1A	EMTA101	1	5	12	C	*
Engineering Physics 1A	EPHA101	1	5	12	C	
Law for Life	LWLF101	1	5	8	C	
Cornerstone 101	CSTN101	1	5	12	C	
Civil Mechanics 1A	CVMC101	1	5	8	C	
Drawings 1A (intro to CAD basic incl)	DRNS101	1	5	12	C	
<b>Year 1 Semester 2</b>						
Engineering Mathematics 1B	EMTB101	1	5	12	C	**
Engineering Physics 1B	EPHB101	1	5	12	C	
Surveying for Civil Engineering 1B	SRCV101	1	5	16	C	
Civil Engineering Methods 1B	CVMT101	1	5	12	C	
Structural Mechanics 1B	STMCI01	1	5	12	C	
Technical Literacy	TECL101	1	5	8	C	
<b>Year 2 Semester 1</b>						
Engineering Mathematics 2A	EMTA201	2	6	12	C	Engineering Mathematics 1B *
Engineering Management 2A	ENMG201	2	6	8	C	
Structural Mechanics 2A	STMC201	2	6	12	C	Civil Mechanics 1A and Structural Mechanics 1B
Water/Hydraulics 2A	WHYD201	2	6	12	C	Civil Mechanics 1A, Engineering Mathematics 1A and Engineering Mathematics 1B
Civil Eng Material 2A	CMTL201	2	6	12	C	
Transport Technology 2A	TRTA201	2	6	12	C	
<b>Year 2 Semester 2</b>						
Engineering Mathematics 2B	EMTB201	2	6	12	C	Engineering Mathematics 2A **
Structural Design Theory Intro 2B	SDTI201	2	6	16	C	Structural Mechanics 2A
Structural Analysis 2B	STAN201	2	6	12	C	Structural Mechanics 2A
Water/Hydrology2B	WHDL201	2	6	12	C	Civil Mechanics 1A, Engineering Mathematics 1A and Engineering Mathematics 1B
Geotechnical Engineering 2B	GEOT201	2	6	12	C	
Transport Technology 2B	TRTB201	2	6	12	C	
<b>Year 3 Semester 1</b>						
CAD Civil Engineering Drawings3A	CCED301	3	7	12	C	Drawings 1A
Reinforced Concrete Design 3A	RFGD301	3	7	12	C	Structural Design Theory Intro 2B and Structural Analysis 2B
Water/ Reticulation Design 3A	WRTD301	3	7	12	C	Water/Hydraulics 2A, Water/Hydrology2B,
Transport Technology 3A	TRTA301	3	7	16	C	Transport Technology 2A
Construction Management 3A	CNMN301	3	7	12	C	Engineering Management 2A
Civil Engineering Documentation 3A	CEDC301	3	7	12	C	Civil Eng Material 2A, Engineering Management 2A
<b>Year 3 Semester 2</b>						
Design Project	DSNP301	3	7	20	C	All 3 <sup>rd</sup> year 1 <sup>st</sup> sem modules
Structural Steel Design 3B	STSD301	3	7	12	C	Structural Design Theory Intro 2B and Structural Analysis 2B

Project Management	PMAN301	3	7	8	C	
Transport Technology 3B	TRTB301	3	7	12	C	Transport Technology 2A
Water Treatment Technology 3B	WTRM301	3	7	12	C	Water/Hydraulics 2A

**Exposure Module – The following subjects (denoted by an \*\*) are exposed to the lower level subject, (denoted by \*), on condition a student obtains a subminimum mark of 40%.**

## 5.2 BACHELOR OF THE BUILT ENVIRONMENT IN GEOMATICS

All modules in the programme are compulsory, offered on a full time basis and require attendance to lectures. There are no electives given for the programme.

Name of module	Code	Study Level	NQF Level	NQF Credits	C/E *	Pre-requisite module/s
<b>Year 1 Semester 1</b>						
Engineering Mathematics 1A	EMTA101	I	5	12	C	*
Cornerstone 101	CSTN101	I	5	12	C	
Sociology of Work 101	SCLW101	I	6	8	C	
Geomatics 1A	GMTA101	I	5	16	C	
Drawing 1A	DRWN101	I	5	12	C	
Engineering Physics 1A	EPHA101	I	5	12	C	
<b>Year 1 Semester 2</b>						
Engineering Mathematics 1B	EMTB101	I	5	12	C	**
Geomatics 1B	GMTB101	I	6	16	C	Geomatics 1A
Survey Drawing 1B	SVDRI101	I	5	12	C	Drawing 1A, Geomatics 1A
Environmental Science 1B	EVSC101	I	5	12	C	
Technical Literacy	TECL101	I	5	8	C	
Engineering Physics 1B	EPHB101	I	5	12	C	
<b>Year 2 Semester 1</b>						
Engineering Mathematics 2A	EMTA201	2	6	12	C	Engineering Mathematics 1B
Photogrammetry 2A	PHGR201	2	6	12	C	Geomatics 1B
Settlement History 101	STHS102	2	6	8	C	
Basic Engineering Management 2A	BEMN201	2	6	8	C	
Control Surveying 2A	CTSU201	2	6	20	C	Geomatics 1B
Geographic Information System 2A	GISS201	2	6	12	C	Environmental Science 1B
<b>Year 2 Semester 2</b>						
Legal Principles 2B	LPPL201	2	6	12	C	
Engineering Surveying 2B	ENSV201	2	7	24	C	Geomatics 1B
Map projections and Coordinate Systems 2B	MPSC201	2	6	12	C	Geomatics 1B
Digital Photogrammetry and Remote Sensing 2B	DPRS201	2	7	12	C	Photogrammetry 2A
Statistics 2B	STST201	2	6	12	C	Engineering Mathematics 1B
<b>Year 3 Semester 1</b>						
Geodesy 3A	GDSY301	3	7	16	C	Map Projections and Coordinate Systems 2B, Engineering

						Mathematics 2A
Cadastral Surveying 3A	CDSV30I	3	7	12	C	Geomatics 1B, Survey Drawing 1B
Theory of Errors and Network Adjustment 3A	TENA30I	3	7	20	C	Statistics 2B
Geographic Information System 3A	GISS30I	3	7	12	C	Geographic Information Systems 2B
Computer Applications 3A	CPTA30I	3	7	12	C	Survey Drawing 1B
Town and Regional Planning: Layout & Design 3A	TRLD30I	3	6	12	C	Settlement History 101
<b>Year 3 Semester 2</b>						
Project Management	PRMA30I	3	7	8	C	Basic Engineering Management 2A
The Global Environment	GENV10I	3	6	8	C	Environmental Science 1B
Survey Project 3B	SVPJ30I	3	7	32	C	All 1 <sup>st</sup> and 2 <sup>nd</sup> year modules and all 3 <sup>rd</sup> year 1 <sup>st</sup> semester modules

**Exposure Module – The following subjects (denoted by an \*\*) are exposed to the lower level subject, (denoted by \*), on condition a student obtains a subminimum mark of 40%.**

### 5.3 BACHELOR OF ENGINEERING TECHNOLOGY HONOURS IN CIVIL ENGINEERING

A BET in Civil Engineering undergraduate student shall only be admitted into the honours programme if their undergraduate BET in civil engineering degree included at least the following knowledge areas in their chosen field of specialisation in this honours programme.

To register for the **Urban** theme a student must have passed modules/subjects in:

- Transport technology and planning
- Urban planning and design

To register for the **Water** theme a student must have passed modules/subjects in:

- Hydraulics
- Hydrology

To register for the **Structures** theme a student must have passed modules/subjects in:

- Structures mechanics/analysis
- Reinforced concrete design
- Structural steel design

<b>BACHELOR OF ENGINEERING TECHNOLOGY HONOURS: CIVIL ENGINEERING: URBAN THEME</b>						
<b>Name of module</b>	<b>Code</b>	<b>Study Level</b>	<b>NQF Level</b>	<b>NQF Credits</b>	<b>C/E*</b>	<b>Exam</b>
<b>Semester I</b>						
Reticulation Design & Management	RDAM80I	1	8	12	C	Yes

Urban Planning & Design	URPT801	I	8	12	C	Yes
Transport Technology & Planning	TTAP801	I	8	12	C	Yes
Pavement & Materials Technology	PAMT801	I	8	12	C	Yes
Geometric Design	GEDE801	I	8	12	C	Yes
Any 12 credit honours level module in civil engineering chosen from either the water or structural themes		I	8	12	C	Yes
<b>Semester 2</b>						
Environmental Engineering	ENEN802	I	8	12	C	Yes
Research Project	REPR802	I	8	32	C	No
Engineering Management	ENMA802	I	8	12	C	Yes
Any 12 credit honours level module in civil engineering chosen from either the structures or water themes.		I	8	12	C	Yes

<b>BACHELOR OF ENGINEERING TECHNOLOGY HONOURS: CIVIL ENGINEERING: WATER THEME</b>						
<b>Name of module</b>	<b>Code</b>	<b>Study Level</b>	<b>NQF Level</b>	<b>NQF Credits</b>	<b>C/E*</b>	<b>Exam</b>
<b>Semester 1</b>						
Hydraulics	HYDR801	I	8	12	C	Yes
Hydrology	HDRY801	I	8	12	C	Yes
Water Treatment Technology	WTTY801	I	8	12	C	Yes
Reticulation Design & Management	RDAM801	I	8	12	C	Yes
Any 12 credit honours level module in civil engineering chosen from either the urban or structural themes		I	8	12	C	Yes
Any 12 credit honours level module in civil engineering chosen from either the structures or urban themes.		I	8	12	C	Yes
<b>Semester 2</b>						
Wastewater Treatment Technology	WATT802	I	8	12	C	Yes
Environmental Engineering	ENEN802	I	8	12	C	Yes
Research Project	REPR802	I	8	32	C	No
Engineering Management	ENMA802	I	8	12	C	Yes

<b>BACHELOR OF ENGINEERING TECHNOLOGY HONOURS: CIVIL ENGINEERING: STRUCTURES THEME</b>						
<b>Name of module</b>	<b>Code</b>	<b>Study Level</b>	<b>NQF Level</b>	<b>NQF Credits</b>	<b>C/E*</b>	<b>Exam</b>
<b>Semester 1</b>						
Reinforced Concrete Design	RFCD801	I	8	12	C	Yes
Pre-stressed Concrete Design	PSCD801	I	8	12	C	Yes
Structural Steel Design	STSD801	I	8	12	C	Yes
Structural Theory	SRTH801	I	8	12	C	Yes
Any 12 credit honours level module in civil engineering chosen from either the urban or water themes		I	8	12	C	Yes
Any 12 credit honours level module in civil engineering chosen from either the urban or water themes		I	8	12	C	Yes
<b>Semester 2</b>						
Research Project	REPR802	I	8	32	C	Yes
Engineering Management	ENMA802	I	8	12	C	No
Choose <b>ONE</b> of the 2 modules below: Structural Engineering – selected topic <b>OR</b> Foundation Engineering	SEST802 FOEN802	I	8	12	C	Yes
Any 12 credit honours level module in civil engineering chosen from either the water or urban themes.		I	8	12	C	Yes

C/E\* = Compulsory / Elective

## **5.4 BACCALAUREUS TECHNOLOGIAE: ENGINEERING: CIVIL**

This instructional programme has a minimum duration of four (4) semesters when undertaken on a part-time or block basis and may be offered in five specialist options listed below:

A student may not change disciplines during the course of his/her B.Tech studies, without prior permission from the HOD.

Where a student fails the project module, but obtains a mark of 45% or more, such student will be permitted to re-submit the project for re-assessment within a minimum stipulated period. Should the final result of such re-submitted project be a pass, then the student will be awarded a mark of 50% irrespective of the mark achieved.

### **Construction Management Discipline**

Students who wish to register with ECSA will be required to do three (3) engineering modules

from **any** of the other specialist disciplines. Project Management (Civil) IV is a compulsory module for this option.

Code	Modules	C/O	Assessment Method	NQF Level
CNTM411	Contract Management Civil IV (Module 1 - Theory)	C	3 hr exam - restricted open book	7
CNTM421	Contract Management Civil IV (Module 2 - Project)	C	100% year mark	7
MTPP411	Management Principles & Practice IV (Module 1 - Theory)	C	3 hr exam	7
MTPP421	Management Principles & Practice IV (Module 2 - Project)	C	100% year mark	7

Plus any three electives from the other specialist disciplines.

### Structural Discipline

FNDE411	Foundation Engineering IV (Module 1 - Theory)	C	3 hr exam	7
FNDE421	Foundation Engineering IV (Module 2 - Project)	C	100% year mark	7
SANA411	Structural Analysis IV (Module 1 - Theory)	C	3 hr exam	7
SANA421	Structural Analysis IV (Module 2 Project)	C	100% year mark	7
STDE411	Structural Timber Design IV (Module 1 - Theory)	C	4 hr exam - restricted open book	7
STDE421	Structural Timber Design IV (Module 2 - Project)	C	100% year mark	7
TSTR412	Theory of Structures IV (Module 1 - Theory)	C	3 hr exam	7
TSTR422	Theory of Structures IV (Module 2 - Project)	C	100% year mark	7

### Transportation Discipline

GMDS411	Geometric Design IV (Module 1 Theory)	C	4 hr exam - restricted open book	7
GMDS421	Geometric Design IV (Module 2 Project)	C	100% year mark	7
TPTE411	Transportation Technology IV (Module 1 Theory)	C	3 hr exam	7
TPTE421	Transportation Technology IV (Module 2 Project)	C	100% year mark	7

Plus any three electives from the other specialist disciplines.

### Urban Engineering Discipline

Code	Modules	C/O	Assessment Method	NQF Level
CMTT411	Construction Materials Technology IV (Module 1 Theory)	C	3 hr exam	7
CMTT421	Construction Materials Technology IV (Module 2 Project)	C	100% year mark	7
GMDS411	Geometric Design IV (Module 1 Theory)	C	4 hr exam - restricted open book	7
GMDS421	Geometric Design IV (Module 2 Project)	C	100% year mark	7
SWMT411	Solid Waste Management IV (Module 1 Theory)	C	3 hr exam	7
SWMT421	Solid Waste Management IV (Module 2 Project)	C	100% year mark	7

Plus any two electives from the other specialist disciplines

### Water Discipline

HYDR412	Hydraulics IV (Module 1 Theory)	C	3 hr exam	7
HYDR422	Hydraulics IV (Module 2 Project)	C	100% year mark	7
WTTC411	Water Treatment Technology IV (Module 1 Theory)	C	3 hr exam	7
WTTC421	Water Treatment Technology IV (Module 2 Project)	C	100% year mark	7

Plus any three electives from the other specialist disciplines

#### Note:

- A total of **eight** modules must be selected from those listed above, such that at least **five** modules are selected from the chosen specialist option, and such that a minimum of **four** modules are at Level IV.
- Construction Materials Technology IV may not be selected in combination with Concrete Technology IV and/or Asphalt Technology IV.
- Not all of the specialist options and not all of the modules within those options will necessarily be available at any particular time.

## 5.5 BACCALAUREUS TECHNOLOGIAE: SURVEYING

This instructional programme has a minimum duration of four (4) semesters when undertaken on a part-time basis as per the criteria below:-

Code	Modules	C/O	Assessment Method	NQF Level
GEOD402	Geodesy IV	C	Continual	7



GISY402	Geographic Information Systems IV	C	Continual	7
PRMT401	Practice Management IV	C	3 hr exam - open book	7
SVPR401	Survey Project IV	C	Continual	7
PHTG401	Photogrammetry IV	O	3 hr exam	7

**Note:**

1. In addition to the compulsory modules candidates must select a minimum of three additional modules representing a minimum total NATED credit rating of 0,291 from the list of optional modules and/or from modules of the Engineering, Cartography or Town Planning B.Tech.programmes. (Refer to the relevant departments for these module credit ratings.)
2. No more than two modules may be selected from the Engineering, Cartography or Town Planning programmes and these may not represent a total NATED credit rating exceeding 0,200. (Refer to the relevant departments for these module credit ratings.)
3. Experiential learning related practical modules may not be included in the modules chosen from the above-mentioned programmes.
4. Not all of the modules listed for this programme will necessarily be available at any particular time.

\*C = Compulsory : O = Optional

## 5.6 MASTER OF ENGINEERING ENTRANCE REQUIREMENTS

Every candidate for this qualification shall have:

1. completed the requirements for the BEngTechHons (Civil Eng) or equivalent
- or**
2. have been granted a conferment of status for the above-mentioned qualification.

## INSTRUCTIONAL PROGRAMME

This is a research-based qualification requiring advanced studies on behalf of the student in any module/s related to the specific field of study. Students are required to undertake research under the guidance of a supervisor.

## 5.7 MASTER OF THE BUILT ENVIRONMENT ENTRANCE REQUIREMENTS

Every candidate for this qualification shall have:

1. completed the requirements for the BBEHons (Geomatics) or equivalent
- or**
2. have been granted a conferment of status for the above-mentioned qualification.

## INSTRUCTIONAL PROGRAMME

This is a research-based qualification requiring advanced studies on behalf of the student in any module/s related to the specific field of study. Students are required to undertake research under the guidance of a supervisor.

## 5.8 DOCTOR OF ENGINEERING ENTRANCE REQUIREMENTS

Every candidate for this qualification shall have:

1. completed the requirements for the Master of Engineering;
- or**
2. have been granted a conferment of status for the above-mentioned qualification.

## **INSTRUCTIONAL PROGRAMME**

This is a research-based qualification requiring advanced studies on behalf of the student in any module/s related to the specific field of study. Students are required to undertake research under the guidance of a supervisor.

### **5.9 DOCTOR OF PHILOSOPHY IN THE BUILT ENVIRONMENT ENTRANCE REQUIREMENTS**

Every candidate for this qualification shall have:

1. completed the requirements for the Master of the Built Environment;
- or*
2. have been granted a conferment of status for the above-mentioned qualification.

## **INSTRUCTIONAL PROGRAMME**

This is a research-based qualification requiring advanced studies on behalf of the student in any module/s related to the specific field of study. Students are required to undertake research under the guidance of a supervisor.

### **6. ASSESSMENT RULES**

The method of assessment for each module/module is indicated in the indicative content (see section 8).

See also General Rules G12 to G16

### **7. RE-REGISTRATION RULES**

See Rule EC11

### **8. INDICATIVE CONTENT**

#### **NOTE:**

1. Except where otherwise stated all modules have a required sub-minima of 40% of the overall semester mark and 40% of the examination mark respectively.
2. The allocation of periods for each module is based on a contact time of 50 minutes with classes commencing at 60 minute intervals.

### **BASIC ENGINEERING MANAGEMENT 2A (BEMN201) (8 Credits)**

Theory: 2 periods per week

Continuous Assessment : Three Tests:

Test 1	- 25%
Test 2	- 30%
Control-Test	- 45%

#### **SYLLABUS**

1. Introduction to Management
2. Construction Organisation and Management
3. The Project Team
4. Financial Management
5. Contract Management

### **CAD CIVIL ENGINEERING DRAWINGS 3A (CCED301) (12 Credits)**

Theory: 3 periods per week

Tutorial: 1 period per week  
Semester Mark: Two tests - 20% each of final mark  
                    Assignment – 20% of final mark  
                    Control Test – 40% of final mark  
Examination: No examination

### **SYLLABUS**

1. Structural Engineering drawing applications
2. Civil Engineering drawing applications
3. Computer drawing application where applicable

### **CADASTRAL SURVEYING 3A (CDSV301) (12 Credits)**

Theory: 3 periods per week  
Practical: 1 period per week  
Semester Mark: Two Tests - 12% each  
                    One Project – 16%  
Examination: One three hour paper - 60%

### **SYLLABUS**

1. Ownership
2. Subdivision and Consolidation of land
3. A study of the acts relating to the survey of land
4. Sectional Titles

### **CIVIL ENGINEERING DOCUMENTATION 3A (CEDC301)**

(12

credits)  
Theory: 4 periods per week  
Semester Mark: Two tests – 10% each  
                    One assignment – 20%  
Examination: One Three hour paper – 60%

**Graduate Attribute (GA) assessed: - GA 6 Professional and Technical Communication.**

### **SYLLABUS**

1. Civil Engineering Estimation
2. Extracting quantities for Roads, Earthworks, Concrete and Steel structures.
3. Compiling of a Schedule of quantities using SABS 1200
4. Clause by Clause examination on the General Conditions of Contract 2015

### **CIVIL ENGINEERING MATERIALS 2A (CMTL201) (12 Credits)**

Theory: 3 periods per week  
Practical: 1 period per week  
Semester Mark: Two tests – 14% each  
                    Practicals – 12%  
Examination: One three hour paper – 60%

### **SYLLABUS**

1. Geology
2. Soils

3. Concrete
4. Bitumen
5. Laboratory practicals

### **CIVIL ENGINEERING METHODS IB (CVMT101) (12 Credits)**

Theory: 3 periods per week

Semester Mark: Two tests - 20% each

Examination: One three-hour paper - 60%

#### **SYLLABUS**

1. Earthworks
2. Structures
3. Road Engineering
4. Dams
5. Bridges
6. Tunnels
7. Harbours
8. Railways
9. Airports
10. Drainage
11. Safety
12. Labour Enhanced Construction

### **CIVIL MECHANICS IA (CVMCI01) (8 Credits)**

Theory: 2 periods per week

Tutorial: 1 period per week

Practical: 2 periods per week

Continuous Assessment:

Tutorial Assignment – will contribute 25% of final mark

Tests – will contribute 65% of final mark

Practicals – will contribute 10% of final mark

Examination: No examination

#### **SYLLABUS**

1. Weights and pressure.
2. Statics of determinate beams & frames.
3. Internal member forces in determinate pin jointed frames
4. Centroid and centre of gravity

### **COMPUTER APPLICATIONS 3A (CPTA301) (12 Credits)**

Theory: 4 periods per week

Semester Mark: Two projects - 25% each

One Test - 50%

Examination: No examination

#### **SYLLABUS**

1. File formats
2. Engineering Road design
3. Engineering Platform design
4. Data Traverse and Cadastral layout

## 5. Database Management Systems

### **CONSTRUCTION MANAGEMENT 3A (CNMN301)** (12 Credits)

Theory: 3 periods per week

Semester Mark: Two tests – 20% each

Examination: One three hour paper - 60%

#### **SYLLABUS**

1. Contract Documentation and Specifications
2. Estimating
3. Pre/post – tender procedures, planning, tender adjudication
4. Project management, quality management, disputes

### **CONSTRUCTION MATERIALS TECHNOLOGY IV MODULE 1 THEORY (CMTT411)** (0806107060)

Theory: 4 periods per week

Semester Mark: Two tests - 20 % each

Examination: One three-hour paper - 60%

#### **SYLLABUS**

1. Concrete technology
2. Asphalt & Bitumen technology
3. Other materials
4. Testing

### **CONSTRUCTION MATERIALS TECHNOLOGY IV MODULE 2 PROJECT (CMTT421)** (0806107060)

Project: 1 period per week

Semester Mark: One industry based project - 100%

#### **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

### **CONTROL SURVEYING 2A (CTS201)** (20 credits)

Theory: 4 periods per week

Practical: 6 periods per week

Semester Mark: Two Tests - 12% each

One Project – 16%

Examination: One three hour paper - 60%

#### **SYLLABUS**

1. Introduction
2. Reconnaissance
3. Triangulation
4. Resections
5. Trilateration
6. Satellite Positioning/GPS
7. Electronic Distance Measurement
8. Traversing
9. Trigonometrical Levelling

## **CONTRACT MANAGEMENT (CIVIL) IV MODULE 1 THEORY (CNTM411) (20426707)**

Theory: 4 periods per week

Semester Mark: Two tests - 20 % each

Examination: One four-hour paper - 60% (restricted open book)

### **SYLLABUS**

- |                                     |                                   |
|-------------------------------------|-----------------------------------|
| 1. Contract Documentation           | 7. Measurement and Payment        |
| 2. Contract Specifications          | 8. Subcontract Work               |
| 3. Pre-Tender Procedures            | 9. Contractual Dispute Management |
| 4. Tender Preparation               | 10. Cost Control and Productivity |
| 5. Tender Award                     | 11. Quality Management            |
| 6. Commencement of Contract/Project |                                   |

## **CONTRACT MANAGEMENT (CIVIL) IV MODULE 2 PROJECT (CNTM421) (20426707)**

Project: 1 period per week

Semester Mark: One industry based project - 100%

### **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

## **CORNERSTONE 101 (CSTN101) (12 Credits) (served module)**

Theory: 2 periods per week

Tutorials: 2 periods per week

Semester Mark:

Weekly reflections written by each student - 10%

Small group class attendance - 10%

(forfeited if student attends less than 80% of tutorials)

A major research project - 36%

Oral presentation - 40%

Information Literacy - 4%

Examination: No Examination

### **SYLLABUS**

1. The Common Set of Values
2. Introduction to journeys: our journeys and those of others
3. Diversity, social groups
4. Diversity, the Constitution and the Bill of Rights
5. Gender diversity
6. Gender and gender-based violence
7. HIV/AIDS and society

## **DESIGN PROJECT (DSNP301) (20 Credits)**

Theory: 5 periods per week

Tutorials: 2 periods per week

Semester mark: Project Submission = 100% of the final mark.

Sub-minima: You must obtain at least 50% in the project to pass.

Examination: No examination

**Graduate Attribute (GA) assessed: -**  
**GA 3 –Engineering Design:**  
**GA 8 – Individual and Teamwork**  
**GA 9 – Independent learning.**  
**GA10 – Engineering professionalism**

## **SYLLABUS**

1. Design project – Design of a structure.  
Urban design

## **DIGITAL PHOTOGRAMMETRY AND REMOTE SENSING 2B (DPRS201)**

(12 Credits)

Theory: 3 periods per week

Practical: 2 periods per week

Semester Mark: Two tests - 10% each

One project - 20% each

Examination: One three-hour paper - 60%

## **SYLLABUS**

1. Introduction
2. Theory of electromagnetic radiation
3. Remote sensing systems
4. Multispectral scanners
5. Radar instruments
6. Image acquisition, processing and interpretation
7. Photogrammetric image system calibration
8. Data reduction, and error analysis
9. Stereoscopic instrumentation
10. Object space control
11. Mission planning

## **DRAWINGS IA – DRNSI01 / DRWNI01 (12 Credits)**

Theory: 6 periods per week – 2 of which are in the computer room.

Continuous assessment:

Assessment 1 – 20% of final mark

Assessment 2 – 30% of final mark

Assessment 3 – 20% of final mark

Assessment 4 – 30% of final mark

Examination: No examination

## **SYLLABUS**

1. Drawing Standards as per SABS0111-I
2. Blending of Lines
3. Perspective Drawings
4. Isometric Drawings
5. Sectioning
6. Orthographic Drawings
7. House Plans (Autocad)
8. Basic Road Design

## 9. Road Intersections

### **ENGINEERING MANAGEMENT 2A (ENMG201) (8 Credits)**

Theory: 2 periods per week

Tutorial: 1 period per week

Semester Mark: Test 1 – 25%

Assignment - 15%

Control Test - 60%

Examination: No Examination

#### **SYLLABUS**

1. Contract planning
2. Planning techniques
3. Financial planning and control

### **ENGINEERING MANAGEMENT (ENMA802) (12 credits)**

Theory: 3 periods per week

Semester Mark: Two tests – 12% each

One project – 16%

Examination: One three hour paper – 60%

**Graduate Attribute (GA) assessed:**

**GA8 – Individual, Team and multidisciplinary working**

**GA11 – Engineering Management**

#### **SYLLABUS**

1. Work Breakdown Structure (WBS)
2. Project risk and auditing
3. Scheduling multiple projects
4. Financial appraisal tools
5. Financial appraisal of civil engineering projects

### **ENGINEERING MATHEMATICS 1A – EMTA101 (12 Credits) (served module)**

Theory: 4 periods per week

Tutorial: 1 period per week

Continuous Assessment:

Two Major Tests – 40% each

Two Minor Tests – 10% each

Examination: No examination

#### **SYLLABUS**

1. Algebra
2. Logarithms and Exponents
3. Trigonometry
4. Functions and Graphs
5. Complex Numbers
6. Calculus
7. Calculus – Differentiation
8. Calculus - Integration



## **ENGINEERING MATHEMATICS IB – EMTB101 (12 Credits) (served module)**

Theory: 4 periods per week

Tutorial: 1 period per week

Continuous Assessment:

Two Major Tests – 40% each

Two Minor Tests – 10% each

Examination: No examination

### **SYLLABUS**

1. Linear Algebra
2. Series
3. Trigonometry
4. Advanced Calculus – Differentiation
5. Advanced Calculus – Integration
6. Differential Equations
7. Vectors

## **ENGINEERING MATHEMATICS 2A – EMTA201 (12 Credits) (served module)**

Theory: 4 periods per week

Tutorial: 1 period per week

Continuous Assessment:

Two Major Tests – 40% each

Two Minor Tests – 10% each

Examination: No examination

### **SYLLABUS**

1. Laplace Transforms
2. Differential Equations
3. Partial Differential Equations
4. Fourier Series

## **ENGINEERING MATHEMATICS 2B – EMTB201 (12 Credits) (served module)**

Theory: 4 periods per week

Tutorial: 1 period per week

Continuous Assessment:

Two Major Tests – 40% each

Two Minor Tests – 10% each

Examination: No examination

### **SYLLABUS**

1. Multivariable Calculus and Vector Analysis
2. Linear Algebra
3. Complex Analysis
4. Transforms

## **ENGINEERING PRACTICE: CIVIL II - MODULE I (EXCV201)**

At least 25 weeks of experiential learning under the supervision of a qualified member in four or more of the following categories of Civil Engineering work:

## **SYLLABUS**

- |                   |                      |
|-------------------|----------------------|
| 1. Administration | 5. Contracts         |
| 2. Drawing        | 6. Construction      |
| 3. Surveying      | 7. Materials testing |
| 4. Design         |                      |

And the submission of a technical report on the experience gained.

## **ENGINEERING: PRACTICE: CIVIL II —MODULE 2 (EXCV301)**

At least 25 weeks of experiential learning under the supervision of a qualified member in four or more of the following categories of Civil Engineering work:

## **SYLLABUS**

- |                   |                      |
|-------------------|----------------------|
| 1. Administration | 5. Contracts         |
| 2. Drawing        | 6. Construction      |
| 3. Surveying      | 7. Materials testing |
| 4. Design         |                      |

And the completion of industry based engineering investigation which will be orally assessed. Obtaining a Learners Drivers Licence (Students with a valid learners or drivers licence will be exempted from this component.)

## **ENGINEERING PHYSICS 1A (EPHA 101) (12 Credits) (served module)**

Theory : 2 periods per week

Tutorial : 2 periods per week

Practical : 2 periods per week

Semester mark :

Two tests (15% each) will be written based on lectures, self-studies and tutorials.

A written practical test (10%) will be done based on applied principles in the laboratory.

Examination : One three-hour paper – 60%

## **SYLLABUS**

1. Introduction, Measurement, Estimating
2. Motion in One Dimension
3. Kinematics in two dimensions; Vectors
4. Dynamics: Newton's Laws of Motion
5. Circular Motion; Gravitation
6. Work and Energy
7. Linear Momentum
8. Rotational Motion
9. Static Equilibrium; Elasticity and Fracture
10. Fluids
11. Oscillations and Waves
12. Sound

## **ENGINEERING PHYSICS 1B (EPHB 101) (12 Credits) (served module)**

Theory : 2 periods per week

Tutorial : 2 periods per week

Practical : 2 periods per week

Semester mark :

Two tests (15% each) will be written based on lectures, self-studies and tutorials.

A written practical test (10%) will be done based on applied principles in the laboratory.  
Examination : One three-hour paper – 60%

## **SYLLABUS**

1. Temperature and Kinetic Theory
2. Heat
3. The Laws of Thermodynamics
4. Electric Charge and Electric Field
5. Electric Potential
6. Electric Currents
7. DC Circuits
8. Magnetism
9. Electromagnetic Induction and Faraday's Law
10. Electromagnetic Waves
11. Light: Geometric Optics
12. The Wave Nature of Light
13. Early Quantum Theory and Models of the Atom
14. Quantum Mechanics of Atoms
15. Nuclear Physics and Radioactivity

## **ENGINEERING SURVEYING 2B (ENSV201) (24 credits)**

Theory: 4 periods per week

Practical: 6 periods per week

Semester Mark: Two Tests – 10% each

Three projects (2 x 8% & 1 x 4%) - 20%

Examination: One three hour paper – 60%

## **SYLLABUS**

1. Basic principles of Engineering Surveying
2. Interpretation of engineering drawings
3. Geometric design: including principles and practice of road alignment
4. Design control and criteria
5. Principles of precise setting out
6. Deformation surveys
7. Setting out of engineering works
8. Areas and volumes

## **ENVIRONMENTAL ENGINEERING (ENEN802) (12 credits)**

Theory: 3 periods per week

Semester Mark: Two Tests – 20% each

Examination: One Three hour paper – 60%

## **SYLLABUS**

1. Environmental impacts
2. The EIA Process
3. Legal Aspects
4. Water and air quality
5. Wastewater effluent treatment
6. Solid waste disposal

7. Hazardous waste treatment
8. Waste minimisation

### **ENVIRONMENTAL SCIENCE IB (EVSCI01) (12 Credits)**

Theory: 3 periods per week

Semester Mark: Two tests - 15% each

Project - 10%

Examination: One three-hour paper - 60%

#### **SYLLABUS**

1. Climatology
2. Human settlements
3. Oceanography
4. Properties of the Earth
5. Geomorphology
6. Astronomical Geography
7. Geographical Maps
8. Geographical properties of South Africa

### **FOUNDATION ENGINEERING (FOEN802) (12 credits)**

Theory: 3 periods per week

Semester Mark: One Test – 20%

Assignment – 20%

Examination: One Three hour paper – 60%

#### **SYLLABUS**

1. Vertical Soil Pressure
2. Lateral Soil Pressure
3. Settlement
4. Bearing Capacity of Soils
5. Single pile foundations

### **FOUNDATION ENGINEERING IV MODULE 1 THEORY (FNDE411) (0806110060)**

Theory: 4 periods per week

Semester Mark: Two tests - 20%

Examination: One three-hour paper - 60%

#### **SYLLABUS**

1. Shallow & deep foundation design
2. Lateral earth support

### **FOUNDATION ENGINEERING IV MODULE 2 PROJECT (FNDE421) (0806110060)**

Project: 1 period per week

Semester Mark: One industry based project - 100%

#### **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

### **GEODESY 3A (GDSY301) (16 credits)**

Theory: 4 periods per week

Semester Mark: Two Tests - 10% each

One Project – 20%

Examination: One three hour paper - 60%

#### **SYLLABUS**

1. Introduction to Geodesy
2. Gravimetry
3. Theory of the Gravity Field of the Earth.
4. Satellite Geodesy.
5. Geodetic control networks

### **GEODESY IV (GEOD402) (0825077060)**

Theory: 5 periods per week

Semester Mark: Six assignments - 10% each

Two tests – 20%

Examination: No examination

#### **SYLLABUS**

1. Co-ordinate systems in two dimensions
2. Co-ordinate systems in three dimensions
3. Co-ordinate systems for the earth
4. Geodetic surveying

### **GEOGRAPHIC INFORMATION SYSTEM 2A (GISS201) (12 Credits)**

Theory: 3 periods per week

Practical: 2 periods per week

Continuous Assessment - Two tests - 20% each

Practical - 25%

Control Test - 35%

Examination: No examination

#### **SYLLABUS**

1. Introduction and Fundamentals of Geographic Information System.
2. Spatial Concepts
3. Spatial Data types
4. Geo-referencing and Geo-coding
5. GIS Hardware and Software
6. Data input and output
7. Data analysis

### **GEOGRAPHIC INFORMATION SYSTEM (GIS) 3A (GISS301) (12 Credits)**

Theory: 3 periods per week

Practical: 2 periods per week

Continuous Assessment : Two tests - 20% each

Practical - 25%

Control Test - 35%

Examination: No examination

## **SYLLABUS**

1. Raster and vector GIS & its Capabilities
2. Representing Reality, Sampling, Data sources, standards & accuracy
3. Spatial Objects & Database Models
4. Spatial Analysis
5. Graphic Output Design
6. Generating Complex Products.

## **GEOGRAPHIC INFORMATION SYSTEMS IV (GISY402) (0605019060)**

Theory: 5 periods per week

Semester Mark: Two tests - 20% each

Two projects - 20% each

One Control Test - 20%

Examination: No examination

## **SYLLABUS**

1. Nature of Geo-referenced information
2. Data capture
3. Data analysis
4. Presentation of information

## **GEOMATICS IA (GMTA101) (16 Credits)**

Theory: 4 periods per week

Practical: 2 periods per week

Semester Mark: Two tests - 12% each

Practical - 16% (Sub-minimum of 8% i.e. 50% of 16% for practical component)

Examination: One three-hour paper - 60%

## **SYLLABUS**

1. Basic principles of Surveying
2. Introduction to Map projections and co-ordinates systems.
3. Various methodologies involved in the determining of heights, (including levelling of control points, Long sections and Cross sections).
4. Co-ordinates calculations
5. Detail Survey & vertical sections (gradients)
6. Area and volumes

## **GEOMATICS IB (GMTB101) (16 Credits)**

Theory: 4 periods per week

Practical: 3 periods per week

Semester Mark: Two tests - 12% each

Practical - 16% (Sub-minimum of 8% i.e. 50% of 16% for practical component)

Examination: One three-hour paper - 60%

## **SYLLABUS**

1. Introduction to Geomatics and Surveying
2. Errors and Standards
3. Map Projection and Co-ordinate systems
4. Co-ordinate calculations (Triangulation)

5. Trigonometric systems and Survey Datums
6. Introduction to Global navigation satellite systems (GNSS & GPS)
7. Total station and Instrument adjustments
8. Trigonometrical levelling
9. Electronic Distance Measurements (EDM)
10. Traversing
11. Engineering & Construction surveying
12. Cadastral surveying

### **GEOMETRIC DESIGN (GEDE801) (12 credits)**

Theory: 3 periods per week

Semester Mark: Two Tests – 20% each

Examination: One Three hour paper – 60%

#### **SYLLABUS**

1. Introduction – definitions of basic terms
2. Horizontal and vertical alignment
3. Basic design consideration and safety characteristics
4. Driver behaviour and reactions
5. Route location
6. Intersection / interchange / roundabout design

### **GEOMETRIC DESIGN IV MODULE 1 THEORY (GMDS411) (0806111060)**

Theory: 4 periods per week

Semester Mark: Two tests - 20% each

Examination: One four-hour paper - 60% (restricted open book)

#### **SYLLABUS**

- |                                            |                                      |
|--------------------------------------------|--------------------------------------|
| 1. Principles & practice of Road Alignment | 5. Intersection & interchange design |
| 2. Environmental impact control            | 6. Drainage design                   |
| 3. Design control and criteria             | 7. Earthworks design                 |
| 4. Elements of design (Geometrics, Safety) |                                      |

### **GEOMETRIC DESIGN IV MODULE 2 PROJECT (GMDS421) (0806111060)**

Project: 1 period per week

Semester Mark: One industry based project - 100%

#### **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

### **GEOTECHNICAL ENGINEERING 2B (GEOT201) (12 Credits)**

Theory: 3 periods per week

Practical: 2 periods per week

Semester Mark: Two tests – 14% each

Three practicals (4% each) – 12%

Examination: One three hour paper

#### **SYLLABUS**

1. Properties of soils
2. Flow of water through soils
3. Effective stresses

4. Shear strength of soils
5. Consolidation
6. Shallow foundations
7. Site investigations
8. Laboratory practicals

### **HYDRAULICS (HYDR801) (12 credits)**

Theory: 3 periods per week

Semester Mark: Two Tests – 15% each

Assignment – 10%

Examination: One Three hour paper – 60%

### **SYLLABUS**

1. Review of the fluid mechanics concepts
2. Review of pipe flow and open channel flow
3. Pipelines and pipe networks
4. Water Distribution Systems
5. Water Pumps and Turbines
6. Introduction to the hydraulics structures

### **HYDRAULICS IV MODULE 1 THEORY (HYDR412) (0806112060)**

Theory: 4 periods per week

Semester Mark: Two tests - 20% each

Examination: One three-hour paper - 60%

### **SYLLABUS**

- |                                                |                            |
|------------------------------------------------|----------------------------|
| 1. Hydrodynamics                               | 4. Open channel hydraulics |
| 2. Hydraulic machinery (Pumps, Turbines, etc.) | 5. Fluvial hydraulics      |
| 3. Hydraulic models                            | 6. Wave hydraulics         |

### **HYDRAULICS IV MODULE 2 PROJECT (HYDR422) (0806112060)**

Project: 1 period per week

Semester Mark: One industry based project - 100%

### **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

### **HYDROLOGY (HDRV801) (12 credits)**

Theory: 3 periods per week

Semester Mark: Two Tests – 15% each

Assignment – 10%

Examination: One Three hour paper – 60%

### **SYLLABUS**

1. Review of the hydrological cycle
2. Surface water Hydrology
3. Groundwater hydrology
4. Well hydraulics



5. Probability and frequency analysis
6. Water Recourses Management
7. Water Recourses in South Africa

### **LAW FOR LIFE (LWLF101) (8 Credits) (serviced module)**

Theory: 2 periods per week

Tutorial; 1 period per week

Semester Mark: One formal test – 60%

Student to complete 2 of 3 assessments below – 40%

A group assignment worth 20% of final mark

A group poster presentation worth 20% of final mark

Draft a Will worth 20% of the final mark

No Examination; 100% course mark

### **SYLLABUS**

1. Introduction to Law
2. Civil and Criminal Law
3. Law of Insurance
4. Road Accident Fund
5. Law of Contract
6. Marriage
7. Succession

### **LEGAL PRINCIPLES 2B (LPPL201) (12 Credits)**

Theory: 3 periods per week

Semester Mark: Two tests - 20% each

Examination: One three-hour paper - 60%

### **SYLLABUS**

1. An introduction to South African Law
2. Legislation as a source of law
3. The Constitution
4. The Law of property
5. The Law of things
6. The Law of contract
7. An introduction to Land reform in South Africa
8. Land Legislation applicable in South Africa
9. Legislation for Surveying students

### **MANAGEMENT PRINCIPLES & PRACTICE IV MODULE I THEORY (MTPP411) (0409226060)**

Theory: 4 periods per week

Semester Mark: 2 tests - 20% each

Examination: One three-hour paper - 60%

### **SYLLABUS**

- |                                |                                      |
|--------------------------------|--------------------------------------|
| 1. Management approaches       | 4. Decision making & problem solving |
| 2. The business environment    | 5. Strategic management              |
| 3. The functions of management | 6. Management by objectives          |

7. Corporate communications
8. Small business management
9. International management

10. Politics, ethics and social responsibility
11. Case studies

## **MANAGEMENT PRINCIPLES & PRACTICE IV MODULE 2 PROJECT (MTPP421) (0409226060)**

Project: 1 period per week

Semester Mark: One industry based project - 100%

### **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

## **MAP PROJECTIONS AND COORDINATE SYSTEMS 2B (MPSC201)**

(12 Credits)

Theory: 3 periods per week

Practical: 2 periods per week

Semester Mark: Two tests - 10% each

One project - 20% each

Examination: One three-hour paper - 60%

### **SYLLABUS**

1. Two- and three-dimensional coordinate systems
2. Grid reference systems, shape of the Earth
3. Mathematical representations of the Earth, (including reference ellipsoids)
4. Geographical coordinates, different types of map projections, Including mathematical models and projection properties)
5. Reference datums and common ellipsoids
6. SA Survey co-ordinate system and UTM system
7. Projection-to-projection transformations

## **PAVEMENT AND MATERIALS TECHNOLOGY (PAMT801) (12 credits)**

Theory: 3 periods per week

Semester Mark: Two Tests – 20% each

Examination: One Three hour paper – 60%

### **SYLLABUS**

1. Introduction to road pavement materials.
2. Typical pavement structures.
3. Underlying engineering concepts.
4. Pavement design, traffic loading, rutting and cracking.
5. Pavement durability and skid resistance.
6. Surface dressing.
7. Pavement maintenance systems

## **PHOTOGRAMMETRY 2A (PHGR201) (12 Credits)**

Theory: 3 periods per week

Practical: 2 periods per week

Semester Mark: Two tests - 10% each

Two projects - 10% each

Examination: One three-hour paper - 60%

### **SYLLABUS**

1. Geometry of sensors and sensor systems (airborne, space borne and terrestrial)
2. Camera calibration, acquisition of images (including flight planning)
3. Image media and formats incl. image compression
4. Principles of analogue and digital photography, Ortho-rectification, mosaicing and geo-referencing

### **PHOTOGRAMMETRY IV (PHTG401) (0825075060)**

Theory: 5 periods per week

Semester Mark: Method of assessment to be decided

Examination: One three-hour paper - 60%

### **SYLLABUS**

1. Photogrammetry project design
2. Graphic output
3. Image interpretation
4. Photogrammetric office organisation
5. Image processing

### **PRACTICE MANAGEMENT IV (PRMT401) (0409258060)**

Theory: 5 periods per week

Semester Mark: Two tests - 13,33% each

One assignment - 13,33%

Examination: One three-hour open book paper- 60%

### **SYLLABUS**

1. Human relations in organisations
2. Principles & practice of management
3. Project management

### **PRESTRESSED CONCRETE DESIGN (PSCD801) (12 credits)**

Theory: 3 periods per week

Semester Mark: Two tests – 20% each

Examination: One three hour open book paper – 60%

### **SYLLABUS**

General understanding of pre-stressed concrete

Design a section to resist load effects

Special application to beams

Special application to slabs

### **PROJECT MANAGEMENT (PMAN301) (8 Credits)**

Theory: 4 periods per week

Semester Mark: Test I - 20%

Group Project – 20% (sub-minimum 50%)

Examination: One three hour paper – 60%

**Graduate Attribute (GA) assessed: GA II – Engineering Management**

## **SYLLABUS**

1. Project Management within Context
2. Modern Project planning methods, tool, analysis and computer applications
3. Oral and written communication of project planning
4. Project Implementation Support of the operational systems

### **PROJECT MANAGEMENT (PRMA301) (8 Credits)**

Theory: 4 periods per week

Semester Mark: Two Tests - 20% each

Examination: One three hour paper – 60%

## **SYLLABUS**

5. Project Management within Context
6. Modern Project planning methods, tool, analysis and computer applications
7. Oral and written communication of project planning
8. Project Implementation Support of the operational systems

### **REINFORCED CONCRETE DESIGN 3A (RFCD301) (12 Credits)**

Theory: 3 periods per week

Tutorial: 1 period per week

Semester Mark: One test - 15%

One test – 20%

Computer assignment – 5%

Examination: One three-hour paper - 60% (restricted open book)

***Graduate Attribute (GA) assessed: GA 2 application of scientific and engineering knowledge***

## **SYLLABUS**

1. Loading & Analysis
2. Element Design & Detailing
3. Computer application

### **REINFORCED CONCRETE DESIGN (RFCD801) (12 credits)**

Theory: 3 periods per week

Semester Mark: Two tests – 20% each

Examination: One Three hour paper – 60%

## **SYLLABUS**

1. Analysis and Design for Torsion
2. Analysis of Concrete Structures
3. Beams on Elastic Material
4. Cracking and Deflections
5. Design for Serviceability
6. Ductility in Reinforced Concrete
7. Water Retaining Structures

### **RESEARCH PROJECT (REPR802) (32 credits)**

Theory: 8 periods per week

The examination consists of a written research report, a written abstract and a poster presentation. Each team member will be allocated a section of the research project to present with cross questions on any aspect of the project. The examiner sets the grade after consultation with the supervisor and the HOD based on the work performance, the research report and the research presentation.

**Graduate Attributes (GA) assessed:**

**GA 1 - Problem Solving**

**GA 2 - Application of scientific and engineering knowledge**

**GA3 - Engineering Design**

**GA 4 - Investigations, experiments and data analysis**

**GA 5 – Engineering methods, skills, tools, including Information technology.**

**GA6 - Professional and Technical Communication**

**GA7 - Sustainability and Impact of Engineering Activity**

**GA9 – Independent learning ability**

**GA10 - Engineering Professionalism**

**SYLLABUS**

The course is based on an individual research work including literature studies according to the study plan. An individual study plan will be commonly written by the supervisor and the student which serves as a project description. The course will include an overview of research methodology. At the end of the practical work, the students will write a research report. A poster based on the research results will be designed, presented and discussed. Data collection can be performed at other universities or authorities, or in industry.

**RETICULATION DESIGN AND MANAGEMENT (RDAM801) (12 credits)**

Theory: 3 periods per week

Semester Mark: One Test – 20%

Assignment – 20%

Examination: One Three hour paper – 60%

**SYLLABUS**

1. Hydraulic Principles
2. Design Principles
3. Ancillary Works
4. Systems Operations
5. Pumping Installations
6. Environmental Aspects

**SETTLEMENT HISTORY 101 (STHS102) (8 Credits)**

Theory: 2 periods per week

Semester Mark: Two tests - 15% each

One project - 20%

Examination: One three-hour paper - 50%

**SYLLABUS**

**SECTION I:** deals with the Classical Period. In this section the principles and practise in the Classical Period is outlined. Classical developments are the foundations of Western civilization.

The concepts, methods, principles and examples are conveyed in the following time frames:

- Pre-history and Early Cities
- Greek period
- Roman Empire period
- Medieval period

**SECTION II:** deals with Contemporary Cities and the Evolution of the South African City. This section puts in perspective the attitudes, events, policy and regulations which have shaped the South African city and society.

The sub-sections are as follows;

- Pre-colonial societies, space and settlement patterns in South Africa
- The Renaissance City
- The Industrial City and the Garden City response
- Early 20<sup>th</sup> Century developments, The New Town Movement
- African Cities

### **SOCIOLOGY OF WORK 101 (SCLW101) (8 Credits) (Served)**

Theory: 2 periods per week

Semester Mark:

The approach will be one of continuous assessment.

The assessment will be made up as follows:

This is how will outcomes be assessed.

Tutorial attendance - 15%

Submission of all tutorials - 20%

Blackboard (online) Exercises - 15%

Group Project - 20%

Submission of a 4-5page written assignment - 30%

Examination: No Examination

### **SYLLABUS**

1. What is Work?
2. Industrialisation and post industrialisation
3. The capitalist workplace
4. Trade unionism
5. Women and Work
6. Precarious Labour

### **SOLID WASTE MANAGEMENT IV MODULE I THEORY (SWMT411) (0806120060)**

Theory: 4 periods per week

Semester Mark: Two tests - 20% each

Examination: One three-hour paper - 60%

### **SYLLABUS**

1. Characteristics of waste
2. Solid waste disposal methods
3. Design, operation & management of landfill sites
4. Operation & management of solid waste removal systems
5. Third World applications

6. Waste recycling
7. Emergency waste management
8. Legal aspects

### **SOLID WASTE MANAGEMENT IV MODULE 2 PROJECT (SWMT421) (0806120060)**

Project: 1 period per week

Semester Mark: One industry based project - 100%

#### **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

### **STATISTICS 2B (STST201) (12 credits)**

Theory: 3 periods per week

Semester Mark: Three Tests – 13.33% each

Examination: One three hour paper - 60%

#### **SYLLABUS**

1. The nature of observations and data acquisition,
2. Types of errors,
3. Means, norms ,accuracy, precision,
4. Reliability, probability, confidence intervals,
5. Distributions and probability density functions
6. Auto- and cross-correlation,
7. Hypothesis testing

### **STRUCTURAL ANALYSIS 2B (STAN201) (12 Credits)**

Theory: 3 periods per week

Tutorial: 1 period per week

Computer module: 1 period week

Semester Mark: Two tests - 17.5% each

Computer application test – 5%

Examination: One three-hour paper - 60%

#### **SYLLABUS**

1. Analysis of statically indeterminate structures

### **STRUCTURAL ANALYSIS IV MODULE 1 THEORY (SANA411) (0806121060)**

Theory: 4 periods per week

Semester Mark: Two tests - 20% each

Examination: One three-hour paper - 60%

#### **SYLLABUS**

1. Advanced structural analysis methods
2. Applicable computer applications

### **STRUCTURAL ANALYSIS IV MODULE 2 PROJECT (SANA421) (0806121060)**

Project: 1 period per week

Semester Mark: One industry based project - 100%

## **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

### **STRUCTURAL ENGINEERING (SELECTED TOPIC) (SEST802) (12 credits)**

Theory: 3 periods per week

Semester Mark: Two tests – 20% each

Examination: One Three hour paper – 60%

## **SYLLABUS**

### **Indicative content for topic 1 and 2**

#### **Masonry Design (Topic 1)**

Un Reinforced Masonry

Reinforced Masonry

Working Details and Drawings

#### **Concrete Technology (Topic 2)**

Core themes:

- Properties of fresh concrete
- Strength of hardened concrete
- Deformation and volume change of hardened concrete
- Durability of concrete
- Concrete mix design
- Reinforcement
- Control of concrete quality
- Sand-cement-mortars, plasters and screed
- Concrete repair

Select any three of the following themes as part of the course:

- Cementitious materials

Other cements

- Aggregates for concrete
- Mixing water
- Chemical admixtures
- Alkali-silica reaction
- Manufacture and handling of concrete
- Formwork
- Thermal properties of concrete and temperature development at early ages in large concrete elements
- High-performance concrete
- High-density concrete
- Low-density concrete
- Self-compacting concrete
- Fibre reinforced concrete
- Precast concrete products
- Shotcrete
- Roller-compacting concrete



- No-fines concrete

### **STRUCTURAL DESIGN THEORY INTRO 2B (SDTI201) (16 Credits)**

Theory: 3 periods per week

Tutorial: 1 period per week

Semester Mark: Two tests - 20% each

Examination: One three-hour paper - 60% (restricted open book)

#### **SYLLABUS**

1. Loading and Limit State Design Philosophy
2. Structural Steel Ties, Struts and Beams
3. Reinforced Concrete Beams

### **STRUCTURAL MECHANICS 1B - MODULE 1 (STMC101) (12 Credits)**

Theory: 3 periods per week

Semester Mark: Two tests - 15% each

Practical - 10%

Examination: One three-hour paper - 60%

#### **SYLLABUS**

1. Section Properties
2. Shear Centroids
3. Stress and Strains
4. Impact Loads
5. Mohrs Circle

### **STRUCTURAL MECHANICS 2A - MODULE 1 (STMC201) (12 Credits)**

Theory: 3 periods per week

Semester Mark: Two tests - 15% each

Practical - 10%

Examination: One three-hour paper - 60%

#### **SYLLABUS**

1. Shear Forces, Bending Moments and Deflection of Statically Determinate Structures
2. Combined Stresses
3. Moment Area Method
4. Shear Centroids
5. Torsion

### **STRUCTURAL STEEL DESIGN 3B - (STSD301) (12 Credits)**

Theory: 4 periods per week

Computer module: 2 periods per week for 6 weeks

Continuous Assessment:

Test One – 20%

Test Two – (GA assessment) – 40% (computer module – sub-minimum 60%)

Test Three – 40% (restricted to students who met the pass requirement of Test 2)

Examination: No examination

**Graduate Attribute (GA) assessed in this module: GA 5 Engineering methods, skills, tools,**

*including information technology. The GA assessment will be conducted in the department computer labs venue where the student must demonstrate achievement of GA 5.*

## **SYLLABUS**

1. Structural loading and analysis
2. Structural steel design

## **STRUCTURAL STEEL DESIGN (STSD801) (12 credits)**

Theory: 3 periods per week

Semester Mark: Design project – 40%

Examination: One three hour paper – 60%

## **SYLLABUS**

Loading, analysis and design of a steel framed structure

## **STRUCTURAL THEORY (SRTH801) (12 credits)**

Theory: 3 periods per week

Semester Mark: One Test – 20%

Assessment – 20%

Examination: One three hour paper – 60%

## **SYLLABUS**

Matrix methods,

Yield Line analysis,

Virtual work for rigid frames

Plastic analysis

## **STRUCTURAL TIMBER DESIGN IV MODULE 1 THEORY (STDE411) (0806125060)**

Theory: 4 periods per week

Semester Mark: Two tests - 20% each

Examination: One four-hour paper - 60% (restricted open book)

## **SYLLABUS**

1. Design of timber structures
2. Computer applications
3. Working details & drawings

## **STRUCTURAL TIMBER DESIGN IV MODULE 2 PROJECT (STDE421) (0806125060)**

Project: 1 period per week

Semester Mark: One industry based project- 100%

## **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project

## **SURVEYING FOR CIVIL ENGINEERING IB (SRCV101) (16 Credits)**

Theory: 4 periods per week

Practical: 3 periods per week

Semester Mark:  
Two tests - 15% each  
Four Practical projects – 40%  
One Control Test – 30%  
Examination: No examination

### **SYLLABUS**

1. Basic principles of Surveying
2. Map Projections
3. Various methodologies involved in the determining of heights (including levelling of control points, Long sections and Cross sections).
4. Various methodologies involved in the determining of horizontal positions (including traversing, double polar and GPS works).
5. Detail Survey and vertical sections (gradients)
6. Setting out civil engineering structures
7. Areas and volumes

### **SURVEY DRAWING IB (SVDR101) (12 Credits)**

Theory: 3 periods per week  
Semester Mark: Two CAD projects - 25% each  
One Control Test - 50%  
Examination: No examination

### **SYLLABUS**

1. Introduction to basic CAD
2. Survey symbols
3. Survey Calculations
4. Digital terrain models (DTM) and Contouring
5. Hatching
6. Definition of CAD layers
7. Identification and manipulation of CAD elements
8. Survey Diagrams
9. General Plans
10. Detail Plan

### **SURVEY PROJECT IV (SVPR401)**

Theory: 5 periods per week  
Semester Mark: Continuous assessment by means of industry related projects  
Examination: No examination

### **SYLLABUS**

A number of industry orientated tasks must be completed by the student.  
Based on a sound investigation a comprehensive report discussing the analysis and solution or completion of the task must be submitted.

### **SURVEY PRACTICE II -(EXSV201)**

Evaluation: Continuous evaluation by the University in collaboration with the supervisory officer

### **SYLLABUS**

At least one year of experiential training under the supervision of a qualified mentor in the following categories of Surveying work:

- |                              |                             |
|------------------------------|-----------------------------|
| 1. Levelling                 | 5. Computer data processing |
| 2. Traverse                  | 6. Detail surveying         |
| 3. Triangulation             | 7. Construction surveying   |
| 4. Trigonometrical levelling |                             |

Obtain a Code 8 Drivers License or higher

### **SURVEY PROJECT 3B (SVPJ301) (32 credits)**

Theory: 4 periods per week

Semester Mark : Continuous Assessment

5 Assignments - 11% each

1 Mini Dissertation – 40%

Skills Test – 5% (sub-minimum of 70% is required to pass)

Examination: No examination

### **SYLLABUS**

1. Introduction
2. Research Methodology
3. Computing for geomatics
4. Survey Drawing
5. Control Surveying
6. Engineering Survey
7. Cadastral Surveying
8. GIS

### **TECHNICAL LITERACY (TECLI01) (8 Credits)**

Theory: 2 periods per week

Semester Mark: Test one – 30 %

Test two – 20 %

Report one – 30 %

Report two – 20 %

Examination: No examination

### **SYLLABUS**

1. Understanding the differences between language used in academic, technical and common environments
2. Experimental/Scientific method and design methods in technical report writing
3. Planning and documenting technical reports for experiments
4. Writing a Technical Report
5. Referencing practice using the Harvard method
6. Utilising spreadsheets and word processors for graphical presentation of information

### **THE GLOBAL ENVIRONMENT (GENVI01) (8 credits)**

Theory: 2 periods per week

Semester Mark : Continuous Assessment

Two assignments – 30% each  
One assignment – 40%

Examination : No examination

### **SYLLABUS**

1. Environmental Pollution (Air, water and soil)
2. Population growth vs. natural resources
3. Climate change and global warming
4. Sustainable development

### **THEORY OF ERRORS AND NETWORK ADJUSTMENT 3A (TENA301)**

(20 Credits)

Theory: 4 periods per week

Semester Mark: Two tests - 20% each

Examination: One three-hour paper - 60%

### **SYLLABUS**

1. Least squares theory
2. Simple and multiple regression
3. Distribution functions
4. Law of error propagation
5. Least squares adjustments of survey observations
6. Network adjustment

### **THEORY OF STRUCTURES IV MODULE 1 THEORY (TSTR412) (0806132060)**

Theory: 4 periods per week

Semester Mark: Two tests - 20% each

Examination: One three-hour paper - 60%

### **SYLLABUS**

1. Advanced structural theory & analysis
2. Applicable computer applications

### **THEORY OF STRUCTURES IV MODULE 2 PROJECT (TSTR422) (0806132060)**

Project: 1 period per week

Semester Mark: One industry based project - 100%

### **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

### **TOWN & REGIONAL PLANNING: LAYOUT & DESIGN 3A (TRLD301)**

(12 credits)

Theory: 3 periods per week

Semester Mark: Two Tests - 12% each

One Project – 16%

Examination: One three hour paper - 60%

### **SYLLABUS**

1. An introduction to the nature of Town Planning.
2. Understanding of the sizes of lots for different types of residential development.

3. Locational distribution of different land use types.
4. A differentiated road hierarchy and appropriate road reserve cross-section.
5. Underlying Concepts and Principles.

### **TRANSPORT TECHNOLOGY 2A - (TRTA201)** (12 Credits)

Theory: 4 periods per week – 1 of which is in the computer room

Semester Mark: Two tests - 15% each

One assessment (software) – 10%

Examination: One three hour paper – 60%

#### **SYLLABUS**

1. Basic Traffic Engineering
2. Route Location
3. Design Considerations
4. Basic Rail Design
5. Earthworks Design
6. Computer Application

### **TRANSPORT TECHNOLOGY 2B (TRTB201)** (12 Credits)

Theory: 3 periods per week

Practical: 1 period per week

Semester Mark: 2 Tests – 15% each

Lab Practicals - 10 %

Examination: One three hour paper - 60%

#### **SYLLABUS**

1. Pavement materials and design
2. Compaction and Stabilization
3. Seal design
4. Pavement rehabilitation

### **TRANSPORT TECHNOLOGY 3A (TRTA301)** (16 Credits)

Theory: 4 periods per week

Semester Mark: 2 Tests – 20% each Test 2 (50% subminimum)

Examination: One three hour paper - 60%

***Graduate Attribute (GA) assessed in Test 2 : - GA 4 Investigations, Experiments & Data Analysis***

#### **SYLLABUS**

1. Transport Planning
2. Transport Systems
3. Traffic Engineering

### **TRANSPORT TECHNOLOGY 3B - (TRTB301)** (12 Credits)

Theory: 3 periods per week

Semester Mark: Two tests - 20% each (Test 2 – 50% sub-minimum)

Examination: One three-hour paper - 60%

**Graduate Attribute (GA) assessed in Test 2: GA 1 Problem solving**

**SYLLABUS**

1. Road Drainage Design
2. Route Location
3. Basic Design Considerations
4. Horizontal Alignment
5. Vertical Alignment
6. Cross Sectional Elements
7. Intersection Design
8. Interchange Design

**TRANSPORT TECHNOLOGY AND PLANNING (TTAP801) (12 credits)**

Theory: 3 periods per week

Semester Mark: One Test – 20%

Assignment – 20%

Examination: One Three hour paper – 60%

**SYLLABUS**

1. Transportation policies
2. Transportation systems
3. Transportation Structures
4. Public transport
5. Private transport
6. Vehicle & Driver characteristics
7. Land Use and transportation planning
8. Spatial Development
9. The Planning Process
10. Traffic Engineering
11. Model Building
12. Transportation systems management

**TRANSPORTATION TECHNOLOGY IV MODULE 1 THEORY (TPTE411) (0806128060)**

Theory: 4 periods per week

Semester Mark: Two tests - 20% each

Examination: One three-hour paper - 60%

**SYLLABUS**

- |                           |                                     |
|---------------------------|-------------------------------------|
| 1. Transport policies     | 5. Private transport                |
| 2. Transportation systems | 6. Freight transport                |
| 3. Terminals              | 7. Vehicle & driver characteristics |
| 4. Public transport       |                                     |

**TRANSPORTATION TECHNOLOGY IV MODULE 2 PROJECT (TPTE421) (0806128060)**

Project: 1 period per week

Semester Mark: One industry based project - 100%

## **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

### **URBAN PLANNING AND DESIGN (URPT801) (12 credits)**

Theory: 3 periods per week

Semester Mark: One Test – 20%

Assignment – 20%

Examination: One Three hour paper – 60%

## **SYLLABUS**

1. Historical Perspective
2. The Planning Process
3. Land Use
4. Planning Legislation
5. Residential Township Development
6. Layout Planning
7. Storm water Management
8. Geometric Design Standards
9. Design and Maintenance of Streets
10. Water Supply
11. Sanitation
12. Solid Waste Management

### **WASTEWATER TREATMENT TECHNOLOGY (WATT802) (12 credits)**

Theory: 3 periods per week

Semester Mark:

Examination:

## **SYLLABUS**

1. Introduction to Waste Water
2. Screening, Grit removal and Equalization
3. Primary and Secondary Clarifiers
4. Flotation , Aeration and Chemical Treatment
5. Microbial Kinetics and **Activated Sludge Process Design**
6. Aerated Stabilization Basin Design
7. Fixed Film Systems And Anaerobic Treatment Processes
8. Tertiary Treatment
9. Sludge Handling, Treatment & Disposal & Solids Waste Management

### **WATER/HYDRAULICS 2A (WHYD201) (12 Credits)**

Theory : 3 periods per week

Practical : 2 periods per week

Semester Mark : Two tests – 10% each;

Lab report / Assignment - 20%

Examination : One three-hour paper – 60%

## **SYLLABUS**

1. Introduction and Basic Concepts
2. Properties of Fluids



3. Hydrostatic principles
4. Hydrodynamic principles
5. Internal Flow (Pipe Flow)
6. Open channel flow
7. Flow Rate and Velocity Measurement

### **WATER/HYDROLOGY 2B ( WHDL201) (12 Credits)**

Theory: 3 periods per week

Semester Mark: Two tests – 10% each

One Assignment/Report – 20%

Examination: One three-hour paper – 60%

#### **SYLLABUS**

1. Hydrology principles and Hydrologic cycle
2. Statistics of Hydrological data
3. Precipitation
4. Abstractions from Precipitation
5. Infiltration
6. Surface Runoff
7. Hydrograph Analysis

### **WATER RETICULATION DESIGN 3A (WRTD301) (12 Credits)**

Theory: 3 periods per week

Semester Mark: One Test – 20%

One assignment – 20%

Examination: One three hour paper – 60%

#### **SYLLABUS**

1. Hydraulic principles, pressure and open channel flow in pipelines, water hammer, networks, Hardy- Cross method.
2. Design of potable water reticulation networks. Balancing & storage reservoirs.
3. Design of sewer reticulation networks.
4. Design of storm water reticulation.
5. Valves, thrust blocks, corrosion protection & access chambers, trench & embankment conditions, flexible & rigid pipes.

### **WATER TREATMENT TECHNOLOGY 3B (WTRM301) (12 Credits)**

Theory: 3 periods per week

Semester Mark: Two tests – 20% each

Examination: One three-hour paper – 60%

**Graduate Attribute (GA) assessed: GA 7 Impact of Engineering Activity.**

#### **SYLLABUS**

1. Physical, chemical and biological quality of water
2. Drinking water standards
3. Overview of water quality standards in South Africa
4. General overview of water treatment basic techniques: coagulation, flocculation, sedimentation, filtration and disinfection

5. Wastewater characteristics and standards

### **WATER TREATMENT TECHNOLOGY (WTTY801) (12 credits)**

Theory: 3 periods per week

Semester Mark: Two tests – 10% each

Assignment – 20%

Examination: One Three hour paper – 60%

#### **SYLLABUS**

1. Overview on Water Quality
2. Introduction to water treatment
3. Membrane Separation
4. Adsorption
5. Ion Exchange
6. Softening
7. Filtration
8. Biological Nutrient Removal Processes

### **WATER TREATMENT TECHNOLOGY IV MODULE 1 THEORY (WTTC411) (0806130060)**

Theory: 4 periods per week

Semester Mark: Two tests - 20% each

Examination: One three-hour paper - 60%

#### **SYLLABUS**

1. Water properties
2. Treatment processes
3. Treatment plant design
4. Water recycling, re-use, recovery & conservation
5. Environmental aspects
6. Plant operation & management

### **WATER TREATMENT TECHNOLOGY IV MODULE 2 PROJECT (WTTC421) (0806130060)**

Project: 1 period per week

Semester Mark: One industry based project - 100%

#### **SYLLABUS**

Students will be required to investigate and produce an appropriate industry related design project.

Updated 14 December 2021 @ 14h00