

# BACHELOR OF ENGINEERING TECHNOLOGY IN CIVIL ENGINEERING

Qualification code: BPCE18 - NQF Level 7 (420 credits)

SAQA ID: 98844, CHE NUMBER: H/H16/E026CAN

Campus where offered:

Pretoria Campus

## REMARKS

a. *Admission requirement(s) and selection criteria:*

• **FOR APPLICANTS WHO OBTAINED A SENIOR CERTIFICATE BEFORE 2008:**

**Admission requirement(s):**

A Senior Certificate or an equivalent qualification, with B symbols (70 – 79%) at Standard Grade or C symbols (60 – 69%) at Higher Grade for English, Mathematics and Physical Science.

**Selection criteria:**

To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **28**.

**Recommended subject(s):**

None.

• **FOR APPLICANTS WHO OBTAINED A NATIONAL SENIOR CERTIFICATE IN OR AFTER 2008:**

**Admission requirement(s):**

A National Senior Certificate with a bachelor's degree endorsement or an equivalent qualification, with an achievement level of at least 5 for English (home language or first additional language) and Mathematics or Technical Mathematics and Physical Sciences or Technical Science.

**Selection criteria:**

To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **28**.

**Recommended subject(s):**

Civil Technology, Construction Technology and Engineering Graphics and Design.

• **FOR APPLICANTS WHO OBTAINED A QUALIFICATION FROM TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET) COLLEGES (PREVIOUSLY KNOWN AS FET COLLEGES):**

**Applicants with a National Certificate (Vocational) at NQF Level 4:**

**Admission requirement(s):**

A National Certificate (Vocational) at NQF Level 4 issued by the Council for Quality Assurance in General and Further Education and Training (Umalusi), with at least a 60% (APS of 5) for English and Mathematics, and at least 70% (APS of 6) for Physical Sciences or Applied Engineering Technology and any three other vocational subjects.

**Selection criteria:**

To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **34**.



**Recommended subject(s):**

None.

**Applicants with a National N Certificate as published in Nated 191: N3 (NQF Level 4):**

**Admission requirement(s):**

A National Senior Certificate and a National N Certificate as published in Nated 191: N3 (NQF Level 4), issued by both the Department of Higher Education (DHET) and the Council for Quality Assurance in General and Further Education and Training (Umalusi), with at least 60% (APS of 5) for English and at least 70% (APS of 6) for Mathematics N3 and Engineering Sciences N3.

Applicants will be exempted from NQF Level 5 modules on the grounds of N4/N5/N6 subjects passed (a minimum of 50% of the qualification's first-year modules). Exemption will be granted from equivalent engineering subjects (including Mathematics and Engineering Sciences) passed with at least 70% (APS of 6).

**Applicants with a N Diploma as published in Nated 191: N4/N5/N6 (NQF Level 5):**

**Admission requirement(s):**

A National Senior Certificate and a National N Diploma (Nated 191: N4/N5/N6) at NQF Level 5, issued by both the Department of Higher Education (DHET) and the Council for Quality Assurance in General and Further Education and Training (Umalusi), with at least 60% (APS of 5) for English and at least 70% (APS of 6) for Mathematics N4, N5 and N6 and Engineering Sciences N4.

Applicants will be exempted from NQF Level 5 modules on the grounds of N4/N5/N6 subjects passed (a maximum of 50% of the qualification's first-year modules). Exemption will be granted from equivalent engineering subjects (including Mathematics and Engineering Sciences) passed with at least 70% (APS of 6).

• **FOR APPLICANTS WITH QUALIFICATIONS ON THE HIGHER EDUCATION QUALIFICATION SUB-FRAMEWORK (HEQSF) OFFERED BY UNIVERSITIES OF TECHNOLOGY:**

The applicant will be considered for admission to the programme, if any of the following qualifications has been completed:

- Higher Certificate in Construction Engineering (NQF Level 5 - 140 credits): at least 60% for all modules completed.
- Advanced Certificate in Construction or Civil Engineering (NQF Level 6 - 140 credits): at least 60% for all modules completed.
- Diploma in Civil Engineering Technology (NQF Level 6 - 280 credits): at least 60% for all modules completed.
- National Diploma: Engineering: Civil (NQF Level 6 - 3,000 credits): at least 55% for all subjects completed.

b. *Assessment procedure:*

All applications received by the published due dates will be ranked according to the APS achieved. After consideration of the Departmental Student Enrolment Plan (SEP), only the top performing applicants will be selected. A waiting list consisting of the remainder of the applicants will provide an opportunity for applicants to fill places created by accepted students failing to meet the enrolment dates. Applicants will be informed per official letter from the Office of the Registrar.

c. *Minimum duration:*

Three years.

d. *Presentation:*

Day classes.



- e. *Intake for the qualification:*  
January only.
- f. *Exclusion and readmission:*  
See Chapter 2 of Students' Rules and Regulations.
- g. *Recognition of Prior Learning (RPL), equivalence and status:*  
See Chapter 30 of Students' Rules and Regulations.
- h. *Module credits:*  
Module credits are shown in brackets after each module.

## CURRICULUM

### FIRST YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
COL105X	Computer Literacy	(5)	(5)	
COS105X	Communication Skills	(5)	(6)	
EGC105B	Engineering Graphics	(5)	(14)	
EMA105B	Engineering Mathematics I	(5)	(28)	
ESU105B	Engineering Surveying	(5)	(28)	
INL125C	Information Literacy (block module)	(5)	(1)	
LFS125X	Life Skills (block module)	(5)	(2)	
SEM125B	Mechanics	(5)	(10)	

### FIRST SEMESTER

CEM115B	Civil Engineering Materials	(5)	(14)
SEP125B	Physics	(5)	(10)

### SECOND SEMESTER

CSP115B	Construction Principles	(5)	(14)
SEC125B	Chemistry	(5)	(8)

TOTAL CREDITS FOR THE FIRST YEAR: **140**

### SECOND YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
GTE206B	Geotechnical Engineering	(6)	(28)	Chemistry Mechanics Physics
SAS206B	Structural Analysis and Strength of Materials	(6)	(28)	Chemistry Mechanics Physics
TRE206B	Transportation Engineering I	(6)	(28)	Chemistry Mechanics Physics
WAE206B	Water Engineering I	(6)	(28)	Chemistry Mechanics Physics

### FIRST SEMESTER

EMA216B	Engineering Mathematics II	(6)	(14)	Engineering Mathematics I
---------	----------------------------	-----	------	---------------------------



## SECOND SEMESTER

PAS216B	Probability and Statistics	(6)	(14)
TOTAL CREDITS FOR THE SECOND YEAR:			<b>140</b>

## THIRD YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
CDP307B	Integrated Civil Engineering Project	(7)	(28)	
STD307B	Structural Design	(7)	(28)	Structural Analysis and Strength of Materials
TRE307B	Transportation Engineering II	(7)	(28)	Transportation Engineering I
WAE307B	Water Engineering II	(7)	(28)	Water Engineering I

## FIRST SEMESTER

SCC316B	Scientific Computing	(6)	(14)
---------	----------------------	-----	------

## SECOND SEMESTER

CEP317B	Civil Engineering Practice	(7)	(14)
TOTAL CREDITS FOR THE THIRD YEAR:			<b>140</b>
TOTAL CREDITS FOR THE QUALIFICATION:			<b>420</b>

## SUBJECT/MODULE INFORMATION (OVERVIEW OF SYLLABUS)

The syllabus content is subject to change to accommodate industry changes. Please note that a more detailed syllabus is available at the Department or in the study guide that is applicable to a particular subject. On 13 October 2017, the syllabus content was defined as follows:

### C

#### CHEMISTRY (SEC125B)

**1 X 2-HOUR PAPER**

*(Subject custodian: Department of Chemistry)*

The language chemistry and matter, The Atom; The Elements and the Periodic Table, ionic and molecular Compounds, reactions in cement and concrete, Chemical tests used for testing construction materials and water, Chemical composition and chemical additives for cement, bitumen and water. (Total tuition time: not available)

#### CIVIL ENGINEERING MATERIALS (CEM115B)

**1 X 3-HOUR PAPER**

*(Subject custodian: Department of Civil Engineering)*

Identify various types of soil and rock. Understand basic properties of soil. Perform various tests on soil to determine its properties (incl. calculations). Implement various methods to change and improve the properties of soil. Classify soil according to its properties. Describe and classify cement and concrete. Perform various tests on concrete to determine its properties (incl. calculations). Explain the properties of fresh concrete, concrete at an early age and hardened concrete. Design a concrete mix according to specifications as set out by the client. Change the properties of a concrete mix with the addition of admixtures to suit design needs. To introduce the student to steel used to reinforce concrete. Know how bitumen is produced. To classify the various bitumen products as used in the civil engineering industry. Perform various tests on bitumen to determine its properties (incl. calculations). Know how to apply bitumen in the civil engineering industry and Implement the use of other construction materials like bricks, steel, geosynthetics and wood in the design of a construction project. (Total tuition time: ± 140 hours)



**CIVIL ENGINEERING PRACTICE (CEP317B)****1 X 3-HOUR PAPER****(Subject custodian: Department of Civil Engineering)**

Engineering communication. Principles of management and management functions. Engineering ethics. Occupational health and safety. Principles of project management. Construction contracts and applicable law. Conditions of construction contract. Engineering specifications. Taking-off quantities and estimation of unit rates. Preparation of payment certificates. Tendering. (Total tuition time: ± 140 hours)

**COMMUNICATION SKILLS (COS105X)****1 X 2-HOUR PAPER****(Module custodian: Department of Applied Languages)**

To identify and apply basic competencies related to communicating in a technical or engineering environment. These competencies include presenting technical information to a variety of audiences, preparing technical reports, participating constructively in formal meetings and preparing a variety of business and technical documents. (Total tuition time: ± 40 hours)

**COMPUTER LITERACY (COL105X)****CONTINUOUS ASSESSMENT****(Module custodian: End User Computing Unit)**

Students have to acquire foundational knowledge in Computing Fundamentals, essential digital skills in key applications based on Ms Office Suite (i.e. MS Word, MS Excel, MS PowerPoint, MS Visio Professional and MS Access) and network basics (i.e. MS Outlook and Internet). A complete syllabus and module outlines are described in the study guide. Students will do online exams that are mapped with SAQA and IC3 Essential Skills for Digital Literacy (International Certification). (Total tuition time: not available)

**CONSTRUCTION PRINCIPLES (CSP115B)****1 X 3-HOUR PAPER****(Module custodian: Department of Civil Engineering)**

Basic principles of construction project. Characteristics of construction project. Basic concepts of construction technology. Measurement and assessment techniques. Construction models (phases). Capacities of machinery versus production. Assessment and testing of materials. Pavement materials. Assessment and qualification of foundations, structures and pavements. Assess and qualify design and construction of single and double stone surfacing. Assess and design of sand seals, slurries, emulsions, rigid and flexible pavements and maintenance, rehabilitation, construction of pavements and structures. (Total tuition time: ± 140 hours)

**E****ENGINEERING GRAPHICS (EGC105B, EGC105C)****CONTINUOUS ASSESSMENT****(Module custodian: Department of Civil Engineering)**

Drawing apparatus, drawing basics, construction geometry, orthographic projection, sections, isometric projection, CAD fundamentals and application of CAD to building drawings. (Total tuition time: ± 140 hours)

**ENGINEERING MATHEMATICS I (EMA105B)****1 X 3-HOUR PAPER****(Module custodian: Department of Mathematics and Statistics)**

Trigonometry, geometry, functions, complex numbers, vector algebra, matrices and transformations, single-variable differentiation and integration, partial differentiation, multiple-variable intervals, introduction to differential equations. (Total tuition time: not available)

**ENGINEERING MATHEMATICS II (EMA216B)****1 X 3-HOUR PAPER****(Module custodian: Department of Mathematics and Statistics)**

Mathematical modelling, first-order ordinary differential equations (ODEs), higher-order ODEs, Laplace transforms, systems of ODE's, numerical solutions of ODEs, Sturm-Liouville problems, partial differential equations. (Total tuition time: not available)

**ENGINEERING SURVEYING (ESU105B)****1 X 3-HOUR PAPER****(Subject custodian: Department of Geomatics)**

Levelling. Survey drawing. Earthworks quantities. The South African coordinate system. The join calculation. The polar calculation. The techniques of using a Theodolite or total station for tachometry. Field observations for tachometry. Tachometry calculations. Planning a site survey. Field observations for a site survey. Survey drawing. Control surveying for Points of Intersections (PI's). Control surveying for horizontal curves. Control surveying for pegging of roads and pipelines. Control surveying for excavation and embankments and intersections. (Total tuition time: ± 280 hours)



**G****GEOTECHNICAL ENGINEERING (GTE206B)****1 X 3-HOUR PAPER***(Module custodian: Department of Civil Engineering)*

Introduction to engineering geology. Rock formation, types, mineralogy and stratigraphy. Rock weathering. Geological structures. Introduction to hydrogeology. Geological maps. Introduction to soil mechanics. Compaction. Subsoil exploration. Introduction to effective stress and pore water pressure. Soil permeability and seepage. Compressibility and consolidation. Shear strength of soil. Lateral earth pressure. Stability of slopes. Ultimate bearing capacity. Ultimate bearing capacity for shallow foundation and load bearing capacity of vertical piles. (Total tuition time: ± 280 hours)

**I****INFORMATION LITERACY (INL125C)****CONTINUOUS ASSESSMENT***(Module custodian: Directorate of Library and Information Services)*

Introduction of information literacy. Development of a search strategy and application of a search string to search engines and academic databases. Evaluation of information sources. Ethical and legal use of information. (Total tuition time: ±10 hours)

**INTEGRATED CIVIL ENGINEERING PROJECT (CDP307B)****PROJECT ASSESSMENT***(Module custodian: Department of Civil Engineering)*

Bohlah Township Development: geotechnical, structural, water and transportation. (Total tuition time: ± 280 hours)

**L****LIFE SKILLS (LFS125X)****CONTINUOUS ASSESSMENT***(Module custodian: Directorate of Student Development and Support)*

Academic, personal and socioemotional skills development for students in higher education. Effective planning and self-management skills (Formulating a life vision (goal setting); Time management; Classroom skills (concentration, note taking and effective listening). Adjusting to university life (student life, diversity and change) Intra- and interpersonal skills development (conflict management, self-esteem). Academic skills for University (critical thinking, creativity, managing assignments and assessments. Effective living (managing diversity and change, healthy living, substance abuse). (Total tuition time: not available)

**M****MECHANICS (SEM125B)****1 X 3-HOUR PAPER***(Module custodian: Department of Mechanical Engineering)*

Introduction and SI units. Kinematics. Force's and Newton's laws of motion. Dynamics of uniform circular motion. Work and Energy. Impulse and momentum and rotational dynamics and torque. (Total tuition time: not available)

**P****PHYSICS (SEP125B)****1 X 2-HOUR PAPER***(Module custodian: Department of Physics)*

Fluids, heat and thermodynamics, waves and sound, electric and magnetic fields and forces. Total tuition time: not available)

**PROBABILITY AND STATISTICS (PAS216B)****1 X 3-HOUR PAPER***(Module custodian: Department of Mathematics and Statistics)*

Sampling techniques and descriptive statistics. Probability. Counting rules. Inferential statistics. Analysis of variance. Regression and correlation analysis. Non-parametric tests. (Total tuition time: not available)

**S****SCIENTIFIC COMPUTING (SCC316B)****1 X 4-HOUR COMPUTER-BASED***(Module custodian: Department of Electrical Engineering)*

Scientific programming environment and software. Selection and loop statements. Data structures. Input, output and graphics. Engineering applications, case studies and simulations. (Total tuition time: ± 140 hours)



**STRUCTURAL ANALYSIS AND STRENGTH OF MATERIALS (SAS206B)****2 X 3-HOUR PAPER****(Module custodian: Department of Civil Engineering)**

Introduction to structural analysis and design. Analysis of axial load carrying statically determinate structures (truss/pin-jointed frames, arches and cables). Analysis of statically determinate beams and rigid jointed frames. Influence lines and moving loads for statically determinate beams and trusses. Geometric properties of different structural shapes. Mechanical properties of structural materials. Concept of simple stresses and strains. Moment area method. Virtual work method. Slope deflection method. Moment distribution method. Influence lines for statically indeterminate structures. Flexibility method. Stiffness method. Beams on elastic foundations. Finite element analysis. Analysis of statically indeterminate arches and Beam-Column Analogy. (Total tuition time: ± 280 hours)

**STRUCTURAL DESIGN (STD307B)****2 X 4-HOUR PAPER****(Module custodian: Department of Civil Engineering)**

Limit state design principles. Load analysis. Reinforced concrete design. Structural steel design. Masonry design and structural timber design. (Total tuition time: ± 280 hours)

**T****TRANSPORTATION ENGINEERING I (TRE206B)****1 X 3-HOUR PAPER****(Module custodian: Department of Civil Engineering)**

Basic principles of transportation systems. Characteristics of transportation systems. Basic concepts of geometric design. Traffic counting techniques. Traffic flow models. Traffic capacities and levels of service. Design of signal setting. Pavement materials. Design of pavements. Design of single and double stone surfacing. Design of sand seals, slurries and diluted emulsions. Maintenance, rehabilitation and construction of pavements. (Total tuition time: ± 280 hours)

**TRANSPORTATION ENGINEERING II (TRE307B)****1 X 3-HOUR PAPER****(Module custodian: Department of Civil Engineering)**

Water transport and distribution: water distribution network modelling, network operation and maintenance, water loss management. Water Resources Management: water use and development, sustainability in water resources, water resource planning and management models, water allocation and conflict resolution. Dam Engineering: introduction to dam engineering, design of dams, dam safety and stability. Irrigation Engineering: basic soil-water-plant relationship, design of irrigation systems, land levelling in irrigation and drainage system design. (Total tuition time: ± 280 hours)

**W****WATER ENGINEERING I (WAE206B)****1 X 3-HOUR PAPER****(Module custodian: Department of Civil Engineering)**

Fluid Mechanics: fluid properties, hydrostatics, hydrodynamics, flow measurement. Hydraulics: water distribution networks, open channel flow. Hydraulics: hydraulic systems (machinery and structures). Hydrology: hydrologic cycle and processes, surface runoff, probability analysis, flood routing, groundwater hydrology. Water and wastewater treatment: water quality, water treatment, wastewater quality, wastewater treatment. (Total tuition time: ± 280 hours)

**WATER ENGINEERING II (WAE307B)****1 X 3-HOUR PAPER****(Module custodian: Department of Civil Engineering)**

Water transport and distribution: water distribution network modelling, network operation and maintenance, water loss management. Water resources management: water use and development, sustainability in water resources, water resource planning and management models, water allocation and conflict resolution. Dam Engineering: introduction to dam engineering, design of dams, dam safety and stability. Irrigation Engineering: basic soil-water-plant relationship, design of irrigation systems, land levelling in irrigation and drainage system design. (Total tuition time: ± 280 hours)

