BACHELOR OF ENGINEERING TECHNOLOGY IN MATERIALS ENGINEERING IN POLYMER TECHNOLOGY

BEngTech (Materials Engineering) (Polymer Technology) - NQF Level 7 (420 credits)

Qualification code: BPPT20

SAQA ID: 111166, CHE NUMBER: H/H16/E099CAN

Campus where offered: Pretoria Campus

REMARKS

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

- **FOR APPLICANTS WITH A SENIOR CERTIFICATE OBTAINED BEFORE 2008:**

  Admission requirement(s):
  A Senior Certificate with a matriculation endorsement or an equivalent qualification, with a C symbol at Standard Grade or a D symbol at Higher Grade for English, and B symbols at Standard Grade or C symbols at Higher Grade for 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 WITH A NATIONAL SENIOR CERTIFICATE OBTAINED IN OR AFTER 2008:**

  Admission requirement(s):
  A National Senior Certificate or an equivalent qualification, with a bachelor's degree endorsement, or an equivalent qualification, with an achievement level of at least 4 for English (home language or first additional language) and 5 for Mathematics or Technical Mathematics, and 5 for Physical Sciences or Technical Sciences.

  Selection criteria:
  To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **28** (excluding Life Orientation).

  Recommended subjects:
  Engineering Graphics and Design and Mechanical Technology.

- **FOR APPLICANTS WITH A NATIONAL CERTIFICATE (VOCATIONAL) AT NQF LEVEL 4:**

  Admission requirement(s):
  A National Certificate (Vocational) at NQF Level 4, with a bachelor's degree endorsement, issued by the Council for Quality Assurance in General and Further Education and Training (Umalusi) with at least a 50% (APS of 4) for English, 50% for Life Orientation (excluded for APS calculation), and 60% (APS of 5) for Mathematics and Science, and 60% (APS of 5) for any other three compulsory vocational subjects.

  Selection criteria:
  To be considered for this qualification, applicants must have an Admission Point Score (APS) of at least **28** (excluding Life Orientation).

  Recommended subject(s):
  None.

- **FOR APPLICANTS WITH A NATIONAL N CERTIFICATE/NATIONAL SENIOR CERTIFICATE AS PUBLISHED IN REPORT 191: N3 (NQF LEVEL 4):**

  Admission requirement(s):
  A National Senior Certificate or a National N Certificate with languages as published in Report 191: N3 (NQF Level 4) issued by both the Department of Higher Education and Training (DHET) and the Council for Quality Assurance in General and Further Education and Training (Umalusi), with at least 50% for English, Mathematics N3, Engineering Sciences N3 and any other two additional subjects.

  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 WITH AN N6 CERTIFICATE IN A RELATED ENGINEERING FIELD AS PUBLISHED IN REPORT 191: N6:**

  Admission requirement(s):
  An N6 Certificate in a related Engineering field as published in Report 191: N6 issued by both the Department of Higher Education and Training (DHET) and the Council for Quality Assurance in General and Further Education and Training (Umalusi), with an average of at least 60% for the qualification, and successful completion of an English Language Proficiency Assessment (done by the University).

  Recommended subject(s):
  None.

- **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 Materials Engineering in Polymer Technology (NQF Level 5 - 140 credits): with an average of at least 60% for the qualification.
  - Advanced Certificate in Materials Engineering in Polymer Technology (NQF Level 6 - 140 credits): with an average of at least 60% for the qualification.
  - Diploma in Materials Engineering in Polymer Technology (NQF Level 6 - 280 credits): with an average of at least 55% for the qualification.
  - National Diploma: Polymer Technology (NQF Level 6 - 3,000 credits): with an average of at least 55% for the qualification.

b. *Assessment procedure(s):*
No further assessment will be done (except for candidates with an N6 Certificate (see above)). Applicants who achieve the minimum APS will be considered until the programme complement is full. Acceptance is subject to available capacity according to the Student Enrolment Plan (SEP). Once a programme is full, a waiting list will be in place to provide an opportunity for applicants to fill places of those who did not register on time. Applicants will be informed of their status per official letter from the Office of the Registrar, alternatively, they can check their application status on the TUT website, www.tut.ac.za.

c. *Recognition of Prior Learning (RPL), equivalence and status:*
See Chapter 30 of Students' Rules and Regulations.

d. *Intake for the qualification:*
January only.

e. *Presentation:*
Day classes.

f. *Minimum duration:*
Three years.

g. *Exclusion and readmission:*
See Chapter 2 of Students' Rules and Regulations.

h. *Re-registration:*
A student may re-register for the module Plastics Design Project only with the permission of the Head of the Department. The purpose of the re-registration is to provide students with an opportunity to complete the final project only, and not to redo the whole module, should they fail the module.

CURRICULUM

FIRST YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
COL105X	Computer Literacy	(5)	(5)	
COS105X	Communication Skills	(5)	(6)	
EMA105B	Engineering Mathematics I	(5)	(28)	
EGE105B	Engineering Graphics	(5)	(14)	
INL125C	Information Literacy (block module)	(5)	(1)	
LFS125X	Life Skills (block module)	(5)	(2)	
MEC105B	Mechanics	(5)	(28)	
PTY105B	Plastics Technology	(5)	(28)	
FIRST SEMESTER				
ORC115B	Organic Chemistry	(5)	(14)	
SECOND SEMESTER				
SOA115B	Strength of Material I	(5)	(14)	
TOTAL CREDITS FOR THE FIRST YEAR:			**140**	

SECOND YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
EMA206B	Engineering Mathematics II	(6)	(14)	Engineering Mathematics I
PAS206B	Probability and Statistics	(6)	(14)	Engineering Mathematics I
PCO206B	Plastics Conversion I	(6)	(28)	Plastics Technology
PPT206B	Plastics Part and Tool Design	(6)	(28)	Engineering Graphics Plastics Technology
TFL206B	Thermo-Fluids	(6)	(28)	Engineering Mathematics I Mechanics
FIRST SEMESTER				
PMI216B	Plastics Material Science I	(6)	(14)	Plastics Technology
SECOND SEMESTER				
PYC216B	Polymer Chemistry	(6)	(14)	Organic Chemistry
TOTAL CREDITS FOR THE SECOND YEAR:			**140**	

THIRD YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
PCO307B	Plastics Conversion II	(7)	(28)	Plastics Conversion I
PDP307B	Plastics Design Project	(7)	(28)	Plastics Part and Tool Design
PDP317R	Plastics Design Project (re-registration) (first-semester module, see paragraph h)	(7)	(0)	
PMI307B	Plastics Material Science II	(7)	(28)	Plastics Material Science I
SOM307B	Strength of Materials II	(7)	(28)	Strength of Material I
FIRST SEMESTER				
SPT316B	Scientific Computing	(6)	(14)	
SECOND SEMESTER				
EPT317B	Engineering Practice	(7)	(14)	
TOTAL CREDITS FOR THE THIRD YEAR:			**140**	
TOTAL CREDITS FOR THE QUALIFICATION:			**420**	

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 module. At time of publication, the syllabus content was defined as follows:

C

COMMUNICATIONAL SKILLS (COS105X) **1 X 2-HOUR PAPER**

(Module custodian: Department of Chemical, Metallurgical and Material Engineering)

The purpose of this module is 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 notional time: 60 hours)

COMPUTER LITERACY (COL105X) **CONTINUOUS ASSESSMENT**

(Module custodian: End User Computing Unit)

This module provides foundational knowledge in computing fundamentals, essential digital skills in key applications based on MS Office Suite and network basics (i.e. MS Outlook and Internet). Online exams are mapped with End-User Computing: SAQA 49077 (61591) Core Element as well as Internet and Computing Core Certification. (IC3). (Total notional time: 50 hours)

E

ENGINEERING GRAPHICS (EGE105B) **CONTINUOUS ASSESSMENT**

(Module custodian: Department of Mechanical and Mechatronics Engineering)

Introduction to graphics communication. Dimensioning and tolerance practices. Geometrical construction. Orthographic projections. Machine drawing and introduction to computer aided design; and Assemblies. (Total notional time: 140 hours)

ENGINEERING MATHEMATICS I (EMA105B) **2 X 2-HOUR PAPERS**

(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 notional time: 280 hours)

ENGINEERING MATHEMATICS II (EMA206B) **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 notional time: 140 hours)

ENGINEERING PRACTICE (EPT317B) **CONTINUOUS ASSESSMENT**

(Module custodian: Department of Electrical Engineering)

Engineering Communication; Project Management; Management and Ethics; Contracts and Intellectual Property; and Entrepreneurship. (Total notional time: 140 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 notional time: 10 hours)

L

LIFE SKILLS (LFS125X) **CONTINUOUS ASSESSMENT**

(Module custodian: Directorate of Student Development and Support)

Personal, socio-emotional and academic skills development for students in higher education. This module includes: 1. Intra- and interpersonal skills (e.g. emotional intelligence, relationships, and conflict management); 2. General study skills (e.g. time management, goal setting, learning styles); 3. Health and wellness (e.g. HIV/AIDS, GBV issues, substance abuse); 4. Student life and adjustment (e.g. identity development, adjusting to a higher education environment); and 5. Financial management. (Total notional time: 20 hours)

M

MECHANICS (MEC105B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Mechanical and Mechatronics Engineering)

The purpose of this module is to equip the student with a fundamental understanding of mechanics and how to apply these to a design problem. (Total notional time: 280 hours)

O

ORGANIC CHEMISTRY (ORC115B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Chemical, Metallurgical and Material Engineering)

Introduction to organic chemistry, organic molecules, classes, nomenclature, structures, bonding, electronegativity and simple reactions; mechanisms of reactions of organic compounds, resonance, specific functional groups of interest include alkanes, alkenes, and their cyclic analogues; aromatic compounds; alcohols, ether and their sulphur analogues; aldehydes and ketones, carboxylic acids and their derivatives. Selected reactions and mechanisms of the specific functional groups include nucleophilic and/or electrophilic additions, substitutions and elimination processes. (Total notional time: 140 hours)

P

PLASTICS CONVERSION I (PCO206B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Chemical, Metallurgical and Material Engineering)

The purpose of this module is to introduce students to polymer process engineering concepts and principles, to enable them to analyse polymer processing operations in terms of common elementary and shaping steps. At the end of the module, if all the tutorials, tests and assignments are completed successfully, the student will be able to identify, analyse, and solve broadly-defined polymer processing problems. (Total notional time: 280 hours)

PLASTICS CONVERSION II (PCO307B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Chemical, Metallurgical and Material Engineering)

The purpose of this module is to introduce students to pre-processing of plastic materials as well as post-production operations in order to achieve the final desired product. At the end of the module, if all the tutorials, tests and assignments are completed successfully, the student will be able to identify, analyse, and solve, evaluate and critically reflect and address broadly-defined problems. (Total notional time: 280 hours)

PLASTICS DESIGN PROJECT (PDP307B/PDP317R) **PROJECT ASSESSMENT**

(Module custodian: Department of Chemical, Metallurgical and Material Engineering)

The purpose of the module is to provide holistic and systematic understanding and knowledge of product design. The module is designed and envisaged to mimic real workplace product design problems in which individuals work as part of a collective but also have responsibilities assigned particularly to them. At the end of this module, students can undertake advanced tasks related to the design of injection moulded polymer products and the tools to produce them. (Total notional time: 280 hours)

PLASTICS MATERIAL SCIENCE I (PMI216B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Chemical, Metallurgical and Material Engineering)

The purpose of this module is to impart fundamental knowledge of the relationships that exist between the structures and properties of materials and on the basis of these structure-property correlations, help students understand the process of designing or engineering the structure of a material to produce a predetermined set of properties. (Total notional time: 140 hours)

PLASTICS MATERIAL SCIENCE II (PMI307B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Chemical, Metallurgical and Material Engineering)

This module building on to the knowledge gained in the Plastics Material Science module. The purpose of this module is to equip the students with fundamental and application knowledge of polymer materials, in terms of the phase structure, properties, process requirements and applications, building on to the knowledge gained in the Plastics Material Science module. (Total notional time: 280 hours)

PLASTICS PART AND TOOL DESIGN (PPT206B) **CONTINUOUS ASSESSMENT**

(Module custodian: Department of Chemical, Metallurgical and Material Engineering)

The purpose of this module is to equip students with essential skills to design an injection-moulded part and the tool required to produce it. The module aims to prepare students for their design project in the final year by introducing the fundamental aspects of plastic part design and tool (mould) design. (Total notional time: 280 hours)

PLASTICS TECHNOLOGY (PTY105B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Chemical, Metallurgical and Material Engineering)

The purpose of this module is to equip the student with sufficient knowledge to understand the variations of selecting a suitable polymer resin together with suitable additives and be able to relate it to a suitable process so that a well-defined product can be manufactured. This module gives an understanding of a polymer, its structure and its properties, which will enable the student to have a fundamental understanding of the concepts of material and manufacturing processes used. (Total notional time: 280 hours)

POLYMER CHEMISTRY (PYC216B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Chemical, Metallurgical and Material Engineering)

Free radical polymerisation of vinyl polymers; ionic polymerisation of vinyl polymers; vinyl polymerisation with complex coordination catalysts; vinyl polymers properties and application; reactions of vinyl polymers; step growth and ring opening polymerisation of non-vinyl polymers; and natural and biodegradable polymers. (Total notional time: 140 hours)

PROBABILITY AND STATISTICS (PAS206B) **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 notional time: 140 hours)

S

SCIENTIFIC COMPUTING (SPT316B) **CONTINUOUS ASSESSMENT**

(Module custodian: Department of Electrical Engineering)

Scientific computing and programming environment. Fundamentals of programming: Selection and loop statements. Use-defined functions. Input, output and graphics. Engineering application case studies and simulations. (Total notional time: 140 hours)

STRENGTH OF MATERIAL I (SOA115B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Mechanical and Mechatronics Engineering)

The purpose of this module is to provide a thorough foundation to the behaviour of materials under the action of external forces as required at higher levels of study and for the purpose of economically designing machine components. (Total notional time: 140 hours)

STRENGTH OF MATERIALS II (SOM307B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Mechanical and Mechatronics Engineering)

The purpose of this module is to provide a sound foundation in the study of Mechanical of Materials advanced knowledge to the behaviour of materials under the action of external forces as required at higher levels of study and for the purpose of economically designing machine components. (Total notional time: 280 hours)

T

THERMO-FLUIDS (TFL206B) **1 X 3-HOUR PAPER**

(Module custodian: Department of Mechanical and Mechatronics Engineering)

Introduction to fluid flow, fluid mechanics and the basics of heat flow in the form of fundamental thermodynamics and principles thereof. (Total notional time: 280 hours)