

BACHELOR OF ENGINEERING TECHNOLOGY IN MECHATRONIC ENGINEERING

Qualification code: **BPMR18 - NQF Level 7 (420 credits)**

SAQA ID: 99604, CHE NUMBER: H/H16/E023CAN

Campus where offered: Pretoria Campus

Please note that this electronic Prospectus differs from the printed booklet.

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 Sciences.

Selection criteria:

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

Recommended subject(s):

Engineering Graphics and Design and Mechanical Technology.

• **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, 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 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).

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 Mechanical Engineering (NQF Level 5 - 140 credits): at least 60% for all modules completed.
- Advanced Certificate in Mechanical Engineering (NQF Level 6 - 140 credits): at least 60% for all modules completed.
- National Diploma: Engineering: Mechanical (NQF Level 6 - 3,000 credits): at least 55% for all subjects completed.
- National Diploma: Mechatronics (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)	
EGM105B	Engineering Graphics	(5)	(14)	
ELC105B	Electrical Circuits	(5)	(28)	
ELS105B	Electronic Circuits	(5)	(28)	
EMA105B	Engineering Mathematics I	(5)	(28)	
INL125C	Information Literacy (block module)	(5)	(1)	
LFS125X	Life Skills (block module)	(5)	(2)	
MEC105B	Mechanics	(5)	(28)	

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

SECOND YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
EBS206B	Embedded Systems	(6)	(28)	Electrical Circuits Electronic Circuits
EMA206B	Engineering Mathematics II	(6)	(14)	Engineering Mathematics I
ESG206B	Engineering Software Design	(6)	(28)	Computer Literacy
PAS206B	Probability and Statistics	(6)	(14)	Engineering Mathematics I

FIRST SEMESTER

DOM216B	Design of Machines	(6)	(14)	Engineering Mathematics I Mechanics
SOM216B	Strength of Materials	(6)	(14)	Engineering Mathematics I Mechanics

SECOND SEMESTER

LSM216B	Linear System Modelling	(6)	(14)	Electrical Circuits Electronic Circuits Engineering Mathematics I Mechanics
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MDR216B	Machines and Drives	(6)	(14)	Electrical Circuits Electronic Circuits Engineering Mathematics I Mechanics
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TOTAL CREDITS FOR THE SECOND YEAR: **140**

THIRD YEAR

CODE	MODULE	NQF-L	CREDIT	PREREQUISITE MODULE(S)
CNS307B	Control Systems	(7)	(28)	Engineering Mathematics II Probability and Statistics
MED307B	Mechatronics Design Projects	(7)	(28)	Design of Machines Engineering Mathematics II Probability and Statistics
PAU307B	Process Automation	(7)	(28)	Design of Machines Electrical Circuits Machines and Drives
TMF307B	Thermoflow	(7)	(28)	Engineering Mathematics I Mechanics

FIRST SEMESTER

IDC317B	Industrial Data Communication	(7)	(14)	Electrical Circuits Electronic Circuits
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SECOND SEMESTER

ENP317B	Engineering Practice	(7)	(14)	
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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. On 8 August 2018, the syllabus content was defined as follows:

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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)



CONTROL SYSTEMS (CNS307B)**1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Introduction to Control Systems; Modelling in the frequency domain; Modelling in the time domain; Time response; Reduction of Multiple sub-systems; Stability; Steady State Errors; Root Locus Techniques and Design via Root Locus; Frequency Response and Design via Frequency Response; Digital Control systems; Practical work and Project. (Total tuition time: ± 280 hours)

D**DESIGN OF MACHINES (DOM216B)****1 X 3-HOUR PAPER****(Module custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)**

To develop the advanced knowledge and understanding of the student in the process of problem assessment and design. At the end of this module, provided that the student has completed all tutorials, assignments and presentations successfully, the student will have a theoretical and practical understanding and knowledge of problem definition, design, communication and computer skills, use of engineering science and knowledge, and can undertake advanced tasks related to the design of components, assemblies and related equipment. (Total tuition time: ± 280 hours)

E**ELECTRICAL CIRCUITS (ELC105B)****1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Direct current circuits. Magnetism and electromagnetism. Single phase alternating current systems. Active components in electric circuits. Alternating current with passive and active components in electric circuits. Three-phase alternating current systems. (Total tuition time: ± 280 hours)

ELECTRONIC CIRCUITS (ELS105B)**1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Identification of electronic components. Basic circuit calculations. Understanding of different electrical signals use. Electrical measurements using the laboratory equipment. Conduction in semiconductors and analysis, design and building of basic power supply circuits. Current flow in transistors and analysis, design and building of single transistor circuits. Design and building of practical op-amp application circuits. Design, analysis and building of practical power supplies. Analysis, design and building of different small signal amplifiers configurations. (Total tuition time: not available)

EMBEDDED SYSTEMS (EBS206B)**1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

Introduction to digital concepts. Number systems (Decimal, Binary, Hexadecimal, Octal). Logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR), Boolean Algebra, Karnaugh Maps, Design Techniques and Code Converters. Combinational Logic: Adders, Comparators, Multiplexers, De-multiplexers, Encoders, Decoders, Code converters. Latches and Flip-Flops, Shift registers, 555 Timers. Asynchronous and Synchronous counters. Programmable logic (FPGAs, VHDL). Peripheral devices (ADC, DAC, I/O port expanders, LCDs, 7 / 14 / 16-Segment displays, Dot-matrix displays, Keypads, EEPROM, RAM). Computer Concepts and Micro-controllers (Architecture of 8-bit micro-controllers, programming, flowcharts, Interrupts, Timers and Counters, Serial communication). (Total tuition time: ± 280 hours)

ENGINEERING GRAPHICS (EGM105B)**CONTINUOUS ASSESSMENT****(Module custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)**

Introduction to graphics communication. Dimensioning and tolerance practices. Geometrical construction. Pictorial projections. Interpenetration and development. Machine drawings. Civil drawings including electrical diagrams. (Total tuition 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 tuition time: not available)



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 tuition time: not available)

ENGINEERING PRACTICE (ENP317B)**1 X 3-HOUR PAPER****(Module custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)**

To prepare the student to effectively plan and execute projects. Write quality technical reports and communicate all project information to peers. (Total tuition time: ± 140 hours)

ENGINEERING SOFTWARE DESIGN (ESG206B)**CONTINUOUS ASSESSMENT****(Module custodian: Department of Electrical Engineering)**

Variables and I/O, Loops (for/while). Program flow (if - else). Functions. Structures. Pointers. GUI's. Dynamic data types. Classes and Objects and Networking. (Total tuition time: ± 280 hours)

I**INDUSTRIAL DATA COMMUNICATION (IDC317B)****1 X 3-HOUR PAPER****(Module custodian: Department of Electrical Engineering)**

To develop the necessary knowledge, understanding and skills required for the student's further progress towards becoming a competent mechatronics engineering technician. It will enable the student to build, operate, diagnose and maintain networks and communications equipment. (Total tuition time: not available)

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)

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

Academic, personal and socio-emotional skills development for students in higher education. Personal and social dimensions address: Effective planning and self-management (goal setting and time management); Adjusting to university life (student life, diversity and change); Intra- and interpersonal skills development (conflict management, self-esteem, relationship management); Effective living (healthy living, HIV education, substance abuse). Academic dimension addresses: Academic skills for university (e.g. critical thinking, creativity, managing assignments and assessments). (Total tuition time: ± 20 hours)

LINEAR SYSTEM MODELLING (LSM216B)**1 X 3-HOUR PAPER****(Module custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)**

To develop the necessary knowledge, understanding and skills required for the student's further progress towards becoming a competent mechatronics engineer. It will enable the student to model, operate, diagnose. (Total tuition time: not available)

M**MACHINES AND DRIVES (MDR216B)****1 X 3-HOUR PAPER****(Module custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)**

Electric machines have a ubiquitous presence in our modern daily lives, from the generators that supply electricity to motors of all sizes that power countless applications. Providing a balanced treatment, the subject takes a ground-up approach that emphasizes fundamental principles. The module carefully deploys physical insight, mathematical rigor, and computer simulation to clearly and effectively present electric machines and drive systems. (Total tuition time: not available)



MECHANICS (MEC105B)**1 X 3-HOUR PAPER****(Module custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)**

To equip the student with a fundamental understanding of mechanics and how to apply these to a design problem. (Total tuition time: not available)

MECHATRONICS DESIGN PROJECTS (MED307B)**CONTINUOUS ASSESSMENT****(Module custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)**

To develop the advanced knowledge and understanding of the student in the process of problem assessment and design. (Total tuition time: ± 280 hours)

P**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 tuition time: not available)

PROCESS AUTOMATION (PAU307B)**1 X 3-HOUR PAPER****(Module custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)**

To provide the student with a fundamental understanding essential for technicians and technologists working in the field of automation engineering. (Total tuition time: ± not available)

S**STRENGTH OF MATERIALS (SOM216B)****1 X 3-HOUR PAPER****(Module custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)**

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 tuition time: ± 140 hours)

T**THERMOFLOW (TMF307B)****1 X 3-HOUR PAPER****(Module custodian: Department of Mechanical Engineering, Mechatronics and Industrial Design)**

Introduction to fluid flow, fluid mechanics and the basics of heat flow in the form of fundamental thermodynamics and principles thereof. (Total tuition time: not available)

