

# BACHELOR OF ENGINEERING TECHNOLOGY HONOURS IN MECHANICAL ENGINEERING

BEngTechHons (Mechanical Engineering) - NQF Level 8 (140 credits)

Qualification code: BHME21

SAQA ID: 117965, CHE NUMBER: H/H16/E199CAN

Campus where offered:

Pretoria Campus

## REMARKS

a. *Admission requirement(s):*

A Bachelor of Engineering in Mechanical Engineering, **or** a Bachelor of Engineering Technology in Mechanical Engineering, **or** a Baccalaureus Technologiae: Mechanical, **or** an Advanced Diploma in Mechanical Engineering, **or** an equivalent qualification with an aggregate of 60% for the final-year of study, **or** an NQF level 7 qualification in a closely related field, obtained from an accredited South African university.

Holders of any other equivalent South African or international qualification may also be considered, see Chapter 1 of Students' Rules and Regulations.

b. *Selection criteria:*

Admission is subject to selection. Prospective students will be evaluated based on the marks obtained in the previous qualification and/or work experience.

All completed applications received within the published due dates will be ranked. After consideration of the Departmental Student Enrolment Plan, only the top ranking applicants will be selected. 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](http://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:*

Block-mode classes.

f. *Minimum duration:*

One year.

g. *Exclusion and readmission:*

See Chapter 2 of Students' Rules and Regulations.

h. *Re-registration:*

A student may re-register for the module Research Project: Electrical Engineering 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 project only, and not to redo it, should they fail the module.



## CURRICULUM

### ATTENDANCE

CODE	MODULE	NQF-L	CREDIT
RMH108S	Research Project: Mechanical Engineering	(8)	(30)
RMH118R	Research Project: Mechanical Engineering (re-reg) (semester module)	(8)	(0)

### FIRST SEMESTER

DAN118S	Data Analysis	(8)	(10)
OTY118S	Optimisation Theory	(8)	(15)
RME118S	Research Methodology	(8)	(10)
SMG118S	Sustainable Management	(8)	(10)
SYD118S	System Dynamics	(8)	(15)

### SECOND SEMESTER

All modules from one of the following options:

#### Option 1: Thermal Energy

PWP118S	Power Plant	(8)	(15)
RRC118S	Refrigeration and Air Conditioning	(8)	(15)
THT118S	Thermal Energy Systems	(8)	(15)

#### Option 2: Physical Asset Management

ASM118S	Asset Management	(8)	(15)
FEM118S	Finite Element Modelling	(8)	(15)
MHM118S	Mechanical Maintenance Engineering	(8)	(15)

#### Option 3: Materials Manufacturing

FEM118S	Finite Element Modelling	(8)	(15)
MPT118S	Materials Processes and Technology	(8)	(15)
MPU118S	Materials Properties and Manufacturing	(8)	(15)

plus one of the following modules:

CTS116S	Contracts	(6)	(5)
EGU116S	Engineering Education	(6)	(5)
EPY116S	Energy Economics and Policy	(6)	(5)
ETN116S	Entrepreneurship	(6)	(5)
IBO116S	International Business Communication	(6)	(5)
IND116S	Industrial Design	(6)	(5)
ITS116S	Intellectual Property	(6)	(5)

TOTAL CREDITS FOR THE QUALIFICATION: **140**



## 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**

### **ASSET MANAGEMENT (ASM118S)**

**CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Mechanical and Mechatronics Engineering)*

The fundamentals of asset management; Introduction to asset life-cycle management; Engineering design decisions; Quantitative and qualitative methods supporting life cycle assessment; Life cycle assessment models; Understanding ISO 55001 and ISO 14040 standards; Life cycle costing. (Total tuition time: not available)

**C**

### **CONTRACTS (CTS116S)**

**CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Civil Engineering)*

The place of the law of contract; Concept of contract; Requirements of valid contracts; Mistakes, duress, misrepresentation and undue influence; Valid, void and voidable contracts; Termination of contracts; Remedies available to affected parties; Legal rules. (Total tuition time: ± 50 hours)

**D**

### **DATA ANALYSIS (DAN118S)**

**CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Electrical Engineering)*

Exploring data; Describing the distribution of a simple variable; Finding relationships amongst variables; Probability and decision making under uncertainty; Probability and probability distribution; Normal, binomial, poisson and exponential distributions; Statistical inference; Sampling and sampling distributions; Confidence interval estimation; Hypothesis testing; Regression analysis; Regression analysis - estimating relationships. (Total tuition time: ± 100 hours)

**E**

### **ENERGY ECONOMICS AND POLICY (EPY116S)**

**CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Electrical Engineering)*

Energy management; Energy accounting; Energy systems and renewable energy. (Total tuition time: ± 50 hours)

### **ENGINEERING EDUCATION (EGU116S)**

**CONTINUOUS ASSESSMENT**

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

Higher education environment; Teaching and learning methods; Assessment; Lecture planning and design. (Total tuition time: ± 50 hours)

### **ENTREPRENEURSHIP (ETN116S)**

**CONTINUOUS ASSESSMENT**

*(Module custodian: Department of Civil Engineering)*

Entrepreneurship and entrepreneurial characteristics; Steps to establish a business; Forms of business ventures; Funding options in business; Business plans. (Total tuition time: ± 50 hours)

**F**

### **FINITE ELEMENT MODELLING (FEM118S)**

**1 X 3 HOUR PAPER**

*(Module custodian: Department of Mechanical and Mechatronics Engineering)*

3D stress analysis; 3D heat transfer; An overview of dynamic analysis procedures; Non-linear problems; Damping; Natural frequency extraction, residual and rigid body modes; Complex eigenvalue extraction; Coupled analysis. (Total notional time: 150 hours)



**I****INDUSTRIAL DESIGN (IND116S)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Architecture and Industrial Design)*

Design thinking; Design, make, test, refine; Business model canvas; Costing and break-even graphs; Spin outs and licensing. (Total tuition time: ± 50 hours)

**INTELLECTUAL PROPERTY (ITS116S)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Industrial Engineering)*

Disclosure analysis; Novelty assessment; IP forms; Methods of protecting IP; IP laws/legislations; Patent protection strategies; Commercialisation of IP (route to market). (Total tuition time: ± 50 hours)

**INTERNATIONAL BUSINESS COMMUNICATION (IBO116S)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Applied Languages)*

Introduction to the language of choice (culture, sounds, syllables and words); Introducing oneself; Formation of simple sentences; Greeting/address forms (work/industry); Business protocol in chosen language (organogram). (Total tuition time: ± 50 hours)

**M****MATERIALS PROCESSES AND TECHNOLOGY (MPT118S)****1 X 3 HOUR PAPER***(Module custodian: Department of Mechanical and Mechatronics Engineering)*

Requirements for choice of engineering materials processes; Fundamentals of engineering materials processes; Engineering materials primary processes; Engineering materials secondary and tertiary processes; Engineering materials processes- design project. (Total notional time: 150 hours)

**MATERIALS PROPERTIES AND MANUFACTURING (MPU118S)****1 X 3 HOUR PAPER***(Module custodian: Department of Mechanical and Mechatronics Engineering)*

Introduction, correlation between process, property and performance of engineering materials; Corrosion; Creep; Fatigue; Fracture; Case study – Manufacturing Project. (Total tuition time: not available)

**MECHANICAL MAINTENANCE ENGINEERING (MHM118S)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Mechanical and Mechatronics Engineering)*

Introduction to Maintenance Engineering; Maintenance Management and Control; Maintenance Costing; Design Considerations for Maintenance; Maintenance Management Systems. (Total tuition time: not available)

**O****OPTIMISATION THEORY (OTY118S)****CONTINUOUS ASSESSMENT***(Module custodian: Department of Electrical Engineering)*

Convexity; Optimality conditions; Nonlinear programming; Linear programming and duality; Quadratic programming; Mixed integer programming. (Total tuition time: ± 150 hours)

**P****POWER PLANT (PWP118S)****1 X 3 HOUR PAPER***(Module custodian: Department of Mechanical and Mechatronics Engineering)*

Introduction to power generation; Turbines; Steam generators; Condensers; Gas generators; Engine power plants; Renewable Energies. (Total tuition time: not available)

**R****REFRIGERATION AND AIR CONDITIONING (RRC118S)****1 X 3 HOUR PAPER***(Module custodian: Department of Mechanical and Mechatronics Engineering)*

Refrigeration; The vapour-compression cycles; Load calculation; Compressors; Condensers; Evaporators; Expansion devices; Refrigerants; Refrigeration systems; Air conditioning; Introduction to air conditioning; Psychrometry and psychrometric chart; Indoor environment quality; Heating and cooling load calculations; Air conditioning processes and systems; Thermal distribution systems; Space air distribution.



**RESEARCH METHODOLOGY (RME118S)****CONTINUOUS ASSESSMENT****(Module custodian: Department of Industrial Engineering)**

Conceptual Design (research objective, research framework, research questions, defining concepts, conceptual modelling); Technical Design (research strategies, research material, research planning); Communicating your research (thesis/dissertation/project layout, research proposal, oral presentation, referencing, style; research paper writing); Statistics in research; Research Professionalism (plagiarism, ethics in research, predator journal avoidance, intellectual property (IP) in research). (Total tuition time: ± 100 hours)

**RESEARCH PROJECT: MECHANICAL ENGINEERING (RMH108S, RMH118R)****PROJECT ASSESSMENT****(Module custodian: Department of Electrical Engineering)**

Project Design and Development; Conference poster and oral presentation; Proposed design and preliminary results; Conference paper and oral presentation; Final implementation and results; final Report: Introduction and project plan, literature review, detail design and implementation, test results and conclusion. (Total tuition time: ± 300 hours)

**S****SUSTAINABLE MANAGEMENT (SMG118S)****CONTINUOUS ASSESSMENT****(Module custodian: Department of Civil Engineering)**

An overview of the technical processes found in systems engineering; The emergence of sustainable strategic management; In search of sustainability; Environmental analysis for sustainable strategic management; Sustainable strategic management resource assessment; Concepts and instruments for corporate sustainability management; Innovation and technology management in the engineering field; Project management in the engineering field; Sustainable management assignment and group presentation. (Total tuition time: ± 100 hours)

**SYSTEM DYNAMICS (SYD118S)****CONTINUOUS ASSESSMENT****(Module custodian: Department of Chemical, Metallurgical and Material Engineering)**

Introduction to system dynamics and mechanistic models; Causal models; Dynamics of mechanistic models, based on fundamental conservation principles; Structure and behaviour of dynamics systems, based on causal dependencies; Steps in fundamental and causal modelling; Agent-based modelling; Distributed systems in engineering modelling. (Total tuition time: ± 150 hours)

**T****THERMAL ENERGY SYSTEMS (THT118S)****1 X 3 HOUR PAPER****(Module custodian: Department of Mechanical and Mechatronics Engineering)**

Introduction to energy systems; Introduction to energy impacts, economics, policies, and sustainability; Basics of thermal energy systems; Analysis of thermal energy systems; Fluid transport in thermal energy systems; Energy transport in thermal energy systems; Simulation, evaluation, and optimization of thermal energy systems; System engineering management. (Total tuition time: not available)

