MECHANICAL ENGINEERING

DUT
DURBAN UNIVERSITY OF TECHNOLOGY
INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE

FACULTY OF ENGINEERING & THE BUILT ENVIRONMENT

2025 HAND BOOK

HANDBOOK FOR 2025

FACULTY of ENGINEERING AND THE BUIILT ENVIRONMENT

DEPARTMENT OF MECHANICAL ENGINEERING

DEPARTMENTAL MISSION

Vision:

Inspire & Empower Scholars in Pursuit of Knowledge in a Dynamic World.

Mission:

Develop engineering professionals to drive entrepreneurship and sustainability for disruptive innovations through scholarship.

Purpose Statement: Bachelor of Engineering Technology: Mechanical

This qualification is primarily industry oriented. The knowledge emphasizes general principles and application of technology transfer. The qualification provides students with a sound knowledge base in the discipline of mechanical engineering and the ability to apply their knowledge and skills to particular career or professional contexts, while equipping them to undertake more specialised and intensive learning. This learning programme has a strong professional and careerfocus and holders of this qualification are normally prepared to enter the mechanical and alliedindustries.

Specifically the purpose of the learning programme is to build the necessary knowledge, understanding, abilities and skills required for further learning towards becoming a competent practicing engineering technologist in the discipline of mechanical engineering. This qualification provides for:

1. preparation for a career in mechanical engineering and areas that potentially benefit from engineering skills, for achieving technological proficiency and to make a contribution to the economy and national development.
2. the educational base required for registration as a Professional Engineering Technologistwith the Engineering Council of South Africa (ECSA).
3. the education base for achieving proficiency in mining/factory plant and marine operations for certificated engineers.
4. entry to NQF level 8 programmes e.g. Honours, Post Graduate Diploma and B Eng Programmes and then to proceed to Masters Programmes and subsequently DoctoralProgrammes.

Purpose Statement: Bachelor of Engineering Technology Honours: Mechanical

The Bachelor of Engineering Technology Honours Degree in Mechanical Engineering is a post graduate specialisation qualification designed to prepare students for postgraduate study. This programme is designed specifically to follow the Bachelors of Engineering Technology in Mechanical Engineering, as offered at the Durban University of Technology.

The qualification consolidates and deepens the graduate's expertise in a specialised area of Mechanical Engineering and develops research capacity in the methodology and techniques of this discipline, while equipping them to undertake more specialised and intensive learning. Programmes leading to this qualification allow students to work

independently and responsibly, applying original thought and judgment to technical and risk-based decisions in complex situations and holders of this qualification are normally prepared to enter a specific niche in the labour market, or to further their studies through Masters and Doctoral programmes.

Specifically the purpose of this programme is to further the necessary knowledge, understanding, abilities and skills required towards becoming a competent practicing Mechanical Engineering technologist.

This qualification provides:

1. Preparation for careers in engineering itself and areas that potentially benefit from engineeringskills, for achieving technological proficiency and to make a contribution to the economy and national development.

2. Entry to NQF level 9 Masters Programmes and the ability to then proceed to Doctoral Programmes.

Purpose Statement: Master of Engineering

Students who have successfully completed the Master of Engineering degree should:

- Be capable of assimilating and evaluating appropriate literature and resources to the field of study;
- Be capable of determining and stating the objectives of a specific research topic and planning an appropriate strategy to reach the objectives;
- Efficiently expedite the research strategy in order to generate an effective solution;
- Be capable of evaluating the quality of the solution in terms of the stated objectives.

Purpose Statement: Doctor of Engineering

Students who have successfully completed the degree should:

- Be capable of assimilating and evaluating appropriate literature and resources to the field of study;
- Be capable of determining and stating the objectives, a specific research topic and planning an appropriate strategy to reach the objectives;
- Efficiently expedite the research strategy in order to generate an effective solution;
- Be capable of evaluating the quality of the solution in terms of the stated objectives;
- Be capable of guiding inexperienced researchers with research projects; • Be capable of synthesizing unique solutions to research problems.

GENERAL INFORMATION

It is becoming increasingly obvious that in order to produce wealth in South Africa, more value must be added to our exports. It is no longer good enough to just export raw materials; we have to expand our manufacturing facilities locally, and export finished goods to a global market. In addition, global competition has increased, and thus sales are more difficult.

Mechanical Engineering is one of the most important fields of technology, and the Department of Mechanical Engineering has developed a mission statement in line with the demands of the country. To assist with wealth creation and upliftment, the department strives to be amongst the best with regards to education, training, research and development. To that end, we have nurtured expertise in the areas of materials, design and manufacturing, and our R&D efforts are recognised both locally and internationally. More importantly, our diplomates and graduates are well received and respected by industry.

In order to educate students effectively, we expect that students who enter the department take their studies seriously. Those who fail repeatedly congest classes and prevent others from taking up studies. Thus, the learner will need to be motivated and diligent in his/her efforts.

What is a University of Technology?

The objective of a University of Technology such as DUT is "to create, apply and transfer knowledge and technology of an international standard through cooperative, professional, career education programmes."

Committee of Technikon Principals (CTP) (2004), *Universities of Technology in South Africa.*

CONTENTS

IMPORTANT NOTICE

The departmental rules in this handbook must be read in conjunction with the 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.

1. CONTACT DETAILS

All departmental queries to:

Secretary:	Mrs A Van Wyk
Tel No:	031-3732115
Fax No:	031 3732139
Email:	adelev@dut.ac.za
Location of Department:	Steve Biko Campus, S5 Level 3

All Faculty queries to:

Faculty officer:	Mrs N Singh
Tel No:	031 3732718
Fax No:	031 3732719
Location of Faculty office:	Steve Biko Campus, S4 Level 3

Executive Dean: [Acting]	Prof S Rathilal
Dean's Secretary:	Ms N Matola
Tel No:	031 3732762
Fax No:	031 3732724

Location of Executive Dean's office: Steve Biko Campus, S6 Level 5

2. STAFFING	Name and Qualification
Head of Department	Prof RW Maladzhi, Pr Tech Eng, DEng (CPUT), M-Tech (CPUT), B-TECH (CPUT), PGC (UMUC), BCOMHONS (UWC), MEd (UNISA)
Deputy Head of Department	Vacant
Professors	Prof P Tabakov, PhD (NU) Prof M Walker, PrEng, PhD (Natal), MScEng (Natal), MSAIMechE Prof TP Mohan, Ph.D Mechanical Engineering; M.E Materials Science; M.Sc Materials Science; B.Sc Physics (Univ. of Madras)
Professor Emeritus	Prof K Kanny, PhD (TU-USA); Pr.Tech (Eng); MSc (NU); GCC (Factories) MSAIMechE
Senior Lecturer	Dr S Mabuwa, DEng (CPUT), MEng (CPUT)
Lecturers	Dr A Ramsaroop, DEng (DUT)
	Dr M Gilpin, DEng (DUT), MSc Eng (UKZN)
	Dr M Moutlana, PhD (UKZN), MSc Eng (UKZN), BSc Eng (MIT) Mr IS Radebe, MSc Eng (UKZN) Dr M Mphahlele, PhD Metallurgical Engineering (UJ) MTech Chem Eng (UJ) Mr T Macholo, MSc Eng (UKZN), BSc Eng (UKZN) Mr T Bright, BSc (UKZN), MSc (UKZN), PGCE (UKZN), MSAIMechE Mr L Semakane, MEng Mechanical (UJ), BIng Mechanical (UJ) Ms L Mathebala, MEng Mechanical (UNISA), BTech Mechanical (UNISA), NDip Mechanical (UNISA)
Senior Technician	Vacant Post
Technicians:	Mr M Mokeretla, MTech Mech Eng (CUT)
	Mr M. Moletsane, MTech Mech Eng (DUT), BTech (DUT)
	Ms M Malik, M Eng (DUT), BTech Mech Eng (DUT)
Senior Technical Assistant:	Vacant Post
Technical Assistant:	Mr P Nyawo
General Assistant:	Vacant Post

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: Mechanical	99599
Bachelor of Engineering Technology Honours: Mechanical	117977
Master of Engineering	96827
Doctor of Engineering	96812

4. PROGRAMME INFORMATION AND RULES

On the basis of a variety of placement assessments, successful applicants will be accepted into a three-year minimum programme of study. An augmented curriculum is devised in order to enhance student development and to improve the student's chances of successful throughput.

MINIMUM ADMISSION REQUIREMENTS: BACHELOR OF ENGINEERING TECHNOLOGY

In addition to rule G7 – Minimum Admission Requirements, the following is required for admission to the program:

(A) NSC, NCV, SC:

Compulsory Subjects	National Senior Certificate	National Certificate (Vocational)	Senior Certificate	
	Rating	Mark	HG	SG
English	4	60%	E	C
Mathematics	4	70%	E	C
Physical Science	4	70%	E	C

Life Orientation		60%		
OR				
Technical Mathematics	5			
Technical Science	5			
+ 2 Vocational Subjects		70%		

Note:

The exit certificate of the candidate must qualify the candidate for degree study at an institution of higher learning. Applicants will be ranked according to the sum of their scores for Mathematics and Physical Science subject to a minimum total score of 100 and with a minimum rating of 4 for Mathematics and 4 for Physical Science.

Other:

Applicants that do not meet the requirements above may qualify for admission if they meet the following criteria:

- They hold a NSC Bachelor's Pass, but do not meet the departmental Mathematics and/or Physical Science requirements, and have passed the following N4 subjects with a minimum of 50% in the same sitting:
  Mathematics and Engineering Science, plus any two of the following: Mechanotechnics, Engineering Drawing, Electrotechnics.

- They hold a cognate Diploma in Engineering, or Diploma in Engineering Technology - The possibility of transfer of credits is considered, dependent upon the Diploma presented.

- They hold a cognate Higher Certificate -The possibility of transfer of credits is considered, dependent upon the Higher Certificate presented.
  In the case of a Higher Certificate in Applied Sciences awarded by the Durban University of Technology a student may be given credits for the following modules:
  Engineering Mathematics 1A, Engineering Physics 1A, Technical Literacy Cornerstone 101

- They hold a cognate National N Diploma - Credit transfer is not possible.

MINIMUM ADMISSION REQUIREMENTS: BACHELOR OF ENGINEERING TECHNOLOGY HONOURS

The number of students enrolled each year will be determined by the University and the departmental growth policies. In addition to the minimum University admission requirements, the following criteria must be met by students wishing to study this programme:

The minimum entry requirement is:

1. The Bachelor of Engineering Technology in Mechanical Engineering. This is also in line with the DUT General Rules handbook, for registration for a Bachelor Honours Degree (Rule G23c).
2. Holders of the phased out Nated-151 BTech Qualification (NQF7 in old framework) may apply for admission into the programme.
3. Applicants that complete a BEngTech at institutions other than DUT will be evaluated on an individual basis, and may need to complete additional undergraduate courses to gain admission.

In addition to the minimum requirements specified above, applicants will be ranked according to their performance in the preceding Bachelor of Engineering Technology. The average mark, for all degree subjects, divided by the number of semesters taken to complete the qualification will be used for ranking. Consideration will also be given to work experience, attainment of relevant industry certifications, completion of short courses and workplace training with regards to ranking and admission into the programme.

DURATION

The duration of the programme is 1 year full-time.

MASTER OF ENGINEERING

Bachelor of Engineering Technology Honours degree or equivalent qualification.
Conferment of status of the above mentioned qualification.

DOCTOR OF ENGINEERING

Master of Engineering degree or equivalent qualification.

5. PROGRAMME STRUCTURE

INSTRUCTIONAL PROGRAMME:

EM1 BACHELOR OF ENGINEERING: TECHNOLOGY IN MECHANICAL ENGINEERING

This is a three year full-time programme which focuses on the development of graduates with critical problem solving skills that support theory and practice in application.

Bachelor of Engineering Technology in Mechanical Engineering (BNMCH1)

Year	Module Name	Study Sem	NQF level	HEMIS credits	SAQA credits	Module Code	Pre-req	Co-req
1	Engineering Mathematics 1A	1	5	0.088	12	EMTA101		
	Engineering Physics 1A	1	5	0.088	12	EPHA101		
	Technical Literacy	1	5	0.067	8	TCLT101		
	Computing & IT	1	6	0.05	8	CMIT101		
	Cornerstone 101	1	5	0.094	12	CSTN101		
	Design 1	1	5	0.1	16	DESG101		
	Electrical Principles 1	2	5	0.088	12	ELEP101		Engineering Mathematics 1A EngineeringPhysics IB
	Mechanics of Machines 1	2	6	0.082	12	MCHM102		Engineering Mathematics 1A EngineeringPhysics IA
	Engineering Mathematics 1B	2	5	0.088	12	EMTB101	Engineering Mathematics 1A	
	Thermofluids 1	2	5	0.086	12	THFL101	Engineering Mathematics 1A Engineering Physics IA	
	Strength of Materials 1	2	6	0.081	12	SMTL101	Engineering Mathematics 1A EngineeringPhysics IA	
	Engineering Physics 1B	2	5	0.088	12	EPHB101		
	Total - year 1				**140**			
2	Computer Aided Draughting	1	5	0.089	12	CADR101	Design 1 Computing & IT	
	Analogue Electronics 1A	1	5	0.086	12	ANLE101		
	Electrical Principles 2	1	6	0.064	12	ELEP201	Electrical Principles 1	

	Fluid Mechanics 2	1	6	0.086	12	FLDM201	Thermofluids 1 Engineering	
	Engineering Mathematics 2A	1	6	0.083	12	EMTA201	Engineering Mathematics 1A Engineering Mathematics 1B	
	Materials Science	1	5	0.086	12	MTLS101		
	Mechanics of Machines 2	2	6	0.088	12	MCHM201	Mechanics of Machines 1	
	Strength of Materials 2	2	6	0.088	12	SMTL201	Strength of Materials1	
	Design 2	2	6	0.091	12	DESG201	Design 1	
	Thermodynamics 2	2	6	0.086	12	THRM202	Thermofluids I	
	Digital Electronics 1A	2	5	0.086	12	DGTE102		
	Project Management	2	7	0.067	8	PROM101		
	Total - year 2				**140**			
3	Design 3	1	7	0.086	12	DESG301	Design 2	
	Strength of Materials 3	1	7	0.084	12	SMTL301	Strength of Materials2	
	Mechanics of Machines 3	1	7	0.084	12	MCHM301	Mechanic s of Machines 2	
	Thermodynamics 3	1	7	0.086	12	THRM302	Thermodynamics 2	
	Fluid Mechanics 3	1	7	0.086	12	FLDM301	Fluid Mechanics 2	
	Instrumentation and Control 1	1	6	0.086	12	INCT101	Analogue Electronics1A Electrical Principles 1	
	Advanced Mechanical Manufacturing	2	7	0.084	12	AMNF101	Computing & IT	
	Electrical Technology Applications	2	7	0.086	12	ELTA101	Electrical Principles 2	
	Principles of Management	2	7	0.067	8	PMNT101		
	Environmental Engineering	2	7	0.055	8	EVLE101		
	Capstone Design Project	2	7	0.11	16	CDSP101	Design 3 Computer Aided Draughting	
	Numerical methods	2	7	0.086	12	NMRM101	Engineering Mathematics 2A	
	Total - year 3				**140**			
	Grand Total				**420**			

LINKING OF MODULES

The following modules are linked as per Rule 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 Mathematic 1B

Engineering Mathematics 2A and Engineering Mathematic 2B

GRADUATE ATTRIBUTES

The Graduate Attributes defined below are stated generically and may be assessed in various engineering disciplinary or cross-disciplinary contexts in a provider-based or simulated practice environment. Words and phrases having specific meaning are defined in this document and in Engineering Council of South Africa (ECSA) in the Engineering Standard (E-09-PT).

Graduate Attribute 1: Problem-solving
Identify, formulate, research literature and analyse broadly defined engineering problems reaching substantiated conclusions using analytical tools appropriate to the discipline or area of specialisation.

Graduate Attribute 2: Application of scientific and engineering knowledge
Apply knowledge of mathematics, natural science, computing and engineering fundamentals, and an engineering specialisation to defined and applied engineering procedures, processes, systems or methodologies.

Graduate Attribute 3: Engineering design
Design solutions for broadly defined engineering technology problems and contribute to the design of systems, components or processes to meet identified needs.

Graduate Attribute 4: Investigations, experiments and data analysis
Demonstrate competence to conduct investigations of broadly defined engineering problems; locate, search and select relevant data from codes, data bases and literature, and design and conduct experiments to provide valid

conclusions.

Graduate Attribute 5: Use of engineering tools
Demonstrate competence to select and apply and recognise limitations of appropriate techniques, resources and modern engineering and IT tools, including prediction and modelling, to broadly defined engineering problems.

Graduate Attribute 6: Professional and technical communication
Demonstrate competence to communicate effectively and inclusively on broadly defined engineering activities, both orally and in writing, with the engineering community and society at large, taking into account cultural, language and learning differences.

Graduate Attribute 7: The engineer and the world
Demonstrate critical awareness of the sustainable development impacts on society, the economy, sustainability, health and safety, legal frameworks and the environment.

Graduate Attribute 8: Individual and collaborative teamwork
Demonstrate competence to function effectively as an individual, and as a member or leader in diverse and inclusive teams and in multi-disciplinary, face-to-face, remote and distributed settings.

Graduate Attribute 9: Independent learning ability
Demonstrate competence to engage in independent learning through well-developed learning skills.

Graduate Attribute 10: Engineering professionalism
Understand and commit to professional ethics and norms of engineering technology practice, including compliance with national and international laws.

Graduate Attribute 11: Project management and finance
Demonstrate knowledge and understanding of engineering management principles.

Yr 1	MODULES	*Exit Level Outcomes*										
		GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11
1.1	Engineering Mathematics 1A											
1.1	Engineering Physics 1A											
1.1	Technical Literacy						D AF			D AF		
1.1	Computing & IT					D AF						
1.1	Cornerstone 101											
1.1	Design 1			D AF				D AF			D AF	
1.2	Electrical Principles 1											
1.2	Mechanics of Machines 1	D AF	D									
1.2	Engineering Mathematics 1B											
1.2	Thermofluids 1	D	D AF		D AF	D	D					
1.2	Strength of Materials 1	D	D						D AF	D		
1.2	Engineering Physics 1B											
Yr 2		1	2	3	4	5	6	7	8	9	10	11
2.1	Computer Aided Draughting					D				D AF		
2.1	Analogue Electronics 1A											
2.1	Electrical Principles 2											
2.1	Fluid Mechanics 2	D	D		D AF		D		D AF			
2.1	Engineering Mathematics 2A											
2.1	Materials Science		D AF							D		
2.2	Mechanics of Machines 2	D AF	D									
2.2	Strength of Materials 2	D	D					D AF		D		
2.2	Design 2			D AF			D		D			
2.2	Thermodynamics 2	D	D			D AF			D			
2.2	Digital Electronics 1A											
2.2	Project Management						D AF		D		D AF	D AF
Yr 3		1	2	3	4	5	6	7	8	9	10	11
3.1	Design 3			D		D			D			
3.1	Strength of Materials 3	AS										
3.1	Mechanics of Machines 3		AS									
3.1	Thermodynamics 3				AS							
3.1	Fluid Mechanics 3									AS		
3.1	Instrumentation and Control 1											
3.2	Advanced Mechanical Manufacturing					D			D	D		
3.2	Electrical Technology Applications											
3.2	Principles of Management										AS	AS
3.2	Environmental Engineering							AS				
3.2	Capstone Design Project			AS		AS	AS		AS			
3.2	Numerical methods		D			D				D		

D = Developed
AF = Assessed Formatively
AS = Assessed Summatively

BACHELOR OF ENGINEERING TECHNOLOGY HONOURS

Module Name	Compulsory / Elective	Credits
Semester 1		
EDPR811 Engineering Design and Research Project (annual course)	C	44
SMAT801 Strength of Materials 4	C	16
ECPM801 Engineering Computational Methods	C	16
MECH801 Mechanics 4	C	16
Semester 2		
STEM801 Selected Topics in Engineering	C	16
PRGE802 Programming for Engineers	*E	16
COMA802 Composite Materials	*E	16
TMDN802 Thermodynamics 4	*E	16
COSY801 Control Systems	*E	16
TOTAL		

***not all electives may be available**

RULES OF COMBINATION

32 credits must be selected from the available electives. A minimum of 140 credits is required to obtain the qualification.

ASSESSMENT PLAN

The class mark shall be made up of a number assessments, of specific weightings. There is an examination for most subjects at the end of the semester. The final mark is a weighted average of the class mark and examination mark and students must achieve a minimum of 50% in the final result, together with sub minimums on various mark components.

ASSESSMENT RESULTS

All assessment results will be available via the DUT online mechanisms (Internet, result line, sms line) as soon as they become available. These constitute the officially published results. The onus therefore is on the student to obtain their results via any of these mechanisms. Non-receipt of results will not be accepted as a valid reason for missing deadlines for applications for remarks, scanning, reassessment, etc.

	Module	ECSA Graduate Attributes										
		GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10	GA11
Compulsory	Strength of Materials 4	A										
	Engineering Computational Methods					A				A		
	Control Systems											
	Mechanics 4		A									
	Selected Topics in Engineering							A			A	A
	Engineering Design and Research Project			A	A		A		A			
Elective	Programming for Engineers											
	Thermodynamics 4											
	Composite Materials											

MASTER OF ENGINEERING (MEng)
PROGRAMME CODE: MNMCHI

This is a research-based qualification, which may require further studies on behalf of the student in any subject/s related to the research.

DOCTOR OF ENGINEERING (DEng)
PROGRAMME CODE: DNMCHI

This is a research-based qualification, which may require further studies on behalf of the student in any subject/s related to the research.

6. ASSESSMENT RULES
EM1 WORK DONE DURING THE SEMESTER

In addition to Rules G12 to Gl5 the following specific rules apply to all modules:

1. The method of evaluation and compilation of the semester/progress mark in all modules will appear in the study guide for the module.
2. A student who for any reason is absent from a particular laboratory/practical or test, must provide proof of his/her reason for absence to the particular lecturer concerned immediately on his/her return to class on the date indicated on the medical certificate and be prepared to sit a make-up test/laboratory or practical that same day or as

determined by the particular staff member. Refusal to accept this will result in a zero mark for the particular test/laboratory or practical.

3. In the case where a module is 100% coursework any student failing to obtain a final result of 50% or higher will have to repeat that module.
4. Any student who elects to re-attend a particular module where there is a semester mark and final examination will forfeit his previous semester mark, irrespective of whether it was higher than the new mark obtained.

EM2 EXAMINATIONS

Students who fail a module will be eligible to write a Supplementary exam in that module provided that they have obtained a final mark (semester and examination mark) of at least 45%:

The semester mark that applied to the preceding examination will apply to the supplementary examination.

Supplementary examinations are offered every semester to those students who are eligible.

EM3 STUDENT DRESS

Students must be neat and tidy at all times. Closed shoes must be worn for the duration of the time spent in any laboratory or workshop. Appropriate safety equipment needs to be worn where applicable.

EM4 SEMESTER MARK

In all examination modules where there is a laboratory/assignment/ practical component included in the semester mark then students must obtain a minimum of 50% for the laboratory/assignment/ practical in order to be eligible to write the final examination.

EM5 SERVICE MODULES

The following modules are service modules in the Department of Mechanical Engineering and students must refer to their respective study guides to ascertain specific rules applicable to these modules.

Engineering Mathematics IA
Engineering Mathematics 1A
Engineering Physics 1A
Cornerstone 101
Electrical Principles 1
Engineering Mathematics 1B
Engineering Physics 1B
Analogue Electronics 1A
Electrical Principles 2

Engineering Mathematics 2A
Digital Electronics 1A
Instrumentation and Control 1
Electrical Technology
ApplicationsControl Systems 4

EM5a REQUIREMENT TO PASS THE GRADUATE ATTRIBUTES (GAs)

In modules where Graduate Attributes (GAs) are assessed, the student must achieve a final minimum pass mark of 50% in that module as well as being deemed competent in achieving the GA requirements, as specified in the relevant study guide, in order to pass that module.

7. RE-REGISTRATION RULES (if more stringent than General Rules) incl. Pre/Co-requisite

EM6 PROMOTION TO THE NEXT SEMESTER

In addition to Rule G21 and at the discretion of the Head of Department: No student shall be promoted to the next semester unless he/she has passed at least four full credits (i.e. 0,083 each) of the previous semester package.

PROMOTION TO A HIGHER LEVEL (G21)

No student is permitted to register for a higher level in a module before having passed the lower level in that module or the lower level pre-requisite module/s.

EM6a PROMOTION TO A HIGHER LEVEL/PROGRESSION RULES

A student will be considered a second year student if they have passed 70 or more first year credits.

A student will be considered a third year student if they have passed 70 or more second year credits in addition to passing all the first year credits.

Exclusion Rules (if more stringent than General Rules)

EM7 EXCLUSION DUE TO LACK OF PROGRESS (UNSATISFACTORY ACADEMIC PROGRESS)

Further to Rule G17, a student is required to have minimally obtained the following module credits after each completed semester of study as stipulated in the table below.

END OF YEAR	MINIMUM SAQA CREDITS	HEMIS CREDITS
1	**84**	0.6
2	**168**	1.2
3	**252**	1.8
4	**336**	2.4
5	**420**	3

Students that fall into this category will be monitored by the department for academic performance and interventions may be suggested as deemed necessary. Students that fail to maintain or improve their academic progress run the risk of contravening rule G17 as per the General Handbook.

Students have the right to appeal as per rule G1 (8) of the General Handbook. Any appeal by a student against academic exclusion must be made within ten workingdays of receipt of the notice of exclusion.

Further to Rule G17, Should a student not fulfil the below, the student will be excluded.

- To have passed all first year modules by the end of their second year of registration;
- To have passed all second year modules by the end of their third year of registration;
- To have passed at least half of the third year modules by the end of their fourth year of registration;
- To complete the qualification by the end of five years of registration

EM8 LATE REGISTRATION

- No registration for any module will be allowed later than one week after the commencement of lectures, without prior written permission from the Head of Department.
- No student will be permitted to add or delete modules later than one week

after the commencement of lectures.

EM9 LECTURE CLASHES

9.1 No student will be permitted to register for any module combination where there will be any timetable clashes in the case where all modules are first time registrations.

9.2 In the case where a student is repeating modules the student will be allowed a maximum of one period clash per repeated registered module.

9.3 It is the responsibility of the student to check, prior to registration, their timetable for potential clashes as the department reserves the right to deregister students from modules registered in contravention of 9.1 & 9.2

EM10 Students are to register for the maximum number of modules available to them, according to EM1, for the level in which they are registering. If a student is registering for modules on two different levels the student must register for all available modules on the lower level and may add additional modules on the higher level, module to EM9.

INDICATIVE CONTENT

NB: Students: to read this section in conjunction with the relevant Learner Guide.

NEW HEQSF PROGRAMMES
(A)BACHELOR OF ENGINEERING TECHNOLOGY

ENGINEERING MATHEMATICS 1A:
Indicative Content
Numbers and Algebra
Areas and Volumes
Trigonometry
Graphs
Complex Numbers
Calculus – Differentiation
Calculus – Integration

ENGINEERING PHYSICS 1A:
Indicative Content

Units, Physical Quantities, Vectors
Equilibrium of a particle
Newton's Second Law, Gravitation
Work and Energy
Impulse and Momentum
Torque
Elasticity
Periodic Motion
Mechanical Waves
Vibrating Bodies
Acoustic Phenomena

TECHNICAL LITERACY
Indicative Content
Introduction into Technical Literacy
Technological Literacy
Introduction to writing a technical report
Experiments and Practicals process
Presentation skills
Critical thinking
Presentation 1
Group Skills
Directions and instructions: writing about process
Writing the formal report
Presentation 2
Resubmission of technical report

COMPUTING & IT
Indicative Content
Computer hardware:
Computer networks:
Microsoft Windows operating environment
Data Protection and Security
Word processing (Microsoft Word):
Spreadsheets (Microsoft Excel):
Introduction to C and MATLAB programming

CORNERSTONE 101
Indicative Content
The module content will be developed around the concept of journeys, across time, across space, and across human relationships. It will take the journey of the uMngeni River (which isclose to all DUT campuses) as a metaphor. The module will bring different disciplinary perspectives to this content – environmental, historical and sociological in particular.
The metaphor of the journey will be sustained across the module and will be applied to personal journeys, historical, political and environmental journeys, and social journeys, with a specific focus on gender. Each section will draw in issues of ethics, diversity and critical citizenry. The

design team may later take a different metaphor or theme, but with the same outcomes and attributes.
The final section of the module will identify and integrate learning from earlier sections and examine implications for further learning. At each stage of the module, activities such as the weekly online journal and class discussion will involve reflection and build communicative practices. There will be a concluding section in which students will identify their learning and examine the implications for their roles as students and as citizens

DESIGN 1
Indicative Content
History of Engineering Design
The engineer in relation to society
Engineering sketching and drawing
Introduction to Mechanical Design
Basic materials properties and uses
Safety, Workshop theory and practice
Use of tools to manufacture components

ELECTRICAL PRINCIPLES 1
Indicative Content
Established electrical principles and laws
Network theorems, conversions and applications
Passive components in DC circuits

MECHANICS OF MACHINES 1
Indicative Content
Analytical Treatment of Co-planar forces
Moments of Co-planar forces
Reactions at Beam Supports
Systems of Co-planar forces
Location of Position of the Resultant force on a Body
Center of Gravity
Mass Moment of Inertia
Torque and Angular Acceleration
Linear Motion
Angular Motion
Work Done, Energy and Power
Conservation of Energy
Momentum and Impulse
Hoists and Haulage
Cams

ENGINEERING MATHEMATICS 1B

Indicative Content

Linear Algebra
Trigonometry
Series
Advanced Calculus - Differentiation
Advanced Calculus – Integration
Differential Equations
Statistics and Probability

THERMOFLUIDS I

Indicative Content For Thermodynamics:

Identify and define the properties used and their units
Define work and heat and use an appropriate sign convention
Define and use the Laws of Thermodynamics and apply them to systems
Define and use the gas laws and appropriate gas properties, together with the processes, to analyse gas systems and cycles.
Define and use appropriate properties, together with the processes, to analyse vapour systemsand cycles
Use appropriate process graphs in the analysis of systems and cycles

Indicative Content For Fluid Mechanics:

Identify and define the properties used and their units.
Calculate viscous drag on plane and cylindrical surfaces using Newton's Law of Viscosity
Define and use the continuity equation and find flow rates and velocities in variable area pipes
Differentiate between flow types (uniform, steady, unsteady, etc.)
Define the momentum equation and use it to determine the forces acting in pipe bends, reducers, nozzles, etc.
Calculate pipe friction losses by Darcy's and Chezy's formulae
Define Bernoulli's Theorem for incompressible fluids and apply it to pipe flow systems
Calculate frictional flow losses for pipeline systems
Describe loss coefficient, equivalent length and shock losses
Construct total energy grade lines and hydraulic gradients to represent pipeline flow and pumping applications
Calculate hydrostatic forces on various submerged surfaces, and components, in relation to centres of pressure and resultant forces
Define Archimedes' Principle and apply it to buoyancy and floating stability for fully- and semi-immersed bodies
Determine the metacentric height and relate it to the equilibrium of floating bodies.

STRENGTH OF MATERIALS I

Indicative Content

Introduction to Strength of Materials
Statics - elements of equilibrium
Introduction to mechanics of deformable bodies and temperature effects

Mechanical properties of materials
Torsion and twisting of elements
Thin-walled pressure vessels

ENGINEERING PHYSICS 1B

Indicative Content

Atomic and Molecular Structure
Coulomb's Law
Current, Resistance and Capacitance
The Magnetic Field
Inductance
Maxwell's Equations
Electromagnetic Waves
The Nature and Propagation of Light

COMPUTER AIDED DRAUGHTING

Indicative Content

Drawing introduction:

1. Basic fundamentals of Orthographic Drawing and Isometric Drawing and
2. Freehand Drawing techniques – all using SABS Drawing Standards.

Use of Computer Aided Drawing Program:

1. All basic Profile and Extrusion commands.
2. 2D (Draft) drawings from 3D (Part) drawings.
3. Assembly Drawing from saved Part drawings.

ANALOGUE ELECTRONICS 1A

Indicative Content

The following topics are covered in this module:
Semiconductor Theory
Diode Applications
Special Purpose Diodes
Transistors
Transistors Amplifiers
Test Equipment

ELECTRICAL PRINCIPLES 2

Indicative Content

The following topics will be covered in this module:
Introduction to Alternating Current (AC)
Capacitor and Inductor in AC circuit
RC and RL circuits
RLC circuits and Resonance
Analysis of AC circuits
Network theorems and conversions

Introduction to Three-Phase Systems

FLUID MECHANICS 2
Indicative Content
Dimensional Analysis
Flow Measurement
Friction and pipe losses
Pipe systems – parallel and three-tank
Varying head flow
Hydraulic Power transmission
Open Channel Flow
Vortex Flow
Jet Impact

ENGINEERING MATHEMATICS 2A
Indicative Content
Partial Differential Equations
Statistics and Probability
Differential Equations
Laplace Transforms
Fourier Series

MATERIALS SCIENCE
Indicative Content
Materials classification
Solidification of metals, crystalline imperfections & diffusion in solids
Mechanical properties of metals
Phase diagrams
Polymeric materials
Composite materials
Corrosion of metals

MECHANICS OF MACHINES 2
Indicative Content
The objective of the course is to review and extend the fundamental principles and formulations of kinematics and kinetics for Newtonian mechanics in the context of problems/systems involving the dynamics of particles and rigid bodies. Topic includes vehicle dynamics, balancing, kinematics, simple harmonic motion, gears and gearing

STRENGTH OF MATERIALS 2
Indicative Content
Shear force and bending moment diagrams
Properties of an area: first and second moment of the area
Bending of various types of beams

Transverse shear
Deflection of beams
Stress transformation
Strain transformation

DESIGN 2

Indicative Content

The objective of the course is to extend the fundamental principles of design. Topics include:
Solid shafts
Hollow shafts
Keys
Splines
Knuckle joints
Clamp couplings
Flange couplings
Belt drives

THERMODYNAMICS 2

Indicative Content

Combustion
Engines
Compressors
Refrigeration

DIGITAL ELECTRONICS 1A

Indicative Content

Introduction to digital electronics
Number systems and codes
Basic logic functions
logic tools and techniques
Combinational logic circuits
Introduction to sequential logic
Simulation of logic circuits
Introduction to programmable logic devices (PLDs)

PROJECT MANAGEMENT

Indicative Content

Introduction to Project Management
Need and advantages of Project management
Definition of Project Management
Modern Project planning methods, tool and computer applications
Communication and presentation of project plans
Project Implementation Support of the operational systems

DESIGN 3

Indicative Content
Design for static strength
Design for dynamic strength
External/Internal braking systems
Single and multi-plate clutches
Gears
Bearings
Shafts
Spring design

STRENGTH OF MATERIALS 3
Indicative Content
Stress-strain analysis of simple structures
Failure criteria
Buckling of struts
Moment-Area method
Energy (Castigliano) theorems
Unit force method (modified Castigliano theorem)
Internal forces in simple frames
Slope and deflection in simple frames
Statically indeterminate beams
Superposition method
Integration method
Asymmetrical bending

MECHANICS OF MACHINES 3
Indicative Content
Kinematics
Flywheels
Vibrations
Engine Balancing
Cams

THERMODYNAMICS 3
Indicative Content
Heat Transfer
Steam Plant
Psychrometry

FLUID MECHANICS 3
Indicative Content
Pipe Networks
Hydraulic machines
Similarity laws
Centrifugal pump blade diagrams

Centrifugal pump curves
Reciprocating pumps
Fans and fan systems
Hydraulic machines

INSTRUMENTATION AND CONTROL 1

Indicative Content

Modern industrial instrumentation
Process control and control methods
Measurement of physical variables
Signal processing and data presentation
Principles of operation of various transducers and their application to typical instrumentation systems
Programmable logic controllers (PLCS) and the programming thereof

ADVANCED MECHANICAL MANUFACTURING

Indicative Content

Section 1: Introduction And Overview Of Manufacturing
Section 2: Fundamentals Of Metal Casting
Section 3: Shaping Processes For Plastics
Section 4: Powder Metallurgy
Section 5: Production Systems And Process Planning
Section 6: Survey Of Automation And Manufacturing Systems
Section 7: Rapid Prototyping
Section 8: Microfabrication And Nanofabrication Technologies

ELECTRICAL TECHNOLOGY APPLICATIONS

Indicative Content

The following topics will be covered in this module:
Basic three phase circuit theory as applied to electrical distribution systems, voltage current, real, and reactive power
Essentials of electrical balanced faults and the protection thereof in distribution systems
The elements of distribution systems such as power transformers, circuit breakers, switch gear, cables, insulators and overhead lines
The synchronous machine and its role in electrical generation
The induction motor and its uses in industry
Principle of operation of DC motors

PRINCIPLES OF MANAGEMENT

Indicative Content

PRIMARY
The environment in which people work:
Understanding the system theory of organizations.
Key concepts of Management:
An introduction to scientific theory of management.
Human Resources Management:

A focus on motivation, ability, and confidence building in people.
The Labour Relations Act:
A look into provisions & stipulations of Labour Relations Act 66 of 1995
Managing People and Teams:
Understanding the science / art of getting things done through others.
SECONDARY
Operations Management, and/or
Principles of Project Management, and/or
Introduction to Accounting, Economics, Financial Management and Budgeting, and/or
Entrepreneurship, and/or
Ethics for Engineering Professionals

ENVIRONMENTAL ENGINEERING

Indicative Content

Introduction
Ecosystems
Sustainability
Remote Sensing of Environment
Environmental Risk
Water Supply
Water Pollution
Solid Waste Management
Air Pollution
Noise Pollution
Climate Change – Impact, Mitigation and Adaption

CAPSTONE DESIGN PROJECT

Indicative Content

Design process
Intellectual property, copyright and patents
Industry Standards
Conceptual design
Material selection
Costing
Hazard and operability studies
Design calculations
Referencing
Reporting

NUMERICAL METHODS

Indicative Content

Roots of equations (Part 2)

- Bracketing methods (chapter 5)
- Open Methods (chapter 6)

Numerical Differentiation and Integration

- Newton-Cotes integration formulas (chapter 21) (PP 7eCh21-Part6)

- Numerical Differentiation (chapter 23)

Ordinary Differential Equations

- Runga-Kutta methods (chapter 25)

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ENGINEERING DESIGN AND RESEARCH PROJECT

Indicative Content

Product Design Specification
Functional Analysis
Concept Development and Selection
Design validation
Manufacture

STRENGTH OF MATERIALS 4

Indicative Content

Sustainability and sustainable systems
Principles of sustainable engineering
Lifecycle costs
Introduction to ethics
Ethics and professionalism as relating to engineering
Continuing professional development
Interpretation of financial statements
Budgeting, forecasting and economic decision making

ENGINEERING COMPUTATIONAL METHODS

Indicative Content

Application of the Finite Element Method (FEM) to structural analysis
Utilisation and implementation of FEM based software
Application of the Finite Volume Method (FVM) for analysis of fluid dynamics.
Utilisation and implementation of FVM based software

MECHANICS 4

Indicative Content

Gyroscopic phenomena and analysis
Vibration of Single-DOF Systems
System Resonance
Vibration of Multi-DOF Systems
Vibration Isolation and Absorption

SELECTED TOPICS IN ENGINEERING

Indicative Content

Sustainability and sustainable systems

Principles of sustainable engineering
Lifecycle costs
Introduction to ethics
Ethics and professionalism as relating to engineering
Continuing professional development
Interpretation of financial statements
Budgeting, forecasting and economic decision making

PROGRAMMING FOR ENGINEERINGS

Indicative Content

Introduction
Structure of a programme
Types, variables, constants, identifiers and scope
Control constructs
Conditionals
Case statements and loops
Operations on arrays and strings
Data pre-processing and data post-processing
Functions, procedures and subroutines
Programming with objects and classes
Complex data types
Parameter passing by reference and value
Encapsulation
Debugging of the programme and error handling

COMPOSITE MATERIALS

Indicative Content

Introduction to composite materials.
Fibres, matrix and interface
Mechanical and chemical aspects
Design, chemical synthesis, manufacturing and processing methods
Mechanical testing methods.
Failure mechanisms based on static, fatigue, impact and other properties
Microstructural consideration
Engineering applications including case studies

THERMODYNAMICS 4

Indicative Content

Steady heat conduction
Transient conduction
Numerical methods in heat conduction
Convection
External flow
Internal flow
Natural convection
Boiling and Condensation
Heat Exchangers

Radiation Heat Transfer
Mass transfer
Thermodynamics of Materials

E&OE