UNIVERSITY OF TECHNOLOGY, JAMAICA

Excellence Through Knowledge

SCHOOL OF ENGINEERING

MECHANICAL ENGINEERING BROCHURE

University of Technology, Jamaica

Mission Statement

"To Positively impact Jamaica and the wider Caribbean through high quality learning oppourtunities, research and value-added solutions to government, industry and communities"

University's 2025 Vision

"We are the # 1 University in the Caribbean for work-ready leaders, committed to transforming students and society through high quality teaching, research and value-added services"

Bachelor of Engineering in Mechanical Engineering

PROGRAMME DESCRIPTION

The Mechanical Engineering programme is a four-year course of study which aims to produce graduates that are competent in the design, production, operation and maintenance of Mechanical systems.

Our programme is equipped with the principles and problem-solving techniques of engineering applicable from modeling to assembly of any object in the marketplace.

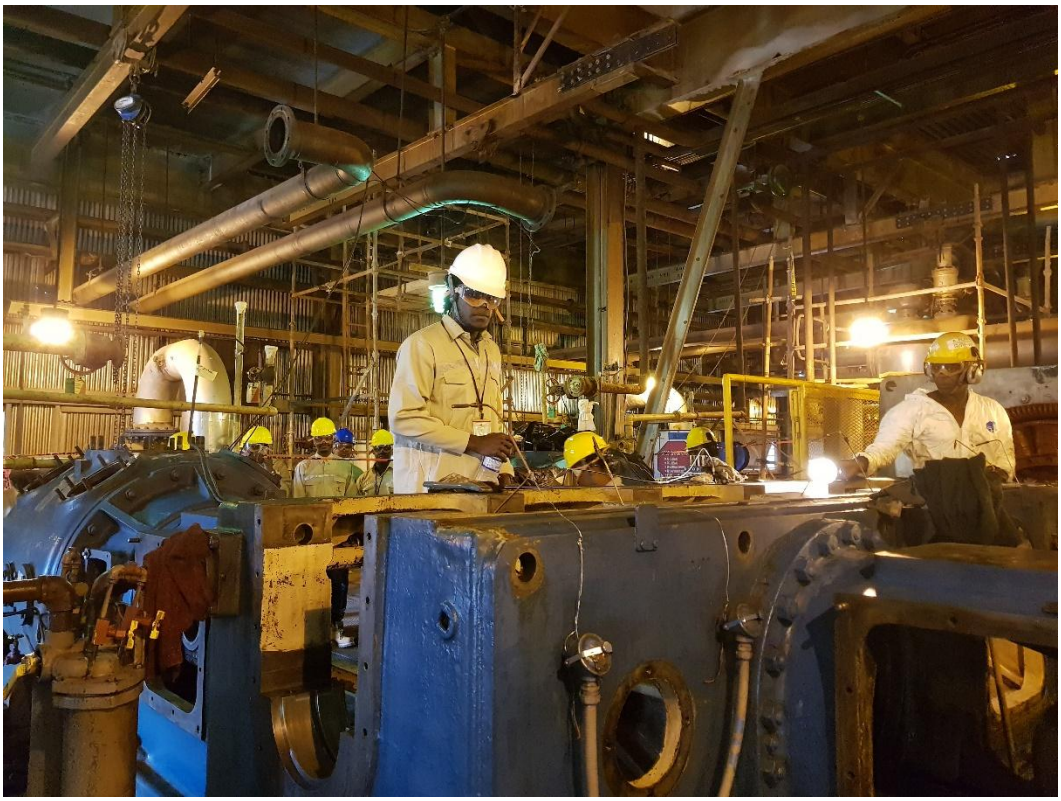
Mechanical engineers conduct analysis encompassing the principles of motion, energy, and force, ensuring that models function safely, efficiently, and reliably, all at an economical cost. This includes solving today's problems and creating future solutions in health care, energy, transportation, world hunger, space exploration, climate change, and more.

DELIVERY & METHODOLOGY

The Offering of all programmes is based on a combination of laboratories, classroom and project-based learning, as well as industry exposure. The general methodology is a student-centered, outcome-based learning. Students are presented with the learning objectives at the start of each module and are encouraged to do additional reading and research to supplement the instructional components.

CAREER OPPORTUNITIES

A Mechanical Engineer can be gainfully employed in a variety of fields, and as such, there is no real limit for the freshly minted mechanical engineer. Jobs are always in demand, particularly in the production plants, aerospace, electronics, biotechnology, tourist Industry, bauxite companies and energy industries.



ENTRY REQUIREMENTS

Students are admitted into the programme on the basis of CSEC achievements and approved CAPE/A-Level studies beyond the fifth form level. Students are admitted to the Bachelor of Mechanical Engineering programme on the basis of **ONE** of the following:

- ✓ Five CSEC/GCE O-Level English Language, Mathematics, Physics and 2 other (Technical or Science related) subjects. **PLUS** GCE A-level Mathematics, Physics and one other relevant subject **OR** six (6) CAPE Units including Physics units 1 and 2, Mathematics units 1 and 2 and two (2) other units in related subjects.

OR

- ✓ Successful completion of Year One of the Diploma in Mechanical or Electrical Engineering with a minimum GPA of 3.05.

OR

- ✓ Successful completion of UTech, Ja Diploma in Engineering or equivalent field of study (for Advanced Placement) with a minimum GPA of 2.7.

OR

- ✓ Successful completion of Associate of Science Degree in Engineering from Montego Bay, Portmore, or Knox Community College with a minimum GPA of 2.7; may enter the programme at the beginning of level 2. Applicants from any other approved institutions will be assessed based on individual merits.

Interview may be required.

PROGRAMME OBJECTIVES

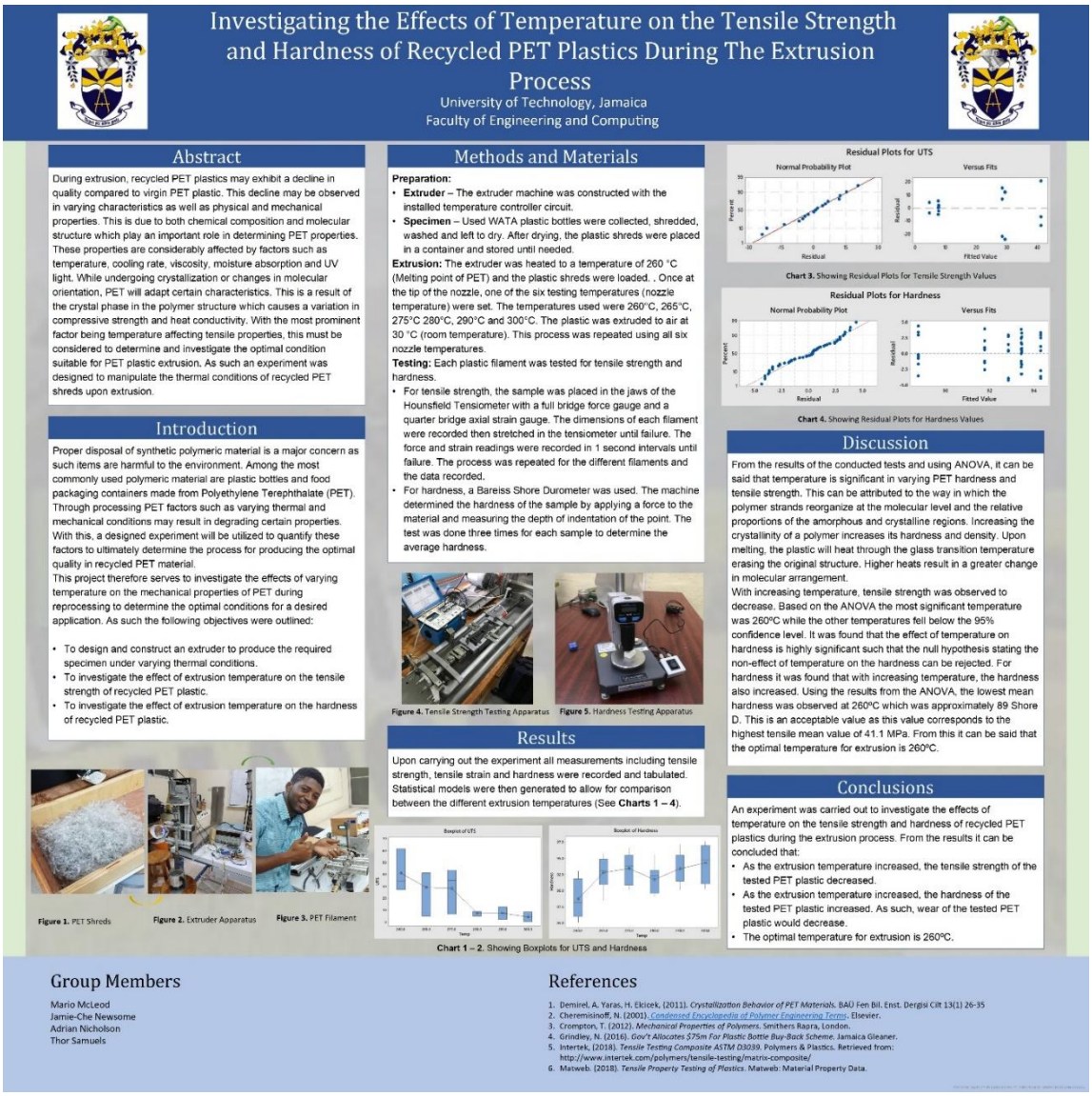
The Mechanical Engineering program seeks to prepare graduates who, after the first few years of their career, have:

- ✓ Established themselves as valued practicing mechanical engineers.
- ✓ Become active supportive members of the community, seeking continuous improvement of skills and professional growth.

The Engineering Department seeks to graduate mechanical engineers who, upon graduation:

- ✓ Be able to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- ✓ Possess the ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- ✓ Be able to communicate effectively with a range of audiences

- ✓ Possess the ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- ✓ Be able to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- ✓ Possess the ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- ✓ Possess the ability to acquire and apply new knowledge as needed, using appropriate learning strategies



COURSE NAME AND DESCRIPTION

Year	Module Code	Module Name	Credit	Module Description
1	**Semester 1**			
	CMP1003	Computers in Engineering	4	This module introduces students to the use of computer software in the field of engineering through the primary use of MATLAB, MS Excel or similar software packages. Students will benefit from the increased the efficiency in performing computations, simulation, information processing and graphical visualization. This module should improve the students' confidence in writing small engineering programs for problem solving.
	COM1020	Academic Writing 1	3	This module is designed at enabling an increase in students' capacity to efficiently utilize receptive and expressive language skills in order to function effectively within the tertiary level environment. It focuses on the inter-related language skills: reading, listening and writing. The module is divided into three units: Acquiring and Processing Information, Basics of Message Production and Message Production in Academic Contexts. Although each unit has its own focus, all three are inter-related and each is meant to reinforce the other.
	LIB1001	Library Fundamentals	1	The module is designed to develop in students the capacity to efficiently use the library and to equip them with the skills to deal with the Information Age. It will assist them in coping efficiently and effectively with the continuous growth of information and the technologies to harness the relevant information sources in whatever format (print, electronic, also whether it is found in books, journals or in multi-media.) that it exits.

Year	Module Code	Module Name	Credit	Module Description
1	MAT2018	BEng. Maths 1- Calculus 1	3	In this module students will be introduced to intermediate aspects of calculus. These include advanced optimization applications of differentiation using LaGrange multipliers, McLaurin's theorem, and evaluation of double integrals. This module helps the students to understand the concepts and demonstrates applications in the theory of linear algebra.
	PHS1005	Engineering Physics 1	4	This syllabus is designed to build on the physics base established in the PCS programme. The topics are treated at an advanced level with emphasis on the understanding and application of physical concepts and principles.
	CSP1001	Community Service Project	1	This module covers the importance of volunteerism in contributing to an improvement in the quality of life in communities around UTech and Community Colleges which deliver its programmes as well as, the wider society. It further unites classroom instructions with real societal needs and explores the relationship between General Education modules and CSP 1001.
	Semester 2			
	CHY2021	General Chemistry 1	3	This module is designed to introduce the student to some of the fundamental concepts required in the study of Chemistry, and is a blend of physical and inorganic chemistry. It includes ten (10) units; starting with the Foundations of chemistry, then taking a close look at the structure of the atom, periodic trends, rates and energy changes of chemical reactions and electrochemistry. The module provides a springboard for other more advanced chemistry modules.

Year	Module Code	Module Name	Credit	Module Description
1	CHY2022	General Chemistry 2	1	This module is designed to develop and enhance the laboratory skills of students doing General Chemistry I. It also serves to complement and reinforce the theoretical aspects of the General Chemistry I module. The module introduces students to basic laboratory techniques that will stand in good stead for more advanced chemistry modules and therefore students will be expected to master the techniques taught in this module before taking on more advanced chemistry modules.
	ENG1001	Engineering Graphics	3	This course develops the student 's competence in the different skills of descriptive geometry and engineering drawing in order to raise the awareness and the need of engineering drawing in the design and technology field. Upon successful completion the student should be able to interpret engineering drawings, draw simple engineering diagrams and schematics according to appropriate standards, and utilise this information in designing components. Lecture classes will be conducted to explain concepts, techniques and basic principles. The use of computer aided drafting packages such as AUTOCAD is an integral part of this course.
	ENG1005	Engineering Workshop	2	Engineering workshop plays a critical role in the design, fabrication and carrying out repairs effectively and safety to various engineering components. As such this module focuses on the safe and effective use of the workshop and the tools and equipment within. It focuses both on the electrical and mechanical workshops which are inherently different and introduce the student both to an Electrical and Electronic workshop and a Mechanical workshop.

Year	Module Code	Module Name	Credit	Module Description
	MAT2022	BEng. Mathematics 2 (Calculus 2)	3	Many engineering systems may be modelled by either ordinary or partial differential equations. The engineering students must therefore obtain competence in solving and interpreting the results of these equations. The aim of this course is to introduce the students to the various standard techniques used for solving differential equations. Various engineering problems will be used as illustrated examples.
	ENG2008	Engineering Statics	3	The purpose of this course is to introduce the student to the field of Mechanical Engineering by using principles and methods of analysis developed in lectures, students will work on mini-projects. These projects will begin with conceptualization, proceed with the analysis of candidate designs, and end in the construction and testing of the device.
2	**Semester 1**			
	COM2014	Academic Writing 2	3	The Academic Writing II module covers skills in critical thinking and reading, information gathering, documentation and argumentation. It focuses on developing reasoning and problem solving competencies and demands the effective use of both receptive and expressive skills. The module is divided into four units: The Concept of Critical Thinking, The Critical Thinking Process, Critically Evaluating Arguments and Writing the Argumentative Research Essay. All three units are inter-related and the skills and competencies acquired in each are reinforced in the others.
	ENG1006	Engineering Seminar	1	Significant importance has been given to seminars. Besides subject specialists, who will be invited to discuss topics of interest, every student will be required to write a report on an

Year	Module Code	Module Name	Credit	Module Description
				engineering topic and hold a seminar on it. This is aimed at increasing the communication skills of the student.
	MAT3004	BEng. Maths 3- Differential Equation & Applications	3	In this module students will be introduced to Laplace transform and Fourier Analysis. It helps the students to develop mathematical skills to analyze signals and systems using transform techniques.
	ELE2210	Electrical Technology	3	In this course the student is introduced to the various concepts of electrical engineering that are important to mechanical engineers. Linear circuit theory and electronics are introduced. Both direct and alternating current circuits are examined.
	ENG2006	Engineering Drawing and Design	3	Many engineering activities centre around the design or analysis of a physical structure. Graphical communications are, therefore, important in facilitating the exchange of ideas between engineers. This course seeks to equip the student with graphical skills and also develop spatial awareness. With these skills, the student will be able to a) understand information given in engineering drawing, and b) produce engineering drawings for communications or for manufacturing purposes. This one-semester, introductory course does not expect to produce draftsmen and women. Instead it seeks to provide students with a sound appreciation of the principles, the conventions and the practice of engineering drawing together with the skill necessary to produce presentable, usable drawings. The basics of computer aided drafting packages such as AUTOCAD is a part of this course.
	ENG2002	Thermodynamics 1	3	This module presents the basic governing principles of thermodynamics and gives a detailed overview of the methods needed to

Year	Module Code	Module Name	Credit	Module Description
				perform thermodynamic analysis of various systems. Fundamental thermodynamic nomenclature is presented along with the theory and application of the 1st and 2nd laws of thermodynamics. Entropy is also covered to establish a foundation for its use in the analysis of various cycles.
	Semester 2			
	MEE2004	Mechanics of Solids	3	This course familiarises the students with the analytical tools necessary for modelling engineering structures (whether machines components or simple structural frames) in a simple and logical manner. It also introduces the students to the principles of Strength of Materials and the associated solution techniques.
	STA2023	Engineering Statistics	3	In this course students will be introduced to basic probability and statistics. Emphasis will be placed on areas that are important to experimental design and quality improvement. The practical applications to engineering will be highlighted.
	MEE2003	Material Science	3	The Material Science module deals with the microstructures and properties of common engineering materials, and subsequent environmental effect. The module provides the student with an insight into the analysis of engineering materials sufficient to understand the factors governing material selection and its importance to design and failures of systems and components.
	MEE2002	Engineering Dynamics	3	This module presents the student with the fundamental principles, methods, and governing equations used to perform dynamic analysis of various mechanical systems. The kinematics and kinetics of particles and rigid bodies in various coordinate systems are covered extensively with an emphasis on practical application of the basic theory through calculations.

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	MEE2001	Mechanical Workshop with Metrology	4	This course exposes to various workshop practices so that they are better able to appreciate the constraints on design imposed by the manufacturing process, and are more aware of the types of failures that may occur due to poor fabrication processes. The topics to be covered are machine tools and their applications, welding and cutting, foundry, hot and cold forming processes, non-traditional manufacturing processes, and measurement. The course material is supported by a set of laboratory activities to be completed by each student.
	MEE2018	Engineering Mechanics Lab 1	2	This course seeks to extend that knowledge gained in physical science within a mechanical engineering context. A variety of topics and concepts are applied, providing a self-contained core of skills vital to the multi-faceted engineer of today. Through a range of statics experiments the module provides a solid foundation for further studies in engineering
3	**Semester 1**			
	MEE3002	Mechanics of Machine	3	This course aims at making the student understand the dynamic behaviour of machines and their elements caused by different kinds of forces. Students learn to solve problems involving kinematics of mechanisms, dynamic forces in mechanisms, turning moment diagrams, balancing of rotating and reciprocating masses, gyroscopic action, epicyclic gear trains, and friction devices.
	MEE3003	Fluid Mechanics	3	Fluid mechanics is the study of mechanics in which the fundamental principles of general mechanics (conservation of matter, the conservation of energy and Newton's laws of motion) are applied to liquids and gases. In this course, students will learn various techniques

Year	Module Code	Module Name	Credit	Module Description
				required to solve realistic fluid flow problems in engineering systems. The emphasis will be placed on developing physical intuition for fluids and problem solving.
	MEE3001	Design of Mechanical Elements	3	The purpose of this course is to introduce the student to the design of Mechanical Elements through the calculation of strengths and factors of safety for materials subjected to static or dynamic loading.
	ENG3002	Thermodynamics 2	3	This module focuses on how thermal energy (from combustion or otherwise) is converted to mechanical power by various power cycles. It also considers the effects of losses how devices and strategies can affect engine output and efficiency. The module initially considers thermodynamic property relations, postponed to this second thermodynamics module when students should have grasped necessary calculus concepts.
	MEE2017	Thermal Fluid Science Lab 1	2	This module is the first in the thermal fluids science sequence. In this module, students are introduced to a variety of laboratory experiments in the areas of thermodynamics, fluid mechanics and fluid dynamics, which facilitate the application of the relevant engineering concepts to a broad range of practical problems and systems.
	MEE2019	Material Science Lab	2	The Material Science course deals with the microstructures and properties of materials. The formation of crystalline structures on solidification of liquid solution along with some common defect is also discussed. Metallurgical theories and concepts are used to enable students to determine values of material properties. Destructive testing is undertaken to determine quality and the behavior of materials under service condition. Heat treatment

Year	Module Code	Module Name	Credit	Module Description
				processes are introduced to show how engineering properties of metals can be enhanced. Other engineering materials are discussed in relation to structure, properties and applications.
	Semester 2			
	MEE3004	Mechanics of Solids	3	This course familiarizes the students' with the analytical tools necessary for modelling engineering structures (whether machines components or simple structural frames) in a simple and logical manner. It also introduces the students to the principles of Strength of Materials and the associated solution techniques.
	MEE3038	Control Systems	3	Control systems represent one of the areas in which computers are heavily involved in the analysis, design and control of systems. Students will be exposed to mathematical foundation, transfer function, block diagram and signal flow graph. State – variable analysis of linear dynamic systems, time-domain analysis of control systems, root locus techniques, and frequent domain analysis of control systems.
	ELE3010	Electrical Machines	4	This course is aimed at providing the mechanical engineering student with the necessary knowledge of electrical machines, so that he/she will be able on graduation to interact and manage effectively in mechanical/electrical work environments such as factories, power stations, etc. Fundamental electrical topics studied in the student's junior years will be reviewed to facilitate the coverage and understanding of new/advanced topics. The treatment will be comprehensive but will be overly rigorous.
	MEE4002	Strength of Materials	3	This is the second module in mechanics of materials. Topics in this module include the effect of geometric discontinuities on stress,

Year	Module Code	Module Name	Credit	Module Description
				plastic behaviour of materials, stresses due to rotational and stresses in thin plates, energy methods, creep and fatigue, introduction to experimental stress and finite elements analysis.
	CMP3004	Computer Aided Design and Manufacturing	3	The course exposes students to the application of computer-based tools in engineering design and analysis. Student will be introduced to geometric and solid modelling, finite elements, manufacturing and optimization.
	MEE3039	Thermal Fluid Science Lab 2	2	This module is the second in the thermal fluids science sequence. This module builds on the foundation laid in the first course. In this module, students are introduced to a variety of laboratory experiments in the areas of heat transfer and thermodynamics, which facilitate the application of the relevant engineering concepts to a broad range of practical problems and systems.
4	**Semester 1**			
	ENG4010	Industrial Work Experience (400 hours)	2	The industrial work experience will allow undergraduate engineering students to interact directly with practicing engineers in their specific technical environments. Emphasis will be placed on problem solving techniques and procedures as well as the understanding ethical and professional standards. Students will be exposed to trouble shooting and problem solving at the industrial level.
	MEE4001	Energy Conversion Systems	3	The relationship between energy consumption and economic development. National energy policy, E/GDP ratio as an indicator of economic well-being, energy elasticity. Conventional energy sources: coal, petroleum, natural gas, the environmental impact of fossil fuels. Non-renewable energy sources: nuclear energy.

Year	Module Code	Module Name	Credit	Module Description
				Conservation techniques: cogeneration. Renewable energy sources: solar thermal, photovoltaics, wind, hydropower, OTEC, wave energy, biogas and biomass. Power Plant issues: sitting, maintenance, availability, reliability, dispatching of equipment.
	MEE3010	Project Management **(ELECTIVE 1)**	3	This course focuses on the planning, scheduling, organizing, and controlling of projects. Projects may involve product development, facility construction, system installation, new business ventures, production layout, or organizing special events. The course integrates the major topics of strategy formulation, organizational structure, project management tools and leadership. As project management becomes increasingly more important in today's world, mastery of its' key tool and concepts is essential in maintaining a competitive advantage in the market place.
	ENG4016	Management for Engineers	3	The objective is to deliver a course of lectures to the students on selected important aspects and areas of Management and Planning. The course must expose them to the existing body of knowledge in the areas of management, organizational theory, marketing, production management, and project planning.
	****	**Social Science/ Humanities Elective**	3	******
	PRJ4029	Major Project 1: Research	3	This module introduces the currently accepted quantitative and qualitative methodologies necessary to enhance the skills and knowledge needed to plan and carry out research for Major and Senior Engineering Projects. It further, equips the participants with the tools necessary to critically assess research methods used for Engineering and Scientific inquiry and to facilitate the development of practical skills necessary for critically analyzing different

Year	Module Code	Module Name	Credit	Module Description
				research styles. This module combines lectures and tutorials in a manner that emphasizes practical application. There is no final examination
	MEE3041	Engineering Mechanics Lab. 2	2	This module is the second in the engineering mechanics sequence. This module builds on the foundation laid in the first course. In this module, students are introduced to a variety of laboratory experiments in the areas of mechanics of machines and strength of materials, which facilitate the application of the relevant engineering concepts to a broad range of practical problems and systems.
	Semester 2			
	ENT3001	Entrepreneurship	3	This module guides participants through the process of entrepreneurship and business creation and culminates with the development of a business plan. It covers topics ranging from creativity, idea generation, business model development, intrapreneurship and marketing, through to the legal and financial aspects of business. The module seeks to enable participants to appreciate the role of creativity, innovation and entrepreneurship in adding value to economic pursuits. The aim is to increase the number of persons who see entrepreneurship and business creation as viable alternatives for employment and contribution to society.
	MEE4014	Power Plant Engineering (Engineering Elective)	3	The purpose of this course is to provide the basic Mechanical Engineering applications to Power Plant Engineering. It seeks to provide understanding of Power Plant components from a maintenance and operational point of view. It also emphasizes the importance of safety and examines the organization of maintenance.

Year	Module Code	Module Name	Credit	Module Description
	MEE4016	Refrigeration and Air Conditioning (Specialization Elective)	3	This is an introductory course. Topics include: vapour-compression refrigeration cycle, cycle performance, expansion devices and auxiliary cycle components, refrigerants, compressors, evaporators, condensers, cooling towers, the absorption cycle, psychrometry and human comfort, the air conditioning cycle, air conditioning systems, cooling load calculations, air conditioning design project. Prerequisite: ENG2002, MEE4005, or other introductory Themodynamics module.
	PRJ4030	Major Project 2: Design and Build	3	This module offers the students an opportunity to design and build solutions for realistic engineering problems that in turn provides learning opportunities that are student centered.
		END OF SEMESTERS LISTINGS		
		ELECTIVES GROUPINGS		
		Engineering Electives		
	MEE4017	Terotechnology	3	The student will learn the theoretical, statistical, practical, and the logical, treatments of industrial maintenance. In addition, the student will be exposed to organisational management and quantitative techniques used

Year	Module Code	Module Name	Credit	Module Description
				in maintenance.
	MEE4020	Welding Technology	3	This course provides the participants with a sound foundation in welding engineering. Participants are engaged in a variety of Welding processes and techniques with related metallurgy and analysis and gain an appreciation of the safety critical aspects of welding and joining materials technology. Topics include arc welding, cutting and gouging, gas welding, gas metal arc welding, resistance welding, friction welding etc.
	MEE4026	Introduction to Safety & Reliability in Engineering **(ENGINEERING ELECTIVE)**	3	This course introduces the students to what is required to ensure safety and reliability in today's commercial, industrial and public sector environments. It is based on the recognition that the performance of a complex system is affected by engineering inputs and begin at conception and extend throughout its lifetime.
	MEE4004	Machine Tools & Modern Production	3	This course aims at providing the students with the knowledge of basic elements of machine tools, soft and hard automation, NC programming. Introduces technologies involved in computer integrated manufacturing, and hierarchical computer control of machines tools and modern methods of Manufacturing.
	MEE3024	Mechatronics	3	This course provides the student with an introduction to the fundamentals of mechatronics and the engineering concepts and techniques that underpin the subject: planning, search techniques, sensors, actuators, control systems and architectures. Students will be exposed to selection criteria, manufacture and trends in the area of mechatronics.
	MEE3007	Design for Manufacturing	3	This course continues to provide the student with the competencies required in the design

Year	Module Code	Module Name	Credit	Module Description
				process. The student is exposed to (1) the concept that the material selection, manufacturing processes and assembly procedures affect design, (2) the art of developing high-quality products at the lowest manufacturing cost and (3) the interaction between product design and the processes by which they are planned and manufactured.
	ENG3017	Management of Technology **(MANAGEMENT ELECTIVE)**	3	The course introduces students to the competitiveness of the manufacturing and service enterprises in the global market place and the creation of wealth through technology. Topics include: impact of rate of change in technological development, integrating technological planning with business planning, technology and product life cycles, technological innovation, research and development management and technology transfer.
	ENG3011	Engineering Economics	3	This course introduces engineering students to the main concepts in economics studies and their relation with various aspects of engineering design and manufacturing operations at various contexts. Topics relating optimization are also introduces in this course.
	MEE3009	Fluid Dynamics	3	This course is the second in the fluid mechanics sequence. Building on the foundation laid in the first course, the students are introduced to the flow of compressible and real fluids. The concept of unsteady flow is also introduced.

Electives Groupings

Module	Module Name	Credits
	Engineering Electives	
MEE4017	Terotechnology	3
MEE4020	Welding Technology	3
MEE4026	Introduction to Safety & Reliability in Engineering	3
MEE4014	Power Plant Engineering	3
	Management	
ENG3017	Management of Technology	3
MEE3010	Project Management	3
ENG3011	Engineering Economics	3
ENG4016	Management for Engineering	3
	Technical Specialization	
MEE4016	Refrigeration and Air Conditioning	3
MEE3009	Fluid Dynamics	3
MEE3027	Mechanical Behaviour of Materials	3
MEE4008	Engineering Vibrations	3

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