MECHANICAL ENGINEERING COURSE MODULES

Picture an eco-car that has the best of all worlds - super sleek, and with an engine that's quiet yet powerful and fuelefficient. With the Diploma in Mechanical Engineering [ME] to give you a head start into building such sleek technology, you'll soon be winning on all fronts. One of the core disciplines of engineering, mechanical engineering is needed practically everywhere - from automotive and energy sectors to computer and biomedical industries.

A highly versatile course, ME provides a broad-based education that enables you to excel in diverse career choices. Its strong emphasis on applied design thinking skills gives you an edge in creating innovative solutions for using clean energy, developing new materials and processes, designing and manufacturing products that range from consumer products to medical devices.

In your first year, you will learn the fundamentals of mechanical engineering with a focus on materials and design skills. It covers modules such as Thermofluids, Materials & Manufacturing Technology and Mechanical Engineering Fundamentals. In your second year, you will be introduced to core mechanical engineering modules such as Applied Mechanics and Strength of Materials.

In your final year, you will get to choose one of four specialisation options, and work on a final-year project that involves the design and development of a new product prototype with real-world application. Or you can round off your learning journey with a local or overseas internship with established organisations such as ST Kinetics and A*STAR.

LEVEL 2.1

Applied Mechanics

This is a follow-on module of Engineering Mechanics. It will equip students with the necessary skills to analyse problems of rigid bodies at rest and in motion. Topics include trusses, friction, work energy method, power and efficiency & Impulse momentum method. This knowledge plays an important role in many diverse engineering applications of the modern world, such as the design of cars, structures, airplanes and various types of machines. Students will be guided to solve engineering problems using these mechanics principles.

Applied Thermofluids

Thermo-fluids is a module of science and engineering encompassing 2 intersecting fields namely Thermodynamics and Fluid mechanics. In relation to mechanical engineering, Thermodynamics is the science of converting energy involving heat to mechanical work and Fluid Mechanics is the study of physical forces in a system in the presence of fluid when at rest or in motion. Heat energy had to be transported by fluid in order to undergo various thermodynamic processes and becomes mechanical work eventually. The way fluid would flow ultimately dominates the entire thermal energy conversion process. This module extends the coverage of Thermofluids in year 1, which further the basic concepts and principles of Thermodynamics and Fluid mechanics concepts. Behaviour of fluids under different conditions like static, dynamic and under the influence of heat will be covered in further details. The most important 2nd law of Thermodynamics will be introduced. Subsequently, Basic Engineering cycles developed from the 2^{nd} law including Steam power cycles and Gas power cycles will be discussed. Students will also be taught on the methods of Engine performance testing.

Career & Professional Preparation II

This module helps to equip students with skills necessary to seek and secure work. They will also be equipped to communicate their personal brand in a positive way. As students sharpen their communication skills, they will also learn how to market themselves effectively.

Engineering Mathematics 3

This module is a continuation of Engineering Mathematics 2. Topics include Integration Techniques & Applications, First Order Differential Equation, Laplace Transform, Probability and Statistics.

Industrial Automation

This module will allow students to explore the concepts of logic and sequential control, and their applications in industrial automation. They will be introduced to a spectrum of technologies, ranging from pneumatics and electropneumatics to programmable controllers, with emphasis on component technology leading to circuit design and implementation. Topics include automated mechanisms, ladder diagrams, basic and advanced features of programmable controllers, design techniques and applications.

Interdisciplinary general module (IS Module)

Students embark on a general module from categories ranging from Communication, Life Skills, Entrepreneurship, Media & the Arts to Science & Technology.

LEVEL 2.2

Computer-Aided Design & Analysis

This practice-oriented module is designed to give students an appreciation of the scope of computer graphics and hands-on practice on the applications of Computer-Aided Design (CAD) in engineering design. This module aims to help the students in the application of the drafting concepts and modelling techniques for development of product models in the design process. Students will learn the principles and capabilities of CAD through three dimensional (3D) solid modelling of engineering components and assembly. A project is used to consolidate the concepts and techniques learnt in the CAD module and Computer-Aided Manufacturing (CAM) module. Another project is used to consolidate the concepts and techniques learnt in the CAD module and Engineering System Design 1 (ESD1) module.

Computer-Aided Manufacturing

This module will allow students to acquire the basic knowledge and skills in handling modern manufacturing processes. The module is practice-oriented with classroom lectures complemented by practical sessions on computernumerical-control (CNC) turning and milling, PRO/NC, reverse engineering, coordinate measuring machines, automation and assembly. There is also coverage on electronics manufacturing and automatic assembly processes. Safety and a positive work attitude form an integral part of the module.

Composite Materials

This module aims to provide students with knowledge of the design, analysis and fabrication of composites materials used in engineering design applications. Topics include basic principles of the design, characterisation, fabrication and repair of composites materials.

Engineering System Design 1

This module will equip students with the fundamental knowledge and practice of proper engineering design process and the applications of engineering principles and analysis in the design, sizing and selection of components such as electric motor, coupling, gears, bearing, chain drives, and fastener and compression spring. Case studies of existing machines and systems, guided tutorials, quizzes, assignments and a practical project will be used to reinforce the theoretical aspects.

Mechanical Design Practice

This is a hands-on module that aims to provide students with opportunities to put the knowledge and skills learnt from the Engineering Design Thinking module into practice through the detailed design, fabrication and testing of an engineering application prototype. In the process, students will hone their design knowledge and skills required for their final-year project or internship.

Strength of Materials

This module aims to provide students with the foundational knowledge of strength of materials with emphasis on applications and problem solving. Topics include simple stresses and strains, torsion in shaft, shear force and bending moment diagrams, stresses in beams, combined stresses and experimental stress analysis.

COURSE CURRICULUM

Module Name	Credit Units
YEAR 2 **Level 2.1 (23 hours per week)**	
Engineering Mathematics 3	4
Industrial Automation	5
Applied Thermofluids	5
Applied Mechanics	5
Career and Professional Preparation II	2
CDC Elective^	2
Level 2.2 (25 hours per week)	
Computer-Aided Design & Analysis	4
Computer-Aided Manufacturing	4
Composite Materials	3
Strength of Materials	5
Engineering System Design 1	4
Mechanical Design Practice	3
IS: World Issues-A Singapore Perspective	2

Notes:

^ For more details on Interdisciplinary Studies (IS) electives, please log on to www.np.edu.sg/is/

IS Modules

The School of Interdisciplinary Studies (IS) delivers a broad-based curriculum, which nurtures a new generation of professionals with multidisciplinary skills and an innovative and entrepreneurial spirit to meet the challenges of a knowledge economy. IS offers both prescribed modules and electives to challenge boundaries. Prescribed modules develop students' competencies in core areas such as Communication, Innovation and Enterprise, Culture and Communication, and Personal Mastery and Development, while elective modules provide insights into Arts and Humanities, Business, Design, and Science and Technology.