AUTOMATION & MECHATRONIC SYSTEMS COURSE MODULES

A bionic arm, a self-driving car and an autopilot train system - these are some icons of the amazing world of automation technology that are brought about by integrating various fields of engineering. If you want to engineer the next generation of smart machines, the Diploma in Automation & Mechatronic Systems [AMS] is your ideal choice.

AMS prepares students for exciting careers in diverse fields ranging from aerospace, marine, industrial systems and healthcare to surgical and consumer product industries. You will learn to use automation and mechatronic technology to develop high-tech solutions for consumer products and industrial applications. What's more, AMS's strong emphasis on De sign Thinking and Practice will give you an edge in creating innovative solutions for using clean energy, developing new materials and processes, and designing high-tech consumer and industrial products.

In the first two years, you will build a strong grounding in the various disciplines of engineering - electrical, electronics, mechanical and computer programming. You will also be equipped with applied design thinking skills.

In your third year, you will learn how to integrate automation systems and manage projects. You will also go on a six-month internship with companies such as ST Kinetics, PSA Singapore, Keppel Offshore & Marine and A*STAR. Or you can choose to work on a final-year project to design and develop a "smart" product prototype. Depending on your interest, you can choose to specialise in one of our three specialisation options: Industrial Systems, Aerospace Systems and Marine & Offshore Systems.

SPECIALISATION OPTIONS

Industrial Systems

You will develop skills and expertise in automation techniques, systems design and integration skills as well as problem -solving techniques used in the design and integration of industrial systems.

Aerospace Systems

You will learn how to apply knowledge in mechanics, structure propulsion and electronics to the design and development of aerospace systems and appreciate the use of automation systems in the aerospace industry**.**

Marine & Offshore Systems

You will be taught the fundamentals of marine engineering, propulsion, as well as ship and oil production to gain an understanding of the various systems used in ship production and offshore facilities.

LEVEL 1.1 Common Curriculum for CEP and Non-CEP Pathways

Engineering Mathematics 1

This module is designed to provide students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Topics include algebra, trigonometry, logarithms, plane analytic geometry, matrices and complex numbers. Throughout the module, there is appropriate use of a Computer Algebra System.

Mechanical Engineering Fundamentals

This module introduces students to the study of external forces in two dimensions and their effect on particles and rigid bodies that are at rest. Students learn the skills to analyse the forces acting on the bodies by drawing free-body diagrams and applying the conditions of equilibrium. Topics include forces and resultants, moments and couples, equilibrium and the concepts of plane friction. This module also aims to equip students with the skills to analyse problems of rigid bodies in motion. Only linear motion in two dimensions will be covered. Topics include kinematics and kinetics of linear motion.

Electrical Engineering Fundamentals

This module provides a foundation in electricity covering basic concepts of electrical circuits and the methods used to analyse them. The module emphasises the understanding of the basic electrical circuit laws (Ohm's Law, Kirchhoff's Voltage and Current Laws) and network theorems, and their application to electrical network analysis. Topics covered include fundamentals of electricity, network theorems, capacitance, electromagnetic induction and inductance.

Programming

This practice-oriented module equips students with basic knowledge and skills in computer programming using C language. The main topics include basic computer programming concepts, fundamentals of C programming including branching, loops, and functions.

Integrated Real-world Project 1

This module aims to integrate the knowledge learnt in the semester and apply to a real-world project and further enhanced through relevant contextualization. Students will work in teams and undertake the project development underpinned by the design thinking approach. On completion of the module, students will be able to apply the skills and develop confidence in tackling projects. Data analytics will be introduced using case-based approach and applied in the integrated real-world project.

Career & Professional Preparation I

This module helps to give students a foundational introduction to their three-year diploma course curriculum and how it prepares them for industry. It will help them to embark on their three-year course with the end in mind, through guided reflection of their personal characteristics, and producing an overall game plan for their future education and career goals. The module aims to deepen students' commitment to the sector that the course prepares them for.

LEVEL 1.2 Mechanical Track

Engineering Mathematics 2

This module is designed to provide students with the fundamental skills in mathematics required to solve basic engineering problems. Topics are introduced in an order that is intended to keep abreast of the application requirements in engineering modules. The emphasis in each topic is on simple applications and problem solving. Throughout the module, there is appropriate use of a Computer Algebra System. Topics include trigonometry, differentiation and simple integration with applications.

Electrical & Electronic Technology

The aim of this module is to introduce the fundamental concepts of digital electronic devices and circuits. It intends to deepen the electrical fundamentals learnt in the first semester. Topics include AC circuit theory and transformer fundamentals, number systems, Boolean algebra, combinational logic design, applications of latches, flip-flops, counters and registers.

Materials & Manufacturing Technology

This module introduces students to properties of common engineering materials with emphasis on mechanical testing methods, heat-treatment, international standard specifications, and selection and applications of such materials. Topics include classification of materials, mechanical testing, alloying, steels, non-ferrous alloys, plastics, ceramics and composites. For manufacturing technology, students will acquire the basic knowledge and skills of manufacturing processes, including drilling, turning, milling, grinding, non-conventional machining, welding and assembly.

Thermofluids

Students will learn the basic laws governing the behaviour of fluids under the influence of energy transfer. Topics include systems concept, temperature and pressure, fluid statics, fluid in motion, continuity equation, laminar and turbulent flows, ideal incompressible flow, Bernoulli's equation, flow measurement and Pitot tube, external flow and application of thermofluid's principles in simple engineering systems.

Integrated Real-world Project 2

This module aims to integrate the knowledge learnt in the semester and apply to a real-world project and understand the relevance and application of the modules learnt. Students will work in teams and undertake the project development underpinned by the design thinking approach. On completion of the module, students will be able to apply the skills and develop confidence in tackling projects at the higher levels.

Engineering & Society

The module aims to imbue students with a sense of purpose as they pursue an engineering education and providing students with a moral compass in their journey as engineering professionals. The sense of purpose is encapsulated by the development and application of professional skills, within the engineering context, that would allow students to make a contribution to society. The module will develop students' cultural quotient (CQ) capabilities and mould their mental disposition to understand and collaborate across diverse cultures. CQ is crucial in the engineering profession due to the proliferation of global connectivity and collaboration, which requires an engineer to empathise, relate, adapt and work effectively with people from diverse backgrounds and cultures. The module will also feature our signature pedagogies, namely, design thinking and service-learning, so that students will be sensitised to the challenges of working as engineers in new and unfamiliar settings.

COURSE CURRICULUM

YEAR 1 Level 1.1 (23 hours per week)	
Career & Professional Preparation I	2
Mechanical Engineering Fundamentals	3
Electrical Engineering Fundamentals	3
Engineering Mathematics 1	4
Programming	4
Integrated Real-world Project 1	4
Innovation Made Possible ^	3

Level 1.2 (27 hours per week)	
Electrical & Electronics Technology	4
Engineering & Society	2
Materials & Manufacturing Technology	4
Thermofluids	4
Engineering Mathematics 2	4
Integrated Real-world Project 2	4
Sports & Wellness^	2
Communication Essentials^	3

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