

ELECTRONIC & COMPUTER ENGINEERING COURSE MODULES

You only need to look around to know that electronics are part of your daily lives - from the smart phones and laptops that you use to the vehicles that you travel in. You can play a part in shaping the way people live, work and play with the Diploma in Electronic & Computer Engineering [ECE]

ECE gives you a strong foundation in electronics, computer and communication engineering. With our industry-relevant curriculum, you will be well-placed to meet the needs of the industry when you graduate.

In your first year, you will learn the fundamental aspects of engineering with modules such as Computer Programming, Analogue Electronics and Digital Fundamentals. In your second year, you can choose to deepen your expertise in a particular field by pursuing one of our five specialisation options. Then in your final year, put your knowledge to the test with a six-month internship with industry leaders such as Xilinx, STATS ChipPac, ST Kinetics, M1 and Singtel.

What's more, you may even get the chance to work on industry-sponsored projects at our technology centres. Plus, you will go on local and overseas study trips that will widen your exposure to the exciting world of engineering.

LEVEL 2.1

Analogue Circuit Design & Applications

This module covers the fundamentals of analogue electronic circuit design and applications. The operating principles and design of commonly used analogue devices and operational amplifier circuits are taught in this module. The main topics include amplifiers, comparators, oscillators, filters, and digital-to-analogue and analogue-to-digital converters. Applications in various practical circuits are also illustrated in this module. This module is a pre-requisite for the Fundamentals of Control Systems module.

Applications Programming

This is a core module for Level 1 or 2 Diploma in AE, BME, ECE and NSS students and is intended to equip students with the fundamental skills required to develop Windows Form applications. The students will develop conceptual understanding to design and develop applications to solve business and engineering problems. Key topics include Windows Control classes, branching & looping, array, data files accessing and methods.

Electronic Design Prototyping 1

The main objectives of this module are to introduce students the techniques to construct an electric circuit and practical skills in measurement and troubleshooting. Students will learn the process for planning, construction and testing of a project. The focus of the module is on the hands-on practice for bread boarding, PCB design and assembly and test & measurement. Simple troubleshooting techniques and CAD tools will also be introduced to aid in their design of the PCB.

Engineering Mathematics 3A

This module is designed to provide students with further mathematical skills to solve basic engineering-related problems. The topics are introduced in an order that is intended to keep abreast of the application requirements in their other engineering modules. Topics included in this module are integration with applications, differential equations, Laplace Transform and Fourier Series.

Microcontroller Programming & Interfacing

This is a core module for level 2 diploma in AE, ECE and ES. This module introduces students to the fundamentals of microcontroller programming and interfacing. C language programming is used to illustrate the operation of the microcontroller. Key topics covered in this module include Interfacing the microcontroller to basic input-output devices such as switches, LEDs, 7-segment display and keypads and IO subsystem like timer and UART.

Interdisciplinary Elective 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

COMMON MODULES:

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.

Electronic Design Prototyping 2

The main objectives of this module are to introduce students the prototyping techniques on electronic assembly and practical skills in electronic project design. Students will learn the process for planning, construction and testing of a project. The focus of the module is on the hands-on practice for CAD design, bread-boarding, point-to-point wiring, PCB assembly, test & measurement, and fault finding on electronic circuits.

Object Oriented Programming

The aim of this module is to build on the foundation of Application Programming and introduce the concepts of Object Oriented Programming to the students. It covers the area from the fundamental concepts of Object Oriented Programming to Web forms design and application using database.

Telecommunication Principles

This is a core module for Level 2 Diploma in ECE and AE. This module is intended to introduce students with fundamentals of radio communication. At the end of this module, students will acquire content knowledge and understanding on the basic concepts of analog communication systems.

Key topics covered in this module includes the characteristics of a basic communication system and the environmental factors that affect communication will be discussed. The concepts that are necessary for the understanding of linear systems will be explained, with emphasis on resonance and filters. Students will be taught the fundamental concepts of analog modulation and demodulation techniques such as AM and FM and their applications. The concept of AM/ FM receiver will also be introduced.

World Issues: A Singapore Perspective (IS Module)

This module takes a global approach to significant current and historical events. The aim is to enhance students' understanding of such events and issues in the context of Singapore, as well as challenge students to think critically about choices and decision-making vis-à-vis the nation state.

COMMON MODULES:

Digital Media & Communication, and Network Systems & Security Options

Data Communications

This is a core module for Level 2.2 / 3 Diploma in ECE. This module provides the foundation for understanding principles in data communication. It will train students to understand and apply key concepts and processes associated with:

- Data transmission of information
- Network topologies

- Transmission media
- OSI reference model & TCP/IP protocol suite
- IP addressing and Subnetting

This module also introduces students to the mobile data communications.

Digital Communications

This is a core module for Level 2/3 Diploma in ECE. This module is intended to provide the foundation for understanding principles in digital communications. Students will acquire understanding of and be able to apply key concepts and processes associated with digital transmission of information and transmission media.

Key topics covered in this module includes channel capacity of a noiseless and a noisy communication channel, pulse modulation techniques, types of sampling, sampling criterion, Pulse-code-modulation system, frequency and time multiplexing techniques, T1 PCM-TDM system, asynchronous and synchronous transmission format, line codes waveforms in digital baseband signaling.

AEROSPACE ELECTRONICS OPTION

Avionics Systems

This module provides students with an appreciation of aircraft electronic systems. It includes topics such as cockpit instrumentation, aircraft electrical systems and aircraft navigation, communication, surveillance, emergency and lighting electronics used by modern commercial aircraft.

This module equips students with the knowledge required for the advanced modules on Aircraft Navigation and Communication Systems (ANCS) and Aircraft Electrical & Instrumentation Systems (AEIS).

Fundamentals of Aerospace Technology

This module aims to provide students with an appreciation on the basics of aerodynamics and principles of flight, basic aircraft structures, components and systems, aircraft basic design features and airworthiness legislations requirement for the aerospace industry. This module then discusses historical events and development and finally, issues which have an impact on the Singapore aerospace industry.

COMPUTER & MOBILE TECHNOLOGY OPTION

Mobile Application Programming

This module aims to provide students with hands-on training on basic mobile applications development using Android open-source platform. It includes a brief introduction of the history and current development of Android; how to setup development environment; how to develop Android application from scratch using different building blocks from Android Application Framework.

MICROELECTRONICS OPTION

Integrated Circuit Design & Technology

This is a core module taken by Microelectronic Option students in level 2. It introduces students to various Integrated Circuit (IC) technologies and provides students with basic integrated circuit design concepts using Metal-Oxide Semiconductor (MOS) technology. The module equips students with the basic practical skills that are needed to design and layout simple MOS digital circuits on silicon.

Wafer Fabrication Fundamentals

This is a core module taken by Diploma in ECE - Microelectronics Option students in Level 2. It aims to provide students with basic knowledge of IC fabrication. The processes that are required to convert a blank wafer to one that is covered with complex circuits are included.

They consist of silicon ingot growth, wafer preparation, photolithography and etching. Yield and reliability as they pertain to IC fabrication are also covered. In addition, this module will provide students with fundamental knowledge of various supporting technologies required in the wafer fabrication industry such as vacuum and pressure measurement systems. Finally, process and device simulations are covered with students undertaking a simulation exercise building and operating their own virtual transistors.

COURSE CURRICULUM

Module Name	Credit Units
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YEAR 2

Level 2.1 (23 hours per week)

Analogue Circuit Design & Applications	5
Applications Programming	4
Electronic Design Prototyping 1	3
Engineering Mathematics 3A	4
Microcontroller Programming & Interfacing	5
Interdisciplinary Studies (IS) elective ^	2

Level 2.2 (23 to 25 hours per week)

Common Modules

Career & Professional Preparation II	2
Electronic Design Prototyping 2	4
Object Oriented Programming	5
Telecommunication Principles	5
World Issues: A Singapore Perspective ^	2

AEROSPACE ELECTRONICS OPTION

Avionics Systems	3
Fundamentals of Aerospace Technology	3

COMPUTER & MOBILE TECHNOLOGY OPTION

Mobile Application Programming	5
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DIGITAL MEDIA & COMMUNICATION OPTION

Data Communications	3
Digital Communications	3

MICROELECTRONICS OPTION

Integrated Circuit Design & Technology	3
Water Fabrication Fundamentals	4

NETWORK SYSTEMS & SECURITY OPTION

Data Communications	3
Digital Communications	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.