## ELECTRICAL ENGINEERING COURSE MODULES

From everyday conveniences such as robotic vacuum cleaners, computers and electric cars to industrial technologies such as power distribution, medical instruments and manufacturing, electrical engineers are practically needed everywhere. If you want to be grounded in one of the most fundamental and flexible engineering fields, the Diploma in Electrical Engineering [EE] is a good pick.

In the first two years, you will gain a good grasp of electrical and electronic engineering and computing applications. The broad-based foundation will prepare you for a wide range of careers in numerous industries ranging from energy and power, robotics and even transportation.

In your final year, you have the choice of picking one of eight specialisation options. Whatever your choice of specialisation is, the EE course will open doors to a wide range of exciting careers. You will also get to put your skills and knowledge into practice with a six-month enhanced internship with industry leaders such as ST Engineering, Resorts World Sentosa, Keppel Offshore & Marine, PSA Marine, Surbana Jurong, ABB, Meiden and SP Group. Or you can work on a design project to develop your very own products and patents.

**LEVEL 2.1**

### 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.

### Electric Circuit Analysis & Measurement

This module covers the concepts, theorems and measurement techniques needed in electrical engineering including three phase system analysis, power measurement and power factor correction, harmonics, transient and steady-state analysis, and measurement procedures and techniques.

### Electrical Machines & Drives

This module provides students with the basic concepts and working principles of common types of electrical machines and motor drives. They will be introduced to the construction, working principles, performance characteristics of transformers, DC motors, induction motors, synchronous generators and stepper motors, and their applications in the industry. Students will also be introduced to motor drive systems and their applications.

### Microcontroller & Applications

This practice-oriented module is designed to equip students with an understanding of the conceptual and operational aspects of a microcontroller embedded system. Students will learn about the hardware and software design of a general-purpose computer system, the fundamental concepts of microcontrollers and the interfacing with external applications. Intel's 8051 microcontroller series will be used as a reference example. Assembly and C language will be used in project-based exercises. Students will also learn to use microcontrollers for engineering applications.

### Sensors & Instrumentation

The module provides students with graphical programming skills using LabVIEW and the knowledge to develop virtual instrumentation systems. Students learn the concept of virtual instrumentation, sensor technologies, data acquisition devices, and computer interfaces such as RS232, GPIB and USB.

### PLC & Applications

This module introduces students to electrical control systems, which cover sequential motor control circuits, direct-on-line and star-delta motor starter circuits. Students will then be taught the PLC (programmable logic controller) theory of operation, basic functions, the I/O addressing and interfacing, and the design of ladder logic programmes. Students will design PLC-based systems related to industrial applications through numerous hands-on exercises.

### Computer-aided Drawing

This module uses the software, AutoCAD to teach the basic commands used to create engineering drawings. Topics covered include: understanding the AutoCAD workspace and user interface, using basic drawing, editing, and viewing tools, organizing drawing objects on layers, adding text and dimensions and inserting reusable symbols (blocks).

**LEVEL 2.2**

### Advanced PLC & Networking

This module provides more programming functions of PLC such as data movement, conversion and logic instructions as well as the control of the variable speed drive. Students will also be introduced DeviceNet, a network system that interconnects control devices for data exchange. Students will learn about the DeviceNet cable system, configuration of the driver, the scanner module and the network devices through hands-on experiments.

### Digital Systems & Applications

This module builds on basic material covered in Level 1 Digital Electronics & Applications with topics such as flip-flops, adders, multiplexers/de-multiplexers, encoders/decoders, shift registers and counters. Students will have plenty of practice-oriented training in the design of digital system with real-life applications. Testing and verification of the digital circuits developed will be done using a hardware description language.

### Electronic Devices & Circuits

This module aims to provide students with a general understanding of some commonly used analogue and digital electronic devices. The module covers the operating principles, characteristics and applications of operational amplifiers, digital-to-analogue and analogue- to-digital converters, integrated-circuit logic families and memory devices.

### Engineering Mathematics 3A

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

### PC Networking

The focus of this module is on learning networking fundamentals. Students will learn both practical and conceptual skills for understanding basic networking. Students will be introduced to two major models used for planning and implementing networks: OSI and TCP/IP. The OSI and TCP/IP model use "layered" approach to networks. Students will learn various network devices, network addressing schemes and types of media used to carry data across the network.

### Power Electronics & Applications

This module provides students with a broad-based understanding of power semiconductor devices (e.g. BJT, IGBT, thyristors, MOSFETs) and the use of such devices for the control of electrical power. Rectifiers, inverters, DC-to-DC power converters, variable speed drives for DC and AC motors will be covered in this module.

### 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.

## COURSE CURRICULUM

| Module Name | Credit Units |
|---|---|
| **YEAR 2** | |
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| **Level 2.1 (27 hours per week)** | |
| Electrical Circuit Analysis & Measurement | 6 |
| Electrical Machines & Drives | 6 |
| Microcontroller & Applications | 3 |
| PLC & Applications | 3 |
| Sensors & Instrumentation | 3 |
| Computer-aided Drawing | 2 |
| Career & Professional Preparation II | 2 |
| Interdisciplinary Studies (IS) Elective ^ | 2 |
| | |
| **Level 2.2 (25 hours per week)** | |
| Advanced PLC & Networking | 2 |
| Digital Systems & Applications | 3 |
| Electronic Devices & Circuits | 6 |
| Engineering Mathematics 3A | 4 |
| PC Networking | 3 |
| Power Electronics & Applications | 5 |
| 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.