DIPLOMA IN ELECTRICAL ENGINEERING
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, Sembcorp Jurong, ABB, Meiden and SP Group. Or you can work on a design project to develop your very own products and patents.

COURSE MODULES
LEVEL 1.2

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 1
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.

**Innovation Made Possible (IS Module)**

This module aims to help students discover and hone their innate ability to think creatively and come up with innovations to tackle problems close to their hearts. Underpinned by the Design Thinking framework, students will be sensitized to the process of user-centric problem solving. They will be introduced to concepts such as empathy, problem-definition, ideation, prototyping and testing through a practical approach featuring engaging out-of-classroom activities, just-in-time master-classes and a hands-on, “learning by doing” delivery format. Ultimately, the module will help students recognize that innovation is attainable and fun and develop creative confidence to explore new ideas in their studies and beyond.

**LEVEL 1.2**

**AC Circuits**

The aim of the module is to provide first year students with a basic knowledge of the fundamental principles in electric circuit analysis. The module first explores DC network theorems such as Kirchhoff's Laws, Thevenin's Theorem and Principle of Superposition. Application of the theorems are then extended to AC circuits which involve impedances such as capacitance and inductance. The module also includes analysis of simple AC series, parallel and series-parallel combination circuits, concept of AC power and understanding of power factor and its effect on electrical energy usage.

**Analogue Electronics**

The aim of this module is to lay the foundations in analogue electronics. At the end of this module, students will acquire content knowledge and understanding on the basic concepts of analogue electronics and some applications. Key topics covered in this module include operating characteristics, working principles and applications of discrete electronic devices such as various types of diodes, MOSFETs and BJTs. Practical circuits will be used to enhance and strengthen the learners’ knowledge so that they will acquire the relevant competencies to move on to more specialized modules.

**Digital Fundamentals**

This module introduces the basic principles of digital systems. It covers combinational and sequential logics circuits, multiplexers/demultiplexers and decoders. Flip-flops and their application in counters and registers will also be discussed. This basic knowledge is essential for students to be able to analyse, troubleshoot and design basic digital circuit system.

**Engineering Mathematics**

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.

**Integrated Real-world Project**

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.

Sports and Wellness (IS Module)
This module helps you to learn a sport as a recreational activity to keep you fit and healthy. Team-building and collaboration skills are developed as you network with other students. There is a total of 19 sports electives to choose from: Aerobics, Badminton, Basketball, Cheerleading, Dance Movement, Dancesport, Flag Football, Hip Hop, Life Saving / Swimming, Netball, Orienteering, Street Soccer, Soccer, Softball, Tennis, Touch Rugby, Volleyball, Wellness Programme and Yoga. Outstanding students are awarded a Pass with Merit.

Communication Essentials (IS Module)
This module aims to develop written and spoken communicative competence in students by exposing them to a range of contemporary issues. Through researching on and discussing different topics from different disciplinary perspectives, students acquire lexis and syntax through critical reading and writing while developing awareness of self in society. The integration of critical thinking and analysis will enable students to articulate their thoughts and perspectives through oral presentations and written texts. The module will also develop an awareness of cultural intelligence with global viewpoints.

COURSE CURRICULUM

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<tr>
<td>Sports &amp; Wellness ^</td>
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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.
**COURSE MODULES**
**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**

| YEAR 2 |
|---------------------------|--------|
| **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      |

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**IS Modules**
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COURSE MODULES
LEVEL 3.1

ELECTRIC TRANSPORTATION OPTION

**Electric Vehicle & Charging Systems**
This module covers the working principles of electric vehicle (EV), electric motors and controllers, the charger and electrical system, the battery storage and management system. The vehicle charging processes (different modes of charging) and the safety requirements will be introduced. The infrastructure for the charging stations, the impact of EV charging on the power network and the use of EV as energy storage for the power system will be examined.

**Fuel Cell Vehicle**
This module aims to provide the students with an appreciation on the use of fuel cell in various mode of transportation. The working principles of Proton Exchange Membrane (PEM) fuel cell and electronic system for fuel cell vehicle will be introduced. The module covers the application of fuel cell for fuel cell car/bus, fuel cell forklifts and fuel cell powered airplane (unmanned aerial vehicles).

**Mass Transit & Light Rail Systems**
This module gives a broad overview of the mass transit systems such as MRT (or subway) and electric light rail system for major cities. The topics include the operation of the electric traction motors, the propulsion system, automatic train control system (ATC), regenerative braking, the auxiliary equipment for the train, the power supply and distribution systems. The students will be introduced to the working principles of high-speed train, such as Japanese bullet train (Shinkansen) and Taiwan high-speed train.

MARINE & OFFSHORE ELECTRICAL SYSTEMS OPTION

**Electrical Power & Machinery Systems**
This module covers the design and operation of electrical power generation plant and emergency power systems for marine and offshore industries. Topics include the design criteria, construction and selection of generators, excitation methods, automatic voltage regulators, as well as synchronisation of generators for parallel operation and load sharing. The operating principles of low voltage and medium voltage DC and AC machines and drives for marine and offshore applications will also be taught.

**Design of Marine Electrical Systems**
This module covers the design of electrical distribution network for ships and oil rigs. Students will learn the estimation of load requirements, selection of protective devices, sizing of cables, design of switchboards and bus bar systems. Harmonic filtering, EM disturbances and counter measures, reserve (standby) and alternative power sources, surge protection, batteries systems will be covered in this module.

**Instrumentation & Auxiliary Systems**
This module covers the fundamentals of instrumentation, method of measurement, process control and their applications in marine and offshore industries. Topics include operating principles of measuring instruments, instrumentation standards, working principles of Supervisory and Data Acquisition (SCADA) system, cathodic protection system, fire and gas detection and alarm systems.

AUDIO-VISUAL TECHNOLOGY OPTION

**Audio Video Systems Integration**
In this module, students will study the standards, characteristics and specifications of audio video devices such as DVD players, surround sound speaker systems, MP3/MP4 players, HDTV (LCD/Plasma) and HDMI cables and connectors. Students will learn how to design integrated audio video systems which covers equipment selection, acoustic and sound proofing, speaker selection and placement and also cable selection and wiring. The module will also introduce students to the latest development in the Digital Living Network Alliance (DLNA) software and devices.

**Stage Lighting**
This module enables students to learn the technical and creative aspects of stage lighting. Topics include basic design, colour and exposure theory, types of lighting instruments, power distribution, control, safety, proper hanging, connection, focus, and control of instruments.

Upon completion of this module, students will be able to perform creative lighting layout, install concert lighting, explain colour theory, integrate lighting control instrumentation, and set up a variety of motion lighting instruments.

**Video Conferencing & Streaming Technology**

This module provides training in streaming technologies that include local network, internet audio and video streaming technology, web-casting and voice over IP (VoIP). Students will acquire knowledge of hardware configurations, transmitters and receivers, quality of service, routing, re-sequence, signal processing and streaming standards. The module also includes an overview of the MPEG-4 data compression mechanism, and issues related to shooting video for streaming, editing, quality control, and the formatting of streaming audio and video to fit various applications such as video conferencing, web-casting, pod-casting and mobile entertainment systems.

**Media Transmission System**

This module allows students to learn about media data communication, analogue and digital transmission systems that include AM, FM, cable TV, satellite TV, DAB, and DVB. For data communication, students will gain an understanding of the base-band concept, data encoder and decoder, error detection and correction, routing information, reconstruction and lock synchronisation. For wireless systems, students will study system configurations, transmitters and receivers, error performance, path loss, signal processing, bandwidth, data rate, relative complexity, advantages and disadvantages, and transmission standards.

**ENGINEERING PRODUCT DEVELOPMENT OPTION**

**Integrated Project**

Students will work on a group project that integrates knowledge and skills learnt from the core modules of the Engineering Product Development option. Students are required to carry out research, design, implementation, testing and troubleshooting processes from a prototype to a final product or system under supervision.

**Applied Analogue Electronics**

This module equips the students with practical skills in analogue signal conditioning, current source and motor drive circuits. Students will learn Power Supply Design principles such as voltage regulator with multiple output voltage requirements, switching noise and battery specifications. Through this module, troubleshooting skills are emphasised to undergird students’ foundations in analogue circuits design.

**Embedded Systems & Applications**

The module covers the hardware and software design for systems containing the PIC microcontroller series, a reduced instruction set processor (RISC). Students will learn to interface the PIC with 7 segment display, LCD, keypad, stepper and servo motor, rotary encoder, relays, real time clock, UART, SPI and I2C communications, analog to digital converter and digital to analog converter. Towards the end of the semester, students will do a mini project and develop a product such as a low cost handheld electronic game.

**Intelligent Motion Control**

This module provides students with a comprehensive understanding of the architecture of a motion control system, including motion controllers, drives, actuators and sensors. Students will learn to design and implement closed loop motion control systems to achieve required motion profiles, involving control in speed, position and acceleration. They will learn about coordinated motion control by linking distributed motion controllers using different communication protocols. Customisation of a motion control solution to cater for different applications will also be explored in the context of integrating motion system with other relevant systems, such as vision, speech and HMI.

**SOLAR TECHNOLOGY OPTION**

**Building Energy Studies**

This module will train students in the field of energy studies using building modelling and simulation software which are increasingly being required by the industry when new buildings are designed or existing buildings are being retrofitted. Energy modelling will allow building owners and designers to better understand and predict the energy...
consumption patterns in their buildings before they are built and commissioned. Students will also learn the various parameters building designers have to consider including meeting the requirements from the local standards and codes.

**COMMON MODULE:**
*Power Engineering, Electric Transportation, and Marine & Offshore Electrical Systems Options*

**Control & Automation**
This module examines the characteristics and designs of the industrial automation process. Two main areas will be covered - continuous feedback control and discrete sequential control. Topics in continuous feedback control include system concept and applications, process characteristics, control strategies, system performance, design of controllers/compensators, and modern digital control systems. Topics in discrete sequential control include system concept and applications, and design tools.

**COMMON MODULE:**
*Electronics, Power Engineering, and Marine & Offshore Electrical Systems Options*

**Power Electronics**
This module deals mainly with the applications of power semiconductor devices for the control and conversion of electric power. The objective is to provide students with a broad understanding of the various power conversion circuits and their industrial applications. The principles of operation and analysis of power conversion circuits such as AC to DC converters, DC to DC converters, DC to AC converters, and AC power controllers are studied in detail together with their applications.

**COMMON MODULE:**
*Electronics and Solar Technology Options*

**Photovoltaic & Cell Fabrication Technology**
This module provides students with fundamental knowledge on the operation principles and behaviour of solar cells and modules including spectral response effect of temperature, parasitic resistance and cell efficiency. Students learn about PV cells interconnection, module fabrication and circuit design. This module also provides hands-on training for students in the NP cleanroom as well as the opportunity to learn how to fabricate solar cells in the laboratory.

**COMMON MODULE:**
*Engineering Management Option*

**E-Commerce Technology & Applications**
This module begins with a brief history of the Internet and e-commerce, and goes on to cover the planning aspects of setting up an e-commerce site and the factors that attract surfers to return to it. Technical ecommerce topics include Hypertext Markup Language (HTML), VBScript, Structured Query Language (SQL), Active Server Pages (ASP .NET) and mobile Web applications (.NET Mobile). These technologies allow an e-commerce site to be data-driven - a dynamic site that provides relevant and up-to-date information with powerful search capability.

**COMMON MODULE:**
*Audio-visual Technology and Electronics Options*

**Electronic System Design**
In this module, students will learn how to design a basic electronic system in the control of electrical equipment and drive systems. The practical considerations will be emphasised through design examples and case studies. The topics covered include the selection of a wide range of electronic devices such as passive and active discrete devices, and opamps for specific applications and the interpretation of manufacturers’ datasheets. There will be hands-on laboratory work and the introduction of software design aids to carry out the electronic design tasks.

**COMMON MODULE:**
*Engineering Management and Power Engineering Options*
Power System Economics & Energy Market
This module aims to equip students with a basic understanding of the economic principles underlying the introduction of competition in the electricity industry. Students will explore the structure, operation and regulations of Singapore’s electricity market, which was introduced to promote the efficient supply of competitively priced electricity and open up the wholesale and retail market for full competition.

COMMON MODULE:
Engineering Management, Power Engineering and Solar Technology Options

Power Distribution & Protection
In this module, students will gain a basic knowledge of high voltage and low voltage distribution systems, related equipment and protection devices. Topics include fault calculation, principles of operation of switching devices, switchboards, transformers and cables, and the economic aspects of power distribution systems. Laboratory sessions include the testing of protection devices, operation of electrical equipment, and familiarisation with the safety requirements and precautions to be taken in the operation and maintenance of electrical apparatus.

COMMON MODULE:
Engineering Management, Power Engineering, Solar Technology and Marine & Offshore Electrical Systems Options

Design & Operation of Photovoltaic Systems
This module takes students through the design process of photovoltaic (PV) system and operation, identifying appropriate PV applications in power systems and undertaking simple PV system design. Topics include concept of PV standalone and on-grid systems, sizing of cables and batteries, lightning protection, power protection and power quality issues.

COMMON MODULE:
Engineering Management, Power Engineering, Solar Technology and Marine & Offshore Electrical Systems Options

Engineering Contract & Project Management
This module provides students with an understanding of the various aspects of electrical contracting and management procedures. Upon completion of this module, they will be able to prepare competitive bids for submission of tenders for projects pertaining to electrical services. They will also be able to apply the knowledge gained in project/contract management. Topics covered include contract arrangements and condition of contracts, cost planning, tendering procedures, specification writing, interim certificates and payments, completion and final payment, as well as variations and their valuation.

COMMON MODULE:

Electrical Installation Design
Students will learn how to design electrical systems for residential, commercial and industrial installations. Topics include the design of artificial lighting systems, selection of protective devices for various distribution networks, sizing of cables and circuit protective conductors, and estimation of load requirements for large buildings. On completion of the module, students will be able to design electrical distribution systems in compliance with statutory requirements.

LEVEL 3.2
6-Month Local/Overseas Internship
Students have the opportunity to apply the skills and knowledge acquired in the classroom in a real-life environment via on-the-job training. This programme allows students to hone skills in the areas of problem-solving, interpersonal communications, project planning and implementation, industrial liaisons and character building. Participating companies will have the opportunity to assess prospective employees and secure the services of these students in advance.

Project Design & Development
Students will work full-time on a group project and have the flexibility to choose from a wide range of topics related to system design and integration, research and development, computer applications or other engineering areas. Students are required to carry out research, design, implementation, testing and troubleshooting processes from a prototype to a final product or system under supervision. Students will also learn to apply project management and scheduling skills to enable them to complete their project in time. They will be required to document their project development process and present their projects at regular intervals.

COURSE CURRICULUM

YEAR 3

Level 3.1 (24 hours per week)
Common Module
Project ID: Connecting the Dots (IS Module) 4

ELECTRIC TRANSPORTATION OPTION
Electric Vehicle & Charging Systems 5
Fuel Cell Vehicle 5
Mass Transit & Light Rail Systems 5
Elective Discipline Module
(Electrical Installation Design, Engineering Contract & Project Management, or Control & Automation) 5

MARINE & OFFSHORE ELECTRICAL SYSTEMS OPTION
Design of Marine Electrical Systems 5
Electrical Power & Machinery Systems 5
Instrumentation & Auxiliary Systems 5
Elective Discipline Module
(Power Electronics, Design & Operation of Photovoltaic Systems, or Control & Automation) 5

AUDIO-VISUAL TECHNOLOGY OPTION
Audio Video System Integration 5
Stage Lighting 5
Video Conferencing & Streaming Technology 5
Elective Discipline Module
(Electrical Installation Design, Electronic System Design, or Media Transmission System) 5

ELECTRONICS OPTION
Electronic System Design 5
Embedded System Design 5
Power Electronics 5
Elective Discipline Module
(Engineering Contract & Project Management, Electrical Installation Design, or Photovoltaic & Cell Fabrication Technology) 5
## ENGINEERING MANAGEMENT OPTION

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<tr>
<td>Engineering Contract &amp; Project Management</td>
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<tr>
<td>Power System Economics &amp; Energy Market</td>
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<td>Elective Discipline Module</td>
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<tr>
<td>(Power Distribution &amp; Protection, Design &amp; Operation of Photovoltaic Systems, or E-Commerce Technology &amp; Applications)</td>
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## ENGINEERING PRODUCT DEVELOPMENT OPTION

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<td>Intelligent Motion Control</td>
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<td>Applied Analogue Electronics</td>
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<td>Integrated Project</td>
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## POWER ENGINEERING OPTION

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<td>Power Distribution &amp; Protection</td>
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## SOLAR TECHNOLOGY OPTION

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<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>Building Energy Studies</td>
<td>5</td>
</tr>
<tr>
<td>Design &amp; Operation of Photovoltaic Systems</td>
<td>5</td>
</tr>
<tr>
<td>Photovoltaic &amp; Cell Fabrication Technology</td>
<td>5</td>
</tr>
<tr>
<td>Elective Discipline Module</td>
<td>5</td>
</tr>
<tr>
<td>(Electrical Installation Design, Power Distribution &amp; Protection, or Engineering Contract &amp; Project Management)</td>
<td>5</td>
</tr>
</tbody>
</table>

### Level 3.2 (22 hours per week)

- 6-Month Local/Overseas Internship: 22
- Project Design & Development: 22

### 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.