

## **CLEAN ENERGY MANAGEMENT COURSE MODULES**

Recycling plastic bags and newspapers is just a tiny step to creating a more sustainable world. With challenges like global warming and rising carbon footprint, you can play a larger role in going green. If you have a heart for the environment and a head for science and engineering, the Diploma in Clean Energy Management [CEM] is perfect for you.

In CEM, you will be exposed to both the supply and demand side of clean energy and energy management. You will learn about the various sources of renewable and clean energy as well as the efficient and sustainable use of energy. With solar energy a key focus in CEM, you will get hands-on training at our Solar Technology Centre. Here, you will work on a solar PV power system to generate electricity. You may also be involved in the SolarNova Programme in your final year.

In your first year, you will acquire a firm foundation in electrical and electronic engineering and a good understanding of how clean energy will contribute to a more sustainable environment. In your second year, you will work on clean energy mini projects while continuing to hone your knowledge in engineering technology. You will also explore alternative sources of energy such as wind, hydro and fuel cell technologies. The course also covers modules such as Photovoltaic [PV] & Cell Fabrication Technology that teaches you to "grow" PV cells, install PV systems and measure cell efficiency.

In your final year, you get the chance to put your skills and knowledge into practice through a six-month internship, either locally or abroad. You can look forward to interning at reputable organisations such as Siloso Beach Resort, Marina Bay Sands, Renewable Energy Corporation [REC], Kamtex Solar, Narada Asia Pacific, HOB Centre of Building Research, Energetix, SMA RT@NUS, Sunseap, Xylem Water Solutions Singapore, Solar Energy Research Institute of Singapore [SERIS] and TOV SOD PSB.

### **LEVEL 1.1**

#### **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.

## **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

Module Name	Credit Units
<b>YEAR 1</b>	
<b>Level 1.1 (23 hours per week)</b>	
Engineering Mathematics 1	4
Mechanical Engineering Fundamentals	3
Electrical Engineering Fundamentals	3
Programming	4
Integrated Real-world Project 1	4
Career & Professional Preparation I	2
Innovation Made Possible	3
<b>Level 1.2 (27 hours per week)</b>	
Engineering Mathematics 2	4
AC Circuits	4
Analogue Electronics	4

Digital Fundamentals	4
Integrated Real-world Project 2	4
Engineering & Society	2
Sports & Wellness	2
Communication Essentials	3

**Notes:**

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