

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 2.1

Power Electronics and Applications

This module deals mainly with the applications of power semiconductor devices and power conversion circuits for the control of electric power. The objective of this module is to provide students with a broad-based understanding of the various types of power semiconductor switches, power conversion circuits and their applications in the clean energy systems and industries. The principles of operation and analysis of the power conversion circuits such as AC-to-DC converters (rectifiers), DC-to-DC converters (DC choppers) and DC-to-AC converters (inverters) will be studied in detail together with their applications.

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.

Electric Circuit Analysis and 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.

Wind, Hydropower and Fuel Cell Technologies

This is an introductory-level module that covers the science and engineering technologies behind 3 types of renewable energy namely, wind power, hydropower and fuel cell. The module provides a straightforward description and practicals on

1. Components and operation principles of fuel cells.
2. Structure and operation principles of horizontal axis wind turbines.

3. Structure and operation principles of hydropower plants.

Clean Energy Mini Projects 1

The Clean Energy Mini-Project module will provide students the opportunities to work hands-on and understand how different clean energy technologies are deployed to convert naturally available energy sources to electrical power, without polluting the environment. It will enhance student's understanding on how the components are integrated together to make up a functional system. The characteristics of the power derived will also be studied via monitoring of the output voltage and current.

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.

Interdisciplinary general 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

Clean Energy Mini Project 2

Students would deepen their knowledge and practical skills in developing standalone application which is powered by solar photovoltaic. The application may be optionally backup with battery. Teams of students are presented with practical real-world problems and are asked to research, brainstorm, discuss, design, plan and implement and integrate a working prototype. They will be responsible for different aspect of the project: They will manage the progress of their project using project management tools and document their works in functional, design documents and final report.

Energy Management in Electrical and Mechanical Systems

This module equips the students with the fundamental knowledge in the concept of energy management for electrical and mechanical systems. Students will learn the economic methods to evaluate energy efficiency, electrical motor systems efficiency and energy efficient lighting technologies.

Photovoltaic and Cell Fabrication Technology

This module is proposed in view of the increasing global interest in alternative renewable energy. The awareness stems from the concern over the fast depleting fossil fuel reserves and the accelerate demands on energy consumption across the world, notable in Asia region where the economic growth takes place. The module will cover the fundamental of photovoltaic, PV cell and module technology and the fabrication steps involved in PV cell manufacturing.

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.

Electrical Control and Drives

This module will provide students with fundamental knowledge on motor drives and its electrical controls. In the industry, motors are the main energy-expending equipment. Therefore, understanding the proper design and operation of electrical controls and drives is essential for efficient energy usage and conservation.

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).

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	
Level 2.1 (26 hours per week)	
Clean Energy Mini Projects 1	3
Electric Circuit Analysis & Measurement	6
Electrical Installation Design	5
Power Electronics & Applications	3
Wind, Hydro and Fuel Cell Technologies	5
Career & Professional Preparation II	2
IS Elective ^	2
Level 2.2 (25 hours per week)	
Engineering Mathematics 3A	4
Clean Energy Mini Projects 2	3
Computer-aided Drawing	2
Electrical Controls & Drives Practice	3
Energy Management in Electrical & Mechanical Systems	5
Photovoltaic & Cell Fabrication Technology	6
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.