



## ADVANCED DIPLOMA OF MECHANICAL ENGINEERING TECHNOLOGY

### MODULE DETAILS

#### Module 18: Renewable Energy Systems

Nominal duration: 4 weeks (48 hours total time commitment)

This time commitment includes the preparation reading, attendance at each webinar (1 hour plus 15-30 minutes for discussion), and the time necessary to complete the assignments and further study.

### MODULE PURPOSE

In the past decade there has been a significant increase in applying wind and solar power technologies from the domestic user to the corporate market. There has been a dramatic improvement in the efficiencies of these technologies and this has helped to make the applications economical. Specific energy yields from wind turbines have increased by 60% and installation costs have dropped significantly (up to 50% in many cases). Many countries are passing legislation to enforce greater use of PV systems and this is helping to drive up the production of these systems.

All of these technologies are interdisciplinary, requiring knowledge of topics as varied as aerodynamics, electricity and wind statistics for wind power and mechanical engineering, electronic and electrical engineering for solar power. This module will outline the step-by-step process of designing, installing and commissioning photovoltaic and wind powered systems. It should be emphasized that this is not an advanced in-depth module, but one covering the important issues enabling you to do simple designs and then investigate the design and installation issues in more detail after the module either by further study or in conjunction with experts in the field.

### PRE-REQUISITE MODULES/UNIT(S)

NONE

### ASSESSMENT STRATEGY

To evaluate the achievement of the learning outcomes; written assignments, group projects and practical exercises are set.

### SUMMARY OF LEARNING OUTCOMES

1. Examine and discuss the basics of renewable energy systems
2. Discuss and design basic photovoltaic (PV) energy systems
3. Discuss and design basic wind energy systems
4. Examine and discuss system development, operation and management



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<b>Learning Outcome 1</b>	<b>Examine and discuss the basics of renewable energy systems</b>
<b>Assessment criteria</b>	<ul style="list-style-type: none"><li>1.1 Examine and discuss the economics of renewable energy and the driving forces behind the technologies</li><li>1.2 Discuss renewable energy applications</li></ul>
<b>Learning Outcome 2</b>	<b>Discuss and design basic photovoltaic (PV) energy systems</b>
<b>Assessment criteria</b>	<ul style="list-style-type: none"><li>2.1 Discuss PV system components</li><li>2.2 Perform basic PV design calculations for a given location</li><li>2.3 Examine and discuss the mechanical design and installation of PV systems</li></ul>
<b>Learning Outcome 3</b>	<b>Discuss and design basic wind energy systems</b>
<b>Assessment criteria</b>	<ul style="list-style-type: none"><li>3.1 Examine and discuss the fundamentals of wind</li><li>3.2 Calculate the available wind power at a given location</li><li>3.3 Discuss wind turbine technology</li></ul>
<b>Learning Outcome 4</b>	<b>Examine and discuss system development, operation and management</b>
<b>Assessment criteria</b>	<ul style="list-style-type: none"><li>4.1 Examine and discuss the development of wind power installations</li><li>4.2 Examine and discuss the operation and management of wind power installations</li></ul>

### **Delivery Mode**

A combination of asynchronous and synchronous e-learning delivery comprising a judicious mix of interactive online web conferencing, simulation (virtual labs) software, remote online labs, online videos, PowerPoint slides, notes, reading and study materials (in PDF, HTML and Word format) accessed through the Moodle Learning Management System (LMS).