

<b>Title:</b>	Energy System & Sustainability <b>APPROVED</b>
<b>Long Title:</b>	Energy Systems & Sustainability
<b>Module Code:</b>	ELEC7023
<b>Credits:</b>	5
<b>NFQ Level:</b>	Intermediate
<b>Field of Study:</b>	Electrical Engineering
<b>Valid From:</b>	Semester 1 - 2015/16 ( September 2015 )
<b>Module Delivered in</b>	<a href="#">2 programme(s)</a>
<b>Module Coordinator:</b>	JOSEPH CONNELL
<b>Module Author:</b>	NOEL MULCAHY
<b>Module Description:</b>	This module analyses Sustainable Energy Systems and provides the underpinning knowledge needed by a wide range of technician engineers.
<b>Learning Outcomes</b>	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	calculate energy requirements, generation and transformation losses of fossil fuel and renewable based energy systems.
LO2	appraise and criticize technologies for energy production and storage.
LO3	analyse methods of reducing the carbon footprint of a building and predict the proposed reduction in energy consumption if employed.
LO4	evaluate thermodynamic properties and perform calculations involving heat, thermal expansion, expansion and compression of gases.
LO5	appraise the characteristics of and evaluate key parameters for energy production.
<b>Pre-requisite learning</b>	
<b>Module Recommendations</b>	
<i>This is prior learning (or a practical skill) that is strongly recommended before enrolment in this module. You may enrol in this module if you have not acquired the recommended learning but you will have considerable difficulty in passing (i.e. achieving the learning outcomes of) the module. While the prior learning is expressed as named CIT module(s) it also allows for learning (in another module or modules) which is equivalent to the learning specified in the named module(s).</i>	
No recommendations listed	
<b>Incompatible Modules</b>	
<i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module. You may not earn additional credit for the same learning and therefore you may not enrol in this module if you have successfully completed any modules in the incompatible list.</i>	
No incompatible modules listed	
<b>Co-requisite Modules</b>	
No Co-requisite modules listed	
<b>Requirements</b>	
<i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed. You may not enrol on this module if you have not acquired the learning specified in this section.</i>	
No requirements listed	
<b>Co-requisites</b>	
No Co Requisites listed	

**Module Content & Assessment**

**Indicative Content**

**Energy Calculations**

Calculation of potential and kinetic energy. Calculation of energy transformation - efficiencies and losses.

**Thermodynamics**

Thermodynamic theory, first law of thermodynamics, perpetual motion, the Carnot cycle.

**Renewable Energy Generation Technologies**

Examination and analysis of renewable energy systems including Tidal/Hydro systems, Wind Generation, Photo Synthesis, Solar PV and Solar Heat.

**Analysis of Energy Production methods**

Suitability of potential energy production systems against current and future demand.

**Energy Storage Technologies**

Examine and appraise methods of energy storage.

**Assessment Breakdown**

%

Course Work

100.00%

**Course Work**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Short Answer Questions	A short answer test based on the lecture material covered in weeks 1-3	1,5	20.0	Week 4
Short Answer Questions	A short answer test based on the lecture material covered in weeks 4-7	2,5	20.0	Week 8
Short Answer Questions	A short answer test based on the lecture material covered in weeks 8-11	4	20.0	Week 12
Project	Group Project based on the current electrical energy usage of the Institute and methods of reducing electrical energy consumption.	1,2,3,5	40.0	Week 10

No End of Module Formal Examination

**Reassessment Requirement**

**Coursework Only**

*This module is reassessed solely on the basis of re-submitted coursework. There is no repeat written examination.*

**The institute reserves the right to alter the nature and timings of assessment**

**Module Workload**

**Workload: Full Time**

<i>Workload Type</i>	<i>Workload Description</i>	<i>Hours</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	Lecture based on Energy Systems	2.0	Every Week	2.00
Tutorial	Problems set based on the lecture material covered that week.	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Reflection upon lecture material and solving of problems set in the tutorial session	3.0	Every Week	3.00
Total Hours				7.00
Total Weekly Learner Workload				7.00
Total Weekly Contact Hours				4.00

**This module has no Part Time workload.**

Module Resources
<i>Recommended Book Resources</i>
<ul style="list-style-type: none"> <li>• edited by Godfrey Boyle, <i>Renewable energy</i>, 2nd Ed., OUP Oxford [ISBN: 978-0199261789]</li> <li>• John Andrews , Nick Jelley 2013, <i>Energy Science: Principles, technologies, and impacts</i>, 2 edition Ed., OUP Oxford [ISBN: 978-0199592371]</li> </ul>
<i>Recommended Article/Paper Resources</i>
<ul style="list-style-type: none"> <li>• Eirgrid <i>Generating Capacity Statement</i>  <a href="http://www.eirgrid.com/aboutus/publications/">http://www.eirgrid.com/aboutus/publications/</a></li> </ul>
<i>Other Resources</i>
<ul style="list-style-type: none"> <li>• Website: SEAI - Sustainable Energy Authority of Ireland <a href="http://www.seai.ie/publications/">http://www.seai.ie/publications/</a>  <a href="http://www.seai.ie/">http://www.seai.ie/</a></li> <li>• Website: International Energy Authority <i>World Energy Outlook</i>  <a href="http://www.worldenergyoutlook.org/publications/">http://www.worldenergyoutlook.org/publications/</a></li> <li>• CD-ROM: CIBSERESET - <i>Renewable Energy Sources Estimation Tool</i>  <a href="http://www.cibse.org/index.cfm?go=page.view&amp;item=658">http://www.cibse.org/index.cfm?go=page.view&amp;item=658</a></li> <li>• Website: RETScreen International <i>RETScreen Software Suite</i>, Natural Resources Canada  <a href="http://www.etscreen.net/ang/home.php">http://www.etscreen.net/ang/home.php</a></li> </ul>

Module Delivered in			
Programme Code	Programme	Semester	Delivery
CR_EEPSY_8	<a href="#"><u>Bachelor of Engineering (Honours) in Electrical Engineering</u></a>	5	Mandatory
CR_EELEC_7	<a href="#"><u>Bachelor of Engineering in Electrical Engineering</u></a>	5	Mandatory