



<b>Title:</b>	Power Engineering <b>APPROVED</b>
<b>Long Title:</b>	Power Engineering
<b>Module Code:</b>	ELEC7014
<b>Credits:</b>	5
<b>NFQ Level:</b>	Intermediate
<b>Field of Study:</b>	Electrical Engineering
<b>Valid From:</b>	Semester 1 - 2016/17 ( September 2016 )
<b>Module Delivered in</b>	<a href="#">2 programme(s)</a>
<b>Module Coordinator:</b>	JOSEPH CONNELL
<b>Module Author:</b>	SRETO BOLJEVIC
<b>Module Description:</b>	This module will cover electric power systems background, fundamental analysis techniques, transmission line parameters, transformer modeling, introduction to power system stability and faults and system protection.
<b>Learning Outcomes</b>	
<i>On successful completion of this module the learner will be able to:</i>	
LO1	Analyse the behaviour of electrical power systems under normal and fault conditions.
LO2	Define the concepts and principles underlying the operation and application of electrical power system protective/control relaying.
LO3	Define the technical, environmental and economic operational constraints on an electrical power system.
LO4	Analyse and quantify power quality in existing and planned electrical power systems.
<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**

**Power System Analysis Techniques**

Three-phase star/delta balance/unbalance systems analysis. Per-unit and symmetrical component method  
Per-unit impedance system diagram

**Normal/Fault State of Power System**

Short circuit condition. State of power system before and after fault events. Power system actions to deal with fault events.

**Protection and Control**

Protective system component and layout. Protection system setting coordination and selectivity. Automatic switching control.

**Electrical Power System Operational Constraints**

Operational constraints as voltage drop, transmission/distribution capacity, losses, greenhouse gas emission and cost of generation/transmission/distribution.

**Power Quality**

Terms such as: voltage variations, frequency variations, harmonics, transient and impact of these on power quality in electrical power system.

**Assessment Breakdown**

	%
Course Work	40.00%
End of Module Formal Examination	60.00%

**Course Work**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Practical/Skills Evaluation: A week-by-week assessment of practical competency through laboratory-based assignments with reports.	1,2,3,4	20.0	Every Week
Short Answer Questions	Assessment of lecture material covered during weeks 1 to 6	1,2	20.0	Week 7

**End of Module Formal Examination**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	End-of-Semester Final Examination	1,2,3,4	60.0	End-of-Semester

**Reassessment Requirement**

**Repeat examination**

Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.

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	Theory of Electrical Power System Operation	2.0	Every Week	2.00
Lecturer-Supervised Learning (Contact)	Practical demonstration of experiments and industrial site visit. A week-by-week assessment of practical competency through lecture supervised learning based assignments with reports (4-5 pages)	2.0	Every Week	2.00
Independent & Directed Learning (Non-contact)	Further study of class notes and recommended resources.	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>• Theodore Wildi 2006, <i>Electrical machines, drives, and power systems</i>, Sixth Ed Ed., Pearson Prentice Hall Upper Saddle River, N.J. [ISBN: 978-0131776913]</li> <li>• Edward Hughes, John Hiley, Keith Brown, Ian McKenzie Smith, 2008, <i>Hughes Electrical &amp; Electronic Technology</i>, Ninth Ed Ed., Pearson Prentice Hall UK [ISBN: 978-0-13-206011-0]</li> <li>• Muhamed E. El-Hawary 2008, <i>Introduction to Electrical Power Systems</i>, Chapters: 1,2,7 [ISBN: 9780470408636]</li> </ul>
<i>Supplementary Book Resources</i>
<ul style="list-style-type: none"> <li>• Geoffrey Stokes 2008, <i>Handbook of Electrical Installation Practise</i>, Fourth Ed Ed., Blackwell Science UK [ISBN: 1405147679]</li> </ul>
<i>This module does not have any article/paper resources</i>
<i>This module does not have any other resources</i>

Module Delivered in			
Programme Code	Programme	Semester	Delivery
CR_EEPSY_8	<a href="#"><u>Bachelor of Engineering (Honours) in Electrical Engineering</u></a>	6	Mandatory
CR_EELEC_7	<a href="#"><u>Bachelor of Engineering in Electrical Engineering</u></a>	6	Mandatory