

Module Details	
Module Title	Smart Grids and Power Systems Analysis
Module Code	ELE7031-B
Academic Year	2022/3
Credits	20
School	Department of Biomedical and Electronics Engineering
FHEQ Level	FHEQ Level 7

Contact Hours	
Type	Hours
Lectures	24
Tutorials	10
Laboratories	6
Directed Study	160

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 1

Module Aims
The module aims to: - Understanding of active network management and smart grids. -Provide an understanding of the role of the electrical power system. -Introduce the basic power system plant used in transmission and distribution of electrical energy in terms of their function, structure and equivalent circuit. -Introduce the techniques required for basic power system analysis. -Introduce the basic concept of active network management and smart grids. -Introduce unbalanced power systems and their characteristics. -Understanding symmetrical and unsymmetrical faults in power systems and smart grids.

Outline Syllabus
1) Introduction of smart grids and electrical power systems 2) Function, structure and equivalent circuit of major power system plant including overhead lines, cables, and transformers 3) Power flow analysis and Protection 4) Symmetrical components 5) Symmetrical/Unsymmetrical faults in power systems and smart grids

Learning Outcomes	
Outcome Number	Description
01	Critically evaluate the range of technologies used in the generation, transmission and distribution of electricity
02	Evidence comprehensive understanding of the main components of power system plant and their functionalities
03	Apply equivalent circuits of power system plant to model electrical transmission and distribution networks
04	Develop advanced skills in problem definition and problem solving related to power system analysis, operation and protection
05	Use basic mathematical and engineering analysis techniques to describe the electrical power system
06	Use engineering analysis tools to design and evaluate the performance of power system plant
07	Communicate the results and conclusion on smart energy systems analysis

Learning, Teaching and Assessment Strategy
Concepts are introduced using formal lectures, tutorials, laboratory practicals, seminars and invited lectures from the energy and power system industries. Deeper/better understanding is developed during tutorials by solving practical problems. Oral feedback is given during tutorial and laboratory classes. Lectures and laboratory sessions will be used to deliver the material. Examples and tutorial sheets will also be used to support the lectures and laboratory work. A combination of learning and teaching methods involving a combination of synchronous and asynchronous lectures, tutorials and laboratories. Portfolio of lab report, Coursework - practical labs with results and analysis. Summative assessment: -A formal examination will assess the learning outcomes LO2, LO3, LO4 and LO5. The weighting of the summative exam is 70%. -A portfolio of laboratory and reports up to approximately 3000 words and software based simulation will be used as coursework. The lab report will assess the learning outcomes LO1, LO4, LO6 and LO7 and the weighting is 30%. -Formative assessment: An interim portfolio of laboratory report will be assessed and feedbacks will be given to each student.

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Examination - Closed Book	Closed Book Examination (2 Hours)	70%
Summative	Laboratory Report	Portfolio of laboratory write-up technical report	30%

Reading List

To access the reading list for this module, please visit <https://bradford.rl.talis.com/index.html>

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

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