UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title:	Smart Grids and Power Systems Analysis
Module Code:	ELE7031-B
Academic Year:	2019-20
Credit Rating:	20
School:	Department of Biomedical and Electronics Engineering
Subject Area:	Electrical Engineering
FHEQ Level:	FHEQ Level 7 (Masters)
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	**Hours**
Lectures	26
Tutorials	12
Laboratory	12
Directed Study	150

Availability	
Occurrence	**Location / Period**
BDA	University of Bradford / Semester 1 (Sep - Jan)

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.
-Introuce 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

1	Critically evaluate the range of technologies used in the generation, transmission and distribution of electricity
2	Evidence comprehensive understanding of the main components of power system plant and their functionalities
3	Apply equivalent circuits of power system plant to model electrical transmission and distribution networks
4	Develop advanced skills in problem definition and problem solving related to power system analysis, operation and protection
5	Use basic mathematical and engineering analysis techniques to describe the electrical power system
6	Use engineering analysis tools to design and evaluate the performance of power system plant
7	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.

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**	**Length**	**Weighting**
Formative	Laboratory Report	Portfolio of laboratory write-up technical report (interim)	-3000 words	%
Summative	Laboratory Report	Portfolio of laboratory write-up technical report	-3000 words	30%
Summative	Examination - closed book	2 hour exam	2 hours	70%

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.