MODULE SPECIFICATION

Part 1: Information			
Module Title	Modern Power Systems		
Module Code	UFMFFJ-15-M	Level	Level 7
For implementation from	2019-20		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	Power Systems Analysis 2019-20		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: See learning outcomes

Outline Syllabus: Introduction to Modern Power System Engineering: Review of technical & commercial structure of the power system, familiarisation with relevant computing techniques, frequency and voltage regulation.

Power System Analysis & Operation: Modelling of machines, lines, cables, transformers and loads; symmetrical and asymmetrical fault calculations- Fault level for both Symmetrical & Un-Symmetrical, Low & High Impedance Faults, Short Circuit Limitations, Real Time Fault Location; Stability; Definition; types of stability studies; Power Angle Curve; swing equation; transient stability; equal area criteria; effect of type of fault on stability; multi-machine studies; methods for improving and maintaining systems stability; Formulation of the power flow problem- Gauss-Seidel Method; Newton-Raphson Method; decoupled Load Flow Solution and Comparison of Load Flow Methods.

Power System Protection: Role of protection; components of protection systems; design criteria of protection systems; zones of protection; protection schemes; primary and backup protection; transmission line protection; busbar protection; transformer protection; generator protection; distance Protection; differential Protection; back Up Protection; over Current Protection and

associated electronics.

Renewable Energy Sources: Status of DGs Technology; Impact of grid-connected DGs; Smart grids.

Teaching and Learning Methods: Lectures are used to deliver the theory and practical content illustrated by detailed examples. Fundamental principles will be supported by directed reading.

Laboratory sessions and tutorials will be used to consolidate principles presented in lectures and give practical and computer simulation experience. Some lectures are given in the form of seminars by specialists from industry.

In addition to 36 hours of scheduled contact, students will be expected to spend (typically) 114 hours in independent study, preparation for classes, assimilation of knowledge, skills development and completion of assessments.

Feedback and student support is given during worked examples and past papers are discussed during revision lectures towards the end of the course.
Scheduled learning includes lectures, tutorials and workshops.

Independent learning includes hours engaged with essential reading, assignment preparation and completion etc.

Part 3: Assessment

The assessment therefore consists of an end of module examination and an individual assignment.

The assessment strategy has been chosen to ensure that fundamental engineering principles are assessed under controlled conditions, while a more open ended research based assignment is used to encourage wider engagement and reflection on this topic.

The assignment involves the design of an electrical network under some specific requirements. The quality of the design must then be simulated and assessed in terms of frequency, voltage and stability. The assignment develops advanced skills of electrical network design including the need to specify and implement the design mathematically.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		50 %	Report
Examination - Component A	✓	50 %	Examination (3 hours)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Report - Component B		50 %	Report
Examination - Component A	✓	50 %	Examination (3 hours)

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	Reference
Demonstrate a sound knowledge of the principles of modern Power Systems	MO1
Confidently compute analysis and design components of modern power networks	MO2
Compute the distribution of power in modern networks with regard to demand and generation	MO3
Evaluate of the stability of the network in steady and transient states	MO4
Analyse fault parameters for proper protection design, schemes and implementation	MO5
Apply the engineering principles covered in this module to real systems	MO6

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	114
Total Independent Study Hours:	114
Scheduled Learning and Teaching Hours:	
Face-to-face learning	36
Total Scheduled Learning and Teaching Hours:	36
Hours to be allocated	150
Allocated Hours	150

Reading List

The reading list for this module can be accessed via the following link:

https://uwe.rl.talis.com/index.html

Part 5: Contributes Towards

This module contributes towards the following programmes of study: