MODULE SPECIFICATION

Part 1: Information			
Module Title	Power Electronics and Energy Systems		
Module Code	UFMFST-30-3	Level	Level 6
For implementation from	2022-23		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engineering, Design & Mathematics		
Module type:	Standard		
Pre-requisites	Principles of Electrical Engineering 2020-21		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Overview: This module introduces concepts in Renewable Energy Industry. It develops students' knowledge of power electronics and its application in power and energy systems. The module will cover the fundamentals of power networks, renewable energies with an emphasis on wind and solar power, and power electronics with an emphasis on power electronic converters, inverters and HVDC for control of power flows in electrical networks, renewable energy systems and electric tractions.

There are international goals for sustainable development of power systems and renewable energy is central to achieving these. This module is designed to develop students' knowledge of power electronics and its application in power and energy systems. The module builds upon earlier modules on analogue electronics.

Educational Aims: This module aims to equip students to work as engineers in the fields of power electronics, energy systems and renewable and sustainable energy, Students will be encouraged and expected to be able to reach a level of competence and professionalism to solve a range of scenario based problems.

Outline Syllabus: Typically, the following topics will be covered:

Introduction to three phase, per unit systems, generation methodologies of traditional and

renewable sources, such as solar, wind and the concept of smart grids.
Use of computational packages, such as PSCAD, MATLAB and ATP Draw for analysis and design of networks.
Components of power networks, computation of load flow and fault current.
Introduction to power electronic semiconductor devices and their characteristics.
Power electronic switching techniques and control.
Design and analysis of DC-DC Choppers, Boost and Buck power converters, multiphase-multilevel AC-DC converters, multiphase-multilevel DC-AC Inverters and HVDC for integration and transfer of renewable energy generation to existing networks or local loads.

Teaching and Learning Methods: The delivery is intended to ensure that students have opportunity to develop practical lab-based skills alongside theoretical understanding of power electronics and energy systems. The module will be delivered using a combination of lectures (concepts and the scope of topics will be introduced) and tutorials (involving example exercises) as well as computer based simulation and laboratory based experimental demonstrations. Both the computer based simulation and the laboratory based demonstrations will enhance student understanding of real-world applications of the material delivered in the module.

Part 3: Assessment

The assessment for this module consists of the following:

Component B will require students to submit an individual written assignment that contributes 50% towards the final mark of the module. The assignment assesses the students' ability to translate their theoretical and practical knowledge to investigate performance of a scenario that requires computation, design and simulation within software.

Component A will be a written exam that contributes 50% towards the final mark of the module. The examination assesses the students' understanding of concepts and techniques and their ability to apply them to electrical problems.

Resit strategy:
Component B will require students to submit a written assignment containing an investigation of the performance of a scenario that requires computation, design and simulation using software.

Component A will be a written examination,

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Examination - Component A	✓	50 %	Written examination (3hours)
Written Assignment - Component B		50 %	Individual written Assignment with evidence of the software simulation
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Examination - Component A	✓	50 %	Written examination (3 hours)
Written Assignment - Component B		50 %	Individual written assignment with evidence of software simulation

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** Design and apply suitable analysis techniques to both power electronics and renewable network systems — MO1 Design and evaluate simulations using of appropriate software — MO2 Design and develop simulated power electronics and energy systems — MO3 Apply and select suitable techniques for the analysis and design of power electronic devices and their use for integration of renewable sources to power grids — MO4
Contact Hours	**Independent Study Hours:** Independent study/self-guided study: 228 **Total Independent Study Hours:** 228 **Scheduled Learning and Teaching Hours:** Face-to-face learning: 72 **Total Scheduled Learning and Teaching Hours:** 72 **Hours to be allocated:** 300 **Allocated Hours:** 300
Reading List	*The reading list for this module can be accessed via the following link:* https://rl.talis.com/3/uwe/lists/6C70F618-32F3-E9B3-E1FC-3DDCE7F27B3D.html

Part 5: Contributes Towards
This module contributes towards the following programmes of study: