MODULE DESCRIPTOR

Module Title

Advanced Power Systems For Renewables' Integration

Reference	ENM271	Version	1
Created	February 2023	SCQF Level	SCQF 11
Approved	June 2023	SCQF Points	15
Amended		ECTS Points	7.5

Aims of Module

This module aims to analyse renewable-electricity generation systems and their integration within the electrical power network leading to smart grids.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

1	Evaluate the operation of AC machines as applied in renewable-electricity generation systems.
2	Make informed judgement on the power electronic converters as applied for electricity conditioning with various renewable-electricity generation systems.
3	Analyse the operation of electrical power systems and smart grids with integrated renewable-electricity generation systems.
4	Appraise grid-integrated renewable-electricity generation systems within a case-study setup.

Indicative Module Content

Principles of operation and analysis of AC generation technologies as applied with renewable energy sources covering double-fed induction machines and permanent magnet synchronous machines. Life cycle assessment of renewable-electricity generation systems. Principles of operation, application, and analysis of power processing technologies covering rectifiers, DC-DC converters and grid-tied inverters. Overview of the electrical power systems sectors and operation, and the challenges associated with the recent integration of distributed renewable-electricity generation systems leading to the transition to smart grids. Introduction to the smart grids and cyber security.

Module Delivery

This module is delivered in both blended learning full-time and online learning part-time modes. For blended learning full-time students, the module will use in-person lectures and tutorials. For online learning part-time students, the module will use online lectures and tutorials. Both cohorts will engage in case study work and forum discussions.

Module Ref:	ENM271 v1

Indicative Student Workload	Full Time	Part Time
Contact Hours	35	35
Non-Contact Hours	115	115
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
Actual Placement hours for professional, statutory or regulatory body		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type:	Coursework	Weighting:	100%	Outcomes Assessed:	1, 2, 3, 4
Description:	Individual Written Report				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

In order to pass the module students should achieve an overall grade of D or greater.

Module Grade	Minimum Requirements to achieve Module Grade:
A	A
B	B
C	C
D	D
E	E
F	F
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	None.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1	TWIDELL, J. and WEIR, T., 2022, 4th Edition. Renewable Energy Resources. Routledge. Published Abingdon, Oxon: Routledge.
2	Zobaa, A. F., & Bansal, R. C. (Eds.). (2011). Handbook of renewable energy technology. World Scientific.
3	J. Duncan Glover, Mulukutla S. Sarma, Thomas Overbye, Adam Birchfield, 2022, 7th Edition. Power System Analysis and Design. Publisher: Cengage, Place of publication: USA.
4	JAYAWEERA D.,2016, Smart power systems and renewable energy system integration, Springer.
5	KARAMPELAS P., EKONOMOU L., 2016, Electricity distribution : intelligent solutions for electricity transmission and distribution networks, Springer.
6	RASHID, M.H., 2015. Electric Renewable Energy Systems. Academic Press.