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MODULE DESCRIPTOR

Module Title

Offshore Renewables

Reference	ENM282	Version	2
Created	June 2019	SCQF Level	SCQF 11
Approved	January 2018	SCQF Points	15
Amended	June 2019	ECTS Points	7.5

Aims of Module

This module aims to highlight the need for advanced electrical technologies in the generation and transmission of electricity from offshore locations and the economics of operation of such offshore based energy systems.

Learning Outcomes for Module

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

1	Demonstrate general awareness of renewable energy and technologies used in the energy conversion process.
2	Critically review the theories and mathematical expressions used by energy converters.
3	Critically analyse the components of a renewables based energy system.
4	Demonstrate general awareness of the challenges around integration of electrical power generated from renewables.
5	Demonstrate critical understanding of the challenges and economics of operating offshore based electrical power generation systems in a case study.

Indicative Module Content

Introduction to renewable energy technologies with a look into their current status and broader applications. Energy conversion and the principles of renewable energy based electricity generation. Evaluate the potential of offshore renewables as a source for sustainable energy. Offshore renewables operation and challenges. Wind turbines basic operation and challenges, with an understanding of the effect of wind turbine separation in a wind farm arrangement. Components of renewable-based energy systems and the structural dynamics of offshore renewable energy applications. Transportation of the electrical power from offshore to onshore sub-stations and grid connections. Challenges to the integration of large scale renewable energy generation and strategies to offset them. Introduction to Supervisory control and data acquisition (SCADA) control system and its application to renewables. Economics of operating offshore renewable power generation systems.

Module Delivery

This module will be delivered full time on campus and online via distance learning. The module is taught through lectures and case studies.

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Indicative Student Workload	Full Time	Part Time
Contact Hours	60	60
Non-Contact Hours	90	90
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:	30%	Outcomes Assessed:	5
Description:	Written report around a case study.				

Component 2

Type:	Examination	Weighting:	70%	Outcomes Assessed:	1, 2, 3, 4
Description:	A closed book examination.				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

In order to pass the module, students should achieve a mark of at least 50% and an overall grade of D or greater.

Module Grade	Minimum Requirements to achieve Module Grade:
A	Greater than or equal to 70%
B	In the range 60% to 69%
C	In the range 55% to 59%
D	In the range 50% to 54%
E	In the range 40% to 49%
F	Less than 40%
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., 2015. Renewable energy resources. Routledge.
2. THEODORE, W., 2007. Electrical machines, drives and power systems, 6/E. Pearson Education India.
3. TAVNER, P., 2012. Offshore Wind Turbines: Reliability. Availability and Maintenance, The Institution of Engineering and Technology, London, UK.
4. BANSAL, R. ed., 2017. Handbook of Distributed Generation: Electric Power Technologies, Economics and Environmental Impacts. Springer.
5. JONES, L.E., 2017. Renewable energy integration: practical management of variability, uncertainty, and flexibility in power grids. Academic Press.
6. RASHID, M.H., 2016. Electric Renewable Energy Systems. Academic Press.
7. PITT, E., 2009. Assessment of Performance of Wave Energy Conversion Systems: Marine Renewable Energy Guides. Department of Energy and Climate Change.