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MODULE DESCRIPTOR

Module Title

Offshore Renewables

Reference	ENM282	Version	3
Created	March 2020	SCQF Level	SCQF 11
Approved	January 2018	SCQF Points	15
Amended	June 2020	ECTS Points	7.5

Aims of Module

This module aims to demonstrate critical awareness and understanding of the advanced technologies implemented in the offshore renewable energy transformation and electricity transportation to onshore, while looking into the challenges and economics of operating such offshore-based renewable energy systems.

Learning Outcomes for Module

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

1	Demonstrate critical understanding of the renewable energy technologies application as sources for sustainable energy while identifying their prospects, needs, operation, applications and challenges around their integration.
2	Demonstrate critical awareness and understanding in applying the energy conversion concept and the principles of offshore renewable energy electricity generation and conditioning.
3	Critically analyse the components and the structural dynamics of offshore renewable energy systems.
4	Demonstrate significant awareness and understanding of the advanced AC and DC technologies applied in the transportation of the renewably generated electricity from offshore to the electricity network.
5	Apply the knowledge and understanding of the considerations and economics of operating offshore renewable electrical power generation systems into a case study.

Indicative Module Content

Overview of the energy classification, statistics, consumption, environmental concerns, and the electricity market reform. Energy conversion and principles of electricity generation from renewables as sources of sustainable energy. Offshore renewable energy systems fundamentals, operation and challenges. Offshore wind farms and the basic operation of wind turbines, with an understanding of the effect of wind turbine separation in a wind farm arrangement. Construction of offshore renewable energy systems and the structural dynamics. Transportation of the electrical power from offshore to onshore sub-stations and grid integration. The electricity grid and challenges to the integration of large-scale renewable energy generation and strategies to offset them. Economics of operating offshore renewable energy systems.

Module Ref:	ENM282 v3

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.

Indicative Student Workload	Full Time	Part Time
Contact Hours	50	50
Non-Contact Hours	100	100
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.