MODULE DESCRIPTOR

Module Title

Drive Analysis for Renewable Energy Systems

Reference	EN3200	Version	1
Created	September 2023	SCQF Level	SCQF 9
Approved	February 2024	SCQF Points	15
Amended		ECTS Points	7.5

Aims of Module

This module aims to provide students with the ability to interpret how the drive systems of renewable energy systems operate and are designed.

Learning Outcomes for Module

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

1	Explain the principles of operation of machine elements commonly used in renewable energy system drivetrains.
2	Assess the suitability of different components for a particular application using design calculations.
3	Assess the vibrational behaviour of drivetrain systems.
4	Discuss induction and synchronous machines and their use in renewable energy systems.

Indicative Module Content

Types of drivetrain commonly used in renewable energy systems such as wind turbines and wave energy converters. Operation and design of drivetrain components such as gears, bearings, shafts, flexible mechanical elements, clutches, brakes, couplings, flywheels, screws, fasteners, hydraulics and pneumatics. Estimation of natural frequency of drivetrain systems and design for vibration. Synchronous machine principles. 1-phase and 3-phase circuits, real and reactive power, principle of three phase generation. 3-phase induction motor, construction and operating principle, basic drive characteristics.

Module Delivery

Full-time students: This module will be delivered using lectures and tutorials supported by directed study. Part-time students: This module is delivered by a combination of lectures and tutorials online. It will be supported by online drop-in evening sessions.

Module Ref:	EN3200 v1

Indicative Student Workload	Full Time	Part Time
Contact Hours	40	40
Non-Contact Hours	110	110
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:	A design project				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

A minimum D grade must be achieved to pass this module.

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	EN2500 or equivalent.
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

1	HAU, E., 2013.Wind Turbines: fundamentals, technologies, application, economics. 3rd ed. Heidelberg: Springer Berlin
2	PECHER, A., KOFOED, J.P., 2017. Handbook of Ocean Wave Energy. Springer Chan
3	BUDYNAS, R.G., NISBETT, J.K., SHIGLEY, J.E., 2020. Shigley's mechanical engineering design. 11th ed. New York, NY: McGraw-Hill Education
4	CHILDS, P.R.N., 2019. Mechanical design engineering handbook. 2nd ed. Oxford: Butterworth-Heinemann
5	WILDI, T., 2013. Electrical Machines, Drives and Power Systems. 6th ed. London: Prentice Hall
6	RASHID, M.H., ed., 2016, Electric Renewable Energy Systems, Academic Press