

MODULE DESCRIPTOR

Module Title

Science For Renewable Energy

Reference	EN1201	Version	1
Created	October 2023	SCQF Level	SCQF 7
Approved	February 2024	SCQF Points	15
Amended		ECTS Points	7.5

Aims of Module

To develop a comprehensive understanding of science and engineering underpinning the different energy processes as well as materials that enables generation, harvesting, conversion and storage of renewable energy.

Learning Outcomes for Module

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

- 1 Describe understanding of the scientific basis of advanced energy systems as well as thermal energy storage and electrochemical.
- 2 Describe the properties, performance, fabrication method, characterisation of functional and hybrid materials to apply in each renewable energy system.
- 3 Implement the energy systems that are efficient and reliable, taking into account the properties of the materials used and the conditions in which the system will operate.

Indicative Module Content

Photo physics, visible light-mediated energy transfer, band structure and optical Properties, material properties and structure relation, chemical bonding, characterisation method, hydrogen technologies, organic and standard electrochemistry, water splitting, electrochemical materials, Butler-Volmer equations and kinetics, electrochemical equations, species transports, co-electrolysis, voltammetry, Gibbs Free Energy, electron flow, and chemical transformation, catalysis basics, thermodynamics, hydrogen storage science, biomass conversion, ocean energy, energy storage science, composite basics, sustainability, gas dynamics, electromagnetism in matter, radiation and dynamics.

Module Delivery

The module is taught through lectures, laboratory and tutorials.

Indicative Student Workload	Full Time	Part Time
Contact Hours	45	45
Non-Contact Hours	105	105
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
Description:	A case study/laboratory report				

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

Component 1 comprises of 100% of the module grade. To pass the module, a D grade is required.

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 Introduction to Materials for Advanced Energy Systems, Tong, Colin, Springer, 2018, ISBN 978-3-319-98002-7 (eBook)
- 2 Wolf, E. L., Physics and Technology of Sustainable Energy, Oxford Graduate Texts (Oxford, 2018; online edn, Oxford Academic),
- 3 Serguei N. Lvov, Introduction to Electrochemical Science and Engineering, CRC Press; 2nd edition (2021)