

## MODULE DESCRIPTOR

### Module Title

Artificial Intelligence and Machine Learning for Renewable Energy Systems

Reference	EN4200	Version	1
Created	October 2023	SCQF Level	SCQF 10
Approved	February 2024	SCQF Points	15
Amended		ECTS Points	7.5

### Aims of Module

To provide students with the ability to evaluate and apply Artificial Intelligence and Machine Learning methods, tools and techniques in renewable energy systems.

### Learning Outcomes for Module

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

- 1 Examine the use of Artificial Intelligence and Machine Learning techniques in renewable energy applications.
- 2 Critique the different Artificial Intelligence and Machine Learning algorithms used in renewable energy applications.
- 3 Develop Artificial Intelligence and Machine Learning solutions for renewable energy systems.

### Indicative Module Content

Fundamentals of logic, reasoning, Artificial Intelligence and Machine Learning. Supervised and unsupervised learning including neural nets, support vector machines, decision trees, probabilistic learning, instance-based learning, metric learning and clustering algorithms. Real-World Applications targeting renewable energy systems.

### Module Delivery

This module will be delivered by means of lectures, tutorials and self-guided study, integrated with computer-based applications.

### 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
<i>Actual Placement hours for professional, statutory or regulatory body</i>		

**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: The coursework consists of a written technical report to examine, critique, design and implement Artificial Intelligence and Machine Learning solutions for renewable energy systems.

**MODULE PERFORMANCE DESCRIPTOR****Explanatory Text**

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

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

**Module Requirements**

Prerequisites for Module	EN3201
Corequisites for module	None.
Precluded Modules	None.

**INDICATIVE BIBLIOGRAPHY**

- 1 C. Tong, Introduction to Materials for Advanced Energy Systems, Springer, 2018, ISBN 978-3-319-98002-7 (eBook)
- 2 E. L. Wolf, Physics and Technology of Sustainable Energy, Oxford Graduate Texts (Oxford, 2018; online edn, Oxford Academic).
- 3 S. Rogers and M. Girolami, A first course in Machine Learning, CRC Press, 2011
- 4 M. P. Deisenroth, A. A. Faisal and C. S. Ong, Mathematics for Machine Learning, Cambridge University Press, 2020
- 5 W. ERTEL, 2011, Introduction to Artificial Intelligence, Springer
- 6 S. Russell and P. Norvig. Artificial Intelligence: A Modern Approach.