**MODULE DESCRIPTOR**

**Module Title**

Inspection and Maintenance

| Reference | ENM273 | Version | 1 |
|---|---|---|---|
| Created | February 2023 | SCQF Level | SCQF 11 |
| Approved | June 2023 | SCQF Points | 15 |
| Amended | | ECTS Points | 7.5 |

**Aims of Module**

This module will enable the student to identify and apply different inspection methods to prioritise maintenance requirements for renewable energy systems

**Learning Outcomes for Module**

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

| 1 | Critically evaluate different inspection and maintenance practices, techniques and strategies for the provision of renewable energy |
|---|---|
| 2 | Make informed judgement on appropriate inspection method selection for a range of renewable energy systems |
| 3 | Produce an appropriate maintenance strategy based on relevant records and data from a selected real world case |
| 4 | Critically appraise new and emerging inspection and maintenance technologies for the Industry 4.0 era |

**Indicative Module Content**

Need for NDE methods in life-cycle analysis, failure in renewable energy systems, Non-destructive evaluation techniques to measure component and system integrity; safety and life prediction. Radiography, Eddy current, Magnetic Particle inspection, Vibration monitoring, Ultrasonic techniques, Acoustic Emission, Infrared Thermography. Failure Modes and Effects Analysis (FMEA) & Failure Modes Effects and Criticality and Affects (FMECA) methods, Remaining Useful Life prediction, Operational Expenditure (OPEX)planning and maintenance strategy selection, Predictive vs preventive maintenance, Introduction to Big Data and machine learning based maintenance strategies, industry practice and examples with consideration for cyber security.

**Module Delivery**

This module is delivered in both blended learning full-time and online learning part-time modes. For blended learning full-time students, the module will use in-person lectures and tutorials. For online learning part-time students, the module will use online lectures and tutorials. Both cohorts will engage in case study work and forum discussions.

| **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 |
| *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: Coursework will assess the learning of the student in applying the knowledge gained on inspection and maintenance strategies. The coursework will be based on a real world case with the students expected to provide a maintenance strategy with appropriate choice of methods and methodologies

## MODULE PERFORMANCE DESCRIPTOR

### Explanatory Text

An overall Grade D is required to pass the module.

| Module Grade | Minimum Requirements to achieve Module Grade: |
|---|---|
| **A** | Excellent performance |
| **B** | Very good performance |
| **C** | Good performance |
| **D** | Satisfactory performance |
| **E** | Borderline Fail |
| **F** | Fail |
| **NS** | Non-submission of work by published deadline or non-attendance for examination |

### Module Requirements

| Prerequisites for Module | Normally a UK honours degree, or equivalent, class 2.2 or above and proficiency in English language for academic purposes (IELTS minimum score of 6.5 or equivalent) |
|---|---|
| Corequisites for module | None. |
| Precluded Modules | None. |

## ADDITIONAL NOTES

Part Time refers to Online Learning Part Time (OLPT).

**INDICATIVE BIBLIOGRAPHY**

1   PAPAELIAS, M., GARCIA, F.P. and KARYOTAKIS, A., 2020. Non-destructive testing and condition monitoring techniques for renewable energy industrial assets. Kidlington, Oxford: Butterworth-Heinemann, an imprint of Elsevier.

2   GROSSE, C. and OHTSU, M., 2008. Acoustic emission testing: Basics for research, applications in civil engineering. 1st ed. Berlin, Heidelberg: Springer-Verlag.

3   BIONDINI, F. and FRANGOPOL, D.M., 2019. Life-cycle design, assessment, and maintenance of structures and infrastructure systems. Reston, VA: American Society of Civil Engineers.