**This Version is No Longer Current**
The latest version of this module is available here

## MODULE DESCRIPTOR

### Module Title

Energy Conversion and Storage

| | | | |
|---|---|---|---|
| Reference | EN3570 | Version | 7 |
| Created | June 2022 | SCQF Level | SCQF 9 |
| Approved | March 2004 | SCQF Points | 15 |
| Amended | August 2022 | ECTS Points | 7.5 |

### Aims of Module

To provide the student with the ability to apply fundamental technical concepts and principles in the appraisal and selection of energy conversion and storage devices.

### Learning Outcomes for Module

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

| | |
|---|---|
| 1 | Analyse the performance of IC engines and combustion in IC engines. |
| 2 | Identify and analyse typical alternative energy storage devices. |
| 3 | Analyse the performance of wind and hydro power generation systems. |
| 4 | Analyse experimental results taken from the IC engine test bed. |

### Indicative Module Content

Heat pumps, geo-thermal/ground source. Rankine cycle, Refrigeration & air conditioning, Combustion, Aspects of Steam Plant Design, Nuclear, IC Engines. Turbo-Machinery: Well's Turbine, Hydraulic Turbines,Pelton, Francis,Kaplan. Dimensional analysis, performance laws, perfomance characteristics, specific speed, energy losses, hydraulic efficiency. Energy storage requirements, principles, technologies and applications. Thermal energy storage, wet and dry systems; mechanical energy storage, flywheels, compressed air energy storage, pumped hydro schemes; electrical energy storage, battery systems, psb, vrb, ZnBr, NaS, Li-ion, lead-acid, metal-air, super capacitors, SMES; hydrogen energy systems, fuel cells, Regenesys system.

### Module Delivery

This module is delivered by a combination of lectures and tutorials online. It will be supported by drop-in evening sessions and labs on campus. Assessments will primarily be online although exams will be held on campus with the full-time cohorts.

| Module Ref: | EN3570 v7 |
|---|---|

| **Indicative Student Workload** | Full Time | Part Time |
|---|---|---|
| Contact Hours | N/A | 44 |
| Non-Contact Hours | N/A | 106 |
| Placement/Work-Based Learning Experience [Notional] Hours | N/A | N/A |
| TOTAL | N/A | 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: | 4 |
|---|---|---|---|---|---|
| Description: | A written laboratory report. | | | | |

### Component 2

| Type: | Examination | Weighting: | 70% | Outcomes Assessed: | 1, 2, 3 |
|---|---|---|---|---|---|
| Description: | Closed book examination. | | | | |

## MODULE PERFORMANCE DESCRIPTOR

### Explanatory Text

The module has 2 components and to gain an overall pass a minimum D grade must be achieved in each component. The component weighting is as follows: C1 is worth 30% and C2 is worth 70%.

Examination:

| | Coursework: A | B | C | D | E | F | NS |
|---|---|---|---|---|---|---|---|
| **A** | A | A | B | B | E | E | |
| **B** | B | B | B | C | E | E | |
| **C** | B | C | C | C | E | E | |
| **D** | C | C | D | D | E | E | |
| **E** | E | E | E | E | E | F | |
| **F** | F | F | F | F | F | F | |
| **NS** | Non-submission of work by published deadline or non-attendance for examination | | | | | | |

## Module Requirements

| Prerequisites for Module | Statics and Dynamics (EN1700) or its equivalent. |
|---|---|
| Corequisites for module | None. |
| Precluded Modules | None. |

## INDICATIVE BIBLIOGRAPHY


1. DIXON, S.L., 2013. Fluid Mechanics and Thermodynamics of Turbomachinery. 7th edition Boston, MA: Butterworth-Heinemann.
2. MASSEY, B., 2006. Mechanics of Fluids. 8th ed. London: Stanley Thornes.
3. EASTOP, T.D. AND CROFT, D.R., 1990. Energy Efficiency for Engineers and Technologists. Harlow: Pearson Higher Education/Longman