

MODULE DESCRIPTOR

Module Title

Systems Engineering

| | | | |
|-----------|-------------|-------------|---------|
| Reference | EN4702 | Version | 6 |
| Created | April 2023 | SCQF Level | SCQF 10 |
| Approved | March 2004 | SCQF Points | 15 |
| Amended | August 2023 | ECTS Points | 7.5 |

Aims of Module

To provide the student with the ability to assess engineering plant systems behaviour, operation and performance.

Learning Outcomes for Module

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

- 1 Examine the matching of engineering systems using qualitative, quantitative and simulation techniques.
- 2 Evaluate techniques and procedures used in the structural and dynamic verification of process piping and pressure vessels.
- 3 Develop optimum solutions for heat exchanger networks in process plant as part of combined heat and power systems.
- 4 Critique non-destructive evaluation techniques and their application to system elements safety and system life prediction.

Indicative Module Content

Analysis of systems involving the interaction of thermal, mechanical and/or electrical components. Design procedures used in process piping/pressure vessel systems. Overview of compliance code software packages. Compliance code design procedures: BS5500; ANSI B31.4. Pipe stressing due to deadweight, design pressure and temperature. Heat exchanger networks in process plant. Combined heat and power systems: process heat. Grand composite curves for heat transfer. Optimisation of networks, pinch technology. Integration of heat and power requirements. Non-destructive evaluation techniques to measure component and system integrity; safety and life prediction.

Module Delivery

The module will be delivered by means of lectures, tutorials and workshops and student centred learning.

Indicative Student Workload

| | Full Time | Part Time |
|---|-----------|-----------|
| Contact Hours | 48 | 48 |
| Non-Contact Hours | 102 | 102 |
| 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: | 30% | Outcomes Assessed: | 4 |
| Description: | Coursework. | | | | |

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%.

| | | Coursework: | | | | | | |
|--------------|---|-------------|--|---|---|---|---|----|
| | | A | B | C | D | E | F | NS |
| Examination: | 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

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|--------------------------|--|
| Prerequisites for Module | Failure Analysis (EN4701) or its equivalent. |
| Corequisites for module | None. |
| Precluded Modules | None. |

INDICATIVE BIBLIOGRAPHY

- 1 SMITH, E., 1996. Thermal Design of Heat Exchangers. Chichester: Wiley.
- 2 SOUMERAI, H., 1987. Practical Thermodynamic Tools for Heat Exchanger Design Engineers. New York: Wiley.
- 3 Nitsche, Manfred, and Gbadamosi, Raji Olayiwola, 2016. Heat exchanger design guide : a practical guide for planning, selecting and designing of shell and tube exchangers. Amsterdam : Elsevier Ltd., [2016].