## MODULE DESCRIPTOR

### Module Title

Signal Acquisition, Instrumentation and Control

| | | | |
|---|---|---|---|
| Reference | EN3500 | Version | 8 |
| Created | May 2022 | SCQF Level | SCQF 9 |
| Approved | March 2004 | SCQF Points | 15 |
| Amended | June 2022 | ECTS Points | 7.5 |

### Aims of Module

To provide the student with the ability to evaluate signals and control systems, select appropriate instrumentation and apply computer-based analysis tools.

### Learning Outcomes for Module

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

| | |
|---|---|
| 1 | Describe and manipulate signals in the time and frequency domains. |
| 2 | Select transducers and instrumentation for the measurement of common control parameters. |
| 3 | Model and analyse linear control systems. |
| 4 | Evaluate the performance of a control systems using computer simulation. |
| 5 | Design simple instrumentation systems for the measurement of common control parameters. |

### Indicative Module Content

Open and closed loop systems, concept of stability, Laplace transform, electrical and mechanical system models, block diagrams, first and second order system response, PID controllers, application of computer based tools in signal acquisition, instrumentation and control. Signal types, signal characteristics, sensitivity, sensors and transducers and their operation, calibration, signal conditioning and amplification, time and frequency domain, sampling theorem and aliasing, anti-aliasing filters, A to D conversion, sampling rate, resolution, D to A conversion, interfacing, digital I/O, virtual instrumentation.

### Module Delivery

Full-time students: This module is delivered by a combination of lectures and tutorials. It will be supported by practical examples and activities including computer based laboratory exercises. Part-time students: 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: | EN3500 v8 |
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| **Indicative Student Workload** | Full Time | Part Time |
|---|---|---|
| Contact Hours | 52 | 52 |
| Non-Contact Hours | 98 | 98 |
| 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: | 50% | Outcomes Assessed: | 3, 4, 5 |
|---|---|---|---|---|---|
| Description: | Online quizzes. | | | | |

### Component 2

| Type: | Examination | Weighting: | 50% | Outcomes Assessed: | 1, 2 |
|---|---|---|---|---|---|
| Description: | Closed book examination. | | | | |

## MODULE PERFORMANCE DESCRIPTOR

### Explanatory Text

The module has two components of assessment and to gain an overall pass a minimum Grade D must be achieved in each component.

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

## Module Requirements

| Prerequisites for Module | Mathematics 2 (EN2901) or equivalent. |
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| Corequisites for module | None. |
| Precluded Modules | None. |

## ADDITIONAL NOTES

An Indicative Bibliography will normally reference the latest edition of a text. In some cases, older editions are equally useful for students and therefore, those are the editions that may be stocked.

## INDICATIVE BIBLIOGRAPHY


| | |
|---|---|
| 1 | DORF, R.C. and BISHOP, R.C., 2017. Modern Control Systems. 13th ed. London: Pearson Education. |
| 2 | DUTTON, K., THOMPSON, S. and BARRACLOUGH, B., 1997. The Art of Control Engineering. Harlow: Addison-Wesley. |
| 3 | BENTLEY, J. P., 2005. Principles of Measurement Systems. 4th ed. London: Longman. |
| 4 | MATLAB. Getting Started Guide. Mathworks. |
| 5 | Simulink User's Guide, Mathworks. |