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## MODULE DESCRIPTOR

### Module Title

Signal Acquisition, Instrumentation and Control

Reference	EN3500	Version	4
Created	May 2017	SCQF Level	SCQF 9
Approved	March 2004	SCQF Points	15
Amended	May 2017	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 of 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

This module is delivered by a combination of lecture and tutorials. It will be supported by practical examples and activities including computer based laboratory exercises.

**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
<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:	50%	Outcomes Assessed:	4, 5
Description:	A typical control system-based investigation and a typical instrumentation-based investigation.				

**Component 2**

Type:	Examination	Weighting:	50%	Outcomes Assessed:	1, 2, 3
Description:	Closed book examination.				

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

To pass the module, you must achieve a 40% weighted average mark from the exam and coursework. In addition you need to achieve at least 35% in both the individual exam and coursework components.

Module Grade	Minimum Requirements to achieve Module Grade:
<b>A</b>	=>70%
<b>B</b>	60-69%
<b>C</b>	50-59%
<b>D</b>	40-49%
<b>E</b>	35-39%
<b>F</b>	0-34%
<b>NS</b>	Non-submission of work by published deadline or non-attendance for examination

**Module Requirements**

Prerequisites for Module	Mathematics 2 (EN2901) or equivalent.
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.