Module Title **Signal Acquisition, Instrumentation and Control** **Keywords** Signal types and characteristics, Data acquisition, Transducers, Control systems, PID controllers	Reference EN3500
	SCQF Level SCQF 9
	SCQF Points 15
	ECTS Points 7.5
	Created December 2003
	Approved March 2004
	Amended August 2011
	Version No. 2

This Version is No Longer Current

The latest version of this module is available here

Prerequisites for Module

Mathematics 2 (CM2900) or equivalent.

Corequisite Modules

None.

Precluded Modules

None.

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

Mode of 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.

Assessment Plan

	Learning Outcomes Assessed
Component 1	1,2,3,4
Component 2	1,2,3,4

Component 2 is an examination which is of 2 hour duration. (50% weighting)

Component 1 is a coursework

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. Evaluate the performance of open and closed loop systems.
4. Evaluate the performance of a control system incorporating a PID controller.

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.

which consists of two items: a typical control system-based investigation and a typical instrumentation-based investigation. (50% weighting)

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.

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 Student Workload

Contact Hours	Full Time	Part Time
Laboratory:	6	6
Lectures:	24	24
Tutorials:	12	12

Directed Study		
Coursework Preparation:	12	12

Private Study		
Private Study:	96	96