

## MODULE DESCRIPTOR

### Module Title

Advanced Signal Processing and Systems Analysis

Reference	EN5502	Version	6
Created	August 2021	SCQF Level	SCQF 11
Approved	March 2004	SCQF Points	15
Amended	August 2021	ECTS Points	7.5

### Aims of Module

To provide students with the ability to analyse, design and implement advanced control systems and signal processing systems.

### Learning Outcomes for Module

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

- 1 Analyse, design and implement advanced digital signal processing systems.
- 2 Design, implement and evaluate digital signal processing operations
- 3 Model, analyse and design digital control systems.
- 4 Analyse, design and evaluate performance of digital controllers using computer simulation.

### Indicative Module Content

Signal Processing: Discrete Fourier Transform, Fast Fourier Transform, Adaptive filtering, Spectral analysis, Wavelet Transform, DSP implementation. Digital Control: Z-Transform, Discrete transfer function, Sampled-data systems, Discrete Equivalents, State-space models, Transient and steady-state responses, Stability and Jury's test, Compensator design, Controllability and observability, Pole placement, Observer design, Digital controller implementation.

### Module Delivery

This is a lecture-based module supplemented with tutorial sessions.

### Indicative Student Workload

	Full Time	Part Time
Contact Hours	38	38
Non-Contact Hours	112	112
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: 2, 4  
 Description: Coursework.

**Component 2**

Type: Examination Weighting: 50% Outcomes Assessed: 1, 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 50% and C2 is worth 50%.

		Examination:						
		A	B	C	D	E	F	NS
Coursework:	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	Control and Signal Processing (EN4502) or equivalent.
Corequisites for module	None.
Precluded Modules	None.

**INDICATIVE BIBLIOGRAPHY**

- FRANKLIN, G.F., POWELL, J.D. and WORKMAN, M., 1998. Digital Control of Dynamic Systems. 3rd ed. Ellis-Kagle Press.
- OGATA, K. 2015. Discrete-time Control Systems. 2nd ed. Prentice Hall.
- ASTROM, K.J. and WITTENMARK, B., 2011. Computer-Controlled Systems: Theory and Design. 3rd ed. Prentice Hall.
- HAYES, M.H., 1996. Statistical Digital Signal Processing and Modelling. New York: Wiley.
- MULGREW, B., GRANT, P. and THOMPSON, J., 2003. Digital signal processing: concepts and applications. 2nd ed. Basingstoke: Macmillan Press.
- Giron-Sierra, Jose Maria, 2017. Digital signal processing with Matlab examples. Volume 2, Decomposition, recovery, data-based actions.
- Ifeachor, Emmanuel C. and Jervis, Barrie W. 2001. Digital signal processing : a practical approach