

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:						NS
		A	B	C	D	E	F	
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