MODULE SPECIFICATION

Part 1: Information			
Module Title	Signal Processing and Circuits		
Module Code	UFMFMA-15-2	Level	Level 5
For implementation from	2018-19		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Contributes towards			
Module type:	Standard		
Pre-requisites	Electrical and Electronic Principles A 2018-19, Electrical and Electronic Principles B 2018-19		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Educational Aims: In addition to Learning Outcomes, the educational experience may explore, develop, and practise but not formally discretely assess the following:

Develop competence in problem identification, analysis, design and implementation (D4, D6)

Understanding of the need for a high level of professional and ethical conduct (S5)

Outline Syllabus: Signal Analysis:

Signals: Definition; deterministic (periodic and aperiodic) random; signal sources; information; mathematical representation of basic deterministic signals.

Phasors: Graphical addition of sinusoids; definition of a phasor; phasor impedance and transfer functions of RLC networks.

Power:

Dc and rms values; power factor; real, reactive and apparent power in RLC networks.

Laplace transforms:

Definition; transforms of common signals; use of tables; solution of ordinary differential equations; partial fractions; generalised impedance and transfer functions of RLC networks; pole/zero diagrams; network time response; forced and natural modes; time constant; stability; second order response; use of standard second order response chart.

Network analysis: RLC network analysis using Laplace transforms; step and sinusoidal response.

Frequency response:

Frequency response from Laplace transfer function; bandwidth in relation to time constant; definition of dB; Bode plots with straight line approximation; Nyquist plots, resonance.

Fourier series: Trigonometric and phasor form; power spectrum.

Fourier transform: Derivation from Fourier series; Fourier transform of common signals; inverse spreading principle; relation to Laplace transforms; Parseval's theorem; energy spectral density.

Convolution: The convolution integral; graphical convolution;

Filters:

Filter classification LP, HP, BP; 2nd and higher order; transfer functions; Butterwoth and Chebychev approximations; normalised prototypes; scaling; passive and active realisations

Systems Electronics:

Operational amplifiers: Non-ideal operational amplifiers; current sources; current mirrors; offset; bias; drift; noise; gain-bandwidth; rise time.

Teaching and Learning Methods: Contact time: 36 hours

Assimilation and skill development: 70 hours

Undertaking coursework : 20 hours

Exam preparation: 24 hours

Total study time: 150 hours

The module will be delivered using a combination of lectures and laboratory work. Tutorials will be incorporated into the lectures. Laboratory work will involve the design and build of analogue electronic circuits. The focus will be on filter design. Relevant ethical issues will be highlighted and students will be encouraged to consider these further through directed reading.

Part 3: Assessment
A formal exam that contributes 50% towards the final mark of the module. The examination is summative and assesses the students' understanding of concepts and techniques, and their ability to apply them in relatively straightforward problems. A lab based coursework that contributes 50% towards the final mark of the module.

Formative assessment will be provided as oral feedback throughout the laboratory sessions particularly with respect to the lab exercises and the logbook entries.			
First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Written Assignment - Component B		25 %	Logbook
Project - Component B		25 %	Small scale project
Examination - Component A	✓	50 %	Exam (2 hours)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Portfolio - Component B		50 %	Coursework
Examination - Component A	✓	50 %	Exam (2 hours)

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will be able to:

	Module Learning Outcomes
MO1	Knowledge and understanding of the basic mathematical principles as applied to the description and analysis of analogue systems (US2)
MO2	An understanding of engineering principles as applied to analogue systems and the ability to assess their performances (E1, E2)
MO3	Competence in using technical literature and the ability to obtain documentation from various sources (P4)
MO4	Demonstrate competence in combining theory and experience as well as acquired engineering skills and the ability to apply these competencies to practical engineering problems (P1)

Contact Hours

Contact Hours	
Independent Study Hours:	
Independent study/self-guided study	114
Total Independent Study Hours:	114
Scheduled Learning and Teaching Hours:	

	Face-to-face learning	36
	Total Scheduled Learning and Teaching Hours:	36
	Hours to be allocated	150
	Allocated Hours	150
Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ufmfma-15-2.html	