Liverpool John Moores University

Title:	Signal Processing
Status:	Definitive
Code:	**6001ELE** (120054)
Version Start Date:	01-08-2019
Owning School/Faculty:	Electronics and Electrical Engineering
Teaching School/Faculty:	Electronics and Electrical Engineering

Team	Leader
David Harvey	Y
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Academic Level:	FHEQ6	**Credit Value:**	10	**Total Delivered Hours:**	38
Total Learning Hours:	100	**Private Study:**	62		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Practical	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Exam	70	2
Report	Report	Matlab exercises	30	

Aims

This module is intended to provide students with a good appreciation of the mathematical concepts necessary to apply digital signal and image processing algorithms to a range of engineering problems.

Learning Outcomes

After completing the module the student should be able to:

1	Characterise analogue and digital systems using appropriate transforms, impulse response and convolution
2	Design and implement digital filters
3	Estimate spectra using appropriate techniques
4	Apply DSP to a range of applications

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Exam	1	2		
Matlab exercises	1	2	3	4

Outline Syllabus

Signals and Systems - Foundations, Architecture Requirements and Characteristics
Use of MATLAB & SIMULINK
Fundamentals – Linear Systems, Convolution and Properties of Convolution
Transforms – Fourier: CTFT, DTFT, DFT, FFT; Laplace and Z-transforms
Digital Filters - Basic Concepts
Finite Impulse Response filters (FIR) - Design, Fourier Series Approximation
Analogue Prototypes - Butterworth, Chebyshev, Elliptic; Analogue-To-Analogue Transforms
Infinite Impulse Response filters (IIR) - Design, Bilinear, Impulse Invariant Transforms
Digital Filters - Implementation, Algorithms & Finite Word Effects

ADCs & DACs - Sample and Hold, Antialiasing
Multirate Signal Processing – Interpolation and Decimation
Spectral Estimation Techniques – Random Processes, Autocorrelation, Periodogram, Bartlett, Welch and Blackman-Tuckey.
Audio and Speech Processing – LPC, Synthesis, Coding and Recognition
Time Frequency Analysis – Short term Fourier series, Wavelets, Filter-Banks
2D Signal Processing – Representation of images, 2D transforms
Neural Networks - Target Detection, Architecture

Learning Activities

A series of lectures and tutorials, with some laboratory activities using MATLAB.

Notes

This module will provide students with a sound grasp of the theory and applications

of modern signal and image processing.