

Signal Processing

Module Information

2022.01, Approved

Summary Information

Module Code	6301ELE
Formal Module Title	Signal Processing
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 6
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

Learning Methods

Learning Method Type	Hours
Lecture	33
Practical	22

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

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.
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After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Characterise analogue and digital systems using appropriate transforms, impulse response and convolution
MLO2	2	Design and implement digital filters
MLO3	3	Process and compress images using appropriate techniques
MLO4	4	Apply DSP to a range of applications

Module Content

Outline Syllabus	<p>Signals and Systems - Foundations, Architecture Requirements and Characteristics Use of MATLAB 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 Time Frequency Analysis – Short term Fourier series, Wavelets, Filter-Banks 2D Signal Processing – Representation of images, image compression, 2D transforms</p>
Module Overview	<p>This module provides you with a good appreciation of the mathematical concepts necessary to apply digital signal and image processing algorithms to a range of engineering problems. You will be able to characterise analogue and digital systems using appropriate transforms, impulse response and convolution. You will also learn to design and implement digital filters, process and compress images using appropriate techniques, and apply DSP to a range of applications.</p>
Additional Information	<p>This module will provide students with a sound grasp of the theory and applications of modern signal and image processing.</p>

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Centralised Exam	Exam	70	2	MLO1, MLO2, MLO3
Report	Matlab exercises	30	0	MLO1, MLO2, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Barry Gomm	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings
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