

## Module Information

2022.01, Approved

### Summary Information

Module Code	6601SLT
Formal Module Title	Signals and Systems with Real World Applications
Owning School	Engineering
Career	Undergraduate
Credits	10
Academic level	FHEQ Level 6
Grading Schema	40

### Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

### Partner Teaching Institution

Institution Name
SLIIT Academy (Pvt) Ltd

### Learning Methods

Learning Method Type	Hours
Lecture	11
Practical	11

### Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-PAR	PAR	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 &amp; Finite Word Effects            ADCs &amp; 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	
Additional Information	<p>This module will provide students with a sound grasp of the theory and applications of modern signal and image processing.</p> <p>UNESCO Sustainable Development Goals            Quality Education            Gender Equality            Industry, Innovation and Infrastructure            Partnerships for the Goals            UK SPEC AHEP 4C Eng.M1 Apply a comprehensive knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Much of the knowledge will be at the forefront of the particular subject of study and informed by a critical awareness of new developments and the wider context of engineering.</p> <p>M2 Formulate and analyse complex problems to reach substantiated conclusions. This will involve evaluating available data using first principles of mathematics, statistics, natural science and engineering principles, and using engineering judgment to work with information that may be uncertain or incomplete, discussing the limitations of the techniques employed.</p> <p>M3 Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed.</p> <p>M6 Apply an integrated or systems approach to the solution of complex problems.</p> <p>M12 Use practical laboratory and workshop skills to investigate complex problems.</p> <p>IEng.B1 Apply knowledge of mathematics, statistics, natural science and engineering principles to broadly-defined problems. Some of the knowledge will be informed by current developments in the subject of study.</p> <p>B2 Analyse broadly-defined problems reaching substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.</p> <p>B3 Select and apply appropriate computational and analytical techniques to model broadly-defined problems, recognising the limitations of the techniques employed.</p> <p>B6 Apply an integrated or systems approach to the solution of broadly-defined problems.</p> <p>B12 Use practical laboratory and workshop skills to investigate broadly-defined problems.</p>

## Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Portfolio	Matlab exercises	100	0	MLO1, MLO2, MLO3, 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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