

Liverpool John Moores University

Title: Signal Processing
Status: Definitive
Code: **6501SLT** (125398)
Version Start Date: 01-08-2021

Owning School/Faculty: Engineering
Teaching School/Faculty: SLIIT Academy (Pvt) Ltd

Team	Leader
David Harvey	Y
Brahim Benbakhti	

Academic Level: FHEQ6 **Credit Value:** 20 **Total Delivered Hours:** 57
Total Learning Hours: 200 **Private Study:** 143

Delivery Options

Course typically offered: S2 and Non Std S2 (S2 for Jan)

Component	Contact Hours
Lecture	33
Practical	22

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Exam	70	2
Report	Report	Matlab exercises. 2000 words	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 Process and compress images 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	3
Matlab exercises	1	2	4

Outline Syllabus

*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*

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.