Liverpool John Moores University

Title:	Digital Signal and Image Processing
Status:	Definitive
Code:	**6102ENG** (116926)
Version Start Date:	01-08-2018
Owning School/Faculty:	Electronics and Electrical Engineering
Teaching School/Faculty:	Electronics and Electrical Engineering

Team	Leader
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Academic Level:	FHEQ6	**Credit Value:**	10	**Total Delivered Hours:**	50
Total Learning Hours:	100	**Private Study:**	50		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24
Practical	12
Tutorial	12

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam		70	2
Report	DSP Assign		15	
Report	DIP Assign		15	

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 linear analogue and digital systems using impulse response, convolution, Fourier transforms, Laplace transforms and Z transforms
2	Analyse, design and implement an FIR and IIR digital filters
3	Use the concepts of point processing, spatial domain processing and Fourier domain processing for the enhancement of images and for the extraction of meaningful information from them with applications in engineering and technology

Learning Outcomes of Assessments

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

Exam	1	2	3
Digital Signal Proc Assignment	1	2	
Digital Image Proc Assignment	3		

Outline Syllabus

Architecture requirements of DSPs,
Use of MATLAB & SIMULINK
Characterising linear and time variant analogue and digital systems.
Fourier transforms, Fourier series, Laplace transform, Z transform.
FIR filter design: The choice of windows: fixed form, adaptable form, Design of optimal filters
IIR filter design: analogue prototypes: Butterworth, Chebyshev, Elliptic. Bilinear transform.

Background: digital image representation, sampling and quantization, image storage
Optical basis of image formation: imaging geometry, stereo-vision, the human visual system.
The basic principles and applications of:
Point processing and histogram manipulation,
Spatial filtering: smoothing, high-pass filtering, first and second derivative filters.
Frequency domain operations: the Fourier transform, ideal low and high pass filters, the Butterworth filter,
Morphology, segmentation and object labeling.
Introduction to colour images.
Image compression: Lossy and non-lossy compression.
Applications of digital image processing.

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.