Liverpool John Moores University

Title:	Advanced Signal Processing
Status:	Definitive
Code:	**7016ENG** (105394)
Version Start Date:	01-08-2016
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Maritime and Mechanical Engineering

Team	Leader
Brahim Benbakhti	Y

Academic Level:	FHEQ7	**Credit Value:**	20	**Total Delivered Hours:**	62
Total Learning Hours:	200	**Private Study:**	138		

Delivery Options
Course typically offered: Semester 2

Component	Contact Hours
Lecture	24
Practical	24
Tutorial	12

Grading Basis: 50 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Examination	60	2
Report	Simulation	case study	20	
Presentation	Present	presentation	20	

Aims

This module aims to develop an advanced understanding of techniques and practical experience in industry-oriented applications of digital signal processing.

Learning Outcomes

After completing the module the student should be able to:

1	Demonstrate advanced understanding of the concepts and analytical tools for DSP and systems
2	Design and implement a range of digital filters
3	Apply appropriate techniques for a stochastic signal
4	Use DSP to implement a range of engineering applications

Learning Outcomes of Assessments

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

Examination	1	3	4
Report	2	4	
Presentation	2	3	

Outline Syllabus

Digital Signal Processing (DSP) and Systems – Fundamentals, Architectures and Characteristics
Analysis Tools and Transforms – Fourier: CTFT, DTFT, DFT, FFT; Laplace and Z-transforms
Digital Filters: Design and Implementation – FIR, Analogue Prototypes, IIR, Algorithms
Stochastic signal processing, Random Processes, Spectrum, PSD, white noise
DSP Implementations:
Multirate Signal Processing – Sampling, Aliasing, Interpolation and Decimation
Speech Processing – LPC, Synthesis, Coding and Recognition
A/D and D/A Conversions – Quantization, Sample and Hold, Antialiasing, Acquisition

Digital Communication – Digital modulation, Multiplexing, Noise
Modulation – MIMO, OFDM, Wavelets,
Data Transmission – bandwidth, Coding, Entropy, Errors
Radio Frequency - Signal Conditioning, Down and Up Conversions, Detection, DDC, NCO, CIC Filter, Sparse Antenna Array Design - Factorization Approach, Aperture Functions

Learning Activities

Lectures and laboratory work supported by handouts.
Tutorials illustrating by numerical examples topics covered at lectures.

Notes

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