Liverpool John Moores University

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Title:	DIGITAL SIGNAL PROCESSING
Status:	Definitive
Code:	**6501ICBTBE** (129106)
Version Start Date:	01-08-2021
Owning School/Faculty:	Pharmacy & Biomolecular Sciences
Teaching School/Faculty:	ICBT, Colombo

Team	Leader
Katie Evans	Y

Academic Level:	FHEQ6	**Credit Value:**	10	**Total Delivered Hours:**	47
Total Learning Hours:	100	**Private Study:**	53		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	30
Practical	6
Tutorial	9

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Examination	70	2
Report	Report	Coursework assessment	30	

Aims

To develop learners' understanding of engineering signal conversion and digital signal processing. It will also develop the skills needed to modify or update existing electronics or biomedical engineering systems using digital signal processing techniques, and to design engineering applications that use digital signal processing

(DSP) techniques.

Learning Outcomes

After completing the module the student should be able to:

1	Investigate and identify the fundamental concepts and types of digital signal processing.
2	Evaluate and solve problems related data conversion techniques for signals.
3	Solve problems related digital signal processing techniques for engineering signals.
4	Investigate, evaluate and analyze DSP techniques used in engineering. Simulate and analyze DSP techniques using a suitable software such as MATLAB.

Learning Outcomes of Assessments

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

Examination	1	2	3
Coursework Assignment	4		

Outline Syllabus

Conversion of engineering signals from one form to another
Data conversion: analogue and digital signals; sampling theorem; analogue to digital conversion (ADC); digital to analogue conversion (DAC); coding; quantization; aliasing error; pre-filtering or anti-aliasing filtering.
Spectra: Fourier transform (FT) representation of discrete time signals; recovery of original analogue signal from its discrete form using appropriate filtering.
Standard digital signal processing techniques
Digital filtering: building blocks for DSP operations; Z-transforms; inverse Z-transforms; implementation models of finite impulse response (FIR) filters; implementation models of infinite impulse response (IIR) filters; digital resonator. Convolution; correlation.
Models of digital signal processing used in industry
Current applications: block diagrams to explain the embedded features of DSP in applications, e.g. mobile phones, radar, digital radio, digital cameras DSP versus microprocessors: advantages of using dedicated DSP devices; architectures; operating systems; choice of DSPs; choice of DSP platforms.
Understand the use of computer simulation to design engineering applications of digital signal processing
Digital filter design: design of FIR digital filters; design of IIR digital filters Adaptive filter: least mean square algorithm; gradient descent adaptation; noise cancellation; equalization Computer simulation: digital filters, e.g., FIR, IIR, adaptive

Learning Activities

Students will be supported in their learning, to achieve the above learning outcomes, in the following ways:
Mathematical and analytical skills are acquired through lectures, seminars, tutorials and group work.
Lecture notes and module guide in the form of comprehensive guidance notes; include theory examples and Q&A will guide to achieve the outcome.
MATLAB computer simulation used to simulate the mathematical function to cover all the learning outcomes.

Notes

This module is part of the Level 6 of the BEng(Hons) in Biomedical Engineering