Module specification

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Module Code	ENG6C2
Module Title	Digital Signal Processing
Level	6
Credit value	20
Faculty	FAST
HECoS Code	10-01-59
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Electrical and Electronic Engineering	Core
MEng Electrical and Electronic Engineering	Core

Pre-requisites

None

Breakdown of module hours

Learning and teaching hours	24 hrs
Supervised learning e.g., practical classes, workshops	0 hrs
Total active learning and teaching hours	24 hrs
Guided independent study	176 hrs
Module duration (total hours)	200 hrs

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Initial approval date	22nd Aug 2022
With effect from date	Sept 2022
Date and details of revision	
Version number	1

Module aims

- To teach thorough knowledge and in-depth understanding of concepts of discrete-time signals and systems, time and frequency domain analysis, Discrete-time Fourier Series and Transform, Z-Transform, System response and Frequency Response, Discrete Fourier Transform (DFT), Fast Fourier Transform (FFT) and Digital Filter Design (IIR and FIR).

Module Learning Outcomes - at the end of this module, students will be able to:

1	Explain the theoretical principles, limitations and methodologies associated with DSP-based system designs.
2	Analyse the discrete time signals and systems in the frequency domain using Discrete Fourier Transform and Fast Fourier Transform.
3	Design and Analyse FIR and IIR filters using a variety of techniques.

In addition to the module learning outcomes, students will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: C3.

Assessment

Indicative Assessment Tasks:
This module will be assessed by means of a portfolio. The portfolio assessment will be based on the simulation and the practical exercises performed during this module. The word count for the portfolio is 4000 words.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1, 2, 3	Portfolio	100%

Derogations

A derogation from regulations has been approved for this programme which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%

Learning and Teaching Strategies

The module is taught through a combination of lectures and workshops. An active and inclusive approach is used to engage learners in the topics and will involve individual, group work and flipped learning experiences aligned to the university's Active Learning Framework (ALF). The approach offers students a flexible and adaptive learning experience that can accommodate a range of options that includes both on campus learning and remote learning where appropriate.

The Moodle VLE and other on-line materials and resources will be available to support learning. ALF offers a balance between the classroom elements and digitally enabled activity incorporating flexible and accessible resources and flexible and accessible feedback to support learning.

This module will be presented to the students through a series of lectures, tutorials and simulation exercises using the MATLAB software. Learning materials will include in-class and on-line lecture notes, exercises and tutorials. Access to practical Laboratory facilities and software packages will be available to the students. Extensive use will be made of VLE (Moodle) to supplement learning materials.

Indicative Syllabus Outline

Introduction to Digital Signal Domain, Discrete-time Signal and its representations, Discrete Signals and Systems, Time-domain analysis, Frequency-domain analysis, Z-transform and its properties, Solution of difference equations using Z-transform, Discrete-time Fourier Series (DTFS), Discrete-time Fourier Transform (DTFT), System response and frequency response, DFT and FFT algorithms, Implementation of Discrete-Time Systems, Digital filters design, FIR and IIR filters, Matlab will be used as main tool for all implementations and design in laboratory.

Indicative Bibliography:

Essential Reads

G. John, et al., *Digital Signal Processing-Principles, Algorithms and Applications, 5th ed*. London, UK: Pearson, 2021.

A. V. Oppenheim, et.al., *Discrete-Time Signal Processing*, *3rd ed*. London, UK: Pearson, 2010.

Other indicative reading

J. H. McClellan, et.al., *Signal Processing First*, *2nd ed*. London, UK: Pearson, 2016.

Employability skills – the Glyndŵr Graduate

Each module and programme is designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

- **Core Attributes**

Engaged
Creative
Ethical

- **Key Attitudes**

Commitment
Curiosity
Confidence
Adaptability

- **Practical Skillsets**

Digital Fluency

Organisation
Critical Thinking
Emotional Intelligence
Communication