Module Specification

Digital Signal Processing

Version: 2024-25, v5.0, 29 Jul 2024

Contents

Part 1: Information

Module title: Digital Signal Processing

Module code: UFMFH8-15-3

Level: Level 6

For implementation from: 2024-25

UWE credit rating: 15

ECTS credit rating: 7.5

College: College of Arts, Technology and Environment

School: CATE School of Engineering

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Signal Theory 2023-24, Signals and Systems 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This is an introductory course to linear digital signal processing (DSP). The course provides the students with basic knowledge in the field by introducing the necessary theoretical concepts. For the students to see the advantages, but also the limitations, of techniques and methods, the theory is backed by a series of lab exercises using appropriate software and hardware.

Features: Not applicable

Educational aims: This modules allows students to extend their knowledge in capturing real world signals for the design and development of digital signal processing tasks.

Outline syllabus: Introduction and basic definitions.
Time domain analysis: Digital convolution (definition, signal shifting, basic methods).
Frequency domain analysis:
Fourier Theory: Definition, discrete Fourier series, discrete Fourier transform, properties.
z-transform: Definition, properties, z-transform vs Fourier transform, graphical approach.
Filter design:
FIR filter design (inverse Fourier transform and windowing).
IIR filter design (Butterworth, Chebyshev, impulse response method).
DSP chips.

Part 3: Teaching and learning methods

Teaching and learning methods: The module is delivered through a combination of lectures, laboratories, and student directed learning to ensure that students are able to integrate theoretical and practical analytical skills and also understand the wider context of the content.

A study-guide is provided and relevant ethical issues will be highlighted and students will be encouraged to consider these further through directed reading.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Apply engineering principles to digital systems and the ability to evaluate their performance (E1, E2)

MO2 Demonstrate the ability to use integrated development environments to describe, simulate, implement and validate digital circuit designs (E3)

MO3 Use technical literature and the ability to critically review ethics and documentation of a technical nature (P4)

MO4 Apply advanced analytical techniques for signal and data processing applications.

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 12 hours

Total = 0

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ufmfh8-15-3.html

Part 4: Assessment

Assessment strategy: The assessment for this module consists of the following:

A project report submission and demonstration that contributes 50% towards the final mark of the module. The project assesses the students' ability to translate their theoretical knowledge to practice by implementing a DSP system and testing its performance. Formative assessment will be provided as oral feedback and feed forward throughout the laboratory sessions particularly with respect to the lab exercises.

A written exam that contributes 50% towards the final mark of the module. The examination assesses the students' understanding of concepts and techniques, and their ability to apply them to Digital Signal Processing (DSP) problems.

Resit strategy:
The resit will be the same as the first sit

Resit deliverable(s) will be scaled appropriately to group size and task complexity

Assessment tasks:

Examination (Online) (First Sit)
Description: Online Examination (2 hours + 2 hours for submission)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO4

Report (First Sit)
Description: Report and demonstration. Guidance given for report formatting. Students will work in groups on the task but are expected to submit individual reports (maximum 10 pages)
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4

Examination (Online) (Resit)
Description: Online Examination (2 hours + 2 hours for submission)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO4

Report (Resit)
Description: Report and demonstration. Guidance given for report formatting. Students will work in groups on the task but are expected to submit individual reports (maximum 10 pages)
Weighting: 50 %
Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electronic and Computer Engineering [SHAPE] BEng (Hons) 2024-25

Electronic and Computer Engineering [SHAPE] BEng (Hons) 2024-25

Electrical and Electronic Engineering [AustonSingapore] BEng (Hons) 2024-25

Electronic and Computer Engineering [SHAPE] BEng (Hons) 2024-25

Electronic and Computer Engineering [SHAPE] BEng (Hons) 2024-25

Electronic and Computer Engineering [SHAPE] BEng (Hons) 2024-25

Electronic Engineering [Sep][PT][Frenchay][6yrs] - Not Running BEng (Hons) 2020-21

Electronic Engineering {Apprenticeship-UCW} {Top-Up} [Frenchay] BEng (Hons) 2023-24

Electronic Engineering {Apprenticeship-UCW} {Top-Up} [Frenchay] BEng (Hons) 2023-24

Electronic Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2020-21

Robotics {Foundation}[Sep][SW][Frenchay][5yrs] BEng (Hons) 2020-21

Electronic Engineering {Apprenticeship-GLOSCOLL} [Sep][FT][GlosColl][5yrs] - Withdrawn BEng (Hons) 2020-21

Electronic and Computer Engineering [Sep][PT][GlosColl][5yrs] BEng (Hons) 2020-21

Electronic and Computer Engineering {Apprenticeship-GLOSCOLL} [Sep][FT][GlosColl][5yrs] BEng (Hons) 2020-21

Electronic Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2021-22

Electronic Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2021-22

Electronic Engineering [Sep][SW][Frenchay][5yrs] - Withdrawn MEng 2021-22

Electronic and Computer Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2021-22

Robotics [Sep][SW][Frenchay][4yrs] BEng (Hons) 2021-22

Robotics {Foundation}[Sep][FT][Frenchay][4yrs] BEng (Hons) 2021-22

Robotics {Foundation} [Sep][SW][Frenchay][5yrs] - Not Running BEng (Hons) 2020-21

Automation and Robotics Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2021-22

Automation and Robotics Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2021-22

Electronic Engineering {Foundation} [Sep][SW][Frenchay][5yrs] - Not Running BEng (Hons) 2020-21

Electronics and Telecommunication Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2021-22

Electronics and Telecommunication Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2021-22

Instrumentation and Control Engineering {Foundation} [Feb][FT][GCET][4yrs] BEng (Hons) 2021-22

Instrumentation and Control Engineering {Foundation} [Oct][FT][GCET][4yrs] BEng (Hons) 2021-22

Electronic Engineering [Frenchay] BEng (Hons) 2022-23

Electronic and Computer Engineering [Frenchay] BEng (Hons) 2022-23

Robotics [Frenchay] BEng (Hons) 2022-23