Module Definition Form (MDF)

Module code: MOD002606	Version: 3 Date Amended: 09/Dec/2022

1. Module Title

Signals and Signal Processing

2a. Module Leader

Kahtan Aziz

2b. School

School of Engineering and the Built Environment

2c. Faculty

Faculty of Science and Engineering

3a. Level

5

3b. Module Type

Standard (fine graded)

4a. Credits

15

4b. Study Hours

150

5. Restrictions

Type	Module Code	Module Name	Condition
Pre-requisites:	None		
Co-requisites:	None		
Exclusions:	None		
Courses to which this module is restricted:	None		

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

A sound understanding of the nature, characteristics and sources of signals is an essential part when studying any aspect of electronic technology. Here you will gain a broad understand of signals, their sources and how they are processed using analogue and digital techniques. You will also gain an insight into how signals are characterised, analysed and filtered, looking particularly at frequency analysis and its application to audio signals in particular. The signal processing has wide range of applications in audio and image processing, audio and video coding, sensors, and control engineering. This is a multi-disciplinary module and used in electronics, robotics, and medical engineering disciplines.

6b. Outline Content

- Nature of signals: sine waves, superposition principle, Fourier Analysis, periodicity, DTFM.

- Modulation techniques: amplitude and frequency.

- Nature of noise; power measurement, white noise.

- Amplifiers: transfer function, harmonic distortion, attenuation, bandwidth, feedback, op-amps and domestic audio amplifiers.

- Audio signals: amplification, clipping, gating, compression.

- Vibrations: damping, critical frequencies, harmonic generation, oscillations.

- Frequency: audio, spectral analysis, harmonics, magnitude and phase.

- Power transfer: impedance, audio applications.

- Filters: analogue, specifications, design, digital filters, graphic equalisers, mixer desks.

- Digital signals: ADC, DAC, sampling frequency, resolution, CD standards, digital recording.

6c. Key Texts/Literature

The reading list to support this module is available at: https://readinglists.aru.ac.uk/

6d. Specialist Learning Resources

Electronics laboratory for exercises and course work design.

7. Learning Outcomes (threshold standards)		
No.	**Type**	**On successful completion of this module the student will be expected to be able to:**
1	Knowledge and Understanding	Understand how signals are generated and their characteristics.
2	Knowledge and Understanding	Perform frequency analysis on signals and to make meaningful use of the results.
3	Knowledge and Understanding	Apply knowledge of mathematics, statistics, natural science, and engineering principles to the solution of complex presence of harmonics in signals and how they are created.
4	Intellectual, practical, affective and transferrable skills	Use practical laboratory and workshop skills to investigate how analogue filters operate and how to define their specifications.

8a. Module Occurrence to which this MDF Refers				
Year	**Occurrence**	**Period**	**Location**	**Mode of Delivery**
2025/6	ZZF	Template For Face To Face Learning Delivery		Face to Face

8b. Learning Activities for the above Module Occurrence			
Learning Activities	**Hours**	**Learning Outcomes**	**Details of Duration, frequency and other comments**
Lectures	12	1-3	1hr lecture per week.
Other teacher managed learning	24	1-4	2hr session per week combining lab exercises and coursework practical skills.
Student managed learning	114	1-4	Self-managed study, preparation for formative and summative assessments.
TOTAL:	150		

9. Assessment for the above Module Occurrence					
Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
010	Coursework	1, 2, 4	40 (%)	Fine Grade	30 (%)

Technical report, 1000 word equivalent, maps to Engineering Council Learning Outcome C12

Assessment No.	**Assessment Method**	**Learning Outcomes**	**Weighting (%)**	**Fine Grade or Pass/Fail**	**Qualifying Mark (%)**
011	Examination Chelmsford	1-3	60 (%)	Fine Grade	30 (%)

Examination 2 hours, maps to Engineering Council Learning Outcome C1

In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).

In addition, students are required to:
(a) achieve the qualifying mark for each element of fine graded assessment as specified above
(b) pass any pass/fail elements

[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]