Module Code	**EEU33C01**
Module Name	Signals and Systems
ECTS Weighting[1]	**5 ECTS**
Semester taught	Semester 1
Module Coordinator/s	Prof. Nicola Marchetti
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On completion of this module the student will be able to: 1 - Represent both continuous-time and discrete-time periodic signals as a Fourier series. 2 - Use the Fourier transform and the Laplace transform to analyse continuous-time signals and systems. 3 - Use the discrete-time Fourier transform and the z-transform to analyse discrete-time signals and systems. 4 - Determine the impulse response, step response and frequency response of both continuous-time and discrete-time systems and determine the response of the LTI system to any input signal. Determine the stability of a feedback system. **Graduate Attributes: levels of attainment** To act responsibly - Enhanced To think independently - Attained To develop continuously - Enhanced To communicate effectively - Enhanced
Module Content	Continuous-Time Signals and Systems: • Introduction to signals, convolution integral. • Continuous-time signals and their properties. Linear Time-Invariant (LTI) systems and their properties (causality, stability). • Fourier series and its properties. Response of LTI systems to complex exponentials. Frequency-selective filters. • Fourier transform and its properties. • Sampling of analogue signals: the sampling theorem. • Laplace transform, its region of convergence and properties. • Analysis of LTI systems using the Laplace transform. • Linear feedback systems. Second order systems. Discrete-Time Signals and Systems: • Introduction to discrete signals and systems, discrete convolution. • Infinite impulse response (IIR) and Finite impulse response (FIR) systems.

[1] TEP Glossary

	• The discrete-time Fourier transform (DTFT); properties of the DTFT. • Stability in discrete-time systems. • z-transform, its region of convergence and properties. • Analysis of LTI systems using the z-transform. • Geometric evaluation of the DTFT from pole zero plot.
Teaching and Learning Methods	3 lectures and 1 tutorial per week.

Assessment Details[2]
Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Annual Written Examination	2-hour Written Examination	1, 2, 3, 4	70%	Exam week
In-class test	50 minutes in-class test	1, 2, 4	15%	8
Matlab-based laboratory	Laboratory report	1, 2, 3, 4	15%	Report due 2 week after lab

Reassessment Requirements	The overall module mark at the supplemental examinations will be determined solely based on the written examination.

Contact Hours and Indicative Student Workload[2]	**Contact hours:** 44
	Independent Study (preparation for course and review of materials): 60
	Independent Study (preparation for assessment, incl. completion of assessment): 21
Recommended Reading List	A.V. Oppenheim, A. S. Willsky with S. H. Nawab, "Signals and Systems," 2nd Ed., Pearson, 2013
Module Pre-requisite	MAU22E01 Engineering Mathematics III

[2] TEP Guidelines on Workload and Assessment

	MAU22E02 Engineering Mathematics IV
Module Co-requisite	
Module Website	Material available on BlackBoard
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	No
Module Approval Date	
Approved by	
Academic Start Year	
Academic Year of Date	September 2024