Course Title	Signals and Systems Theory				
Course Code	ECE230				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	2nd Year / 4th Semester				
Teacher's Name	TBA				
ECTS	6	Lectures / week	3 hours / 14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	The objective of this course is to provide a comprehensive introduction to the fundamental axioms, theories and conventions underlying the operation of digital systems, and to equip students with the necessary skills which will allow them to analyse, design, test, and simulate the operation of basic digital circuits. The course follows an embedded laboratory approach, where students are required to utilize design and simulation tools during the implementation of lectures.				
Learning Outcomes	Upon succesful completion of this course students should be able to: • Explain the theory and applications of basic signal and system concepts (average value, energy, orthogonality, periodic and non-periodic and random signals) • Define and analyze continuous-time signals and systems and identify the relationship between time and frequency domain models. • Analyse periodic waveform and calculate the parameters of the Fourier series representation of any periodic waveform and transform time-domain signals using Fourier, Laplace and Z Transforms • Calculate the linear difference equation and the unit sample response for any linear discrete time system • Identify and explain the difference of Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) systems • Evaluate the transfer function for any linear discrete time system and stability • Develop simple mathematical models to represent signals and systems and draw the system diagram for certain unit sample responses and recognise the effects of noise on certain signal processing operations				
Prerequisites	ECE205	Co-requisites	None		
Course Content	Signals and Systems: Basic concepts of signals and systems, in continuous and discrete time. Introduce linear, time invariant systems and functions. Important categories of signal (periodic and non-				

	periodic, random, energy signal and power signal). Define signal symmetry and explain the concept of orthogonality. Periodic signals: The Fourier trigonometric series, derivation and calculation of the Fourier coefficients. Input and output relationships. Band-limited signals. Frequency-domain models: Frequency domain representations and the Fourier Transform. Fourier Transform of signals Time-domain models: Discrete time signals, sampling, unit-sample response and convolution. FIR and IIR discrete time systems. Response of a discrete time system (convolution of input sequence with the unit sample response). Z Transforms & Laplace Transforms: The Z Transform and application to discrete time signals and systems. System response and stability of discrete time systems. Pole-zero models. The Laplace transform. Laplace models of signals (e.g. unit step function, exponential function, sinusoid etc). Inverse Laplace transform. Properties of Laplace transformations.
Teaching Methodology	Face- to- face
Bibliography	M.L. Meade and C.R. Dilon, Signals and Systems, Chapman and Hall. S.S. Soliman and M.D. Srinath, *Continuous and Discrete Signals and Systems*, Prentice Hall. C. Philips, J. Parr, E. Riskin, *Signals, Systems, and Transforms*, Prentice Hall. A.V. Oppenheim, A.S. Willsky, and S.H. Nawab, *Signals and Systems*, Prentice Hall.
Assessment	Examinations: 70% Assignments/Lab: 20% Class Participation and Attendance: 10% 100%
Language	English