Course Title	Introduction to Communication Systems				
Course Code	ECE325				
Course Type	Compulsory				
Level	Bachelor (1st Cycle)				
Year / Semester	3rd Year / 5th Semester				
Teacher's Name	Konstantinos Katzis, Constantinos Loizou				
ECTS	6	Lectures / week	3 hours / 14 weeks	Laboratories / week	N/A
Course Purpose and Objectives	The objective of this course is to describe the basic concepts of analog and digital communication systems and the principles of the operation of radio-frequency amplifiers, oscillators, filters, modulators and demodulators. Students are also presented to a range of applications of communication systems, analog and digital modulation and demodulation techniques, and learn to evaluate the performance of communication systems in the presence of noise.				
Learning Outcomes	Upon successful completion of this course, students should be able to: • Describe the radio frequency spectrum and the bands of different types of radio systems • Define the basic principles of both analog and digital communication systems and explain the behaviour of basic electronic components at radio frequencies • Identify the basic modulation and demodulation schemes used in radio communication systems • Analyze, implement and construct amplitude and frequency modulated radio transmitters and receivers • Specify the performance of different communication systems especially in the presence of noise				
Prerequisites	ECE230	Co-requisites	None		
Course Content	Noise in radio systems: Introduction to Random processes; the random process model, types of random processes, stationarity, autocorrelation. Basic concepts of noise generated within a radio receiver. Signal to noise ratio (SNR). Noise factor and measurements. Noise in digital systems. Amplitude modulation: Amplitude modulation description, Double-sideband amplitude modulation (DSBAM) and DSBAM non-sinusoidal modulating signal. Distortion of an AM wave. Spectrum. Other forms of AM, DSB-SC-AM, SSB-AM and Vestigial Sideband. Demodulation schemes of AM signals. Introduction to the super-heterodyne receiver and its parameters. Angle modulation:				

	Frequency modulation (FM) and Phase modulation (PM) techniques. Representation of FM and PM signals. Spectra. Narrowband and wideband FM. Pre-emphasis and de-emphasis. Digital communication systems: Baseband and digital signalling, Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM), sampling, quantization, encoding and companding. Digital signalling. Line codes and spectra. Intersymbol interference. Digital modulation: Time and Frequency Division Multiplexing. Binary modulated band-pass signalling. On-Off Keying (OOK), Binary Phase-Shift Keying (BPSK), Differential Phase-Shift Keying (DPSK), Frequency-Shift Keying (FSK). Performance of communication systems: Error probability. Information theory. Channel capacity.
Teaching Methodology	Face- to- face
Bibliography	S. Haykin, *Communication Systems*, John Wiley and Sons J. Proakis and M. Salehi, *Fundamentals of Communication Systems*, Pearson D.C. Green, *Radio Communication*, Pearson L.W. Couch, *Digital and Analog Communication Systems*, Prentice Hall. B.P. Lathi and Zhi Ding, *Modern Digital and Analog Communication Systems*, The Oxford Series in Electrical and Computer Engineering
Assessment	Examinations 70% Assignments/Lab 20% Class Participation and Attendance 10% 100%
Language	English