Course unit title:	**Communications Systems II**		
Course unit code:	AEEE422		
Type of course unit:	Compulsory		
Level of course unit:	Bachelor (1st Cycle)		
Year of study:	4		
Semester when the unit is delivered:	8		
Number of ECTS credits allocated :	6		
Name of lecturer(s):	Dr. Haris Haralambous		
Learning outcomes of the course unit:	1. Explain of the concepts of information, information measure and digital information sources. Describe the components of digital communication systems. Define the capacity of a channel and discuss its associated limitations. 2. Define the sampling theorem and describe the steps of quantization and encoding to obtain PAM and PCM baseband signals. Relate baseband transmission and baseband line codes and explain the incentive of multilevel signaling. 3. Evaluate performance of digital communication systems and calculate quantization error, bit and baud rates, transmission bandwidth, Signal to Noise ratio and Power Spectral Density of line codes. 4. Explain basic transmission impediments such as effects of noise, eye patterns, intersymbol interference and bit synchronization issues. Suggest possible solutions. 5. Differentiate and describe bandpass modulation and demodulation techniques such as ASK, BPSK, DPSK and FSK. Examine generation and detection techniques. 6. State the principles of multiplexing and compare approaches of multiuser communication systems, i.e. FDMA, TDMA and CDMA.		
Mode of delivery:	Face-to-face		
Prerequisites:	AEEE321	Co-requisites:	None
Recommended optional program components:	None		
Course contents:	• Introduction to digital communications. Applications. • Conversion of analog signals to digital signals. Nyquist theorem. Aliasing. Low pass filtering. PAM demodulation. • Uniform and Non-uniform quantization. Quantization error. • Pulse Code Modulation. Encoding. • Baseband transmission. Baseband line codes. Unipolar, Polar, RZ, NRZ, Bipolar, Manchester. Rates. Bandwidth. Signal to Noise ratio. Power Spectral Density of line codes. Differential coding. Multilevel signaling and baud rate. • Effects of Noise and eye patterns. Intersymbol interference. • Regenerate Repeaters and bit synchonization. Delta modulation.		

	• Bandpass Communications, bandpass modulation and demodulation techniques, ASK, BPSK, DPSK, FSK. Generation and detection. • Multiuser communications. Multiplexing. Synchronization. FDMA, TDMA, CDMA.
Recommended and/or required reading:	
Textbooks:	L. W. Couch II, *Digital and Analogue Communication Systems*, 7th edition, Prentice Hall, 2007.
References:	B. P. Lathi, *Modern Digital and Analog Communication Systems*, 3rd edition, Oxford University Press, 1998.
Planned learning activities and teaching methods:	The taught part of course is delivered to the students by means of lectures, conducted with the help of computer presentations. Lecture notes and presentations are available through the web for students to use in combination with the textbooks. Lectures are supplemented with laboratory work carried out at the communications laboratory. During laboratory sessions, students perform individual or small group experiments performed in the Communications Laboratory. The laboratory is equipped with workstations that include a digital communications board, a desktop computer that communicates and controls the board, a digital oscilloscope and other equipment for measurements.
Assessment methods and criteria:	• Assignments 10% • Tests: 20% • Laboratory Work: 10% • Final Exam 60%
Language of instruction:	English
Work placement(s):	No