ELEC3701 COURSE CATALOG INFO

Course Code : ELEC3701				**Course Name :** Introduction to Communication Systems			
Semester	**Lecture (Le+T+L)**	**Local Credit**	**ECTS**	**Language**	**Category**	**Instructional Methods**	**Prerequisites**
5	(4+1+0)	4	7	English	Core	Lecture	MATH2201, ELEC2501
Course Content	Review of Fourier transform and LTI systems; Baseband and passband signal and system representations. Linear and angular modulation. Modulators and demodulators; Frequency translation and FDM; Review of probability and introduction to random processes; Noise analysis of communication systems; Pulse modulation, PCM and TDM; Matched filtering and intersymbol interference.						
Course Outcomes	**CO 1.** Describe and identify random processes, and compute their statistical properties relevant for communication **CO 2.** Analyze and evaluate the performance of basic communication techniques, and design communication system components to satisfy given requirements, i.e., effective use of scarce resources such as power and bandwidth, and the trade-offs in system design **CO 3.** Use transform domain analysis to understand the concept of modulation, the need for modulation, and its effect on spectra of signals **CO 4.** Model the communication channel using time and frequency domain analysis and random processes, and quantify the effect of noise in communication systems **CO 5.** Design basic modulator and demodulator circuits, simulate modulation and demodulation techniques, and their performance in noise.						

COURSE PLAN	
W1	Representation of signals and systems, Fourier analysis, frequency and bandwidth.
W2	Hilbert transform, complex representations of signals and systems.
W3	Amplitude Modulation, Linear Modulation Techniques
W4	FDM, Phase Modulation, Frequency Modulation (FM)
W5	Frequency Modulation (FM) continued
W6	Review of probability and random variables.
W7	Review of probability and random variables, Cnt'd.
W8	Introduction to random processes. Autocorrelation, power spectral density, Gaussian processes, white processes, filtering of noise.
W9	Noise in CW modulation systems, Signal to Noise Ratio, Linear Receivers, Envelope Detectors
W10	Noise in FM receivers

W11	Sampling, Pulse Amplitude Modulation, Quantization
W12	Pulse Code Modulation, Multiplexing, Modifications of PCM
W13	Baseband Pulse Transmission: Matched Filter Receiver
W14	Bandlimited Channels, Intersymbol Interference, Nyquist Criterion for no ISI

COURSE ASSESMENT AND ECTS WORK LOAD			
Type of Work	**Count**	**ECTS WORK LOAD**	
		Time (Hour)(Including prep. time)	**Work Load**
Attendance	14	4	56
Final Exam	1	15	15
Quizzes			0
Term project			0
Reports			0
Final Project			0
Seminar			0
Assignments	7	2	14
Presentation			0
Midterms	2	17	34
Project			0
Laboratory		0	0
Tutorial	14	1	14
Other(Self study, Paper reviews)	14	3	42
		Total work load	175
		Total work load/25	7
		ECTS Credit	7

PROGRAM OUTCOMES - COURSE OUTCOMES RELATIONS		
PO	**Program Outcomes**	**CO**
1	**1.1.** Adequate knowledge in fundamentals of mathematics (algebra, differential equations, integrals, probability etc), science (physics, chemistry, biology etc.) and computer science (programming and simulation);	1
	1.2. ability to use theoretical and applied knowledge in these areas in complex engineering problems.	1
2	**2.1.** Ability to identify, formulate, and solve complex engineering problems;	2,..,5
	2.2. ability to select and apply proper analysis and modeling methods for this purpose.	2,..,5
3	**3.1.** Ability to design and integrate components of a complex system or process, as they relate to Electrical and Electronics Engineering discipline, under realistic constraints and conditions, in such a way as to meet desired requirements;	2,5
	3.2. ability to apply modern design methods.	2,5
4	**4.1.** Ability to devise, select, and use techniques and tools needed for analyzing and solving complex problems encountered in engineering practice;	5
	4.2. ability to employ information technologies effectively.	
5	**5.1.** Ability to design experiments,	
	5.2. ability to conduct experiments, gather, analyze and interpret data.	
6	**6.1.** Ability to work in intra-disciplinary teams;	
	6.2. ability to work in multi-disciplinary teams;	
	6.3. ability to take individual responsibilities.	
7	**7.1.** Ability to effectively communicate via written and oral means;	
	7.2. knowledge of at least one foreign language;	
	7.3. ability to write effective reports and comprehend written reports;	
	7.4. ability to write design and manufacturing reports	
	7.5. ability to present effectively,	
	7.6. ability to give and follow clear instructions.	
8	**8.1.** Recognition of the need for lifelong learning;	

	8.2. ability to access information, to follow developments in science and technology, and to continue to educate him/herself.	
9	**9.1.** Consciousness to behave according to ethical principles, and about professional and ethical responsibility;	
	9.2. knowledge on standards used in engineering practice.	
10	**10.1.** Knowledge about business life practices such as project management, risk management, and change management;	
	10.2. awareness in entrepreneurship, innovation;	
	10.3. knowledge about sustainable development.	
11	**11.1.** Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering;	
	11.2. awareness of the legal consequences of engineering solutions.	

Revison Date	**Prepared by**	**Approved by**
1.9.2019 1.6.2021	Prof. Dr. Onur KAYA Asst. Prof. Farshad MIRAMIRKHANI	Prof.Dr. Ahmet Aksen