EC322- Introduction to communication Systems

CREDIT HOURS

3 Hours

CONTACT HOURS (Hours/week)

Lecture: 2; Tutorial: 2; Lab: 2

COURSE COORDINATOR

Dr. Ashraf Mamdouh

TEXT BOOK

Lathi, B.P. and Zhi Ding "Modern Digital and Analog Communication Systems" 4th Ed. Oxford UN

COURSE DESCRIPTION

Introduction to communication theory. Fourier transform as a mathematical tool for spectral analysis. Sampling Theory, Convolution of continuous and discrete signals, Correlation, Concept of power and energy spectral densities and correlation between waveforms. Transmission through linear filters and channels. Hilbert transform and Positive pre-envelope and complex envelope. Response of LPF and BPF to signals.

PREREQUISITE:

BA 323 - EC 321

RELATION OF COURSE TO PROGRAM

Required

COURSE INSTRUCTION OUTCOMES

The student will be able to:

- learn the concept of spectrum (line and continuous) using F.T
- introduce the definition of convolution, and correlation.
- introduce the definition of signal bandwidth, signal power and signal PSD.
- learn the effect of linear system of signals.

TOPICS COVERED

- Introduction and types of signals and systems.
- Introduction to Fourier Transform
- Properties of Fourier Transform
- Time and frequency convolution
- F.T of special functions
- F.T of periodic signals
- Sampling Theory, discrete time signals, 7th week exam

- Convolution of discrete time signals and DFT
- Spectral density and Correlation (Auto, Cross) of power and energy signals
- Hilbert transform / Complex and natural envelope
- System Impulse response and transfer function - System Characteristics: Linearity, Time Invariance, Stability, and Causality for continuous and discrete systems.
- Conditions for distortion-less transmission through stable system .
- Impulse response of discrete-time system and discrete convolution – discrete correlation-Auto-correlation & Cross-correlation of discrete signals
- Ideal LPF filters in time and frequency domains
- Ideal BPF filters in time and frequency domains

CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:

Professional component Content			
Math and Basic Sciences	**Engineering Topics**	**General Education**	**Other**
	✓		

RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:

Student Outcomes		Course aspects
A	An ability to apply knowledge of mathematics, science, and engineering	a_1 a_2
B	An ability to design and conduct experiments, analyze and interpret data.	b_1 b_2 b_3 b_4
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economics, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability	
D	An ability to function on multi-disciplinary teams.	
E	An ability to identify, formulate, and solve engineering problems	e_1 e_2 e_3
F	An understanding of professional and ethical responsibility	
G	An ability to communicate effectively	
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social content	
I	A recognition of the need for, and an ability to engage in life-long learning.	
J	A knowledge of contemporary issues within and outside the electrical engineering profession.	
k	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	k