Faculty of Engineering & Technology

Signal Analysis

Information :

Course Code :	COM 362	**Level**	**:**	Undergraduate	**Course Hours :**	3.00- Hours

Department :	Department of Electrical Engineering

Instructor Information :

Title	Name	Office hours
Lecturer	AHMED SAEED ABDELSAMEA SAYED	8
Assistant Lecturer	Amiraa Sayed Ahmed Abdallah Elhamshary	1

Area Of Study :

Upon successful completion of the course, the student should be able to:
1. Think clearly in time and frequency domains and switch from one to the other with relative ease.   .
2. Understand the fundamental concepts of continuous time signals and systems.
3. Interpret the signals and systems mathematically and graphically.
4. Classify the signals and systems.
5. Solve the linear Differential Equations of constant coefficients
6. Find the impulse response of a LTICs.
7. Analyze of the linear time –invariant continuous time systems {LTICs} using the convolution integral.
8. Understand the concept of orthogonal signals
9. Represent the continuous time periodic signals in frequency domain using   Fourier series.
10. Analyze the LTIs when the input signals are Eigen functions..
11. Represent the continuous time aperiodic signals in frequency domain using Fourier Transform.
12. Analyze the LTIs in Frequency domain and find the response in time domain.   13. Use of MATLAB to reinforce and visualize the concepts presented during the course
14. Use of MATLAB to analyze the LTICs.
15. Develop the research skills using internets, reference books.
16. Share ideas and work in a team or a group

Course outcomes :

a.Knowledge and Understanding: :

1 -	Demonstrate knowledge and understanding of the fundamentals of signals and systems {Representation and Classification}.
2 -	Demonstrate knowledge and understanding of convolution as a method of signal analysis .
3 -	Demonstrate knowledge and understanding of solving the DEs and finding of the impulse response of the LTICs.
4 -	Demonstrate knowledge and understanding of Fourier series and Fourier transform which provide a spectral description of analog signals, and their applications.

b.Intellectual Skills: :

1 -	Perform the manipulation of signals by various operations.

2 -	Represent the analog signal in terms of the basic functions
3 -	Classify the signals and the systems.
4 -	Find the forced response and natural response of the LTICs
5 -	Find the impulse response of the LTICs.
6 -	Perform the analytical convolution.
7 -	Find the convolution by ranges{Graphical convolution}.
8 -	Calculate the Fourier series coefficients for periodic signal.
9 -	Use efficiently the properties of the Fourier series.
10 -	Compute the Direct Fourier transform and the Inverse Fourier Transform.
11 -	Use efficiently the properties of the Fourier transform and explore the effect of operations on the spectrum of the signal

c.Professional and Practical Skills: :

1 -	System analysis in time and in frequency domains and switching from one to the other.
2 -	Use efficiently the software toolbox {ADSP} which is designed to run under MATLAB to analyze the LTICs .

d.General and Transferable Skills: :

1 -	Work in a self-directed manner.
2 -	Work coherently and successfully as a part of a team in the Lab., projects, and assignments.
3 -	Manage time and meet deadlines
4 -	Analyze problems and use innovative thinking in their solution
5 -	Use the Internet in searching for information about electronic devices applications.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
An Overview{introduction, signals, systems, frequency domain, and Applications}	5	3	2
Analog Signals {Signals, operations on signals , Signal symmetry ,harmonics signals, Impulse function and its properties, doublet, and Moments} . Introduction to use MATLAB.	10	6	4
Analog Systems {Scope and objectives, system classification ,Analysis of LTI system, LTI systems described by D.Es, Impulse response and system stability.	15	9	6
Continuous Convolution Scope and objectives, Properties, convolution by ranges, stability and causality. Response to periodic signals, and correlation	15	9	6
Fourier series :Scope, forms, simplification through signal symmetry, Parseval,s relation, spectrum of periodic signals, system response to periodic signals, orthogonality and least square.	15	9	6
The Fourier Transform: Fourier transform pairs and properties, system analysis using the Fourier Transform. Energy and power spectral density, Time-Bandwidth Measures.	10	6	4
Revision	5	3	2

Teaching And Learning Methodologies :

Lectures

Tutorials

Laboratories

Research assignments

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Final Exam	40.00	16	to assess the comprehensive understanding of the scientific background of the course, to assess the ability of problem solving and of analysis and design of simple electronic circuits
First Mid-Term Exam	15.00	7	to assess the skills of problem solving ,understanding of related topics.
Project	5.00	13	to assess the ability of implementing a simple electronic project that shows knowledge and understanding of different technical issues
Quiz 1	5.00	5	
Quiz 2	5.00	9	
Research work (Group work)	5.00	3	collection to assess ability to gather suitable data and to work in a group
Second Mid Term Exam	15.00	11	to assess the skills of problem solving ,understanding of related topics.

Course Notes :

No course notes are required

Recommended books :

Mrinal Mandal and Amir Asif, 'Continuous and Discrete Time Signals and Systems', Cambridge University Press,2007.

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