هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	Signals and Systems
Course Code:	EE1332
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	V5
Last Revision Date:	01-01-2025

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (5th level, 3rd year)					
4. Course general Description:					
Classification of continuous- and discrete-time signals, Continuous and discrete-Linear time-invariant systems, Fourier series, Fourier transform, Laplace transform, Discrete time Fourier Transform, Linear circuits and systems concepts, Impulse response, Convolution, Transfer function, Frequency response, Introduction to Ideal Filters, Introduction to sampling of analog signals, Introduction to difference equations and discrete Fourier Transform.					
5. Pre-requirements for this course (if any)**:**					
EE1221, EE1231					
6. Co-requisites for this course (if any)**:**					
--					
7. Course Main Objective(s):					

After finishing the course successfully, the student shall

- Understand the type of Time-Signals.
- Identify the characterization of the Continuous-Time signals.
- Identify the characterization of the Discrete-Time signals.
- Analyze the Time transformation for Continuous-time signals.
- Analyze the Time transformation for Discrete-time signals.
- Understand the singularity function for both Continuous-time signals and Discrete-time signals.
- Identify the characterization of Continuous Linear-Time Invariant systems.
- Identify the Properties of Continuous Linear-Time Invariant systems.
- Analyze the Convolution process mathematically and graphical for Continuous Linear-Time Invariant systems.
- Drive the Differential Equation models for Continuous Linear-Time Invariant systems.
- Identify the characterization of Discrete Linear-Time Invariant systems.
- Identify the Properties of Discrete Linear-Time Invariant systems.
- Analyze the Convolution process mathematically and graphical for Discrete Linear-Time Invariant systems.

- Drive the Differential Equation models for Discrete Linear-Time Invariant systems.
- Understand the Fourier Series
- Drive the Fourier series for periodical signals.
- Understand the Fourier Transform.
- Analyze and find if exist the Fourier Transform for any signal.
- Understand the Properties of Fourier Transform.
- Understand the Laplace Transform.
- Analyze and find if exist the Laplace Transform for any signal.
- Understand the Properties of Laplace Transform.

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	60	100%
2	E-learning	-	-
3	Hybrid • Traditional classroom • E-learning	-	-
4	Distance learning	-	-

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	45
2.	**Laboratory/Studio**	-
3.	**Field**	-
4.	**Tutorial**	15
5.	**Others (specify)**	-
Total		60

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
K1	Sketch the signal and categorize it into two type	1.1	Delivering Lectures Encouraging students to use internet and library resources. Solve problems in groups during tutorial	HWs and Exams (Quizzes and Midterms)
K1	Interpret the singularity functions and use them in defining the signals for both time domain signal continuous and discrete	1.2	Delivering Lectures Group discussions during class.	Exams (Quizzes and Midterms)
K1	Demonstrate Fourier series technique and apply it to periodic time signals	1.5	Delivering Lectures Group discussions during class Solve problems in groups during tutorial	HWs and Exams (Quizzes and Midterms)
K1	Analyze and apply different types of time and amplitude transformations for both continuous and discrete time-domain signals	1.7	Delivering Lectures. Solve problems in groups during tutorial	HWs and Exams (Quizzes, Midterms, and Final)
K1	Use the Fourier transform technique and establish the relation between continuous time domain and the continuous frequency domain	1.4	Delivering Lectures. Group discussions during class Solve problems in groups during tutorial	HWs and Exams (Quizzes and Midterms)
2.0	**Skills**			
NA				
3.0	**Values, autonomy, and responsibility**			
V2	Demonstrate ethical behavior among peers, and be punctual	4.3	Active participation during the course	Lecture attendance

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction: Introduction to Signals and Systems	6
2.	Continuous-Time Signals and Systems: Transformations of Continuous-Time Signals, Signal Characteristics, Common Signals in Engineering,	6

	Singularity Functions, Mathematical Functions for Signals, Continuous-Time Systems and Properties.	
3.	Continuous-Time Linear Time-Invariant Systems: Impulse Representation of Continuous-Time Signals. Convolution for Continuous-Time LTI Systems, Properties of Convolution.	6
4.	Continuous-Time Linear Time-Invariant Systems (cont.): Properties of Continuous-Time LTI Systems, Differential-Equation Models, Frequency Response	6
5.	Fourier Series: Definitions of Fourier Series, The Spectrum. Properties of Fourier Series.	6
6.	Fourier Series (cont.): System Analysis. Fourier Series Transformations	6
7.	Fourier Transform: Definition of the Fourier Transform. Properties of Fourier Transform. Fourier Transform of Time Functions.	6
8.	Fourier Transform (cont.): Sampling of Continuous Time Signals. Energy and Power Density Spectra. Applications.	6
9.	Application of Fourier Transform: Ideal Filters , Sampling	6
10.	Laplace Transforms: Definition, Laplace Transform of Functions. Laplace Transform Properties.	6
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1	6-8	20%
2.	Midterm 2	12-14	20%
3.	Quizzes	1-15	5%
4.	Homework (7)	1-15	7%
5.	MATLAB Projects	1-15	5%
6.	Report/ Oral Presentation about a subject studied in the course	14	3%
7.	Final Exam	16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	Signals, Systems and Transforms, Charles L. Phillips, John M. Parr and Eve A. Riskin, Prentice Hall, 2007, Fifth Edition.
Supportive References	• Alan V. Oppenheim, signals and systems (2nd edition), Prentice Hall, 1997. • B. P. Lathi, Signal Processing & Linear Systems, 2nd ed., Oxford University Press, 2005.

	• D. McMahon, Signals and Systems Demystified, McGraw-Hill, 2007. • L. Chaparro, Signals and Systems Using MATLAB With Online Testing, Academic Press, 2011. • Hwei Hsu, Schaum's Outline of Signals and Systems, Second Edition, McGraw-Hill, 2010. • R. Ziemer, W. Tranter, D. Fannin, Signals and Systems: Continuous and Discrete (4th Edition), 4th edition, Prentice Hall, 1998.
Electronic Materials	Computer animations and online resources supplied by the instructor.
Other Learning Materials	Different Online sites.

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	One classroom: fits up to 25 students with white board.
Technology equipment (projector, smart board, software)	A laptop computer connected to a projector to display PowerPoint presentations
Other equipment (depending on the nature of the specialty)	N/A

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	**Students**	**Indirect**
Effectiveness of Students assessment	**Students**	**Indirect**
Quality of learning resources	**Relevant Focus Group**	**Indirect**
The extent to which CLOs have been achieved	**Dept. Quality Committee**	**Direct**
Other		

Assessors (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	