هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

2023
TP-153

Course Specification
(Bachelor)

Course Title:	**Introduction to Signal Processing**
Course Code:	**CEN 1303**
Program:	**Bachelor in Computer Engineering**
Department:	**Computer Engineering**
College:	**Faculty of Computers and Information Technology**
Institution:	**University of Tabuk**
Version:	**1.0**
Last Revision Date:	**27 July 2022**

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (4)					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: 6th Level / 3th Year					
4. Course general Description:					
This course covers Mathematical Description and classification of Various Signals and Systems including Introduction to mathematical software packages (eg. MATLAB), Continuous Linear Time Invariant Systems, Convolution and correlation, Fourier Series and Transforms, Laplace Transform, Sampling and reconstruction, Discrete Linear Time Invariant Systems, Transfer Functions and Applications to communication systems such AM/FM systems.					
5. Pre-requirements for this course (if any)**:**					
Math 1201					
6. Co-requisites for this course (if any)**:**					
N/A					
7. Course Main Objective(s):					
The main purpose for this course is: **1. Understand of the different signal classes.** **2. Identify continuous and discrete time systems.** **3. Understand the concepts of discrete-time signals and systems.** **4. Explain Laplace transform properties, Sampling, and reconstruction.** **5. Describe Fourier series and transforms.** **6. Understand how digital processing problems can be presented by MATLAB.**					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	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**	30
3.	**Field**	
4.	**Tutorial**	
5.	**Others (specify)**	
Total		

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

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Outline the fundaments of signals classes and systems.	K1	Lectures, Group discussions	Exams
1.2	Define Fourier Transforms	K4	Lectures	Exams
1.3	Recognize the Laplace Transform, Sampling and reconstruction	K5	Lectures, Group discussions	Exams
2.0	**Skills**			
2.1	Analyze and design the algorithms and the functions in MATLAB	S1, S2	Lectures, Lab Sessions	Exams, Labwork
2.2	Summarize Laplace Transform properties	S1, S2	Group discussions, Case studies	Exams, Labwork
2.3	Develop Fourier series to explain the Time Fourier Transform	S1, S2	Group discussions, Lab Sessions	Exams, Labwork
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of PLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Demonstrate the effectiveness of teamwork.	V2	Lectures, textbooks, provided handouts, references. Lab Sessions	• Exams, quizzes, assignments, • Labwork

C. Course Content

No	List of Topics	Contact Hours
1.	**Fundamentals of Signals and Systems I**	5
2.	**Fundamentals of Signals and Systems II** **Lab:** Introduction to (MATLAB/SIMULINK) software	5
3.	**Continuous and Discrete time systems I** **Lab:** MATLAB Programs: Verification of the Sampling theorem, MATLAB Code	5
4.	**Continuous and Discrete time systems II** **Lab:** MATLAB Programs: Verification of the Sampling theorem, MATLAB Code	5
5.	**Introduction to mathematical software packages (MATLAB) I** **Lab:** Mathematical Software Packages	5
6.	**Introduction to mathematical software packages (MATLAB) II** **Lab:** Mathematical Software Packages	5
7.	**Continuous-Time and Discrete-Time Fourier Transform I** **Lab:** Continuous time Fourier transform using MATLAB software	5
8.	**Continuous-Time and Discrete-Time Fourier Transform II** **Lab:** Discrete-time Fourier transform using MATLAB software	5
9.	**Convolution and Correlation analysis I** **Lab:** Convolution using MATLAB software	5
10.	**Convolution and Correlation analysis II** **Lab:** Correlation using MATLAB software	5
11.	**Laplace Transform I** **Lab:** Laplace transform using MATLAB software	5
12.	**Laplace Transform II**	5

	Lab: The inverse Laplace transform using MATLAB software	
13.	**Transfer Functions** **Lab:** Open loop and closed loop Transfer function implementation using (MATLAB/SIMULINK) software	**5**
14.	**Transfer Functions** **Lab:** Open loop and closed loop Transfer function implementation using (MATLAB/SIMULINK) software	**5**
15.	**Signal processing application I**	**5**
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	quizzes, assignments	2-15	20%
2.	Labwork	14 or 15	10%
3.	Mid-Exam 1	6 or 7	15%
4.	Mid-Exam 2	11 or 12	15%
5.	Final Exam	After 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	**Oppenheim A. and Willsky A. S. Nawab, Signals and Systems, 2nd Ed., 1997, Prentice Hall. Lathi B. P., Modern Digital and Analog Communication Systems, 3rd Edition, 1998, Oxford University Press, New York.** E. W. Kamen and B. S. Heck., Fundamentals of Signals and Systems Using the Web and Matlab, 3rd Ed., 2007, Prentice Hall.
Supportive References	
Electronic Materials	• **Faculty members websites** • **www.free-ebooks.net**
Other Learning Materials	**Blackboard Platform**

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	**Classroom, Laboratory**
Technology equipment (projector, smart board, software)	**projector**
Other equipment (depending on the nature of the specialty)	**MATLAB and SIMULINK**

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Teaching	Faculty, Program Leaders, and Advisory Board	Both Direct and Indirect
	Students	Indirect
Effectiveness of Students Assessment	Faculty, Program Leaders, Advisory Board, and Independent Opinion	Both Direct and Indirect
Quality of Learning Resources	Faculty, Students, and Advisory Board	Indirect
The Extent to which CLOs have been Achieved	Faculty, Program Leaders, Advisory Board, and Independent Opinion	Direct (as in section B) and Indirect/Surveys
	Students	Indirect
Other	-	-

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	
REFERENCE NO.	
DATE	