2023
TP-153

Course Specification
(Bachelor)

Course Title:	Introduction to Communication Systems
Course Code:	EE1351
Program:	Electrical Engineering
Department:	Electrical Engineering
College:	College of Engineering
Institution:	Imam Mohammad Ibn Saud Islamic University
Version:	V3
Last Revision Date:	10-10-2024

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: (6th level, 3rd year)					
4. Course general Description:					
Elements of a communication system. Transmission of signals through linear systems. Representation of baseband and band-pass signals and systems, Signal spectrum. Analog Amplitude Modulation and Demodulation (AM, DSBSC, SSB, VSB). Analog Angle Modulation and Demodulation (PM, FM). Noise representation and analysis: SNR analysis of AM and FM systems. Sampling theorem. QAM multiplexing. Pulse modulation techniques: PAM, PPM, PWM.					
5. Pre-requirements for this course (if any)**:**					
EE 1332, STAT 1215, EE 1224					
6. Co-requisites for this course (if any)**:**					
--					
7. Course Main Objective(s):					
1. Ability to analyze signals and systems in time and frequency domain. 2. Understand and analyze different types of amplitude modulated signals. 3. Understand and analyze different types of angle modulated signals. 4. Ability to evaluate the performance of amplitude and angle modulated signals in the presence of additive white Gaussian noise. 5. Understand sampling theorem and pulse modulation techniques.					

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	-	-

No	Mode of Instruction	Contact Hours	Percentage
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**			
K1	Recognize the parameters, characteristic, and applications of Communication Systems.	1.7	PPT presentations Computer Animations Encouraging students to use internet and library recourses Direct questions to students during class	Quizzes in class Midterm exams Final exam
K1	Describe the Amplitude Modulation techniques	1.6	PPT presentations Computer Animations Encouraging students to use internet and library recourses Direct questions to students during class	Quizzes in class Midterm exams Final exam
K1	Describe Frequency Modulation/Demodulation techniques	1.6	PPT presentations Computer Animations Encouraging students to use internet and library recourses	Quizzes in class Midterm exams Final exam

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			Direct questions to students during class	
K1	Explain the multiplexing techniques (FDM and TDM)	1.7	PPT presentations Computer Animations Encouraging students to use internet and library recourses Direct questions to students during class	Quizzes in class Midterm exams Final exam
2.0	**Skills**			
S1	Use basic Formatting (Sampling, quantization, encoding)	2.2	PPT presentations Computer Animations Encouraging students to use internet and library recourses Direct questions to students during class	Quizzes in class Midterm exams Final exam
3.0	**Values, autonomy, and responsibility**			
V1	Evaluate the performance of a digital modulation techniques	3.2	Prepare report / presentation using computer	Report / presentation

C. Course Content

No	List of Topics	Contact Hours
1	Introduction: Introduction to communications systems.	1
2	Representation of Signals and Systems: The Fourier transform and its properties, Linear filters, Low-pass and Band-pass filters and systems.	3
3	Amplitude modulation: Double-side band with suppressed/large carrier modulation, Quadrature multiplexing, Single-side band and vestigial side band methods of modulation, Frequency translation, Frequency division multiplexing.	8
4	Angle modulation: Frequency and phase modulation, Phase-locked loop, Nonlinear effects in FM systems, The superheterodyne receiver.	16
5	Probability theory and random processes (revision): Random variables and random processes, Mean, Correlation and Covariance	16
6	functions. Power spectral density, Noise, Narrowband noise.	8
7	Noise in Continuous-Wave modulation systems: Receiver model, Noise in DSB-SC receivers, Noise in AM receivers, Noise in	8
Total		**60**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Midterm 1	6th week	20%
2.	Midterm 2	12th week	20%
3.	Homework and mini-project	All term	5%
4.	Quizzes	3rd week & 9th week	15%
5.	Final Exam	Final Exam week	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	Communication Systems Simon Haykin and Michael Moher WILEY 2009, 5th Edition
Supportive References	1- 1. R. E. Ziemer and W. H. Traner, Principles of Communications, 4th edition, Wiley, 1995 2- 2. Leon Couch, Digital and Analog Communication Systems, 6th edition, Prentice Hall, 2001 3- 3. Maurice Schiff, Introduction to Communication Systems Simulation, Artech House Mobile Communications Library, 2006 4- 4. Bruce Carlson, Paul Crilly and Paul B. Crilly, , Communication Systems , McGraw-Hill , 5th ed., 2009. 5- 5. John G. Proakis and Masoud Salehi, Fundamentals of Communication Systems,
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	