



## Course Specifications

<b>Course Title:</b>	Introduction to Communication System
<b>Course Code:</b>	222 CNET-3
<b>Program:</b>	Bachelor in Computer and Network Engineering
<b>Department:</b>	Computer and Network Engineering
<b>College:</b>	Computer Science and Information Technology
<b>Institution:</b>	Jazan University

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## A. Course Identification

<b>1. Credit hours:</b>	03 Hours
<b>2. Course type</b>	
a.	University <input type="checkbox"/> College <input type="checkbox"/> Department <input checked="" type="checkbox"/> Others <input type="checkbox"/>
b.	Required <input checked="" type="checkbox"/> Elective <input type="checkbox"/>
<b>3. Level/year at which this course is offered:</b>	Level-9 / Year-03
<b>4. Pre-requisites for this course (if any):</b>	None
<b>5. Co-requisites for this course (if any):</b>	None

### 6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	52	100
2	Blended	--	--
3	E-learning	--	--
4	Distance learning	--	--
5	Other	--	--

### 7. Contact Hours (based on academic semester)

No	Activity	Learning Hours
<b>Contact Hours</b>		
1	Lecture	22
2	Laboratory/Studio	22
3	Tutorial	--
4	Others (specify)	8
	<b>Total</b>	52

## B. Course Objectives and Learning Outcomes

### 1. Course Description

This course provides an introduction and survey to communication systems applications with electronic techniques and operation with analog and digital modulation. It establishes the definition and the need for modulation with Pulse Modulation techniques. It discusses analog-to-digital conversion and elaborates on its two steps such as sampling and quantization. Analyze the digital Modulation techniques and also describe the current developments in radio communications. Students can perform the experiments and mini-projects on hardware devices of communication systems lab.

## 2. Course Main Objective

Upon the completion of the course, students will be able to

- Explain the functions of three main parts of electronic communication system.
- Analyze the techniques of Amplitude Modulation and Demodulation.
- Identify signal assessments with noise and angle modulation.
- Design of pulses or rectangular waves modulate a carrier; a broad spectrum of sidebands are produced.
- Recognize different modulation schemes that affect the bit error rate in communication systems.
- Describe the functions of Transmitter and Receiver in Radio Communications.
- Performs the projects and experiments on hardware engineering components in the Lab.

## 3. Course Learning Outcomes

CLOs		Aligned PLOs
1	<b>Knowledge and Understanding</b>	
1.1	<b>Explain</b> the major concepts in structure of Communication systems.	K1
1.2	<b>Describe</b> the functions of Radio Transmitter and Receiver.	K2
1.3	<b>Recognize</b> the Communication Applications with electronic techniques.	K3
2	<b>Skills :</b>	
2.1	<b>Design</b> time and frequency bands of Digital Modulation Techniques.	S2
2.2	<b>Analyze</b> the different types of Modulation and Demodulation schemes.	S3
2.3	<b>Identify</b> signal assessments with noise, frequency and phase measurements in analog and digital modulation schemes.	S5
3	<b>Values:</b>	
3.1	<b>Recognize</b> ethical and professional responsibilities in communication systems and make informed judgments	V3

## C. Course Content

No	List of Topics	Contact Hours
1	<b>CHAPTER-1: INTRODUCTION TO COMMUNICATION SYSTEMS &amp; NOISE</b> <ul style="list-style-type: none"> <li>• Definition of Communication</li> <li>• Elements of a Communication System: <ul style="list-style-type: none"> <li>• Information Source</li> <li>• Transmitter</li> <li>• Channel</li> <li>• Receiver</li> <li>• Destination</li> </ul> </li> </ul>	5T+4P

	<ul style="list-style-type: none"> <li>• External Noise and Types: <ul style="list-style-type: none"> <li>• Atmospheric Noise</li> <li>• Extraterrestrial Noise</li> <li>• Industrial Noise</li> <li>• Internal Noise and Types: <ul style="list-style-type: none"> <li>• Thermal Agitation Noise</li> <li>• Shot Noise</li> <li>• Transit-Time Noise</li> <li>• SNR (Signal to Noise Ratio)</li> <li>• Noise Figure</li> </ul> </li> </ul> </li> </ul>	
2	<p><b>CH-2: AMPLITUDE MODULATION</b></p> <ul style="list-style-type: none"> <li>• Introduction to Amplitude Modulation (AM)</li> <li>• Equations for Message, Carrier and Modulated wave</li> <li>• Modulation Index</li> <li>• Types of Amplitude Modulation: <ul style="list-style-type: none"> <li>• DSB-FC (Double Side Band Full Carrier)</li> <li>• DSB-SC (Double Side Band Suppressed Carrier)</li> <li>• SSB (Single Side Band Suppressed Carrier)</li> <li>• VSB (Vestigial Side Band)</li> </ul> </li> <li>• Advantage and disadvantages of AM</li> <li>• Amplitude Demodulator : Crystal Detector</li> </ul>	4T+4P
3	<p><b>CH-3: ANGLE MODULATION</b></p> <ul style="list-style-type: none"> <li>• Introduction to Angle Modulation <ul style="list-style-type: none"> <li>• Amplitude</li> <li>• Frequency</li> <li>• Phase</li> </ul> </li> <li>• Angle Modulation Techniques: <ul style="list-style-type: none"> <li>• FM (Frequency Modulation)</li> <li>• PM (Phase Modulation) <ul style="list-style-type: none"> <li>• Advantages and Disadvantages of FM and PM</li> <li>• FM signal with Noise</li> </ul> </li> </ul> </li> </ul>	4T+4P

4	<p><b>CH-4: PULSE &amp; DIGITAL MODULATION TECHNIQUES</b></p> <ul style="list-style-type: none"> <li>• Differentiate Analog Modulation and Pulse Modulation.</li> <li>• Pulse Modulation Techniques: <ul style="list-style-type: none"> <li>• PAM (Pulse Amplitude Modulation)</li> <li>• PWM (Pulse Width Modulation)</li> <li>• PPM (Pulse Position Modulation)</li> </ul> </li> <li>• Introduction of Pulse Digital and techniques: <ul style="list-style-type: none"> <li>• PCM (Pulse Code Modulation)</li> <li>• Delta Modulation</li> </ul> </li> <li>• Introduction of Digital Modulation</li> <li>• Basic Digital Modulation Schemes / Techniques: <ul style="list-style-type: none"> <li>• ASK (Amplitude Shift Key)</li> <li>• FSK (Frequency Shift Key)</li> <li>• PSK (Phase Shift Key)</li> </ul> </li> <li>• Applications and Advantages of Digital modulation</li> <li>• M-ARY Schemes: <ul style="list-style-type: none"> <li>• M-Ary PSK</li> <li>• M-Ary FSK</li> </ul> </li> <li>• M-Ary Equation</li> <li>• Numerical on M-Ary</li> </ul>	6T+4P
5	<p><b>CH-5: RADIO COMMUNICATIONS</b></p> <ul style="list-style-type: none"> <li>• Introduction to Radio Communication</li> <li>• Radio communication System</li> <li>• Block diagram of Radio Transmitter <ul style="list-style-type: none"> <li>• AM Transmitter</li> <li>• FM Transmitter</li> </ul> </li> <li>• Radio Receivers Types: <ul style="list-style-type: none"> <li>• Tuned Radio Frequency Receiver</li> <li>• Super-heterodyne Receiver</li> </ul> </li> <li>• Sensitivity of Receiver</li> <li>• Selectivity of Receiver</li> </ul>	5T+4P
6	Final Exam	4T+4P
<b>Total</b>		52

### Online Study Topics

- Need for modulation
- Introduction to Noise
- A Survey of Communication Applications
- Sine and Cosine wave and its Harmonics
- Numerical on FM and PM
- Numerical on PCM.
- Uses of Radio waves

## D. Teaching and Assessment

### 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
<b>1.0</b>	<b>Knowledge and Understanding</b>		
1.1	<b>Explain</b> the major concepts in structure of Communication systems.	<ul style="list-style-type: none"> <li>➤ Lectures</li> <li>➤ Classroom discussions</li> </ul>	<ul style="list-style-type: none"> <li>➤ Midterm Exam</li> <li>➤ Assignment-1</li> <li>➤ Final Exam</li> </ul>
1.2	<b>Describe</b> the functions of Radio Transmitter and Receiver.	<ul style="list-style-type: none"> <li>➤ Lectures</li> <li>➤ Classroom discussions</li> </ul>	<ul style="list-style-type: none"> <li>➤ Assignment-2</li> <li>➤ Final Exam</li> </ul>
1.3	<b>Recognize</b> the Communication Applications with electronic techniques.	<ul style="list-style-type: none"> <li>➤ Lectures</li> <li>➤ Classroom discussions</li> <li>➤ Lab exercises</li> </ul>	<ul style="list-style-type: none"> <li>➤ Midterm Exam</li> <li>➤ Assignment-1</li> <li>➤ Lab Exam</li> <li>➤ Final Exam</li> <li>➤ Mini-projects</li> </ul>
<b>2.0</b>	<b>Skills</b>		
2.1	<b>Design</b> time and frequency bands of Digital Modulation Techniques.	<ul style="list-style-type: none"> <li>➤ Lectures</li> <li>➤ Classroom discussion</li> <li>➤ Lab exercises</li> </ul>	<ul style="list-style-type: none"> <li>➤ Final Exam</li> <li>➤ Assignment-2</li> <li>➤ Lab Exam</li> </ul>
2.2	<b>Analyze</b> the different types of Modulation and Demodulation schemes.	<ul style="list-style-type: none"> <li>➤ Lectures</li> <li>➤ Classroom discussion</li> <li>➤ Lab exercise</li> </ul>	<ul style="list-style-type: none"> <li>➤ Final Exam</li> <li>➤ Assignment-2</li> <li>➤ Lab Exam</li> </ul>
2.3	<b>Identify</b> signal assessments with noise, frequency and phase measurements in analog and digital modulation schemes.	<ul style="list-style-type: none"> <li>➤ Lectures</li> <li>➤ Classroom discussion</li> <li>➤ Lab exercises</li> </ul>	<ul style="list-style-type: none"> <li>➤ Final Exam</li> <li>➤ Assignment-2</li> <li>➤ Mini-Projects</li> <li>➤ Lab Exam</li> </ul>
<b>3.0</b>	<b>Values</b>		
3.1	<b>Recognize</b> ethical and professional responsibilities in communication systems and make informed judgments	<ul style="list-style-type: none"> <li>➤ Lectures</li> <li>➤ Classroom discussion</li> <li>➤ Lab exercise</li> </ul>	<ul style="list-style-type: none"> <li>➤ Mini-projects</li> <li>➤ Lab Exam</li> </ul>

### 2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Assignments / Mini Project	4 <sup>th</sup> Week	20%
2	Midterm Exam	6 <sup>th</sup> Week	20%
3	Lab Exam	11 <sup>th</sup> Week	20%
4	Final Theory Exam	12 <sup>th</sup> Week	40%

\*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

## E. Student Academic Counseling and Support

### Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

Department have an arrangement for “Academic Counseling and Support” for each student by the department. The Department Coordinator nominates faculty members for “**Student Academic Advisory Committee**” every semester. These “**Academic Advisors**” are responsible for student counseling and advising to a group of fix number of students (around 10-15 students) and maintaining students’ files. At the beginning of semester and at time of course registration all students take counseling from Academic Advisor according to his previous grades and coverage of pre-requisite course and follow-up.

In addition, students with GPA below than 2.00 are remained under deep observation and continuous meetings with respective course teachers about their performance are arranged to help and support the students. The course teacher is to be associated with this course provide a proper guidance for students who are looking to focus on their future career based on their intellectual interests, identify better opportunities related to this course and connections in their academic fields.

## F. Learning Resources and Facilities

### 1. Learning Resources

<b>Required Textbooks</b>	" Principles of Electronic Communication Systems " by Louis E. Frenzel Jr, 4th Edition, 2016, McGraw -Hill Education, ISBN: 978-0-07-337385-0.
<b>Essential References Materials</b>	“Modern Digital and Analog Communication Systems” B.P Lathi and Zhi Ding, 2011 Oxford University Press, ISBN-13 : 978-0198073802.
<b>Electronic Materials</b>	Teaching Slides Chapter wise available on Black Board.
<b>Other Learning Materials</b>	----

### 2. Facilities Required

Item	Resources
<b>Accommodation</b> (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms with projectors. Labs with a minimum of 12 sets of modules, 12 piece each.
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	SCILAB software
<b>Other Resources</b> (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	Available the required special lab with Hardware Kits and Digital Oscilloscope with experiments kits



## G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Sufficiency of resources and facilities for students	Students	Course evaluation survey form
Effectiveness of teaching / learning process	Students	Course evaluation survey form
Effectiveness of teaching / learning process	HOD/QAU	Course reports / result analysis
Quality of learning Resources	Track leaders	Review meetings and star rating with suggestions for further modification and improvements
Verifying standards of student achievement / evaluation	HOD / committee nominated by HOD	Random re-checking of evaluated answer sheets
Achievement of course learning outcomes	Course Teachers and Course Coordinators/Academic coordinator / HOD	CLO assessment template that is further verified at course coordinator, Track leader and QAU level.

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

**Assessment Methods** (Direct, Indirect)

## H. Specification Approval Data

<b>Council / Committee</b>	DEPARTMENT COUNCIL
<b>Reference No.</b>	
<b>Date</b>	