

**Faculty of Engineering & Technology**

**Communication 1**

**Information :**

**Course Code :** COM 411

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Specialization of Electronics & Communication

**Instructor Information :**

Title	Name	Office hours
Associate Professor	KAMEL MOHAMED MAHMOUD HASSAN	2
Teaching Assistant	Mahmoud Ahmed Nasr Kamal Abdo Mostafa	

**Area Of Study :**

- Understand the function of each basic element of a communication system and its fundamental limits.
- Understand the principles of operation of analog modulation techniques.
- Analyze and compare practical analog modulations and their applications on radio transmitters and receivers.
- Execute the basic calculations of the link budget in guided and unguided channels as well as noise calculations.
- To build up the appropriate experimental set-up schemes to evaluate the basic parameters of analog communication systems.

**Description :**

History of communication, Communication systems: block diagram, transmission media, frequency bands, fundamental limits, Shannon, s equation, linear and nonlinear distortion, noise (internal and external noise sources). Energy and power spectral densities. Amplitude modulation (conventional AM, SSB, DSB and VSB) and demodulation, Angle modulation and demodulation (PM and FM), Automatic gain control, Automatic frequency control, FDM Systems, Broadcast transmitters and receivers (AM SSB and FM) and circuits (Detectors, Mixers, Automatic gain control, Automatic frequency control, Phase-locked-loop, Applications of class C RF power amplifiers: limiters, harmonic generators and amplitude modulators, FM stereo broadcast transmitters and receivers

**Course outcomes :**

**a.Knowledge and Understanding: :**

1 -	Memorize the technical terminology in communication engineering
2 -	a2. Explain the basic elements of a communication system.
3 -	a3. Classify different types of analogue modulation techniques in communication systems.

4 -	a4. Explain different types of amplitude and frequency modulation and their applications in radio transceivers.
5 -	a5. Explain coherent and non-coherent detection methods in communication systems.
<b>b. Intellectual Skills: :</b>	
1 -	b1. Manage the power budget for guided and unguided communication channels.
2 -	b2. Analyze channel performance in communication systems in terms of noise and channel capacity.
3 -	b3. Develop the calculations of the PSD, ESD, the essential BW of an energy signal, and the input-output power relationship of a communication system.
4 -	b4. Develop the basic calculations for AM and FM signals.
5 -	b5. Compare different types of modulation techniques.
<b>c. Professional and Practical Skills: :</b>	
1 -	c1. Formulate data and requirements for designing a simple analog communication system.
2 -	c2. Able to choose the appropriate modulation technique for a certain application
3 -	c3. Develop the appropriate scheme to measure the main parameters of analog communication systems.
4 -	c4. Validate the performance of radio receivers and radio transmitters.
<b>d. General and Transferable Skills: :</b>	
1 -	d1. Demonstrate the ability to work in a self-directed manner.
2 -	d2. Show the ability to work coherently and successfully as a part of a team in the Lab., projects, and assignments.
3 -	d3. Accomplish the planned time schedule and meet deadlines.
4 -	d4. Attempt the use the Internet in searching for information about basic elements in communication system applications.

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Communication History, basic definitions, Elements of comm. system.	5	3	2
Contaminations: 1. Attenuation (guided & Unguided Channels) 2. Distortion, 3. Interference, and 4. Noise.	5	3	2
Shannon and Hartly Theorem Noise sources (Internal & External). Linear Distortion	5	3	2
Linear Distortion: Distortion-less Transmission, Equalization, Multipath effect. Fading. Nonlinear distortion	10	6	4
Energy Spectral Density (ESD), Power spectral Density (PSD)	5	3	2
Amplitude Modulation. DSB-SC, generation methods, basic Equations, Detection, methods. DSB-FC, generation and detection Basic equations and measurements.	10	6	4
SSB-SC. Basic Equations, Hilbert Transform Generation: Filtering method, NL modulator, and phasing method. DSB-FC	10	6	4

### Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
AM Radio Transmitters: Block diagram, Main Specs. Measurements of Main Specs	5	3	2
AM Radio Receiver Block diagram ,Main Specs Measurements of Main Specs	5	3	2
Angle Modulation Main concept of instantaneous frequency. BW of FM signal {Carson s Rule. Generation of FM signal {Direct and Indirect methods, Demodulation of FM signal}.Interference of Angle modulation. Pre-emphasis, and De-emphasis in FM Broadcasting FM Receiver. Measurements of Main Specs	10	6	4
Course Project & Technical Assignments	5	3	2

### Teaching And Learning Methodologies :

- Interactive Lecturing and Discussions.
- Problem Solving.
- Experiential Learning.
- Site Visit.
- Project and Presentation.

### Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
• Final exam	40.00		
o Assignments and Course Project	15.00		
o In Class Quizzes and Homework	10.00		
o Lab test	5.00		
o Mid-Term exams	30.00		

### Books :

Book	Author	Publisher
Modern Digital and Analog Communication Systems	B.P.Lathi	Oxford

