



**Instructor** : Dr. Awad Kh. Al-Asmari  
Office 2C8 (Phone 467-6814)

**Teaching Assistant** : Mohammed Aqel

**Time and Location** : Lecture: Sat, Mon & Wed 1C19

**Text Book** :

1. Awad Kh. Al-Asmari, **Principles of Communication**, (Version EE 320-3), 2006.
2. Simon Haykin, **Communication System**, John Wiley & Sons, Inc, 4<sup>th</sup> Edition.

**Course Content**

**CHAPTER 1: INTRODUCTION**

- Communication System, Analog and Digital Messages, Analog to Digital Conversion, Important reasons for Modulation

**CHAPTER 2: SPECTRAL ANALYSIS “REVIEW”**

- Fourier series, Alternative form for Fourier Series, Response of linear system, Orthogonality Principle of Sinusoids, Normalized Power, Average Power and Power Gain, Power Spectral Density

**CHAPTER 3: FOURIER TRANSFORM**

- Properties Of Fourier Transform, Examples For Fourier Transform, Unit Step Function, Unit Impulse Function, Even & Odd Functions, Ideal Filters, RC Filters, Hilbert Transform, Representations of Band Pass Signals.

**CHAPTER 4: AMPLITUDE MODULATION**

Amplitude Modulation (Generation of AM Waves, Demodulation of AM Waves).

- Double Sideband-Suppressed Carrier Modulation (Generation of DSB-SC Waves, Detection of DSB-SC Waves)
- Single Sideband Modulation (Generation of SSB-SC Waves, Demodulation of SSB-SC Waves).
- Vestigial-Sideband Modulation ( Modulation and Demodulation of VSB, Television Signals)
- Comparison of AM Techniques (AM, DSB-SC, SSB-SC, VSB) in terms of Bandwidth, Complexity, and Average Power.
- Frequency Translation
- Frequency Division Multiplexing (FDM)

**CHAPTER 5: ANGLE MODULATION**

- Frequency Modulation (Basic Definitions, Phase Modulation (PM), Frequency Modulation (FM), Generation of Narrowband Frequency Modulation (NBFM).
- Properties of the Bessel Function  $J_n(\beta)$ .
- Transmission Bandwidth of FM Signals.
- Power Calculation of FM Signal.

- Multitone of FM.
- Generation of FM Waves (Direct and Indirect Generation).
- Demodulation of FM Waves (Frequency Discriminator)
- FM Stereo Multiplexing
- Phase Locked Loop

**CHAPTER 6: SAMPLING THEORY**

- Sampling Theory (Ideal sampling, Practical sampling)
- Band-pass signal sampling.

**CHAPTER 7: PULSE AMPLITUDE MODULATION**

- Pulse Amplitude Modulation (PAM).
- Pulse Width Modulation (PWM).
- Pulse Position Modulation (PPM).
- Time-Division Multiplexing (TDM).
- Advantages and Disadvantages of FDM and TDM.

**CHAPTER 8: DIGITAL PULSE MODULATION**

- Quantization of Signals.
- Quantization Error.
- Pulse Code Modulation (PCM).
- Noise in PCM System.
- Delta Modulation (DM).
- Differential Pulse Code Modulation (DPCM).

**CHAPTER 9: ADVANCE TOPICS**

- Introduction to Digital Modulation Techniques
- Binary Phase Shift Keying (BPSK)
- Quadrature Phase Shift Keying (QPSK)
- Binary Frequency Shift Keying (BFSK)
- Minimum Shift Keying (MSK)

|                |   |     |                      |                             |
|----------------|---|-----|----------------------|-----------------------------|
| <b>Grading</b> | : | 05% | Attendance           |                             |
|                |   | 15% | Homework and Quiz    |                             |
|                |   | 20% | First Mid-term Exam  | (Mon. 21-09-1426, 09:30 PM) |
|                |   | 20% | Second Mid-term Exam | (Sat. 22-11-1426, 3:30 PM)  |
|                |   | 40% | Final Exam           |                             |

**Attendance** : - Attendance is mandatory on a lectures and tutorials. Attendance is TAKEN at each meeting.

- A student with Absence rate of greater than 25% by the second midterm is PROHIBITED from taking the Final Exam.

**Notes** : - Honor system is applied. Cheating will NOT be tolerated at all neither in home works, exams or attendance list. Cheating means FAILING.