BIRZEIT UNIVERSITY

Faculty of Engineering and Technology
Department of Electrical and Computer Engineering
First Semester 2019/2020

Course number and name: ENEE3303- Principles of Communication Systems
Credits and contact hours: Credit: 3 (Lecture: 3, Lab.: 0)
Instructor's or course coordinator's name: Nofal Nofal
Office: Masri 216, **email**: nonofal@birzeit.edu
Office hours: S, M, W 11:15am – 12:50 pm

Textbooks:

- S. Haykin, Communication Systems, 5th Edition, (John Wiley & Sons Inc., New York, 2010).
- **Reference**: Ha H. Nguyen and Ed Shwedyk, A First Course in Digital Communications, Cambridge University Press, ISBN: 9780521876131
- **Reference**: S. Haykin, Communication Systems, 3rd Edition (Wiley)
- **Reference**: B. P. Lathi, Modern Digital and Analog Communication systems, 3rd Edition. (Oxford University Press)
- **Reference:** L. W. Couch, II, Digital and Analog Communication Systems, 6th Edition. (Prentice Hall)

Specific course information

- **Description**: The objective of this course is to introduce the student to the principle of transmitting an information bearing signal from a source point to a destination point with little or no distortion. To achieve this general goal, the course presents methods and models for representing the information signal, and how the signal in the time domain can be represented in the frequency domain. The course also explains in detail the conventional methods implemented for the modulation of an analog signal, focusing on how to generate and demodulate the information bearing signal. This course is concerned with analog and digital modulation techniques that covers amplitude and frequency modulation and digital pulse code modulation, PCM. The course also introduces the concept of a random process and uses this to highlight the role of noise in a communication system. The course concludes with a comparison study on the performance of analog communication systems in AWGN..
- **Prerequisites:** ENEE2302 and ENEE2307 (co-requisite)
- Core course for Electrical Engineering

Specific goals for the course

Upon the successful completion of this course a student should understand:

- To understand the general block diagram of a communication system and be able to explain the function of each block.
- To be reminded of the Fourier series and Fourier transform analysis.
- To be introduced to the types of linear distortion and nonlinear distortion.
- To learn how to find the response of a band pass system to a band pass input through the introduction of the pre-envelope concept.
- To learn in detail how to modulate, demodulate, analyze the spectrum of the following amplitude techniques: normal AM, DSB-SC, SSB-SC, VSB.

- To learn in detail how to modulate, demodulate, analyze the spectrum of a frequency modulated signal.
- To learn how to multiplex a number of signals in the frequency(FDM) and how to demultiplex them.
- To be introduced to the random process concept and what characterizes it.
- To be able to find the response of a linear system to a random process
- To be exposed to some common processes such as the Gaussian process and the random binary process.
- To be able to compare the performance of the analog modulation techniques in AWGN.
- Learn the principles of the different sampling techniques, Quantization methods, and pulse code modulation, PCM

(ABET) Relationship of course to Electrical Engineering Program Student Outcomes:

- (a) Ability to apply mathematics, science and engineering principles.
- (k) Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Brief list of topics to be covered

- Review of Signals and Systems **(self study)**
- Amplitude Modulation (AM) Systems
- Angle Modulation: Frequency and Phase Modulation
- Random Processes and Noise
- Performance (SNR) of Analog Demodulators in Noise
- Pulse Modulation: The Sampling Theorem and Pulse Code Modulation

Tentative Grading:

- Quizzes, programing 20%
- First Exam 20%
- Second Exam 20%
- Final Exam 40%

Course Policy: It is the responsibility of each student to adhere to the principles of academic integrity. (you can find all about academic integrity on Ritaj). Academic Integrity means that the student should be honest with him/herself, fellow students, instructors, and the University in matters concerning his or her educational endeavors. **Cheating will not be tolerated in this course.** University regulations will be pursued and enforced on any cheating student