The University of Jordan
School of Engineering
Electrical Engineering Department
2nd Semester – A.Y. 2020/2021

Course: **Communications Lab – 0953429 (1 Cr. – Required Course)**

Instructor: Prof. Mohammed Hawa + Eng. Noor Awad
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Office Hours: Will be posted soon

Course website: http://engineering.ju.edu.jo/ (Go to Electrical Engineering Department Labs)

Catalog description: Baseband binary transmission and matched filter receiver measurements. Generation and reception of incoherent binary ASK, PSK, and FSK signals. Waveform shaping. Eye diagram.

Prerequisites by course: **EE** **0953422** Communications (II) (pre- or co-requisite)

Prerequisites by topic: Students are assumed to have a background in the following topics:
- Analog and digital modulation techniques.
- Continuous and discrete signal and system analysis
- Probability and Random Processes.
- Additive white Gaussian noise (AWGN).

Textbook: **Lab Manual which can be obtained from the course Website.**

References:

1. Modern Digital and Analog Communications Systems by B. P. Lathi and Zhi Ding, Oxford University Press, 5th Edition, 2018.
2. Fundamentals of Communication Systems by John G. Proakis and Masoud Salehi, Prentice Hall, 2nd Edition, 2013.
3. Digital and Analog Communication Systems by Leon W. Couch, Prentice Hall, 8th Edition, 2012.
4. Digital Communications: Fundamentals and Applications by Bernard Sklar, Prentice Hall, 2nd Edition, 2017.
5. Digital Communications, by John Proakis and Masoud Salehi, McGraw-Hill Education, 5th Edition, 2007.
6. Digital Communication Systems by Simon Haykin, Wiley; 1st Edition, 2013.
7. RF Circuit Design by Christopher Bowick, Newnes, 2nd Edition, 2007.

8. Basic Communications Electronics by Jack Hudson and Jerry Luecke, Master Publishing, 1st edition, 1999.

Schedule: 16 Weeks, 10 Lab sessions (3 Hours each) plus exams.

Course goals: The overall objective is to allow the student to perform a set of experiments needed to understand the functionality of analog and digital modulation and demodulation techniques as well as line coding techniques via testing and analyzing circuits, including carrier acquisition and recovery circuits, receiver front-ends, and superheterodyne receivers.

Course learning outcomes (CLO) and relation to ABET student outcomes (SO):

Upon successful completion of this course, a student will:		[SO]
1.	Be able to conduct appropriate experimentation to understand the basic principles of amplitude, frequency and phase modulation techniques, and line coding techniques, including the effects of noise and transmitter/receiver hardware limitations on the system.	[6]
2.	Be able to analyze and interpret measured data, and use engineering judgment to draw conclusions.	[6]
3.	Know the basics of communications laboratory instruments (including power supplies, function generators, oscilloscopes and spectrum analyzers) and be able to properly use such instruments.	[6]
4.	Understand the requirements and pre-requisites for technical reporting, and be able to properly report experimental results.	[3]
5.	Be able to effectively function in a team in a collaborative and inclusive manner, to reach the lab goals and objectives.	[5]

Course topics:		Hrs
1.	Familiarization with the oscilloscope and available hardware.	3
2.	Amplitude Modulation (AM): Transmission.	3
3.	Amplitude Modulation (AM): Reception.	3
4.	Frequency Modulation (FM) and PLL.	3
5.	Spectrum analyzer.	3
6.	Line coding techniques: Unipolar, Polar, Manchester. Clock synchronization.	3
7.	Amplitude Shift Keying (ASK): transmitter and receiver.	3
8.	Phase Shift Keying (PSK): transmitter and receiver.	3
9.	Frequency Shift Keying (FSK): transmitter and receiver.	3
10.	Hardware project.	3

Ground rules: Attendance is required and highly encouraged. To that end, attendance will be taken every lab session. Eating and drinking are not allowed during the lab, and cell phones must be set to silent mode. All exams (including the final exam) should be considered cumulative. Exams are closed book. No scratch paper is allowed. You will be held responsible for all reading material assigned, even if it is not explicitly covered in lecture notes.

Assessment & grading policy:

Assignments	0%	Quizzes	13%
First Exam	0%	Projects	0%
Midterm Exam	30%	Lab Reports	13%
Final Exam	40%	Teamwork	4%
		Total	**100%**

Last Revised: March 2021