

# Department of Electrical and Computer Engineering

## EEL 3514: Communication Systems

Fall 2021

Dr. Elias Alwan

[ealwan@fiu.edu](mailto:ealwan@fiu.edu); (305) 348-5424

Office: EC 3952

Office hours:

Monday 9:00 AM to 12:00 PM

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**Days and Time: T/TH: 11:00 AM 12:15**

**PM Location: EC 3239**

**Textbook:** Digital and Analog Communications Systems, 8th edition, Prentice Hall, Leon W. Couch, 2013, ISBN 0-13-291538-3

### **SOFTWARE**

Matlab, Microwave Office, ADS

### **Prerequisite Courses**

- EEL3110- Circuit Analysis
- EEL3135- Signals and Systems
- ESI3215- Evaluation of Engineering Data I

### **Course Description and Purpose**

This course is an introduction to analog and digital communication systems. Topics include signals in communications; Fourier Transform; energy power signals; noise characterizations; bandwidth considerations; probability of error; analog and digital modulations; frequency domain analysis; matched filter applications; modulation, demodulation, ADC, sampling theory, and aliasing.

### **Course Objectives**

Upon completing this course, students will be able to:

- Identify and evaluate analog and digital modulation schemes
- Identify the different building blocks of a communication link

- Implement an end-to-end communication link
- Understand the major impairments of communication links
- Conduct link budget, noise, and bit error rate analyses

### **Important Information**

Before starting this course, please review the following pages:

- [Accessibility and Accommodation](#)
- [Academic Misconduct Statement](#)

\*Instructors retain the right to modify the course syllabus for any reason throughout the semester provided that:

- fair and adequate notice is given to enrolled students either by e mail, in writing, or through online publishing.
- modifications to the syllabus are not arbitrary or capricious; and,
- students are not unfairly disadvantaged by mid semester changes to grading standards, attendance standards, or performance measures.

### **Department Regulations Concerning Incomplete Grades**

To qualify for an Incomplete, a student:

1. Must contact (e.g., phone, email, etc.) the instructor or secretary before or during missed portion of class.
2. Must be passing the course prior to that part of the course that is not completed
3. Must make up the incomplete work through the instructor of the course
4. Must see the instructor. All missed work must be finished before last two weeks of the following term.

### **ABET Relationship of course to program outcomes:**

(Select corresponding boxes below to applicable program outcomes for the course.)

- 1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- 2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- 3. an ability to communicate effectively with a range of audiences.
- 4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- 5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- 6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.

- ☒ 7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

### Sample Grading Scheme

Letter	Range%	Letter	Range%	Letter	Range%
A	95 or above	B	83 - 86	C	70 - 76
A-	90 - 94	B-	80 - 82	D	60 - 69
B+	87 - 89	C+	77 - 79	F	59 or less

### GRADING POLICY

Grading Policy	
Topic	Percentage
Homework/Drop Quizzes	10%
Project	15%
Exam I	25%
Exam II	25%
Final	25%

### HOMEWORK

- Will be assigned weekly
- Homework is submitted through Canvas
- Some homework will include a small MATLAB/RF CAD exercise. The instructor will provide tutorials

### PROJECT

- Students are encouraged to form a team of up to 4 students
- The project will be simulation-based. Students are encouraged to get acquainted to MATLAB during the semester

### MIDTERMS

- The midterm will be held in class.
- One (1) Cheat sheet
- No Smart Phones & No Google
- Use of blue or black pen (no pencil)
- **Based on class and homework.**
- **There is a possibility for a web-based exam.**

## **FINAL EXAM**

- To be taken during Final Examination Week
- Comprehensive
- Web-based multiple-choice exam
- Open book. Closed Notes, No Google

## **TOPICS**

**Chapter 1. INTRODUCTION**

**Chapter 2. SIGNALS AND SPECTRA**

**Chapter 3 BASEBAND PULSE AND DIGITAL SIGNALING**

**Chapter 4 BANDPASS SIGNALING PRINCIPLES AND**

**CIRCUITS Chapter 5 AM, FM, AND DIGITAL**

**MODULATED SYSTEMS**

**Chapter 7 PERFORMANCE OF COMMUNICATION SYSTEMS CORRUPTED BY NOISE**