

## **Communication Systems**

0595.4100

**Spring Semester**

**LECTURER** Prof. Arie Yeredor

Office: 121 "Maabadot" building  
Telephone: 640-5314  
E-mail: arie@eng.tau.ac.il

**INSTRUCTOR** Mr. Amir Weiss

Office: 309 Software building  
Telephone: 640-6120  
E-mail: amirwei2@mail.tau.ac.il

### **PREREQUISITES**

Random Signals and Noise

### **COURSE DESCRIPTION**

### **COURSE TOPICS**

Week 1: Introduction, communication systems' configuration, basic principles and main properties for frequency-domain analysis, the Fourier transform of a deterministic signal vs. the spectrum of a stationary random process, cyclostationarity.

Part A, Weeks 2-8

Pulse Coding Modulation (PCM), Pulse Amplitude Modulation (PAM); Quantization and quantization noise; Basic digital modulation methods; Transmission in an Additive White Gaussian Noise (AWGN) channel, a matched filter; Inter-Symbol Interference (ISI) and eye-diagrams; Delta modulation.

Part B, Weeks 9-14

Bandpass signals and their representations; Narrow band noise.  
Amplitude modulations (definition, implementation, detection, analysis): Amplitude Modulation (AM), Double-Side Band Suppressed Carrier (DSB-SC); Single-Side Band (SSB) modulation, Hilbert transform;  
Angle modulations (definition, implementation, detection, analysis): Phase Modulation (PM), Frequency Modulation (FM), Narrow-Band FM.

## **ASSIGNMENTS**

Weekly homework assignments to be handed in for evaluation within two weeks, after which solutions would be published.

## **MIDTERM COURSE POLICY**

A midterm exam will be scheduled in the beginning of the semester. During an examination, student shall not use books, papers, or other materials not authorized by the instructor. The midterm will count for 10% of the total course grade, and will be based on problems that appeared in the lectures, recitations and HW assignments.

## **FINAL COURSE POLICY**

The final exam will cover the entire course material and will count for 90% of the total course grade.

Students will have a first exam, Moed A. If the student does not pass, they can retake the exam, Moed B. The last exam taken will be the student's final grade for the exam.

## **SUGGESTED READING**

1. L. W. Couch, Digital and Analog Communication Systems, Prentice Hall, 2001. **621.382 COU**
2. A. B. Carlson & P. B. Crilly & J. C. Rutledge, Communication Systems. **621.382 CAR**
3. S. Haykin, *Communication Systems*, 4th Edition, New York: John Wiley and Sons, 2000. **621.382 HAY**
4. S. Haykin & M. Moher, An Introduction to Digital and Analog Communications. **621.382 HAY**
5. J. G. Proakis, *Digital Communications*, 4th Edition, McGraw-Hill, 2000. **621.382 PRO**
6. E. A. Lee & D. G. Messerschmitt, Digital communication. **621.382 BAR**

**Note: The course material is not based on, nor does it closely follow, any specific textbook. None of the books in this list provides a full, self-contained version of the course material, but they supplement each other.**