

EE 6391 Signaling and Coding for Wireless Communication Systems

Dept. of Electrical Engineering
The University of Texas at Dallas

Instructor: Prof. Murat Torlak

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Office Hours: W 2:00-4:00PM or by appointment

Class Time and Place: TR 5:30-6:45PM and GR 4.208

Class Web site: <http://www.utdallas.edu/~torlak/courses/ee6391>

Teaching Assistant and Office hours: NA

Prerequisites: EE 6352 and EE 6390

Course Objectives:

- Ability to understand wireless channel models
- Ability to understand advanced digital modulation techniques used in wireless communications
- Ability to evaluate the capacity of wireless channels
- Ability to evaluate the performance analysis of digital modulation techniques over wireless channels
- Ability to apply diversity techniques to mitigate the effect of multipath fading on wireless communications
- Ability to understand codes design for wireless channels
- Ability to evaluate performance of coding methods over wireless channels
- Ability to design adaptive signaling and coding techniques for wireless communications

Grading: 20% Midterm I, %15 Midterm II (HW exam), %35 Final, %20 Project, 10% Simulation assignments and class participation.

Homework Policy: Homework assignment will be collected but will not be graded. Turning in homework will be considered as class participation. Midterm II will contain only homework problems assigned during the semester.

Project Policy: Project topic studied and selected by each student and approved or adjusted by me based on its difficulty level. The project will generally be theoretical analysis, hardware implementation or computer simulation (you can choose any software tool, MATLAB, Agilent EDA, Labview, and etc) related to topics covered in this course:

1. One page project proposal will be due at ONE WEEK AFTER MIDTERM TIME.
2. With one page proposal, you will have to select and survey a JOURNAL PAPER from a paper list that I will provide on advanced wireless communication topics.
3. For your final report, you are supposed to implement and present the simulation or experiments presented in the selected journal paper.
4. Your 4-page report will be due at the end of the semester.
5. An oral presentation will accompany the project.

Primary Text:

Wireless Communications by Andrea Goldsmith, Cambridge University Press

Secondary Text:

Fundamentals of Wireless Communication by Tse & Viswanath, Cambridge University Press, Available online at <http://www.eecs.berkeley.edu/~dtse/book.html>

Other References:

1. *Digital Communication over Fading Channels: A Unified Approach to Performance Analysis*, by M. K. Simon and M-S Alouini, Wiley, 2000.
2. *Wireless Communications – Principles and Practice, 2/e* by Theodore S. Rappoport, 2002 Prentice Hall.
3. *Principles of Mobile Communications* by Gordon L. Stüber, Kluwer Academic Publishers, 2000.
4. *Mobile Communications Engineering, Theory and Applications*, by W. C. Y. Lee, Second Edition, McGraw-Hill, 1998.

Overview:

Study of signaling and coding for wireless communications systems. Topics will include advanced modulation and coding schemes for wireless communications and their performance analysis in wireless channels.

Topical Outline:

1. Characterization of wireless channels: Narrowband and wideband channel models
2. Capacity of Fading channels
3. Digital communication methods and their performance in fading
4. Diversity
5. Coding and interleaving
6. Adaptive modulation, and power control
7. Emerging modulation, diversity, and coding methods for wireless communications

Attendance: Mandatory

Academic Dishonesty: Please see the UTD Graduate catalog for policy on academic dishonesty. Copying a graded homework assignment and giving or receiving aid on the exams is considered cheating and will be harshly penalized