EEL 6535 - Digital Communications

Dr. John M. Shea

Spring 2012

Pre-requisite: EEL 5544 or equivalent

Computer requirement: Some problems will require MATLAB. Students may want to purchase the student version of MATLAB, as departmental computer resources are limited. Not being able to get on a computer is not a valid excuse for late work. Web access with the ability to run Java programs is also required.

Meeting Time: MWF 9:35-10:25
Meeting Room: CSE E107

Contact Information
Email: jshea@ece.ufl.edu
Phone Number (text message or call): (352)575-0740
Twitter: @jmshea
Personal Web page: http://wireless.ece.ufl.edu/jshea
Office: 439 New Engineering Building
Office hours: Mon. and Thurs. 10:45–11:45 AM or by appointment

Class Web page: On Sakai: https://elearning2.courses.ufl.edu


Suggested References:

Other References:


Course Topics (as time allows):

- Optimal Filtering, Decisions, and Signal Sets (∼ 10 lectures)
- Coherent Communications (∼ 6 lectures)
- Noncoherent Communications (∼ 4 lectures)
- Synchronization (∼ 4 lectures)
- Intersymbol Interference and Equalization (∼ 6 lectures)
- Fading Channels (∼ 3 lectures)
- Multi-antenna Communication (∼ 4 lectures)
- Multi-channel Communication (∼ 3 lectures)

Goals and Objectives: Upon completion of this course, the student should be able to

- design receivers for arbitrary signal sets on additive Gaussian noise channels
- determine the error probabilities for communications over an AWGN channel
- evaluate tradeoffs between bandwidth and energy efficiency
- design and evaluate the performance of coherent and noncoherent receivers
- explain the terms fading, nonselective, frequency-selective, time-selective
- evaluate the performance of modulation in fading channels with and without diversity
- understand various carrier and symbol synchronization techniques
- understand and evaluate the performance of multi-antenna communication schemes, including beamforming and Alamouti code (modulation)
- understand ISI and techniques to combat it in time and frequency

Grading: Grading will be based on two exams (40% each), homework and quizzes (10%) and participation (10%). The participation score will take into account in-class participation, e-mail or messaging exchanges, discussions outside of class, etc. A grade of > 90% is guaranteed an A, > 80% is guaranteed a B, etc. There is no grader for this class, so homework will generally be graded on a 0 or 1 scale. No formal project is required, but, as mention above, students may be required to use MATLAB in solving some homework
problems. When students request that a submission (test or homework) be regraded, I reserve the right to regrade the entire submission rather than just a single problem.

Off-campus students are expected to participate in the class discussions on Sakai. Off-campus students should complete quizzes given during class time and submit via email to the instructor.

Attendance: Attendance is not mandatory. However, students are expected to know all material covered in class, even if it is not in the book. Furthermore, the instructor reserves the right to give unannounced “pop” quizzes with no make-up option. Students who miss such quizzes will receive zeros for that grade. If an exam must be missed, the student must see the instructor and make arrangements in advance unless an emergency makes this impossible. Approval for make-up exams is much more likely if the student is willing to take the exam early.

Academic Honesty:

All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action.

This statement is a reminder to uphold your obligation as a student at the University of Florida and to be honest in all work submitted and exams taken in this class and all others. If exams are given for grades, honor statements on exams must be signed in order to receive any credit for that exam.

I understand that many of you will have access to at least some of the homework solutions. Time constraints prohibit me from developing completely new sets of homework problems each semester. Therefore, I can only tell you that homework problems exist for your benefit. It is dishonest to turn in work that is not your own. In creating your homework solution, you should not use the homework solution that I created in a previous year or someone else’s homework solution.

Collaboration on homework is permitted unless explicitly prohibited, provided that:

1. Collaboration is restricted to students currently in this course.
2. Collaboration must be a shared effort.
3. Each student must write up his/her homework independently.
4. On problems involving MATLAB programs, each student should write their own program. Students may discuss the implementations of the program, but students should not work as a group in writing the programs.

I have a zero-tolerance policy for cheating in this class. If you plagiarize (copy someone else’s words) or otherwise copy someone else’s work, I will give you a failing grade for the class. Furthermore, I will be forced to bring academic dishonesty charges against anyone who violates the Honor Code.