ECE 460 – Communication and Information Theory
Department of Electrical and Computer Engineering
George Mason University
Spring 2014

Class Meeting Information
Day and Time: Tuesday and Thursday, 10:30 – 11:45 am
Location: Enterprise Hall 276

Instructor Information
Instructor: Dr. Jill K. Nelson
Office: 3216 Engineering Building
Phone: 703-993-1598
Email Address: jnelson@gmu.edu
Office Hours: TBA

Teaching Assistant Information
TA: Neshat Etemadi Rad
Email Address: netemadi@gmu.edu
Office Hours: Monday 11 am – 3 pm, 3204 Engineering Building

Course Website
http://gmu.blackboard.com

The course website is located within Blackboard. You can log into Blackboard using the same login name and password you use to log into your GMU email account. You will need to be registered for the course in order to access the course website.

Reading assignments, homework assignments, solutions, announcements, and any miscellaneous handouts will be posted on the website. Please check it frequently for updates.

Required Textbook

Prerequisites
• ECE 220 – Grade of C or better
• STAT 346 – Grade of C or better
• This class also assumes you have some experience with MATLAB. If your MATLAB background is weak, you will need to work through the online tutorials available on the Mathworks website.

Course Topics
• Fourier analysis of LTI systems
• Analog modulation techniques
• Probability theory and introductory random processes
• Digital modulation techniques
• The matched filter
• Digital communications on additive white Gaussian noise channels
Class Format
There will be assigned reading associated with each class period; it will be posted in the calendar on the course website. You are expected to complete the assigned reading before coming to class. You will need material in the assigned reading in order to successfully complete in-class quizzes and group exercises.

Active participation in class has been shown to improve learning and retention. Each class period will include a combination of lecture and in-class problems to facilitate active engagement. The in-class problems will be solved in groups and will give you a chance to apply the material you have learned from your reading and from the lecture. Your performance on the in-class problems will be evaluated with respect to both approach to the problem and effectiveness of group effort.

Some class periods will include a reading/review quiz designed to assess your understanding of the homework, the material covered in the previous class period, and the reading assignment for the current class period. These quizzes are to be completed individually – no collaboration is allowed. The purpose of these quizzes is to ensure that you keep up with the course material, as well as to help you identify topics that require additional study.

Because some class time is devoted to quizzes and problem-solving sessions, not all material will be covered in a lecture format. You are responsible for material covered in the reading but not in lecture, and such material may be included in homework assignments, quizzes, or exams.

You are expected to attend each class period. While attendance is not explicitly recorded, absences will be apparent in your quiz and in-class problem performance. If you are not present, you are responsible for the material covered during the class and for obtaining notes from another student. Additionally, you are responsible for turning in any assignments due at the beginning of the class period.

All alarms, ringers, etc., must be turned off during class. Texting, using your laptop for something other than lecture-related work, etc., is considered a distraction to the instructor and to those trying to focus on the class. Students engaging in non-class-focused activities will be asked to leave the classroom.

Homework Assignments
Homework assignments will be given approximately weekly throughout the course and will be posted on the course website. The assignment due dates will be given in the assignments. Homework assignments are due at the beginning of the class period on the due date. No late homework assignments will be accepted. Solutions will be posted on the course website. The lowest homework grade will be dropped when computing each student’s overall homework score.

Homework submissions should be written neatly. Pages should be stapled, and problems should appear in order. I reserve the right to return problem sets ungraded if they don’t meet these requirements.

You are encouraged to work in groups and discuss the assigned problems. If you wish, you may (but are not required to) submit homework completed in a pair. Homework submissions with more than two names will receive zero credit. Homework submitted as a pair must represent a collaboration of the two students whose names appear on it. Copying from other students, from existing solutions, or from any other source, is considered cheating and will not be tolerated. Note that you are responsible for all material on the homework via quizzes, in-class problems, and exams.
MATLAB Project
One large MATLAB project will be assigned during the latter part of the course. This project will give you the opportunity to design and simulate a digital communications system and to evaluate its performance. A detailed description of the requirements for project completion and submission will be provided with the project assignment.

Exams
The course will include two mid-term exams (given during class) and one final exam. The dates for these exams are as follows:
Midterm Exam 1: Tuesday, March 4, in class
Midterm Exam 2: Tuesday, April 15, in class
Final Exam: Tuesday, May 13, 10:30-11:45 am
Each of the mid-term exams will focus on the material that has been covered since the previous exam. However, much of the material in the course builds on the material that is covered before it. Hence, even though the in-class exams are not explicitly cumulative, they will require an understanding of the basic material on which the tested material builds. The final exam will be cumulative, explicitly evaluating your understanding of all material covered in this course.

All exams will be closed book and closed notes unless otherwise stated by the instructor. Absolutely no collaboration is allowed on exams.

Grading
Your final score will be based on a weighted combination of your scores on quizzes, in-class problems, homework assignments, the MATLAB project, and exams as follows:

- In-Class Problems: 4%
- Quizzes: 8%
- Homework Assignments: 8% (lowest grade will be dropped)
- MATLAB Project: 10%
- Mid-term 1: 22%
- Mid-term 2: 22%
- Final Exam: 26%

A request for a grade change for any assignment must be provided to the instructor within two class periods after the assignment is returned. The request must include the graded assignment in question and a written statement describing why a grade change is requested.

Honor Code
GMU is an Honor Code university. The principle of academic integrity is taken very seriously and violations are treated gravely. Three fundamental principles to follow at all times are that: (1) all work submitted be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the ground rules on a particular assignment, ask for clarification. No grade is important enough to justify academic misconduct.

All students are expected to abide by the George Mason University Honor Code. Any reasonable suspicion of an honor code violation will be reported. You must review the rules of the GMU Honor Code and be familiar with them. The GMU Honor Code can be found at:
http://academicintegrity.gmu.edu/honorcode/
Reposting of Course Material to Other Websites
The course materials (lecture notes, homeworks, projects, exams, solutions, and anything else posted on the course website) are copyrighted. You may not upload them to any other website or share them with any on-line or off-line test bank.

Office of Disability Services (ODS)
If you are a student with a disability and require special accommodations, please contact me and the Office of Disability Services (ODS) as soon as possible. All special accommodations must be arranged through ODS.

Office of Disability Services (ODS): 703-993-2474; http://ods.gmu.edu

Other Useful Campus Resources
  o Writing Center: A114 Robinson Hall; 703-993-1200; http://writingcenter.gmu.edu
  o University Libraries: “Ask a Librarian” http://library.gmu.edu/mudge/IM/IMRef.html
  o Counseling and Psychological Services (CAPS): 703-993-2380; http://caps.gmu.edu
  o The University Catalog: http://catalog.gmu.edu
  o University Policies: http://universitypolicy.gmu.edu

Tentative Weekly Schedule
Week 1 – Intro; review of LTI systems and Fourier analysis
Week 2 – Review of sampling theory; bandpass signaling
Week 3 – Amplitude modulation (AM)
Week 4 – Frequency and phase modulation
Week 5 – Review of probability
Week 6 – Probability theory and random variables
Week 7 – Introduction to random processes
Week 8 – Introduction to power spectral density
Week 9 – Digital modulation schemes
Week 10 – Receivers for digital signaling in AWGN
Week 11 – The matched filter
Week 12 – Performance of digital receivers in AWGN
Week 13 – Performance of digital receivers in AWGN, continued
Week 14 – Application: Mobile communications