ECE 460 – Communication and Information Theory
Department of Electrical and Computer Engineering
George Mason University
Spring 2011

Class Meeting Information
Day and Time: Tuesday and Thursday, 3:00 – 4:15 pm
Location: Nguyen Engineering Building 1103

Instructor Information
Instructor: Dr. Jill K. Nelson
Office: 3216 Engineering Building
Phone: 703-993-1598
Email Address: jnelson@gmu.edu
Office Hours: Monday 3:30 - 4:30 pm
            Friday 1:30 – 2:30 pm
            Other times by appointment

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
  Englewood Cliffs, NJ, 2002

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 the daily quizzes and the group exercises assigned in class.

Each class period will begin with a short “reading and review” quiz designed to assess your understanding of the material covered in the previous class period and of 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. The lowest quiz grade will be dropped when computing each student’s overall quiz score.

Following the quiz, each class period will include a combination of lecture and in-class problems. 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.

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.

Electronic devices, including laptop computers, cellular phones, PDAs, iPods, etc. are not permitted to be used during class. All alarms, ringers, etc., must be turned off. Students using any such devices will be asked to leave the classroom. If you are a student with a disability, please see the instructor to arrange academic accommodations.

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.

You are encouraged to work in groups and discuss the assigned problems. However, the work you turn in should be your own. You must write up (or program in the case of MATLAB) your own solutions for the homework problems. Note that copying from other students, from existing solutions, or from any other source, is not your own work.

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 1, in class
Midterm Exam 2: Tuesday, April 19, in class
Final Exam: Tuesday, May 17, 1:30 – 4:15 pm
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 daily quizzes, in-class problems, homework assignments, and exams as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Quizzes</td>
<td>12%</td>
</tr>
<tr>
<td>In-Class Problems</td>
<td>10%</td>
</tr>
<tr>
<td>Homework Assignments</td>
<td>7%</td>
</tr>
<tr>
<td>Mid-term 1</td>
<td>22%</td>
</tr>
<tr>
<td>Mid-term 2</td>
<td>22%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>27%</td>
</tr>
</tbody>
</table>

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**

All GMU students have agreed to abide by the letter and the spirit of the Honor Code. You can find a copy of the Honor Code at academicintegrity.gmu.edu. Any reasonable suspicion of an Honor Code violation will be reported to the Honor Committee for review.

**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