ENTS 622 Introduction to Digital Communications - Fall 2018 Syllabus

Course Description: Principles of analog and digital communication systems design. This includes analysis of the performance and relative merits of different modulation such as PSK, QAM, and GMSK, spectral analysis, signal processing techniques, filtering, frequency selective fading channels and coherence bandwidth, time varying channels and Doppler spread, and optimum receivers. Also provides hands-on labs where students learn to work with the Ettus B210 software-defined radio, using GnuRadio; for example, students will generate digital signals, and perform pulse-shaping, synchronization, and equalization for different digital modulation schemes.

Prerequisites: Successful completion of a technical undergraduate degree, including successful completion of courses in differential and integral calculus, signals & systems (Fourier transforms, convolution, properties of linear time-invariant systems), and probability theory & random processes.

Lecture: Section 010x: Monday • 5:30pm – 8:15pm • SPH 0308
Section 020x: Monday • 9am – 11:45am • ITV 1111

Lab sessions: Section 0101: Wednesday • 5:30pm-8:15pm • AVW 1362 • T.A.
Section 0102: Tuesday • 9am-11:45am • AVW 1362 • T.A.
Section 0103: Thursday • 9am-11:45am • AVW 1362 • T.A.
Section 0201: Thursday • 9am-11:45am • AVW 1362 • T.A.

Instructor:
Name: Alejandra Mercado email address: mercado@umd.edu office: AVW 1365
Regular Office Hours: Mon 4PM-5PM & Thu 11AM-12PM (always set up appointment online, here)

TA Office Hours (email first to schedule an appointment):
Name: Name:
Email address: Email address:
Hours: Hours:
Office Location: Office Location:

Logging in to the Course for announcements, documents, etc.:
Go to http://elms.umd.edu. Login with your Maryland Directory ID and password.

Texts and Supplies
- Required Textbook:
  - “Communication Systems” by Haykin and Moher; Publisher: Wiley; 5 edition (March 16, 2009); ISBN-10: 0471697907
- Supporting References for course material:
  - “Communications Systems” by Simon Haykin (UMCP Engineering and Physical Sciences Library Stacks TK5101 .H37 1994 on reserve for course)
  - “Digital Communications” by John Proakis (UMCP Engineering and Physical Sciences Library Stacks TK5103 .7 .P76 2001 on reserve for course)
  - “Principles of Communication Engineering” by Wozencraft and Jacobs (UMCP Engineering and Physical Sciences Library Stacks TK5101 .W62)
- Supporting References for background review:
  - “Signals and Systems” by Oppenheim, Willsky and Young (UMCP Engineering and Physical Sciences Library Stacks QA402 .O63 1983)
Grading

Attendance Quiz (first day) 4%
Midterm exam: 20%
Weekly Quizzes: 23%
Weekly Labs: 23%
Homework: 10%
Final Exam: 20%
Total 100%

Final Grading will be determined using the following scale based on the overall average score:

Threshold for A-, A, A+ 90 %
Threshold for C-, C, C+ 70 %
Threshold for B-, B, B+ 80 %
Threshold for D-, D, D+ 60 %
Threshold for F everything else

A± denotes excellent mastery of the subject and outstanding scholarship.
B± denotes good mastery of the subject and good scholarship.
C± denotes acceptable mastery of the subject and the usual achievement expected.
D± denotes borderline understanding of the subject and marginal performance.
F denotes unsatisfactory performance.
XF denotes failure due to academic dishonesty.

Tentative Course Schedule

The instructor reserves the right to make schedule changes based on class progress.

<p>| Week # | Week beginning Monday | Lecture Topic from text | Lab Quiz || USRP Lab |
|--------|-----------------------|-------------------------|----------|----------------|
| 1      | Aug 27                | Introduction to the course. Chapter 1 ATTENDANCE QUIZ (late arrivals will be counted as 0%) | Quiz covers “Communications System Overview” from Lecture 1 (late arrivals will receive 0%) || Introduction to B210 and GnuRadio, Signal generation, sampling rate, scope |
| 2      | Sept 3                | Labor Day on Monday: attend Labs for lecture Chapter 2 | Quiz on lab material covered in previous week’s lab || Lecture Chapter 2 |
| 3      | Sept 10               | Chapter 2               | Quiz on lecture material covered in previous week’s lab || noise, spectral analysis |
| 4      | Sept 17               | Chapter 3               | Quiz on lab material covered in previous week’s lab || AM |
| 5      | Sept 24               | Chapter 4               | Quiz on lab material covered in previous week’s lab || FM |
| 6      | Oct 1                 | Chapter 5               | Quiz on lab material covered in previous week’s lab || BPSK |
| 7      | Oct 8                 | Chapter 6               | Quiz on lab material covered in previous week’s lab || PSK |
| 8      | Oct 15                | Chapter 7               | Quiz of lab material covered in previous week’s lab || Problem-solving session labs |
| 9      | Oct 22                | Midterm exam            | Quiz on lab material covered in previous week’s lab || QAM |
| 10     | Oct 29                | Chapter 8               | Quiz on lab material covered in previous week’s lab || equalization |
| 11     | Nov 5                 | Chapter 8               | Quiz on lab material covered in previous week’s lab || pulse-shaping |
| 12     | Nov 12                | Chapter 9               | Quiz on lab material covered in previous week’s lab || synchronization |
| 13     | Nov 19                | Chapter 9               | Problem-solving session labs (excludes Thursday) |</p>
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<tr>
<th></th>
<th>Date</th>
<th>Chapter</th>
<th>Notes</th>
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<tr>
<td>14</td>
<td>Nov 26</td>
<td>Chapter 9</td>
<td>Quiz on lab material covered in previous week</td>
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<td>15</td>
<td>Dec 3</td>
<td>Chapter 10</td>
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<td>16</td>
<td>Dec 10</td>
<td>Chapter 10</td>
<td>No labs</td>
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<td>16</td>
<td>Dec 11</td>
<td>Reading Day</td>
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<td>Dec 12 - 18</td>
<td>Finals week</td>
<td>No labs</td>
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A. Requirements
Students are expected to be on time, attend all class meetings and lab sessions, and complete all assignments and all assessments of their knowledge and understanding of the class material.

B. Assignments
Any assignment that is turned in should be complete, and represent the student’s individual and original work. Turn in your assignment at the beginning of the class. Late assignments will not be accepted, as this would place an unfair burden on students who hand in their work in a timely manner.

C. Make-up Policy
In the case of an excused absence (such as a disabling medical emergency with a letter from a physician on official letterhead, or a death in the immediate family with proper documentation), the instructor will redefine the grading distribution in accordance with what assessment was lost.
Excused Absence: If you miss an assessment (test or project), contact me as soon as possible. You may receive an excused absence for such things as: medical emergencies, or death of an immediate relative. Unexcused absences will result in a grade of zero for the missed assessment.

Religious Observance: The student should inform the instructor at the beginning of the semester about any absences due to religious observances. We will make appropriate arrangements for the missed assessment. This must be NO LATER than the second week of classes.

D. Audit Policy
Audit students must participate fully in the course and follow all policies and procedures to audit the course. Exception: exams and reports are not required.

E. Academic Integrity
The maintenance of the highest standards of intellectual honesty is the concern of every student and faculty member at the University of Maryland. Plagiarism, which is defined as appropriating or closely imitating another person’s work or ideas and representing them as one’s own original work, is strictly prohibited. Use of phones, tablets or other electronic devices during a test is not allowed. Talking or whispering during exams or quizzes is never allowed. Academic Dishonesty or Misconduct can occur in many ways. Some examples are:

- Plagiarizing from written, video, or Internet resources
- Forgery
- Submitting materials that are not the student’s own work, such as Matlab code
- Taking examinations in the place of another student, including assessment tests
- Assisting others in committing academic dishonesty
- Copying from another student during an examination or on a homework assignment.

Failure to abide by the rules of Academic Integrity (which, in addition to the described above is detailed in http://www.president.umd.edu/policies/docs/III-100A.pdf) will result, at the very least, in a grade of XF: the grade appears on the student’s transcript with the notation “Failure due to academic dishonesty,” as well as further disciplinary actions.

F. Taping and/or Distributing Course Materials Forbidden
All course materials (lecture slides and other materials provided to you) are to be considered copyrighted by the University of Maryland – and may not be reproduced for anything other than personal use without written permission from your instructor and the College Dean. Video-taping or audio-taping lectures is forbidden. If you publicly post or share course materials, and especially any solutions for homework, exams, quizzes, project, etc., you will be in violation of U.S. Copyright Law, University of Maryland policies, as well as the Code of Academic Integrity.
G. Disability Support Services
Disability Support Services (DSS): Any student who may need an accommodation due to a disability should contact DSS offices at 0106 Shoemaker Building (301.314.7682) A letter from DSS authorizing your accommodations will be needed. For a complete list of other student support services, please refer to the Student Handbook.

H. Cancellation of Classes
If inclement weather forces the campus to suspend classes or close, public service announcements will be provided to local radio and television stations as early as possible. Assume that classes will be held unless you read or hear otherwise from the university web page or radio or television.

You may also call check the UMCP web page at [http://prepare.umd.edu/weather](http://prepare.umd.edu/weather)

Check the canvas (ELMS) course site frequently and always before coming to campus for lecture, as instructor will post announcements there about class cancellations or other course-related matter.

CONTACTS:
Students learn best from each other when studying together. Also, class contacts are useful in the event you miss a class. I strongly encourage you to meet your neighbors, and get some contact information.

Name: __________________________  Name: __________________________

Email: __________________________  Email: __________________________

Phone: __________________________  Phone: __________________________

Name: __________________________  Name: __________________________

Email: __________________________  Email: __________________________

Phone: __________________________  Phone: __________________________

VETERANS
If you are a veteran or on active or reserve status and you are interested in information regarding opportunities, programs and/or services, please visit the University of Maryland Veterans Program Office website at [http://registrar.umd.edu/veteran-benefits.html](http://registrar.umd.edu/veteran-benefits.html)

QUESTIONs ABOUT GRADUATE SCHOOL POLICIES?
You can view University of Maryland Graduate School policies and practices in the Graduate Catalog, here: [http://apps.gradschool.umd.edu/Catalog/policy.php](http://apps.gradschool.umd.edu/Catalog/policy.php)