Communication Engineering Lab

ECE 461 – Fall 2010

Lab location: ENGR 3505
Lab Hours: Thursdays, 10:30 am - 1:20 pm
Credit Hours: 1
Corequisite: ECE 460, Communication and Information Theory

Primary instructor: Vasiliki N. Ikonomidou
E-mail: vikonomi@gmu.edu (preferred)
Office: Engineering, 3909
Office Hours: Tuesdays, 3-5 pm; other hours by appointment (e-mail me!)

Regarding communication:
I will try to respond to e-mails within two business days of receiving them. Due to University regulations, you need to use your GMU e-mail account in all correspondence related to the course. Please put ECE 461 in the subject line!

Teaching assistant: Nazia Ahmed
E-mail: nahmed10@gmu.edu
Office Hours: Wednesdays, 3:20 to 7:20 pm.

Grading policies

(a) Attendance and lab demonstration – 10%

Attendance to the lab sessions is mandatory. Students must complete and successfully present all the experiments in order to pass the course; students with one lab exercise not completed can still pass the course with an additional 5% penalty. Students with two or more not completed exercises will fail the course.

If you must miss a session, notify the instructor by e-mail as soon as possible stating the reason for your absence. A common make-up session to cover for a single absence will be offered towards the end of the semester. If due to medical reasons you must miss more than one session, please contact me for alternative arrangements.
Successful attendance to the lab comprises of being there on time, being prepared and actively participating to the experiments. A successful presentation of the experiment includes a presentation of the experimental setup, the code and the measurements, and an understanding of the nature of the measurements.

In order to keep track of attendance and presentations, a signature sheet will be provided to you. It is your responsibility to get the instructor’s signature on this sheet for every lab successfully completed, and to turn this sheet in with your final exam.

(b) Lab reports – 35%

Lab reports constitute a major component of the course. They should demonstrate an understanding of the background, and a clear and critical presentation of the procedure followed and the results obtained. “Critical” means questioning what was done and why such results were obtained.

Lab reports should be typed, and no longer than 10 pages.

Lab reports are due at the beginning of the class the week after the experiment was completed; there will be a 20% penalty for every day delay after that. In case of a documented medical emergency that doesn’t allow you to submit the report on time, please notify the instructor.

(c) Design lab – 10%

The “design lab”, which will be demonstrated at the last day, will be different from other labs in that it will require the students to design and demonstrate a full modulation / demodulation system. Students, working in teams, will be required to put together a working system that will be able to take an input signal at one end, modulate it and transmit it to a receiver unit; the latter should be able to reproduce the original signal. Each student will need to submit a detailed report on the design, and answer questions during the demonstration. The report for the design lab is due at the day of the final exam.

(d) Midterm exam – 25%

The midterm exam will consist of a theoretical (pen and pencil) part and an experimental demonstration. Both parts are open notes/book.

(e) Final exam – 20%

The final exam will consist of a theoretical (pen and pencil) part and an experimental demonstration. Both parts are open notes/book. The final exam is cumulative.

Academic Integrity

All George Mason University 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. All violations of the Honor Code will be reported to the Honor Committee for review.

In this lab, you will work in pairs. It is expected that you will collaborate in conducting the experiment, and that you will discuss problems that arise with your partner. It is also expected
that you will present the same lab results as your partner. However, it is not acceptable that one partner conducts all the experiment; both students should share the work in the experimental procedure. It is also expected that you write the report on your own; the answers to the questions of the lab manual should reflect your own understanding of the subject.

**Academic courtesy / Lab rules**

Please familiarize yourself with the laboratory rules of the ECE department.

- No food or drinks are allowed in the lab
- Students are not allowed in the lab without a Lab Instructor or Lab Monitor present
- Handle equipment with care. If you suspect there is a problem with the equipment, notify the Lab Instructor, the TA or the Lab Monitor.
- You are responsible for leaving your workstation clean and in good condition when you leave.
- Smoking is not allowed in the building
- Use of cell phones or mp3 players is not allowed during class

Make sure you dress appropriately for the lab. Wear shoes with insulating soles, and avoid jewelry. Practice the general rules of electronics safety.

While discussions between the lab partners are expected during the experimental part of the class (but not during lecture), please be considerate of your classmates and avoid excessive noise.

**Detailed Course Information**

This course aims at providing the student with hands-on experience in analog and digital communication systems. For the first part of the course, basic analog modulation circuits will be build and the associated modulations studied both in the time and the frequency domain. For the second part of the course, a DSP-based kit will be used to construct subsystems of a digital communications system.

**Lab manual:**

The manual for the lab exercises will be available in pdf format on Blackboard.

**Recommended textbooks:**

The lab notes make references to the required textbook of ECE 460, Communications Systems Engineering by Proakis and Salehi.

Louis E. Frenzel, Principles of Electronic Communication Systems, Career Education.

The ARRL handbook for radio communications, ARRL – the national association for amateur radio
In the lab manual, you will find references to datasheets of ICs used – you are expected to download them from the companies’ websites and read them.

**Materials required:** A materials list will be provided with all lab exercises. Each student will be assigned a TMS320C6711 DSK kit, which he/she will be held responsible for, and will need to return at the end of the semester.

**Calendar (tentative – ALL dates and assignments are subject to change)**

Aug 30 – First day of the semester

Sep 2 – Introduction to the lab

Sep 9 – Lab exercise 1: Spectrum analysis and transfer function

Sep 14 – Last day to add classes

Sep 16 – Lab exercise 2: Amplitude modulation

Sep 23 – Lab exercise 3: Balanced modulator

Oct 1 – Last day to drop (67% tuition penalty)

Sep 30 – Lab exercise 4: Frequency modulation

Oct 7 – Lab exercise 5: Phase locked loop

Oct 14 – Review

Oct 21 – Midterm exam

Oct 28 – Lab exercise 6: Introduction to TMS320C6711

Nov 4 – Lab exercise 7: Baseband modulation

Nov 11 – Lab exercise 8: Amplitude Shift Keying

Nov 18 – Lab exercise 9: Frequency Shift Keying

Nov 25 – Thanksgiving – No class

Dec 2 – Lab exercise 10: Frequency Shift Keying Demodulation using Phase Locked Loop

Dec 9 – Design lab demonstration – Design your complete digital transmit/receive system

Dec 16 – Final Exam