Cleveland State University
Department of Electrical Engineering and Computer Science

EEC 517 - Embedded Systems

Catalog Data: Embedded Systems EEC 517 (2-2-4)
Prerequisites: Students must have graduate standing.
Software design of microcontroller-based embedded systems. Topics covered include:
- microcontroller architecture
- assembly programming
- C programming
- real time interrupts
- program size considerations
- input/output issues
- analog-to-digital conversion
- serial port reception/transmission.

Textbook: No textbook is required for the course. You will need to print the datasheet for the
Microchip PIC16F877 microcontroller, and you should print out the PowerPoint
slides from the lectures. You will be permitted to use the data sheet, slides, and your
notes for exams and quizzes. No electronic devices are permitted during exams and quizzes.
The datasheet is available at the Resources page linked above and the
slides are available on the course website.

Instructor: Dr. Dan Simon
Email: d.j.simon@csuohio.edu
Course web site: embeddedlab.csuohio.edu/EEC417
Office: Fenn Hall 343 or 326
Office Hours: T/Th, 12:00 - 2:00 PM

Course Objectives:
After taking this course:
1. The student should be familiar with Microchip's microcontroller products.
2. The student should be able to design an embedded system using a Microchip microcontroller.
3. The student should be able to interface the embedded system with electronics in order
to collect data and control external devices.
4. The student should be able to choose an appropriate microcontroller for an embedded
system based on system requirements.
5. The student will also be in a position to design embedded systems with
microcontrollers and digital signal processors from companies other than Microchip.

Grading:
- Assignments 40%
- Midterm 20%
- Final Exam 20%
- Project 20%
- 100%

A 93 - 100
A- 90 - 92
B+ 87 - 89
B 83 - 86
Lab Assignments:

Lab assignments consist of two components:
1. Building and demonstrating the correct operation of a circuit to test the assembly code provided for the lab assignment (25 percent of grade).
2. Submitting written answers to a set of questions related to the circuit and assembly code (75 percent of grade).

The written questions of the lab assignments will be available on the course website as Word documents which you can edit and enter your answers. There will be an item in the assignment that the instructor or TA will sign after you demonstrate the **correct operation** of a **neatly constructed** circuit board. **Both must be submitted together as a single assignment.** The demonstration and written assignment may be submitted up to one class period late (next lecture or next open lab for your section), but a 20 percent late penalty will be assessed on both parts of the assignment. After the late period, solutions to the lab assignments will be posted on the course website, and neither the written assignments nor the demonstration will be accepted after the posting.

Lab assignments are due at the **beginning of class** on the date listed in the table below and must be handed in as hard copies. You can fax your assignment to the ECE department's fax number (216-687-5405) if you are not at school on the day that the lab is due. **Email attachments are not accepted.** But you must have previously demonstrated the correct operation of your circuit and obtained a signature.

Projects:

EEC 517 students are responsible for a term project. See the Project page linked above. The project should combine graduate-level material with a PIC-based embedded system. The project grade will be based on the degree of difficulty, the degree of success, the written report, and the oral presentation, which will be given during the last week of the semester. Project guidelines are available at the Project link above. Please be sure to read these early in the semester, since the projects require a significant amount of work.

Online submission:

The letter of intent, the proposal, and the written report must be submitted at [www.turnitin.com](http://www.turnitin.com) using class id 5933580 and password "embedded." Assignments are due by 11:59 PM on the due date. The website will not accept late submissions.

Exams:

1. No electronic devices are permitted during exams.
2. Be sure to bring your PIC datasheet, notes, and printed lecture slides to the exams, since material from the lectures slides will be on the exams.
3. You must take the exams from your own section.
4. No makeup exams will be given without the prior permission of the instructor.
**Attendance:**
Attendance is only required for the two days of project presentations for your section. Attendance on those days will count toward your grade in an amount equal to one lab assignment. However, in addition to days on which exams are given, you must be present to demonstrate your working project on or before the due date, and obtain a signature from the instructor or TA.

On open lab days, the instructor or TA or both will be available to assist you with debugging your circuit or code and for assistance with homework questions. Many students attend these sessions and find them to be very helpful in completing their assignments. You may attend any open lab no matter which section you are in.

In addition, the lab will be available 2:00 - 4:00 before each M/W class, and 12:00 - 2:00 after each T/Th class. The instructor or TA will be available for assistance. If the lab is not open during the open lab time, ask the instructor, TA, or department secretary to open it for you.

There is an "Announcements" link above which is used for important announcements related to the class. It is your responsibility to check this page regularly, especially before you work on assignments, to see if any changes have been made or hints provided. Emails will NOT be sent to the class.

**Equipment:**
Each student must have the following equipment for this course.

1. Kit A1 (PICkit 3) or Kit A2 (PICkit 2) : microcontroller development kit and accessories(Student purchase.)
2. Kit B: Miscellaneous lab equipment, including a solderless breadboard, a wire cutter/stripper, a digital multimeter, and one or more colors of solid 22-gauge wire. (Student purchase.)
3. Kit C: A kit of electronics parts for the labs. (Loaned to the student and returned at end of semester.)

**Note:**
A few of the lab assignments require a serial communications port on the computer being used for the labs. The computers in the SH 326 lab have serial ports. If you want to use your own computer, be sure that it has a serial port. If not, you can purchase (or borrow from someone) a USB to serial port adapter such as the Sabrient USB 2.0 to Serial DB9 Male RS232 1 Foot Cable Adaptor, Model SBT-USC1K. It is often helpful to bring a small screwdriver and needle-nose pliers to the lab to aid in building your circuits.

**Academic Honesty:**
Students may work together on assignments, but those who hand in identical answers will be given a grade of zero and may also face additional penalties. Also, paying someone (or a website such as freelancer.com) to do your assignment or project is considered a very serious act of academic dishonesty and will result in an F grade for the course and a permanent entry in your student record.