

Syllabus
EE 3710 – Embedded Systems
Spring 2017

Description: Design and implementation of a microcontroller or microprocessor embedded system including assembly language programming, interfacing to peripherals, interrupt handling and debugging techniques. Lecture and Lab. Laboratory exercises build toward a final embedded systems project.

Information: This course is required for the Electronics Engineering Degree.

Instructor: Dr. Fon Brown, 626-7781 (Office), Room ET 236B, fonbrown@weber.edu.

Office Hours: Posted at faculty.weber.edu/fonbrown.

Classroom (Section 1): Ogden Campus, M2-100, 10:30 TR.

Classroom (Section 2): Ogden Campus, ET 139, 5:00 MW.

Student Learning Outcomes: At the conclusion of this course, the student will be able to:

1. Write a computer program in assembly language.
2. Write code to handle interrupts.
3. Debug a computer program using both hardware and software tools.
4. Interface peripherals to a microcontroller or microprocessor using a bus.
5. Document the hardware and software of an embedded systems design.

Student Assessment: The following course assessment criteria will be used:

1. Homework and Quizzes (20%)
2. Laboratory Assignments (20%)
3. Exam 1 (20%)
4. Exam 2 (20%)
5. Projects/Documentation (20%)

Grading:

93%-100%: A	87%-90%: B+	80%-83%: B-	73%-77%: C	60%-70%: D
90%-93%: A-	83%-87%: B	77%-80%: C+	70%-73%: C-	0%-60%: E

Course Assessment: The following course assessment criteria will be used:

1. Student Reviews
2. Faculty Review (annually)
3. Advisory Committee Review (every two years)

Credits and Contact Hours: Four semester credit hours. Six contact hours per week.

Prerequisite: EE 2700 Digital Circuits,
CS 1410 Object Oriented Programming or CS 2250 Structured Programming.

Text: *The 8051 Microcontroller and Embedded Systems, 2nd Edition*, Mazidi et.al.
C8051F020/1/2/3 8K ISP FLASH MCU Datasheet
C8051F020DK Development Kit

Reading: Prior to each class students are expected to read the section in the text indicated on the schedule and review the questions and problems at the end of the chapter that relate to those sections.

Exams: There will be two midterm exams. A student may take an exam early if there are extenuating circumstances and at least one week notice is given. There are no makeup exams, but there is a makeup project that can be used to recover half of the points missed on any one midterm exam.

Homework: The tentative homework schedule is given on the course website. Any changes will be announced in class. Homework is due 2 class periods after it is assigned. Late homework is accepted up until the next exam and may be graded if time permits, but it will be subject to a 20% late penalty.

Quizzes: Unannounced quizzes will be given from time to time to check for understanding and to reward those students who faithfully attend class.

Labs: This is a lab intensive course. Each student will build a microcontroller system that interfaces to LEDs, LCDs, potentiometers, switches and more. Students may work in groups of 2 to design and debug, but each student must build his own system. Most labs require preparation before the lab period begins. Preparation is graded during the first 30 minutes of the laboratory period and is worth 10 points per lab assignment. When the assignment is complete, an additional grade worth up to 10 points will be given. Points are assigned according to the rubric(s) in the lab assignment. Late work is penalized 20%.

Project: The project for this semester is to write a version of Gorilla. For this project, students may work with their lab partners to design and develop their code. (Students are also allowed to trade hardware or help other students find coding bugs.) Each team will turn in design documentation in addition to demonstrating the project to the lab instructor. Completion of the project (no missing features) is required to receive a grade of C or better in this class. Cheating (e.g. copying code from another team) will result in a failing (E) grade. The project demonstration is due at the time scheduled for the final exam. The design document is due at that time as well. No late work will be accepted after the time scheduled for the final exam.

Topic Outline:

1. Microprocessor/Microcontroller Architecture
2. Machine and Assembly Language
3. Instruction Set Architecture
4. I/O Ports
5. Timers
6. Serial Communication
7. Interrupts
8. Busses
9. Semiconductor Memory
10. A/D and D/A conversion
11. Miscellaneous peripherals

Course Fees: The fees associated with this course are used to provide circuit boards, components, solder and wire for students to build their microcontroller systems. Remaining funds, if any, are used to maintain the equipment and computers in the laboratory.

Services for Students with Disabilities: Any student requiring accommodations or services due to a disability must contact Services for Students with Disabilities (SSD), Room 181 of the Student Services Center. SSD can also arrange to provide course materials (including the syllabus) in alternative formats if necessary.