EENG 383
Microcomputer Architecture and Interfacing
Syllabus

Instructor:  Associate Professor William Hoff, office is Brown Hall BB314H
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Office hours: M 2-4, W 2-3

Course grader:  Chris Rice   crice@mymail.mines.edu
Lab instructors:  See course website.

Meetings:
• Lectures are held in AH134 on MWF from 1-2 pm.
• Lab is held in BB305 on Thursdays.

Web sites:
• The main course website is http://inside.mines.edu/~whoff/courses/EENG383.  Visit this often, as it will contain lecture slides, homework assignments and solutions, labs, grades, etc.
• Please use Piazza to ask questions about the material – this is often the quickest way to get help.  Go to http://piazza.com/ to sign up.
Other useful web sites:
• Technological Arts (http://www.technologicalarts.ca) – this is the manufacturer of the circuit boards that we will use in lab.
• Freescale Semiconductor (http://www.freescale.com) – this is the manufacturer of the HCS912 microcontroller.  We will also use their “CodeWarrior” software development tool.  You can download and install it on your own computer – get the Special Edition: CodeWarrior for HCS12(X) Microcontrollers (Classic).

Description (from bulletin):
Microprocessor and microcontroller architecture focusing on hardware structures and elementary machine and assembly language programming skills essential for use of microprocessors in data acquisition, control, and instrumentation systems.  Analog and digital signal conditioning, communication, and processing.  A/D and D/A converters and microprocessors.  RS232 and other communication standards.  Laboratory study and evaluation of microcomputer systems; design and implementation of interfacing projects.  Prerequisite: EENG284 or consent of instructor.  3 hours lecture; 3 hours lab; 4 semester hours.

Exams:
Exams will be open book.  If you have a conflict, you must see me before the exam or you will get zero credit!  Hourly exams will be held in the normal classroom at the normal time.  There is no final exam.

Textbooks:

Labs:
This course will focus on the use of a popular microcontroller, the Freescale MC9S12C32, although most concepts apply to microcontrollers in general.  In the lab we will use evaluation circuit boards from Technological Arts.  Students will work in teams of two people in the lab.  Each team must check out a kit from the EECS lab technician (in BB313) for the duration of the semester.
Calendar:
A calendar listing of important dates and course topics will be posted on the course website. While every effort will be made to follow this schedule, it may be updated from time to time.

Homeworks:
Homework will be assigned regularly. Although all homework assignments must be turned in, not all problems on each assignment may be graded. Late assignments will not be accepted. You are allowed to seek or give help to other students on homework assignments. However, unless I instruct otherwise, you must actually work through each problem yourself and hand in your own work. Direct copying is unacceptable.

Final Project:
Each lab team will choose a final project, subject to the approval of the instructor, which you can work on in the lab. You will be required to give a presentation and demo, and turn in a report.

Lab Assignments:
Lab reports are due to the lab instructor within one week after the lab project is completed. Please discuss late assignments with the lab instructor.

Objectives:
The main objective of this course is to give the students the ability to design and build microprocessor based data acquisition and control systems. In order to accomplish this, there are detailed objectives for specific topics:

1. Microcomputer programming. The student will have the ability to design programs for microcontrollers in assembly language, with the use of different addressing modes, subroutines and stack operations, and interrupts. The student will have the ability to explain the instruction execution cycle, and derive the results of instruction execution. The student will have the ability to classify flowcharts and pseudo-code documentation as to whether they are correctly structured or incorrectly structured.

2. Microcontroller architecture. The student will have the ability to explain the overall hardware architecture of microcontrollers, including busses, memories, and input/output subsystems. The student will have the ability to apply timer and A/D subsystems to solve measurement and control tasks. The student will have the ability to derive the signals on the address, data, and control busses at each clock cycle. The student will have the ability to design modifications and enhancements to a microcontroller system.

3. Microcontroller interfacing. The student will have the ability to derive waveforms for serial communications interfaces. The student will have the ability to apply microcontrollers and external circuitry to interface to a variety of sensors and actuators. The student will have the ability to calculate key parameters for A/D and D/A converters.

Assessment and Grading:
Students will be assessed with respect to the objectives listed above, using the following elements:

- Two exams: 30%
- Laboratory (grades based on lab reports): 25%
- Homework assignments: 15%
- Final project: 25%
- In-class assignments: 5%

There will be no final exam.