APSC 380 Course Information

Instructor

Ed Casas. You can contact me by e-mail: `edc@ee.ubc.ca` or at my office in MCLD 155 (preferably during office hours). Office hours will be scheduled at the first lecture. MCLD 155 is in the basement of the Electrical and Computer Engineering building.

Lectures

Wednesdays and Fridays, 8:30 to 9:30 AM from September 3 to November 28.

The lectures on Wednesdays only from September 10 until October 29 will be held in the Applied Science PC Lab in CEME 2210 (the Civil and Mechanical Engineering Building). All other lectures will be held in MCLD 208.

Teaching Assistants

Tonghua (Tommy) Zhang (`tonghuaz@ee.ubc.ca`) and Shahram Davari (`shahramd@ee.ubc.ca`). Tommy and Shahram will help students in the lab and will mark lab reports and assignments.

Labs

The labs are an integral part of the course and *all labs must be completed to pass the course*. The labs are to be done individually.

The tentative schedule is as follows:

Lab	Topic	Starts
1	A Simple C Program	Sep 8
2	Programming a Keypad and Display	Sep 22
3	Washing Machine Controller	Oct 6
4	A Simple Digital Circuit	Oct 20 (due Nov 4)

You will have two weeks to complete each lab. You must demonstrate your program to one of the TAs when it is complete. The lab reports must be handed in before the start of the next set of labs (e.g. the first report is due on Monday September 22 the second on October 6th, etc.).

One mark (out of a total of 10) will be subtracted from a lab's mark for each day it is late. Note that you must complete each lab even if you would get a mark of zero.

The APSC 380 lab is in MCLD 112. It is open from 8:30 AM until at least 4:00 PM. TAs will be available to answer questions and check your program or circuit but only at certain times. The TA schedule will be determined at the first lecture.

The lab reports should include a brief description of your program or circuit, the source code listings or schematics, answers to any questions posed in the lab notes and any diagrams or other documentation that may be required to document your work.

Ken Madore is the staff member in charge of the lab. He is often available in the lab during the day and will provide you with a user ID and a password at the start of the course. He may also be able to help you with problems in the labs if you cannot find of one of the TAs and he is not busy with other duties.

Do not wait until the last few days to start the labs. They will take longer than you expect and the lab gets crowded near the end of each lab segment.

Assignments

An assignment will be given out each week and will be due the following week. Solutions will be given out for all questions but not all questions will be marked. *Late assignments will be given a mark of zero*.

Assignments are to be done individually. Students are encouraged to seek help from classmates but copying is not allowed. Possible penalties for plagiarism include a mark of zero for all assignments.

Text

There is no textbook assigned for this course. Detailed notes will be distributed before the relevant lecture. The notes will often contain exercises or sections to be completed during the lecture.

Please wait until the end of the lecture before taking any extra copies. You can always print copies from the course's Web page (see below).

Other References

The C Programming Language, second edition, by Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall, 1988, is the standard textbook on C.

The Art of Electronics, second edition, by Paul Horowitz and Winfield Hill, Cambridge University Press, 1989, is a good practical reference book on most aspects of electronics.

Real–Time Microcomputer System Design: An Introduction, by Peter Laurence and Konrad Mauch, McGraw-Hill, 1987, is the text previously used for this course.

Web Page

Students should check the course Web page (`http://www.ee.ubc.ca/ apsc380`) regularly for announcements about the course. These web pages can be read with any browser. Copies of the lecture notes, assignments, exams, and solutions will be available in various formats.

Evaluation

There will be a one-hour mid-term examination in late October (date TBD) and a final exam in December. The final mark will be calculated as follows:

final exam	45%
midterm exam	25%
labs/reports	20%
assignments	10%

All labs must be completed to pass the course.

Prerequisites

Student should have some experience programming in a procedural language such as PASCAL or C. Students should be able to analyze basic electrical and electronic circuits.

Intended Audience

Students interested in using (not designing) microcomputers for control (not computational) applications.

Objectives

By the end of the course the student should be able to:

- identify a control system's inputs and outputs
- design and describe (in tabular and diagram formats) a state machine that implements a given control function
- convert between number systems and apply basic logical and arithmetic operations to numbers
- write a computer program that implements a given algorithm using the subset of C taught in the course
- describe the result of executing a given C program written in the course's subset of C
- describe the function and operation of a microprocessor's address, data and control buses when executing certain basic machine-language instructions

- give the levels appearing on various signal lines during the exchange of data over simple parallel (printer) and serial (RS-232) interfaces
- select an appropriate type of sensor for a given application
- describe the principles of operation of three basic types of A/D converters (flash, successive-approximation and dual-slope)
- draw schematics and compute steady-state voltages, currents and power dissipation of simple BJT, FET, SCR and Triac switching circuits
- select a particular type of electric motor for a given application
- identify possible safety and reliability concerns for a given control application

Detailed objectives will be provided in the introduction to each set of lecture notes.

Course Outline

The following is the approximate order of the topics to be covered:

- microcomputers for control applications
- programming in C
- state machines
- boolean logic, number systems, logic circuits
- microcomputer system architecture
- parallel and serial interfaces
- mid-term exam
- sensors and analog-to-digital converters
- electromechanical actuators and power electronics
- safety and reliability