PHYS 319 Spring 2017
Course Outline

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Labs: M, T, Th 2-6 pm, Hebb 42
Lecture: Th 11:30-12:30 Hebb 12

Text: Introduction to Embedded Systems Using Microcontrollers and the MSP430. Available for download from the UBC library at http://webcat2.library.ubc.ca/vwebv/holdingsInfo?bibId=7372090. We won't follow this text closely, but its a great reference.

Web Page: The lab manual and many other helpful links can be found on the course web page at http://www.phas.ubc.ca/~michal/phys319

Introduction:
In this course you will learn how to program a microcontroller and have it interact with the world via devices like sensors, motors and displays. For the first 6 weeks you'll follow a lab manual to get started on the basics of learning how to program the devices. The remainder of the course is project-based. You will need to choose a project, acquire the parts needed, build the circuitry required, and write the code for your microcontroller to make it work.

You are welcome to use the computers in the lab, but you will probably find it beneficial to be able to program the devices from your own computer. We have prepared set-up guides for Windows, Mac, and Linux that will walk you through the steps of installing the software tools you will need. You should attempt to go through the relevant steps in the set-up guides **before** coming to the labs in weeks 2, 3, and 5. We will do our best to help you with any problems during the lab time. If you plan to use the lab computers, there is an equivalent guide to using the software tools on the lab computers.

Grading Scheme:
Lecture questions and activities: 5%
Programs and lab reports for weeks 1-6: 20%
Midterm: 20%
Project proposal & status report: 5%
Project quality and functionality: 20%
Oral presentation: 10%
Final written report: 20%

Late work: The maximum mark is reduced by 10% per day.

Before week 2:
  – get a PHAS ID (Henn 205, self-register) if you don't have one
  – read the lab manual for week two
  – look at the tools installation guide for the OS of your choice, and/or the lab computer guide. And prepare your computer to use the assembler and flasher **before** your week 2 lab.

There are two fewer Mondays in the term due to Holidays (Jan 2 for New Year's Day and Feb 13 for Family Day). One of these is easily made up at the end: we'll schedule oral presentations on Tuesday or Thursday in the final week according to availability. To make up for the other missed week, students in the Monday section are advised to get ahead of the schedule below in the first 6 weeks of class.

Schedule (Tentative):

Jan 3, 5, 9	Lab 1	Lab: Introduction to the lab and getting started on the breadboard Lecture: MSP430 architecture, assembly
Jan 10, 12, 16	Lab 2	Lab: Assembly on the MSP430 Lecture: Reading the Manual, programming concepts, interrupts, Assembly vs C
Jan 17, 19, 23	Lab 3	Lab: C programming and peripherals on the MSP430 - Lab 1/2 write-ups due before the start of your Lab 3 time. Lecture: Programming in C, MSP430 peripherals
Jan 24, 26, 30	Lab 4	Lab: C programming and peripherals on the MSP430 (cont) -This week you should be prepared for an informal discussion in the lab on possible projects Lecture: MSP430 timers. Sensors and interfaces
Jan 31, Feb 2, 6	Lab 5	Lab: Sensors and host-computer communications mini-project - Lab 3/4 write-ups due before the start of your Lab 5 time. - Project Proposal due Lecture: analog outputs, driving external loads.
Feb 7, 9 <u>Monday Feb 13 is a holiday</u>	Lab 6	Lab: Sensors and host-computer communications mini-project Monday is a holiday this week. Monday people to make up time on T/Th Lecture: <u>Midterm exam</u>
Feb 14, 16, 27	Project 1	Lecture: midterm post-mortem. Measuring capacitance - Lab 5/6 write-ups due by midnight, Friday Feb 17. (If this date presents serious problems for students in the Monday section, please let us know).
Feb 20, 21, 23	Spring Break	
Feb 28, Mar 2, 6	Project 2	Lecture: op-amps, power supplies
Mar 7, 9, 13	Project 3	- Project status report due in your lab session
Mar 14, 16, 20	Project 4	
Mar 21, 23, 27	Project 5	
Mar 28, 30, Apr 3	Project 6	
Apr 4, Apr 6	Final presentations	Monday this week will be the last time for project work. - Oral presentations will take place Tuesday and Thursday, and if necessary during the Lecture hour on Thursday. - Formal project report due April 7, 5 pm. - Return of all course materials borrowed