EEL 4742C: Embedded Systems
Spring 2019

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Class Time & Location

Section	Day & Time	Location
1 (lecture)	Tuesday, Thursday @ 9:00-10:15 am	ENG-2 302
2 (lecture)	Monday, Wednesday @ 6:00-7:15 pm	BA-1 116
11 (lab)	Tuesday @ 3:00-4:50 pm	ENG-1 257
12 (lab)	Tuesday @ 5:00-6:50 pm	ENG-1 257
13 (lab)	Thursday @ 3:00-4:50 pm	ENG-1 257
14 (lab)	Thursday @ 5:00-6:50 pm	ENG-1 257

Catalog Description (credits, goals and prerequisites)

EEL 4742C ECS-ECE 3(3,2) - Microcontroller systems, assembly language programming, data representation, memory and device interfacing, timing analysis, parallel and serial communication, timers, interrupts, signal interfacing considerations, and applications. Prerequisite: EEL 3801C (Computer Organization)

Textbook

- "MSP430 Microcontroller Basics", by John H. Davies, Published by Newnes Press (An Imprint of Elsevier), 2010. ISBN 978-0-7506-8276-3.

- Texas Instruments documentation (posted on Webcourses)

Evaluation Board

Lab boards	Texas Instruments LaunchPad - MSP-EXP430FR6989 Educational BoosterPack MKII - BOOSTXL-EDUMKII
Alternative (for home use)	Texas Instruments LaunchPad - MSP-EXP430G2ET (Reduced functionality; board used in EGN 3211)

Course Topics

- Introduction
- MSP430 microcontrollers
- Masking arithmetics
- Flashing LEDs and reading push buttons
- Using the timer
- Interrupts
- Low-power modes
- LCD display
- Advanced timer features (multiple channels, timer output)
- Concurrent event handling with interrupts
- UART communication
- I2C communication
- ADC converter (SAR type)
- SPI communication

- Pixel graphics
- May be discussed if time permits:clock modules, MSP430 architecture, real-time operating system (RTOS)

Learning Outcomes

Upon completion of this class, the student shall:

1) understand the embedded systems basics (chip organization, programming environment)
2) be able to do masking arithmetics (bit manipulations)
3) understand the timer module's various modes and be able to program it
4) understand interrupts and be able to program them
5) understand the low-power modes and be able to use them in codes
6) be able to understand the basics of the segmented LCD display and program it
7) understand the push button debouncing algorithms and be able to program them
8) understand the communication protocols SPI, I2C and UART
9) understand the basics of the analog-to-digital converter (SAR type)
10) be able to understand the basics of the pixel display and program it

Exam Dates

The midterm exams are in Week 6 and Week 12 of the semester which correspond to the following dates.

Section 1 (TR)	Midterm 1: Thursday, February 14 Midterm 2: Thursday, March 28 Final exam: To be decided.
Section 2 (MW)	Midterm 1: Wednesday, February 13 Midterm 2: Wednesday, March 27 Final exam: To be decided.

General Items / Policies

- Announcements for the class will be made on WebCourses.
- Lab attendance is required. If a student needs to miss a lab, the TA should be informed.

- The student should ensure that uploads to Webcourses are successful. **After uploading a document, the student should download it back from the server and open it on their computer to ensure that the server has received the file.**
- The student should discuss grades with the instructor or TA within two weeks from when the grades are posted so that the staff don't get a load of requests in the end of the semester.
- Late assignments may or may not be accepted depending on how late they are; the instructor should be consulted in such case.
- Make-up exams require a university accepted and documented reason; the instructor should be consulted in such case.

Course Grade

The final course grade is based on the following weights:

Homework: 15%	Lab: 15%	Exams: 70% (equal weights of 23.33% each)

The letter grade will be assigned based on the intervals below:

A: [90-100] B: [80-<90] C: [70-<80] D: [60-<70] F: <60

Originality of Submitted Work

The students can discuss in speaking the homework and lab questions and solutions with their classmates. Such discussions should be done in speaking only. No written materials or code should be shared. All the work submitted by the students should be original and of their own making.

Special Accommodations

- Students who require special accommodations should consult with Student Accessibility Services (SAS) at https://sas.sdes.ucf.edu to determine their eligibility and accommodations.
- Active duty military students should make the class instructor aware of any accommodations granted by the university.

First Week Activity

The first week activity documents the student's participation in the class. If the student doesn't complete the first week activity, financial aid payments may be delayed. This activity carries a small amount of points and is graded for all the students in the class.

Activity: Submit your answer to the participation homework by Friday of the first week at 5pm. It's posted on Webcourses.