Electrical and Computer Engineering 3710
Microcontroller Hardware and Software

Required

Course Description:
Synthesis of microcontroller systems, including hardware, programming, and interfacing. Covers architecture basics, instruction set, assembly languages programming, I/O, timing, and interrupts. Includes hands-on implementation. Three lectures, one lab.

Prerequisites:
ECE 2290, ECE 2700, CS 1410

Textbooks:


References:


Course Outcomes:
1. Write and debug assembly and C language routines for the ARM Cortex-M3 microcontroller.
2. Interface a microcontroller with external peripherals.
3. Document hardware and software designs.
4. Understand some ways in which computers can be made to interface with physical systems.

Topics Covered:
- Distinction between microcomputers and microcontrollers
- Assembly language
- Basic computer architecture
- Programming microcontroller in C
- Memory addressing and memory mapping with external devices
- I/O programming (DACs, ACDs, sensors)
- Timer programming
- Serial port programming
- Interrupts in assembly and C
- LCD and keyboard interfacing
- Pulse-width modulation for control
- DC and stepper motors

**Outcome Assessments (Grades):**

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<thead>
<tr>
<th>Assessment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>20%</td>
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<tr>
<td>Exams</td>
<td>30%</td>
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<tr>
<td>Labs</td>
<td>20%</td>
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<tr>
<td>Projects</td>
<td>30%</td>
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**Class Schedule:**

- Class: Three times a week for fifty minutes.
- Lab: Once a week for two hours and forty-five minutes.

**Contribution of course to meeting the requirements of Criterion 5:**

- 4 credit hours of Engineering Topics and contains significant engineering design content

**Relationship of course to student outcomes:**

a. An ability to apply knowledge of mathematics, science, and engineering.

c. An ability to design a system, component, or process to meet desired needs.

e. An ability to identify, formulate, and solve engineering problems.

g. An ability to communicate effectively.

k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Instructor:**

Ryan Gerdes, Assistant Professor
August 2013