

**EEL 4746 Introduction to Microcontrollers and
EEL 4746L Introduction to Microcontrollers Lab**

Credits: 4

Text book, title, author, and year: *Microcomputer Engineering, 3rd Ed.*, by Gene Miller, Prentice-Hall, 2004.

Supplemental materials: *68HC12 Microcontrollers*, by Pack, D. & S. Barrett, Prentice-Hall, 2002.

Specific course information

- a. **Catalog description:** Introduction to Microcontrollers, assembly language, microcontroller hardware, I/O hardware alternatives, application studies in overview of C programming for microcontrollers, as well as hands-on experiments.
- b. **Prerequisites:** CDA 3201 Logic Design
- c. **Co-requisites:** EEL 4746L Microcontroller Lab
- d. **Required, elective, or selected elective:** Required

Specific goals for the course

Specific outcomes of instruction: This course introduces undergraduate students to the fundamentals of design and implementation using microcontrollers, including assembly language programming, architecture, I/O interface, and applications. Upon completion of the course the student should be able end of the course the student should be able to: (i) Program microcontrollers with assembly language; (ii) Interface microcontrollers with I/O devices; and (iii) Use Microcontrollers in various applications.

Brief list of topics to be covered:

1. The role of microcontrollers in embedded systems
2. Microcontroller resources
3. Microcontroller machine language
4. Microcontroller assembly language
5. M68HC11 hardware
6. Polling and Interrupt concept
7. Real time interrupt
8. Timer overflow interrupt
9. Input capture
10. Output compare
11. Serial communication interface
12. A/D conversion
13. Applications
14. Overview of Programming M68HC12
15. Overview of Programming Microcontrollers in C

The lab covers:

- Lab 1: Introduction to M68HC11EVB and Welcome
- Lab 2: M68HC11 Instructions and Addressing Modes
- Lab 3: Multiplication, Sorting and Program Control Instructions

- Lab 4: Basic, General Purpose Parallel I/O
- Lab 5: Free Running Counter, Time Over Flow, and Input Capture
- Lab 6: PWM, RTI, A/D Conversion, and Motor Control
- Lab 7: Live Test