

1. *Course number and name*

ENGR 290: Introduction to Microcontrollers

2. *Credits and contact hours*

1 credit hours; 2 contact hours per week for seven and a half weeks.

3. *Instructor's or course coordinator's name*

Instructor: M. Azadi, Assistant Professor of Mechanical Engineering

Course coordinator: M. Azadi, Assistant Professor of Mechanical Engineering

4. *Text book, title, author, and year*

There is no required text, but a number of references are provided, depending on the actual type of microcontroller used in the course.

a. *other supplemental materials*

AVR Studio Manual

Copies of slides used in lectures

5. *Specific course information*

a. *brief description of the content of the course (catalog description)*

Hands-on course on microcontroller programming. Review of C programming concepts applicable to microcontroller programming. Review of basic microcontrollers functions. Design and implementation of simple controllers using the Atmel AVR line of microcontrollers. Individual projects.

b. *prerequisites or co-requisites*

Engineering students in sophomore year or later.

c. *indicate whether a required, elective, or selected elective course in the program*

Elective for Mechanical Engineering; Elective for Electrical Engineering

6. *Specific goals for the course*

a. *specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.*

- Students are introduced to the use of a standard microcontroller in embedded control systems applications
- Students will become familiar with typical features of a simple microcontroller
- Students will become familiar with standard peripherals such as Logic Inputs/Outputs, Analog-to-Digital-Converter, Timers, Interrupts, and Serial Communication

- Students will be introduced to the basic concepts of Labview/Simulink as applied to microcontrollers
- Peripherals such as Logic Inputs/Outputs, Analog-to-Digital-Converter, Timers, Interrupts, and Serial Communication
- Students will obtain hands-on experience in designing simple control systems and implementing them using the microcontroller

b. explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.

Course addresses ABET Student Outcome(s): b, c, e, i, k.

7. Brief list of topics to be covered

- Introduction to Microcontrollers
- Introduction to programming microcontrollers with Labview/Simulink
- Analog to Digital and Digital to Analog Conversion
- Pulse Width Modulation (PWM); Duty Cycle; Configuration and Usage
- Controller Implementation;
- Reading sensor data and activating actuators