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