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