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: Nick Rentsch, Lecturer
   Course coordinator: V.V.Krishnan, Professor

4. Textbook, title, author, and year
   There is no required text, but a number of references are provided, depending on the
   actual type of microprocessor 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
      ENGR 205, 206 : Basic Electrical Circuits & Laboratory, and
      ENGR 103: Introduction to C Programming (or an equivalent
      Programming course in C)

   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 8-bit or 16-bit microcontroller in
        embedded control systems applications
• Students will become familiar with typical features of a simple microcontroller, such as the Atmel AVR line of microcontrollers
• 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 C-programming as applied to microcontrollers
• Typical features of a simple microcontroller, such as the Atmel AVR line of microcontrollers, will be covered. In addition, 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 the Atmel Mega16
• C language Review;
• Introduction to AVR Studio
• External Interrupts; Timers
• UART Serial Communication; Analog to Digital and Digital to Analog Conversion
• Pulse Width Modulation (PWM); Duty Cycle; Configuration and Usage
• Controller Implementation; DC Motor control