1. **Course number and name**  
   ENGR 411: Instrumentation and Process Control laboratory

2. **Credits and contact hours**  
   1 credit hour; one 2 hr 30 min laboratory session/week.

3. **Instructor’s or course coordinator’s name**  
   Course coordinator: Mojtaba Azadi, Assistant Professor of Mechanical Engineering

4. **Text book, title, author, and year**  
   None required.

   a. **other supplemental materials**
      - Additional reading material on ISA standards and codes will be provided during laboratory briefing sessions.

5. **Specific course information**
   a. **brief description of the content of the course (catalog description)**  
      Instrumentation for measurement of flow, temperature, level and pressure. Experiments on level, flow, and temperature control. P, PI, PID, and programmable logic controllers.

   b. **prerequisites or co-requisites**
      ENGR 410: Process Instrumentation and Control (maybe taken concurrently)

   c. **indicate whether a required, elective, or selected elective course in the program**  
      Required/Elective for Mechanical Engineering; Elective for Electrical Engineering.

6. **Specific goals for the course**
   a. **specific outcomes of instruction**
      - Students will acquire the ability to design basic process control configurations using standard algorithms and process instrumentation typically used in industry.
      - Students will acquire hands-on experience with basic industrial instrumentation.
      - Students will acquire a working knowledge of the basic control strategies used in the control of industrial processes.
      - Students will be able to develop P&ID and spec sheets for simple control systems.
• Students will be able to trace control loops in industrial systems.
• Students become familiarized with system simulation and control with MATLAB/Simulink.

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): a, b, c, e, g, i, j, k.

7. Brief list of topics to be covered

• Calibration of Sensors
• Calibration of Final Control Elements
• Loop Tracing and ISA Standards
• Commissioning a Flow Control Loop with a Digital Controller
• Level Control Using "P" and "PI" Controllers.
• Temperature Control Loop with Cascade and Ratio Control
• Dynamics of Control Loop-Tuning
• Simulink and MATLAB Simulations