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**  
   Instructor: Ben Rasenow, Instructor  
   Course coordinator: V.V. Krishnan, Professor of Mechanical Engineering

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

   a. other supplemental materials  
      3. 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, ex. The student will be able to explain the significance of current research about a particular topic.**  
      - 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

   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 controls
- Dynamics of Control loop-tuning