1. *Course number and name*
   ENGR 300: Engineering Experimentation

2. *Credits and contact hours*
   3 units. Two 1-hr lectures and one 2-hr, 45-min lab session per week.

3. *Instructor's or course coordinator's name*
   Instructor: Mutlu Ozer, Instructor (lecture); Mutlu Ozer, Instructor and Dipendra Sinha, Proffessor (lab)
   Course coordinator: Ed Cheng, Associate Professor

4. *Text book, title, author, and year*
   Wheeler, A. J. and A. R. Ganji. *Introduction to Engineering Experimentation*. 3rd Edition. Pearson Prentice Hall, 2010.

   b. *other supplemental materials*
      ENGR 300 Laboratory Manual.

5. *Specific course information*
   d. *brief description of the content of the course (catalog description)*
      Engineering experimentation. Characteristics of instrumentation and computerized data acquisition. Design, planning, and documentation of experiments. Common methods of probability and statistics.

   e. *prerequisites or co-requisites*
      ENGR 201 or 206, ENGR 205, ENG 214 with grade of C- or better.

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

6. *Specific goals for the course*
   c. *specific outcomes of instruction, ex. The student will be able to explain the significance of current research about a particular topic.*
      - Ability to plan an experiment, identifying the primary variables of interest.
      - Ability to make sound engineering assumptions.
      - Ability to select appropriate instrumentation for measurements.
      - Acquisition of "hands-on" skills in using instrumentation.
      - Understanding of good laboratory practices.
      - Ability to work on teams.
      - Ability to set up and troubleshoot experiments.
      - Knowledge of data acquisition systems and components.
      - Ability to understand and specify/select data acquisition components.
      - Ability to specify signal conditioning specifications.
      - Knowledge of instrumentation characteristics.
      - Knowledge of theory and operation of devices for measuring solid-mechanical quantities.

- Knowledge of theory and operation of devices for measuring pressure, temperature, and humidity.
- Knowledge of theory and operation of devices for measuring fluid flow rate, fluid velocity, and fluid level.
- Ability to compute descriptive statistics for experimental data.
- Ability to understand probability concepts and read statistical distribution tables. Ability to quantify the uncertainty of experimental data.
- Ability to carry out linear regression and understand measurements of correlation for paired data sets.
- Ability to write simple technical memo/letter.
- Ability to write a formal engineering report.
- Ability to make an oral presentation using visual aids.

d. 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, d, e, g, k.

7. Brief list of topics to be covered

- Introduction and General Characteristics of Measurement Systems
- Measurement Systems with Electric Signals
- Computerized Data-Acquisition Systems
- Discrete Sampling and Analysis of Time-Varying Signals
- Statistical Analysis of Experimental Data
- Experimental Uncertainty Analysis
- Measurement of Solid-Mechanical Quantities
- Measuring Pressure, Temperature, and Humidity
- Measuring Fluid Flow Rate, Fluid Velocity, Fluid Level and Combustion Pollutants
- Dynamic Behavior of Measurement Systems
- Guidelines for Planning and Documenting Experiments