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.

   e. other supplemental materials
   ENGR 300 Laboratory Manual.

5. *Specific course information*
   j. 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.

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

   l. 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*
   g. 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.

h. 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