

MAE 171B

Mechanical Engineering Laboratory II

Designation: Required course

Catalog Data:

Mechanical Engineering Laboratory II (4)

Independent research in teams with a faculty member in the MAE dept. Students research projects using experimental facilities in undergraduate laboratories (wind tunnel, water channel, vibration table, and testing machine and control systems) or faculty research laboratory. Students propose and design experiments, obtain data, complete engineering analysis, and write a research report.

Prerequisites: Grades of C- or better in MAE 171A

Prerequisites by Topic: Fluid mechanics and aerodynamics, heat transfer, strength of materials, dynamics of rigid bodies, vibrations, analysis and design of linear control, and experimental methods.

Textbook, Required Materials: Laboratory notes on water tunnel, wind tunnel, materials and control experiments, and chapters from supporting textbooks in fluids, aerodynamics, controls, and materials. Also Fundamentals of Measurement Error, James L. Taylor, NEFF instrument Corp., 1988 for error analysis. Laboratory notes are available on the web and in soft reserves. Website for course at: <http://maecourses.ucsd.edu/labcourse/advanced>.

Class/Laboratory Schedule: 2 lecture hours and 6 laboratory hours per week

Course Topics:

1. Operation of laboratory facilities and data acquisition processes
2. Error analysis and Statistics
3. Technical report writing and oral presentation skills
4. Group and project management
5. Engineering ethics
6. Engineering design and analysis

Course Objectives: (Numbers in parenthesis refer to MAE Program Outcomes)

Objective 1: To introduce students to the application of experimental methods in the practice of Mechanical Engineering (2b).

Objective 2: To provide students experience in engineering analysis of experimental data using relevant theory from fluid mechanics, aerodynamics, materials, and control systems (1a,2b).

Objective 3: To develop technical engineering report writing and oral presentation skills (7g).

Objective 4: To provide an introduction to engineering ethics and the Professional Engineers Code of Conduct (6f).

Objective 5: To develop in students the ability to formulate a research problem, design experiments and analysis tools and to complete a research project in a team setting (2b, 4d, 9i, 11k).

Methods of Evaluation:

1. Graded reports describing engineering analysis of experiments.
2. Oral presentations and posters.

Performance Criteria: (Numbers in parentheses refer to the methods of evaluation used to assess student performance.)

Objective 1

1.1 Students will demonstrate an understanding of specific experimental methods used in the experiments conducted in the laboratory (1, 2).

Objective 2

2.1 Students will demonstrate the ability to analyze experimental data in the context of one of the following Mechanical and Aerospace subjects: fluid mechanics, aerodynamics, materials, dynamics, and control. (1, 2).

Objective 3

3.1 Students describe experiments conducted in the laboratory including relevant theory, experimental procedures, data analysis, error analysis, and comparison with theory (1).

Objective 4

4.1 Students participate in group discussion of ethics and the Professional Engineers Code of conduct based on case study review provided by National Society of Professional Engineers (3).

Objective 5

5.1 Students will demonstrate the ability to formulate a research problem, design experiments and analysis tools and to complete the a research project in a team setting (1,3)

Contribution of Course to Professional Component:

Engineering Science

Prepared by: R.A. deCallafon and R. Cattolica, March 2000

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