MAE 171A
Mechanical Engineering Laboratory (4 units)

Class/Laboratory Schedule: Two hours lecture, three hours lab, seven hours outside preparation, 12 hours/week total

Course Coordinator(s): Marko Lubarda, Kal Seshadri, Vitali Nesterenko

Textbook/Required Materials: Lecture slides covering solid mechanics, fluid mechanics, heat transfer, and controls background theory and experiments, lecture slides on statistics, error analysis, report writing, engineering ethics, NSPE code of ethics and related resources.

Catalog Description: Design and analysis of experiments in fluid mechanics, solid mechanics, and control engineering. Experiments in wind tunnel, water tunnel, vibration table and material testing machines, and refined electronic and electromechanical systems. Laboratory report writing; error analysis; engineering ethics.

Prerequisites: MAE101A, MAE 143B, and MAE 170. Enrollment restricted to MC 27 and MC 30–34 majors only.

Course Type: Required

Course Objectives:

1. Have students gain experience operating lab equipment and experimental setups for fluid mechanics studies, strength-of-materials tests, heat-transfer experiments, electromechanical vibration systems, linear feedback circuits and control system design
2. Enable students to apply theoretical knowledge and engineering principles to design and conduct experiments in fluid mechanics, solid mechanics, heat transfer, and controls.
3. Teach students to analyze experimental data, compare results with theoretical predictions and simulations, evaluate validity of models, perform statistical analysis, quantify uncertainty.
4. Develop students' teamwork and communication skills by having students coordinate lab work, co-author lab reports, and engage in peer review.
5. Teach engineering ethics so students understand ethical standards in testing, data interpretation, reporting, professional interactions, and are equipped to engage knowledgeably with ethical dilemmas in engineering and professional work.

Course Topics:

1. Laboratory equipment, data acquisition
2. Statistics, error analysis
3. Teamwork
4. Technical report writing
5. Engineering ethics
6. Fluid mechanics experiment
7. Solid mechanics experiment
8. Heat-transfer experiment
9. Vibration and feedback control system experiment

Last Updated: 20th March 2025