ME 795/895: Experimental Fluid Dynamics

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Spring 2023 — 3.0 credits
Tuesdays & Thursdays
2:10 PM - 3:30 PM
Kingsbury N334

Course Description

This is a senior/graduate level course that will introduce students to a variety of experimental methods and techniques for the measurement of fluid flows. Topics include signal processing and analysis, thermal anemometry, image velocimetry, and infrared fluid sensing. The knowledge gained in this course is intended to help students carry out advanced research in fluid mechanics at the graduate level or in an industrial research lab setting.

Prerequisites

- Graduate Students–Previous graduate level exposure to fluid dynamics recommended (ME 807 or equivalent), able to program in MATLAB or similar analysis tool.
- Undergraduate Students–General qualifications include good academic performance in ME 503, ME 603, ME 608, and ME 646.

Organization

The course will include both a lecture and a strong laboratory component. The lectures will focus on the theory and basic concepts of the experimental techniques and the laboratory experiments will provide hands-on-training in application of the techniques.

Assignments & Grading

Lab Reports	60% (active participation in labs, quality of reports)
Lab Journal	10% (necessary data logging and quality of notes; assessed at end of semester)
Final Examination	30%

Laboratory

Lab attendance is mandatory. A journal (i.e. a bound non-spiral notebook) is to be maintained for all the labs for data logging, reduction, graphing, interpretation and discussion. Six laboratory or analysis exercises will be completed during the semester. Students will perform these exercises in groups during a three-hour lab section during the weeks in which they occur. Due dates for lab reports are provided on Canvas. Please note that all labs must be taken and the lab reports written to pass this course.

Academic Honesty

You are required to comply with all University policies regarding Academic Honesty and to familiarize yourself with those policies (LINK HERE). Suspected violations of academic honesty are handled following Section 9.7, Procedures for Dealing with Academic Misconduct in the Student Rights, Rules, and Responsibilities Handbook, and may result in probation, deferred suspension, suspension, or expulsion. Dishonesty can irreparably degrade your reputation as an engineer or scientist. Don't waste your time or mine by cheating in a senior/graduate-level technical elective.

Laboratory and Analysis List

1. Signal Processing and Analysis
2. Infrared Camera Calibration Lab
3. Hot Wire Anemometry Lab
4. Particle Image Velocimetry
5. Free Convection Lab
6. Surface Wave Hydrodynamics Lab