

ME 795/895
EXPERIMENTAL METHODS IN FLUID DYNAMICS

Fall Semester 2020
Lecture: TR 2:10–3:30, DeMeritt 240
Laboratory TBD, Kingsbury S111/113

Instructors:

Prof. Christopher White
S254 Kingsbury Hall, Mechanical Engineering Department
E-mail: chris.white@unh.edu, Phone: (603) 862-1495, Fax: (603) 862-1865

Prof. Nathan Laxague
121D Chase Ocean Engineering Laboratory
E-mail: nathan.laxague@unh.edu, Phone: (603) 862-4023

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, pressure measurement, thermal anemometry, and advanced laser-based optical diagnostics. 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.

Grading:

Homework 15% (Pass/Fail grading)
Lab Reports 50% (active participation in labs, quality of report)
Lab Journal 10% (necessary data logging and quality of notes)
Final Examination 25%

Homework:

Homework is due one week after it is assigned, at the beginning of class. Late homework will be graded but points will be deducted. The HW will be graded on a pass/fail system.

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. Approximately six laboratory exercises will be completed during the semester. Students will perform these exercises in groups during a three-hour lab section each week (some weeks there will be no lab, a detailed lab schedule will be provided prior to the start of class). Some lab exercises will last only one week while others may span two or more weeks in length. Nonetheless, each student is expected to submit a lab report no later than one week after the completion of a lab exercise. Hand in the lab report during the following week's lab or put the report in the Instructor's ME mailbox. Late lab submissions will be submitted but with point deductions. Please note that all labs must be taken and the lab reports written to pass this course.

CoViD-19:

Potential space for text relevant to the course in the context of CoViD-19.

Academic Honesty:

You are required to comply with all University policies regarding Academic Honesty and to familiarize yourself with those policies. (<http://www.unh.edu/vpsas/handbook/academic-honesty>) 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. We catch people all the time. Do honest work; to do otherwise will cheapen your own self-image, and it isn't worth the risk.

LAB SCHEDULE: Dates TBD

- Exercise 1 Signal Processing and Analysis
- Exercise 2 Imaging Calibration Lab
- Exercise 3 Particle Image Velocimetry (PIV) Experiment
- Exercise 4 Droplet Evaporation Experiment
- Exercise 5 Bubble Bursting Experiment
- Exercise 6 Quadcopter Wind Sensing Lab