

CARLETON UNIVERSITY
Department of Mechanical & Aerospace Engineering

COURSE OUTLINE for MECH 5008
EXPERIMENTAL METHODS IN FLUID MECHANICS
Catherine Clark, Fall 2015

Week Topic

- 1 Basic measurement concepts
- 2-3 Signal characteristics and calibrations, signal analysis
- 4-5 Data acquisition, measurement system modeling
- 6-8 Probability and statistics, measurement uncertainty, error propagation
- 9 Wind tunnel design
- 10-12 Pressure and temperature measurement techniques, flow visualization

Lectures will be a combination of slides (see cuLearn) and hand-written notes on the chalkboard.

Students with disabilities requiring academic accommodations in this course are encouraged to contact the Paul Menton Centre for Students with Disabilities (500 University Centre) to complete the necessary forms. After registering with the Centre, make an appointment to meet me in order to discuss your needs at least two weeks before the first assignment is due. This will allow for sufficient time to process your request.

Projects: Three projects will be assigned throughout the term, with each project involving the review of a measurement technique in fluid mechanics.

All projects are to be submitted in hard-copy at the beginning (first 15 min) of the class in which they are due. Late submissions will receive a 10% penalty and emailed copies are not accepted. All papers should include appropriate references and citations following an appropriate style.

Final exam: There will be a 48-hr take-home, open-book final examination. The final exam papers will not be returned to the students.

Course Grades: The final exam will count for 55% of the final grade. Each of the three course projects will count for 15% of the final grade.

Unofficial Prerequisites: Although students in this class may come from different backgrounds, a familiarity with fluid dynamics, aerodynamics and signal analysis is important.

References:

Goldstein, Richard J., *Fluid Mechanics Measurements*, Hemisphere Publishing Corporation.

Tavoularis, S., *Measurements in Fluid Mechanics*, Cambridge University Press.

Benedict, R.P., *Fundamentals of Temperature, Pressure and Flow Measurement*, John Wiley & Sons Inc.

Contact Information: Email: catherine.clark@carleton.ca (best way to reach me)
Phone: 613-990-6796 (NRC office phone)

My Background:

- B.Eng.(2007), M.A.Sc.(2010) Carleton
- Designed a low-speed wind tunnel and a hydrokinetic turbine geometry (Master's thesis)
- Currently work for the NRC Aerospace Portfolio - Aerodynamics Laboratory
- Ontario Professional Engineer

Areas of Experience:

- Low-Speed Experimental Aerodynamics
- Wind tunnel testing for aircraft stability and control design
- Icing wind tunnel calibration, development and testing
- Computational Fluid Dynamics

My Rules:

Plagiarism: If I see two identical papers, I will treat them as one submission and leave it to the students to decide how that one grade will be split between them. If I see anything copied word for word from a publication or website, that section of the assignment or project receives a zero.

Language: Spelling and grammar are important. If I cannot understand what you are trying to say then I will assume that you don't understand it either and I will mark accordingly. Use spell-check, and if English isn't your first language get a friend to review the paper before you submit it.