

MCEN 7221 – Spring 2010

TURBULENCE

Instructor: Olivier Desjardins
ECME 269B
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Office hours: Open door, Monday/Tuesday 5-6 PM, or by appointment

Course schedule: Noon on Monday/Wednesday/Friday in ECCR 139

Text: Turbulent Flows, S. B. Pope (not strictly required, but strongly encouraged)

Other references: Statistical Theory and Modeling for Turbulent Flows, P. A. Durbin & B. A. Pettersson Reif
A First Course in Turbulence, H. Tennekes & J. L. Lumley

Introduction: Turbulent flows play a fundamental role in a great number of engineering applications. Hopefully you are already familiar with the equations and physics that govern fluid motion. By combining this knowledge with a fairly advanced statistical description of the flow, we will be able to develop a comprehensive theory of turbulence. In addition, we will explore several state-of-the-art turbulence modeling strategies.

Turbulence is different from the courses you have taken so far. Here, equations will be important, but much of the theory is based on scaling arguments. The comprehension of dimensional analysis and the concept of scales will be important. The objective of the course is to provide the theory and knowledge for understanding (for example) publications or seminar talks on the subject, and to serve as a basis for contributing to the field.

Review/problem sessions: Depending on questions and comments, review/problem/tutorial sessions will be organized. Possible topics: Cartesian tensors, Fourier transforms, etc...

Problem sets: Bi-weekly problem sets, typically assigned and due on Wednesdays. Problem sets are due in class. Solutions will be handed out in class.

You are encouraged to work with your colleagues, but you must prepare your own write-up and submit your own work.

Exams: Mid-term exam on Wednesday, March 3 in class. Final exam TBA.

Grading:	Problem sets	50 %
	Mid-term exam	15 %
	Final exam	35 %

Communications: e-mail for official communication.

Other resources: <http://efluids.com>.

Additional policies:

1. If you qualify for accommodations because of a disability, please submit a letter to me from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. Contact: 303-492-8671, Willard 322, and <http://www.colorado.edu/disabilityservices>.

Disability Services' letters for students with disabilities indicate legally mandated reasonable accommodations. The syllabus statements and answers to Frequently Asked Questions can be found at <http://www.colorado.edu/disabilityservices>.

2. Campus policy regarding religious observances requires that faculty make every effort to reasonably and fairly deal with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. I will accommodate your personal needs. Please let me know during the next two weeks if the schedule above conflicts with your religious observances. See full details at http://www.colorado.edu/policies/fac_relig.html.

3. Students and faculty each have responsibility for maintaining an appropriate learning environment. Students who fail to adhere to such behavioral standards may be subject to discipline. Faculty members have the professional responsibility to treat all students with understanding, dignity and respect, to guide classroom discussion and to set reasonable limits on the manner in which they and their students express opinions. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender variance, and nationalities. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. See polices at <http://www.colorado.edu/policies/classbehavior.html> and at http://www.colorado.edu/studentaffairs/judicialaffairs/code.html#student_code.

4. The University of Colorado at Boulder policy on Discrimination and Harassment: (<http://www.colorado.edu/policies/discrimination.html>) The University of Colorado policy on Sexual Harassment and the University of Colorado policy on Amorous Relationships apply to all students, staff and faculty. Any student, staff or faculty member who believes s/he has been the subject of discrimination or harassment based upon race, color, national origin, sex, age, disability, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Judicial Affairs at 303-492-5550. Information about the ODH and the campus resources available to assist individuals regarding discrimination or harassment can be obtained at <http://www.colorado.edu/odh>.

5. All students of the University of Colorado at Boulder are responsible for knowing and adhering to the academic integrity policy of this institution. Violations of this policy may include: cheating, plagiarism, aid of academic dishonesty, fabrication, lying, bribery, and threatening behavior. All incidents of academic misconduct shall be reported to the Honor Code Council (honor@colorado.edu; (303) 725-2273). Students who are found to be in violation of the academic integrity policy will be subject to both academic sanctions from the faculty member and non-academic sanctions (including but not limited to university probation, suspension, or expulsion). Other information on the Honor Code can be found at <http://www.colorado.edu/policies/honor.html> and at <http://www.colorado.edu/academics/honorcode/>.