

57:020 Mechanics of Fluids and Transfer Processes
Spring 2004

9:30-10:20 AM, M W F – 3321SC

Instructor: Professor Jacob Odgaard

Office Hours: 4115 SC, 10:30 - 11:15 am MWF
306 HL - by appointment (5-5213)
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Course Objectives:

This is a first course in fluid mechanics. It provides an introduction to basic concepts in fluid statics, kinematics and dynamics. All of which apply to diverse aspects of engineering and, in many respects, life itself. This course provides the requisite material for many other fluids, hydraulics, and heat-transfer courses in the Biomedical, Civil & Environmental, Chemical, and Mechanical Engineering programs.

Control-volume principles are developed and used to demonstrate applications to simple flow systems in engineering to determine flow rates and forces, and energy losses and power requirements. Regular homework assignments are made. Laboratory experiments are an integral part of the course. They reinforce theory and its practical applications, and introduce methods of fluid flow measurement and data analysis. The experiments are conducted in teams, with each member writing a separate report.

Text: Engineering Fluid Mechanics, Crowe, Roberson & Elger, John Wiley and Sons, 7th ed., 2001

References: On two-hour reserve in Engineering Library

Introduction to Fluid Mechanics, Janna, Brookes/Cole
Fluid Mechanics, Streeter & Wylie, McGraw Hill
Mechanics of Fluids, Shames, McGraw Hill
Life in Moving Fluids, Vogel

Homework

1. Homework problems are assigned MWF, are due WFM, and will be returned FMW, respectively. Late submission will not be accepted without a legitimate reason, explained in writing at the time of submission.
2. Pre-selected homework problems are graded. Note: Additional graded problems may be given. Students are strongly encouraged to work all assigned homework problems, some of which may appear on examinations.
3. Homework solutions should be prepared in the following format:

Name
Problem statement
Relevant figure, drawn or sketched neatly to scale

Formulas used, numerical values, units

Details of the work

Results expressed to appropriate precision and in appropriate stated units

4. Solutions will be posted in the Engineering Library soon after the problems have been graded. Consult these to correct your solutions for future reference.
5. A Teaching Assistant will grade homework problems. The instructor (Prof. Odgaard) should be consulted in case of difficulty in solution of problems or questions concerning grading.
6. Each problem will be graded on the basis of 10 points. Homework accounts for 20% of the final grade.

Laboratories

1. Experiments are an important part of this course. Each student must participate fully in the conduct of these experiments, and in the compilation and analysis of results. Experiments are conducted in teams, and team effort is encouraged in the conduct of experiments and analysis of results. However, each student must prepare an independent lab report.
2. The experiments are performed in the Fluids Laboratory, an instructional facility distributed within IIHR-Hydroscience & Engineering's (formerly, Iowa Institute of Hydraulic Research) research areas. Three physical experiments and two numerical simulation experiments will be conducted in two sessions. Each student will be assigned a team on the basis of alphabetical order in the first class list for each section. If students wish to form a different team, the instructor must be notified no later than the beginning of the second week of classes.
3. Consult the LABORATORY SCHEDULE for the dates on which your team will perform the experiments. Deadlines for the submission of lab reports are indicated on the class schedule.
4. More detailed instructions on laboratory procedures and reports will be provided during the Laboratory Procedures classes and the lab sessions.

Examinations

1. There will be two 50-minute, and one 120-minute (FINAL), examinations on the dates shown on the class schedule.
2. All exams are closed notes and books. A formula sheet will be made available.
3. Exams may include standard problems as well as multiple-choice and true-false questions. Examinations may include problems previously assigned for homework.

Grading

The final course grade will be based on the total points earned during the semester. The distribution of points is as follows:

Two in-semester exams, counted at 10% each

= 20

Final examination, 30%	= 30
4 lab reports, 7.5% each	= 30
Homework problems, 20%	= 20

TOTAL	100 points