

M.E. 3031-002, Fluids/Thermal Laboratory
University of Colorado Denver

Term: Fall 2009
Meeting Time: Monday and Wednesday from 5:30 to 6:45 PM in WC 139 or TE 128
Instructor: Scott Blakley
Office: TBD
Office Hours: Monday: 2:30 to 5:00 PM
Tuesday: By Appointment
Wednesday: 2:30 to 5:00 PM and 7:00 to 8:00 PM
Thursday: By Appointment
Phone: 303-475-3898
Fax: 303-556-6371
E-mail: scott.blakley@email.ucdenver.edu

Catalog Description

Laboratory exercises in compressible and incompressible fluid flow; steady-state and transient heat transfer. Prerequisite: ENGR 3012; corequisite: M.E. 3021

Recommended Text

Robert W. Fox and Alan T. McDonald, Introduction to Fluid Mechanics, John Wiley & Sons. Any edition of this textbook is an excellent reference.

Homework Assignments

Homework assignments will be handed out in class. Most of the homework will use data collected during laboratory experiments. Homework assignment grades will be 60% of your grade for the course. You will be given a score from 0 to 100 points on each assignment. None of the homework will be dropped before your homework average is computed. The graded homework assignments will be returned in class.

Laboratory Reports

There will be two laboratory reports that will be based on experiments conducted in the laboratory. The reports will require the use of Microsoft Word and its equation editor. Each laboratory report grade will be 20% of your grade for the course. You will be given a score from 0 to 100 points on each laboratory report. The first report will be due on Wednesday, October 14th; and the second will be due on Wednesday, November 18th. The graded reports will be returned in class.

Grading

Homework Assignments	60%
Laboratory Reports	40%

Each homework assignment and each test is graded on a scale of zero to 100 points. Your grade in the course will be computed as a weighted average of your homework assignment and test averages using the following equation:

$$\text{AVERAGE} = 0.6 \times \text{HW} + 0.4 \times \text{LAB}$$

HW is the average of your homework assignment grades (0–100) and LAB is the average of your laboratory report grades (0–100). The following scale will be used to assign grades at the end of the semester:

Average	Grade
94 and above	A
90 to 93.9	A–
87 to 89.9	B+
83 to 86.9	B
80 to 82.9	B–
77 to 79.9	C+
73 to 76.9	C
70 to 72.9	C–
60 to 69.9	D
Below 60	F

Course Policies

There will be no extra credit work given to make up for missing homework assignments, missing laboratory reports, or poor performance on any of the assigned work. Late homework or late laboratory reports will not be accepted for grading without an acceptable excuse. If you have a good reason why you could not turn in an assignment or a laboratory report on time then you must speak with the instructor and receive permission to turn in the late work. The late assignment must be turned in within one week of its original due date. Most of the homework problems are based on work done in the laboratory and you must participate in the experiments in order to receive full credit for such a homework assignment. The laboratory reports are all based on work done in the laboratory and you must participate in the experiments to receive full credit for a report. Homework solutions or laboratory reports that are merely copies of the work of others or a copy of any kind of posted or published solutions will not be accepted for grading.

Course Schedule

Week	Topics Covered
Week #1 <ul style="list-style-type: none"> • August 17 • August 19 	Lectures on Monday and Wednesday in WC 139. Using barometers and manometers to determine pressures.
Week #2 <ul style="list-style-type: none"> • August 24 • August 26 	Lectures on both Monday and Wednesday in WC 139. Using pitot-static tubes to determine airspeeds. Ideal gas equation of state. Using Microsoft Excel to make calculations.
Week #3 <ul style="list-style-type: none"> • August 31 • September 2 	Lectures on both Monday and Wednesday in WC 139. Aerodynamic drag, drag coefficients, and Reynolds numbers. Using Microsoft Excel to create plots.
Week #4 <ul style="list-style-type: none"> • September 9 	LAB WEEK Meet on Wednesday in TE 128 to collect drag data for the smooth spheres.
Week #5 <ul style="list-style-type: none"> • September 14 • September 16 	Lectures on Monday and Wednesday in WC 139. Using Microsoft Word and its equation editor. Composition of the first laboratory report.
Week #6 <ul style="list-style-type: none"> • September 21 • September 23 	LAB WEEK Meet on both Monday and Wednesday in TE 128 to collect data for the rough spheres.
Week #7 <ul style="list-style-type: none"> • September 28 • September 30 	Lectures on both Monday and Wednesday in WC 139. Pressure distribution on a cylinder. Pressure coefficients. Using the pressure distribution on a cylinder to compute the drag coefficient.
Week #8 <ul style="list-style-type: none"> • October 5 	LAB WEEK Meet on Monday in TE 128 to collect pressure distribution data for a cylinder.
Week #9 <ul style="list-style-type: none"> • October 12 • October 14 	Lectures on Monday and Wednesday in WC 139. Pressure distribution and lift force on an airfoil. Pressure coefficients and lift coefficients. The first laboratory report is due on Wednesday, October 14 th .
Week #10 <ul style="list-style-type: none"> • October 19 	LAB WEEK Meet on Monday in TE 128 to collect pressure distribution data for the NACA 4412 airfoil.
Week #11 <ul style="list-style-type: none"> • October 26 • October 28 	Lectures on Monday and Wednesday in WC 139. Using the pressure distribution on an airfoil to compute the lift coefficient.
Week #12 <ul style="list-style-type: none"> • November 2 	LAB WEEK Meet on Monday in TE 128 to collect more pressure distribution data for the NACA 4412 airfoil.
Week #13 <ul style="list-style-type: none"> • November 9 • November 11 	Lectures on Monday and Wednesday in WC 139. Composition of the second laboratory report
Week #14 <ul style="list-style-type: none"> • November 16 • November 18 	Lectures on Monday and Wednesday in WC 139. Heat transfer by conduction and convection. Heat transfer along an extended surface. The second laboratory report is due on Wednesday, November 18 th .
Week #15 <ul style="list-style-type: none"> • November 30 	LAB WEEK Meet on Monday in TE 128 to collect temperature data for the heat transfer experiment.