

CVEN 311-201 Fluid Dynamics (Honors)
Tuesday - Thursday 12:45-2:00, Fall 2018
Zachry Engineering Education Complex 312

Instructor: Dr. Kuang-An Chang
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Textbook: *Munson, Young and Okiishi's Fundamentals of Fluid Mechanics*, 8th Edition, by P.M. Gerhart, A.L. Gerhart, J.I. Hochstein. Wiley, 2016.

Course Description: Fluid properties; statics; kinematics; basic conservation principles of continuity, energy and momentum; similitude and hydraulic models; incompressible flow in pipes; fluid dynamic drag.

Objective and Outcomes: The objective of this course is to apply the physics of fluid statics and dynamics to the solution of problems in civil engineering – for example, hydrostatic loads on structures, calculation of fluid flowrates through pipes and pipe networks, forces on pipe supports, design of scale models for fluid flow, drag forces on objects from viscous fluids, etc. This course also contributes to the following ABET-identified outcomes of the civil engineering curriculum:

- Ability to apply knowledge of basic mathematics, science, and engineering to solving civil engineering problems
- Ability to formulate and solve civil engineering problems
- Ability to communicate effectively in oral and written forms

Prerequisites: MATH 251 and CVEN 221; CVEN 302 or registration therein

Course Website: eCampus | <http://ceprofs.civil.tamu.edu/kchang/>

Instructor Office Hours: TR 2:00–3:30 or by appointment. Please refer to my weekly schedule posted on my web site.

TA Office Hours: W 2:00–3:30, R 11:00–12:30

Reading Assignments: You are responsible for reading the relevant material in the text covered in lecture.

Grading Policy:	Homework	5%
	Quizzes	15%
	Exam 1	25%
	Exam 2	25%
	Final Exam	30%

Ground Rules:

Letter grades will be assigned from your total course score according to 90% to 100%: A; $\geq 80\%$ but $< 90\%$: B; $\geq 70\%$ but $< 80\%$: C; $\geq 60\%$ but $< 70\%$: D; below 60%: F. Please note that homework and quizzes are 20% of your total grade – please do not neglect this work.

Homework: Students may work together on homework assignments, and are encouraged to help one another. Blind copying of assignments is not permitted and will receive zero credit. Homework is graded by the TA, and *not all homework problems may be graded. The lowest homework score will be dropped.* Homework will be assigned on Thursday, and will be due on the following Thursday at the *beginning* of class. *No late homework will be accepted.* For a valid university excuse, exceptions are granted only if you notify your instructors in advance (except in the case of a valid emergency or event that cannot be planned beforehand). Please do not ask for other exceptions.

Quizzes: An in-class closed-book quiz will be assigned *on each homework due date.* This quiz will consist of a single problem which is very similar, if not identical, to the homework turned in that day. These will be graded by the TA. *The lowest quiz score will be dropped.* This will allow you to miss one quiz for unforeseen circumstances. Any further missed quizzes will result in a grade of zero for each one missed unless accompanied by a University excuse.

Exams: Two 75-minute in-class examinations and a two-hour final examination are scheduled (see the course calendar given below). The instructor will grade these exams. Unexcused absences will result in a grade of zero for missed examinations. All exams are closed book and are cumulative. You are allowed to bring in one single-sided letter size paper with your own notes and formulas. You may *not* include examples, problems or solutions on this sheet. This sheet will be turned in with your exam. You should also bring a calculator (be sure it works), sufficient paper and writing implements to the exams; do not count on these items being provided. No other resources are permitted in the exams.

Regrading: A request for regrading an exam, quiz or homework assignment must be made *within one week* after the exam, quiz or homework is returned. For exam grade reconsiderations, a *written explanation* must be presented for each problem to be re-examined. This must be limited to: a thorough explanation of your solution, its connection to the posted exam solution, and the reasons for the awarding of additional points.

Absences: The University views class attendance as an individual student responsibility. Students are expected to attend class and to complete all assignments. Instructors are expected to give adequate notice of the dates on which major tests will be given and assignments will be due. For more details, please read Part I, Rule 7 of the Texas A&M University Student Rules at <http://student-rules.tamu.edu/>. Please contact the instructor as soon as you know you will miss a class or an exam so that a reasonable alternative can be accommodated. Unexcused absences will result in a grade of zero for the missed work. The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence.

Academic Dishonesty: *“An Aggie does not lie, cheat, or steal, or tolerate those who do.”* Students are expected to understand and abide by the Aggie Honor Code presented on the web at: <http://www.tamu.edu/aggiehonor/>. No form of scholastic misconduct will be tolerated. Academic misconduct includes cheating, fabrication, falsification, multiple submissions, plagiarism, complicity, etc. These are more fully defined in the above web site. Violations will be handled in accordance with the Aggie Honor System Process described on the web site.

ADA: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Cain Hall, or call 845-1637.

Course Schedule: The course schedule follows on the next page. It is tentative, depending on travel and other occurrences; please check the website.

ABET Input: Students may be asked to allow copies of their assignments and exams to be submitted to the Accreditation Board for Engineering and Technology (ABET) review panel. The purpose of this is to demonstrate to ABET that our stated mission and objectives are being effectively implemented. Your grade will not be affected by participation.

Course Outline: (subject to change; see website for up-to-date information)

WEEK	MTG	DATE	TOPIC	READING	HOMEWORK
1	1	28-Aug	Introduction, Dimensions, Units, Ideal Gas Law	1.1 - 1.5	
	2	30-Aug	Viscosity, Compressibility, Surface Tension	1.6 - 1.9	
2	3	4-Sep	Fluid Statics	2.1 - 2.4	
	4	6-Sep	Gages, Manometers	2.5 - 2.7	HW 1
3	5	11-Sep	Force on Plane Surface	2.8 - 2.9	
	6	13-Sep	Force on Curve Surfaces	2.10 - 2.11	HW 2
4	7	18-Sep	Bernoulli Equation	3.1 - 3.2	
	8	20-Sep	Pressure Variation Normal to Streamline	3.3 - 3.4	HW 3
5	9	25-Sep	Stagnation and Dynamic Pressure, Examples	3.5 - 3.6	
	10	27-Sep	Energy Line, Hydraulic Grade Line, Restrictions	3.7 - 3.8	HW 4
6	11	2-Oct	Fluid Kinematics	4.1 - 4.2	
	12	4-Oct	Control Volumes and Reynolds Transport Equation	4.3 - 4.4	HW 5
7	13	9-Oct	Examination I		
	14	11-Oct	Conservation of Mass	5.1	HW 6
8	15	16-Oct	Principles of Linear Momentum	5.2	
	16	18-Oct	Examples	5.2	HW 7
9	17	23-Oct	Energy Equation	5.3	
	18	25-Oct	Examples	5.3	HW 8
10	19	30-Oct	Dimensional Analysis	7.1 - 7.4	
	20	1-Nov	Similitude, Modeling	7.5 - 7.8	HW 9
11	21	6-Nov	Practical Model Studies	7.9	
	22	8-Nov	Pipe Flow Characteristics, Laminar Pipe Flow	8.1 - 8.2	HW 10
12	23	13-Nov	Examination II		
	24	15-Nov	Turbulent Pipe Flow, Friction Factor	8.3	HW 11
13	25	20-Nov	Moody Diagram, Minor Losses	8.4 - 8.5	
		22-Nov	No Class		
14	26	27-Nov	External Flow, Lift and Drag	9.1	
	27	29-Nov	Boundary Layer	9.2	HW 12
15	28	4-Dec	Friction and Pressure Drag, Drag Coefficients	9.3	HW 13
16	29	12-Dec	Final Examination (Wed. 8:00 am - 10:00 am)		