MECH 3315
Fluid Mechanics
Spring 2025

Course Information

Course Number: MECH 3315.002
Course title: Fluid Mechanics
Term: Spring 2025

Class hours: 4:00 pm - 5:15 pm, Monday & Wednesday
Location: GR 4.428

Teaching Assistant: Sankeerthana Manchikatla
TA office hours: 1 pm – 2 pm, Mondays
Location: ECSW 3.164

Instructor office hours: 2:30 pm – 3:30 pm, Wednesdays
Location: ECSW 3.150H

Prerequisite: MECH 2330 and ENGR 3300
Prerequisite or Corequisite: MECH 3310

Course platform: eLearning and Microsoft

Instructor

Dr. Zhen Liu
Office ECSW 3.150H
Email: Zhen.Liu@utdallas.edu

Course Description

MECH 3315 - Fluid Mechanics (3 semester credit hours) Lecture course. In this course, we will study the physics governing the motion of fluids at an introductory level. We will familiarize ourselves with basic concepts in fluid mechanics, such as continuum, velocity field, and vorticity. We will apply the principle of mass conservation and Newton's law to describe the motion of fluids and solve basic engineering problems. After studying simple cases of fluid motion for in-viscid fluids, we will consider viscosity for internal flows (e.g. pipe flows) and external flows (airfoils and bluff bodies). Dimensional analysis will also be presented.

Course Learning Objectives/Outcomes

CLO 1: Derive the governing equations of fluid mechanics, and use the equations to reason about fluid flows.

CLO 2: Explain the concept of control volume and apply it to solve fluid mechanics problems in inertial frames.

CLO 3: Identify key non-dimensional parameters for given systems and use such numbers to characterize the systems.

CLO 4: Explain the role of fluids in real life situations.

Required Textbooks

Fundamentals of Fluid Mechanics, Munson, Young, Okiishi, Gerhart, Gerhart & Hochstein, 8th ed., Wiley.

(If you are able to obtain a copy of another edition, feel free to use it.)

Outline (tentative)*

*The outline might change as the semester progresses. You will be notified of such changes via eLearning as soon as possible.

Week	Dates	Topic	Book Chapters
1	Jan. 22	Overview; introduction to fluid mechanics	1
2	Jan. 27; Jan. 29	Fluid Statics	1-2
3	Feb. 3; Feb. 5	Fluid Statics	2
4	Feb. 10; Feb. 12	Newton's second law	3
5	Feb. 17; Feb. 19	Bernoulli equation	3-4
6	Feb. 24; Feb. 26	Fluid kinematics	4
7	Mar. 3; Mar. 5	Control volume analysis	5
8	Mar. 10; Mar. 12	Mar. 10: in-class **mid-term #1** for chapter 1-3, 4.1-4.2 Control volume analysis	5
9	Mar. 17; Mar. 19	Spring Break – No classes	N/A
10	Mar. 24; Mar. 26	PDE analysis	6
11	Mar. 31; Apr. 2	Navier-Stokes equations	6
12	Apr. 7; Apr. 9	Dimensional Analysis (**mid-term #2** for chapter 5-6)	7
13	Apr. 14; Apr. 16	Flow in pipes	8
14	Apr. 21; Apr. 23	Introduction of boundary layers	9
15	Apr. 28; Apr. 30	Flow over objects	9
16	May 5; May 7	Review	
	Final week	**Final exam** (chapter 7, 8, 9)	

Grading Policy

Homework (20%)

Mid-term exam #1 (25%)

Mid-term exam #2 (25%)

Final exam (30%)

Course & Instructor Policies

Homework: Homework assignments will be collected electronically via e-Learning. Typical due for homework is 3:30 pm on Wednesdays. The homework schedule may be modified as the semester progresses. Information about homework assignments will be posted to eLearning at least one week before the due time. Late homework will not be accepted without the instructor's approval. The solutions should be clearly hand written and scanned or typed. Non-legible writings will get zero points. After the due date, homework solutions will be available on eLearning. Homework is not pledged, but should not be simply copied from another source. All quantities must have the correct dimensions. All final answers must be clearly boxed.

Exams: There will be three exams (two mid-term exams and one final exam). In all exams, you will be allowed to bring one US letter page with notes you prepared. You cannot use electronic devices such as laptop, tablet, cell phone etc. during the exams. Clearly show the steps in each problem and box the final answer.

Make-up exams: You must have a certified (doctor or otherwise) excuse for missing any exams. I am willing to work with you for university-sanctioned travel or in other circumstances at least one week before the exam date.

Class Materials

The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course; however, these materials are for registered students' use only**. Classroom materials may not be reproduced or shared with those not in class or uploaded to other online environments** except to implement an approved Accessibility Resource Center accommodation. Visual recordings are not permitted in class. Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Class Attendance and Participation

Regular and punctual class attendance and participation are expected. Students who fail to attend and participate in class regularly are inviting scholastic difficulty.

Failure to comply with these University requirements is a violation of the Student Code of Conduct.

Texas Senate Bill 17, the recent law that prohibits diversity, equity, and inclusion programs and activities at public universities in Texas, does not in any way apply to academic course instruction.

Comet Creed

This creed was voted on by the UT Dallas student body in 2014. It is a standard that Comets choose to live by and encourage others to do the same:

"As a Comet, I pledge honesty, integrity, and service in all that I do."

Academic Support Resources

Please visit the Academic Support Resources page to view the University's academic support resources for all students.

Additional Course Considerations

The instructor may have intermittent, unavoidable professional travels during the semester. If that happens, the instructor will provide advance notices and the classes will be administered by a TA.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.