MEMORANDUM FOR STUDENTS ENROLLED IN CHEN 3330

SUBJECT: CHEN 3330 - Fluid Mechanics - Administrative Instructions

Lecture times: Tue/Thu 1:30 PM - 2:50 PM

Instructor: Zishu Cao

Office: RBN 3013

Office hours: Wed 11:30 AM – 1:30 PM, Thu 2:50 PM – 3:50 PM

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Welcome to CHEN 3330 – Fluid Mechanics. This course will introduce the fundamentals basics of fluid motion. Focus is placed on applications of high relevance to the chemical industry, such as flow in pipes and characteristic curves of pumps. Students in this class learn the fundamentals of momentum transfer and how these fundamentals are applied to chemical processes. Upon completion of this course, students will be equipped to perform detailed analysis of power and fluid flow requirements in processes that are typical of the chemical industry. The material learned on this course will form the basis for additional transport phenomena courses, such as heat transfer and mass transfer.

CHEN3330 Fluid Mechanics Course Objectives

1. Explain fundamental fluid properties and flow behaviors, including viscosity, shear stress, laminar/turbulent regimes, and boundary layer development.
2. Apply conservation principles of mass, momentum, and energy using both control volume and differential formulations (continuity and Navier-Stokes equations).
3. Analyze internal flows in conduits by calculating velocity distributions, pressure drops, and head losses using empirical correlations and friction factor charts.
4. Evaluate the performance of fluid machinery, particularly centrifugal pumps, using characteristic curves, efficiency considerations, and scaling laws.
5. Develop problem-solving strategies for open-ended engineering applications

Mode of delivery: This is an **in-person course** where we will meet during the assigned lecture times at the assigned lecture room. Course assignments, such as homework and open-ended projects, will always be submitted online via Canvas.

1. The course has the following prerequisite courses which must be completed successfully prior to taking this course:

- Engineering Statics (ENGR 2301)
- MATH 3305 (Differential Equations)

2. You are encouraged to seek additional instruction (AI) during my office hours, before/after class, or by appointment. Take advantage of this opportunity, it's FREE and really will help! To take the advantage of AI, the following avenues are available:

- Scheduled office hours
- Email to set up an appointment if you have a scheduling conflict during office hours.

3. Classroom Procedures:

a) Please bring textbooks, calculators, and other learning devices to every class. If you have an ebook or e-copy of a book, you are welcome to bring your laptops/tablets. Please read the relevant assigned reading materials in the book. Attendance is highly encouraged, and it will help you to get high final grade. You will not be able to share calculators during exams or quizzes. Class preparation is your individual responsibility.

b) Textbooks:

Welty, J.R.; Rorrer, G.; Foster, D.G.; "Fundamentals of Momentum, Heat, and Mass Transfer", John Wiley & Sons, New York, 2019, 7th Edition.

Optional:
Fox and McDonald's Introduction to Fluid Mechanics, John Wiley & Sons, New York, 2020, 10th Edition

4. Evaluations

a) Academic Dishonesty:
All work must be your own. Plagiarism of assignments (homework, projects, etc.) will not be tolerated. You can get help from others; however, all help from others must be documented. Please refer to the University of Texas at Tyler current Undergraduate Catalog for academic policies and Manual of Policies and Procedures for Student Affairs (MOPPS, Chapter 8) regarding academic integrity, cheating, and plagiarism.

b) Homework:
Homework will help you understand the course materials better and are mandatory. Students may *discuss* their homework solutions with one another, but each student must submit their own, independent solutions (i.e. you may not just copy someone else's homework). If you receive assistance from a fellow student on a problem, you must cite that assistance within your solution. The problems assigned in a homework should not only be correct but should also be neat, organized, and complete (showing all the intermediate steps). No guess work should be required to see what you did.

A. Late submissions: Late homework will receive the following penalties:
- 0-24 hrs late – a 25% deduction of the earned grade
- 24-48- hrs late – a 50% deduction of the earned grade
- More than 48 hrs late – No credit

B. All homework in this course must be properly documented. As you are having your work reviewed it is likely that you might receive help from your classmates, just simply document it. Information from the course textbooks (equations and outlines of procedures), class notes, or me is considered immediately available to all students and need not be acknowledged or documented. **YOU ARE REQUIRED TO ACKNOWLEDGE AND DOCUMENT ALL OTHER ASSISTANCE AND REFERENCES USED.** Documentation will be accomplished in accordance with any manual for writing, footnote or endnote, for papers, but for written homework, just place the documentation right at the point you received help using Who and what assistance.

c) Quizzes:
There will be four quizzes during the semester, scheduled dates will be announced on Canvas at least one week in advance. The quizzes will include problems similar to lecture examples and previous homework assignments. For grading, the highest three quiz scores will count toward the final grade, while the lowest score will be dropped.

d) Midterm Exams and Final Exam:
There will be two mid-term exams and one final exam. Official reasons for missing an exam are outlined in "Student handbook". The dates will be announced on Canvas at least one week in advance. Report any conflict to me as soon as possible prior to the exam. Exams and the final are closed book and notes. You may only use a NCEES approved (or FE equivalent) calculator (eg. Casio – FX 115 ES, TI 30XA etc.). Solutions to the exams will not be posted, however the exam will be solved in class after the graded exams are returned.

e) Project:
This semester, all the students in the College of Engineering will participate in a "hands-on" project, which will consist of a group competition. As part of the activities of this course, CHEN 3330 students will participate in a "Bottle Rockets" competition (competing against groups of Chem Eng sophomore and seniors). The purpose of this competition is twofold: (1) to provide students the opportunity to wrestle with an open-ended, practical engineering problem, and (2) to increase awareness of STEM Challenges across the state of Texas. Student teams will consist of 4 or 5 students, who will be responsible for answering questions during the Poster

Session. Each team shall designate a registered participant as their team captain. Additional details about the Fall Special will be made available in a separate document.

The project grade will be determined by three key components:
(1) Technical report: Preparing a professional report that documents project management, design decisions, engineering analysis, and construction process. **In this report, you are expected to apply fluid mechanics principles to analyze and justify your design choices, explaining how these principles guided improvements in performance.**
(2) Poster Presentation: Delivering a technical poster that communicates both engineering and project management aspects of your work in a clear and professional manner.
(3) Competition: Physically testing your rocket, with performance and design elements evaluated during competition.

5. Grading

Grades will be based entirely on the student's demonstrated ability to develop detailed, neat, organized, and correct solutions to the problems presented. Correct answers accompanied by incorrect, incomplete, or untidy solutions may receive no credit.

Course Points	
Quizzes (3 at 7 points each)	21 (21 %)
Homeworks (7 at 2 points each)	14 (14 %)
Participation (1 at 5 points)	5 (5 %)
Project (1 at 10 points)	10 (10%)
Midterm Exam (2 at 14 points)	28 (28%)
Final Examination (1 at 23 points)	22 (22%)
Total 100 (100%)	

Grade Scale based on points	
Higher than 85 points	A
Between 70 and 85 points	B
Between 60 and 70 points	C
Between 30 and 60 points	D
Less than 30 points	F

You need at least 60 points total to pass the course with a C grade.

6. Collection of Student Work:

Throughout the semester I will collect student work (best, average, and worst) for the ABET course and outcomes notebooks. This will require me to make a copy of your work, keep your original and return a copy of the graded work to you. I will not draw attention as to what level of work you accomplished.

7. Assigned Readings:

You are required to do the assigned reading prior to class as it will help you to understand the material presented during the instruction and will give you an opportunity to ask questions on topics you found difficult.

8. UT Tyler Honor Code:

Every member of the UT Tyler community joins together to embrace:
Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

9. Students Rights and Responsibilities:

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: http://www.uttyler.edu/wellness/rightsresponsibilities.php

10. Campus Carry:

We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at http://www.uttyler.edu/about/campus-carry/index.php

11. UT Tyler a Tobacco-Free University:

All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors.

Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless tobacco, snuff, chewing tobacco, and all other tobacco products.

There are several cessation programs available to students looking to quit smoking, including counseling, quitlines, and group support. For more information on cessation programs please visit www.uttyler.edu/tobacco- free.

12. Grade Replacement/Forgiveness and Census Date Policies:

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at http://www.uttyler.edu/registrar. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.
a. Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.

b. Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)

c. Schedule adjustments (section changes, adding a new class, dropping without a "W" grade)

d. Being reinstated or re-enrolled in classes after being dropped for non-payment

e. Completing the process for tuition exemptions or waivers through Financial Aid

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions that students need to be aware of. These include:

13. State-Mandated Course Drop Policy:

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for the specific date). Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

14. Disability Services:

In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Services counselor. If you have a disability, including a learning disability, for which you request an accommodation, please contact the Disability Services office in UC 3150, or call (903) 566-7079.

15. Student Absence due to Religious Observance:

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

16. Student Absence for University-Sponsored Events and Activities:

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

17. Social Security and FERPA Statement:

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

18. Emergency Exits and Evacuation:

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services**.**

19. Artificial Intelligence (AI) Language for Syllabi:

UT Tyler is committed to exploring and using generative AI tools as appropriate for the discipline and task undertaken. We encourage discussing generative AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of generative AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any generative AI tool. Additionally, users should be aware that generative AI tools rely on predictive models to gen-erate content that may appear correct but shown sometimes to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit.

In this class, Generative AI is not permitted in this course at all. To best support your learning, you must complete all graded assignments by yourself to assist in your learning. This exclusion of other resources to help complete assignments includes generative artificial intelligence (AI). Refrain from using AI tools to generate any course context (e.g., text, video, audio, images, code, etc.) for an assignment or classroom assignment.

20. Additional UT Tyler Resources for Students

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu
- The Mathematics Learning Center, RBN 4021, this is the open access computer lab for math students, with tutors on duty to assist students who are enrolled in early-career courses.
- UT Tyler Counseling Center (903.566.7254)

21. Tentative Class Schedule:

Week	Week of	Topics	Chapter	Evaluations
1	8/25	Vector Operations, Differentiation with Vectors		
2	9/1	Coordinate systems, Introduction	1	HW 1 Due
3	9/8	Introduction, Fluid Statics	2	Quiz 1
4	9/15	Fluid Statics	2	
5	9/22	Mass balance - control volume	4	HW 2 Due, Quiz 2
6	9/29	Momentum balance - control volume	5	
7	10/6	Energy Balance - Control volume	6	HW 3 Due
8	10/13	Stress, Newtonian and non-Newtonian fluids	7	***Midterm 1***
9	10/20	Differential fluid element in laminar flow	8	HW 4 Due
10	10/27	Navier Stokes Equations	9	
11	11/3			HW 5 Due ***, Midterm 2***
12	11/10	Viscous Flow, Pressure drop and head loss in pipes	12,13	Quiz 3
13	11/17	Pumps	14	HW 6 Due
14	11/24	Thanksgiving Break		
15	12/1	Review for Final		Quiz 4, HW 7 Due

Assignments due for the week will be announced on canvas, please make sure to regularly check canvas for announcements.

Important Dates:
Census Date: September 8, 2025
Last day to withdraw: November 3, 2025

No Classes:
Thanksgiving Break: November 24-28, 2025

Final Exam: December 8-12, 2025 (TBA)

Note: This syllabus, including the grading criteria, schedule and the content, are tentative. They can be changed at anytime at the sole discretion of the instructor