

CE 2375 – Introduction to Fluid Mechanics – Spring 2021 (100% Online)

The University of Texas at El Paso
 Department of Civil Engineering
 Class: MWF 8:30am-9:20am, Online (Blackboard)
 CRN: 22337
 Prerequisites: MATH 1312 Calculus II

Instructor: AHM Golam Hyder
 Email: ahyder@miners.utep.edu
 Office hours: Friday, 11am-12pm, Blackboard
 Faculty Mentor: W. Shane Walker, Ph.D., P.E.

Required Course Materials:

1. **Pearson's MasteringEngineering** ([CE2375SPRING21WALKER](#)). The purchase for access to this MasteringEngineering homework can also be made in combination with the textbook.
2. **Hibbeler (2018) Fluid Mechanics (Second Edition), Pearson (9780134649290)**
 Here are three options to purchase the textbook with the MasteringEngineering access:
 - Bundle: Bound Text + Modified MasteringEngineering Access Card (ISBN: 9780134675862)
 - Bundle: Loose-leaf Text + Modified MasteringEngineering Access Card (ISBN: 9780134675848)
 - Modified MasteringEngineering with eText Access Card (ISBN: 9780134629155)

Supplemental Texts:

- Finnemore & Franzini, Fluid Mechanics with Engineering Applications, Tenth Edition, McGraw Hill
- Cengel, Cimbala, & Turner, Fundamentals of Thermal-Fluid Sciences, Fourth Edition, McGraw Hill

Description and Objectives

This course involves a study of the fundamental theory of fluid mechanics, and the topics included in this course are:

1. Fluid properties
2. Fluid statics (e.g., hydrostatics)
3. Conservation of Mass (e.g., continuity, Reynolds Transport Theorem)
4. Conservation of Energy (e.g., The Bernoulli Equation, Hydraulic Grade Lines)
5. Conservation of Momentum
6. Dimensional Analysis & Similitude
7. Flow through Closed-Conduits
8. Open-Channel Flow
9. Pumps and Turbines
10. Compressible Flow

Expectations

Class Sessions: This course will be delivered on-line **asynchronously**. Instruction materials will be uploaded to Blackboard, and students will review them at their convenience.

Punctuality: Late assignments will not be accepted.

Ethics: In engineering, personal integrity is of utmost importance, especially in the assessment and reporting of environmental conditions. Also, in most cases, it is necessary to work in teams to develop and design optimal solutions to problems and challenges, and it is essential that each team member contribute to the productivity of the team. In this course, I strongly recommend that you complete homework assignments in teams; in many cases, you will help each other through the solution of difficult problems. My goal for the homework is for you to develop proficiency in the basic application and calculations in design. Thus, every student is accountable for *understanding* the concepts, analysis, and solution. Any student committing plagiarism (e.g., copying another's work without understanding) or any other form of academic dishonesty will be reported to the Dean of Students for disciplinary action (which may include expulsion from the University). For a concise summary of engineering ethics, I have provided here the Fundamental Canons within the [Code of Ethics](#) of the American Society of Civil Engineers (ASCE):

1. *Engineers shall hold paramount the safety, health and welfare of the public and shall strive to comply with the principles of sustainable development³ in the performance of their professional duties.*

2. *Engineers shall perform services only in areas of their competence.*
3. *Engineers shall issue public statements only in an objective and truthful manner.*
4. *Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.*
5. *Engineers shall build their professional reputation on the merit of their services and shall not compete unfairly with others.*
6. *Engineers shall act in such a manner as to uphold and enhance the honor, integrity, and dignity of the engineering profession and shall act with zero-tolerance for bribery, fraud, and corruption.*
7. *Engineers shall continue their professional development throughout their careers, and shall provide opportunities for the professional development of those engineers under their supervision.*

Course Communication

There are a number of ways we can keep the communication channels open:

- **Office Hours:** We will not be able to meet on campus, but I will still have office hours for your questions and comments about the course. My office hours will be held on Blackboard Collaborate [link will be provided] on each Friday, 11 am - 12 pm.
- **Email:** UTEP e-mail is the best way to contact me. I will make every attempt to respond to your e-mail within 24-48 hours of receipt. When e-mailing me, be sure to email from your UTEP student account and please put the course number in the subject line. In the body of your e-mail, clearly state your question. At the end of your e-mail, be sure to put your first and last name, and your university identification number.
- **Discussion Board:** If you have a question that you believe other students may also have, please post it in the Help Board of the discussion boards inside of Blackboard. Please respond to other students' questions if you have a helpful response.
- **Announcements:** Check the Blackboard announcements frequently for any updates, deadlines, or other important messages.

Scholastic Integrity

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the [Office of Student Conduct and Conflict Resolution \(OSCCR\)](#) for possible disciplinary action. To learn more, please visit [HOOP: Student Conduct and Discipline](#).

Homework

Homework assignments will be completed through Pearson's MasteringEngineering (available from <https://www.masteringengineering.com/site/login.html>). You can register and purchase access to this course at <https://www.pearsonmylabandmastering.com/northamerica/masteringengineering/> with Course ID: hyder57865 and course name: CE2375SPRING21WALKER. **Homework assignments are expected to require AT LEAST 4-6 HOURS PER ASSIGNMENT (in addition to reviewing instructional materials).** Each class session will have a corresponding homework assignment (available in MasteringEngineering the previous day). The homework assignment associated with each class session will be due before the following class session. If you **score less than 90%** on a homework assignment, then you will automatically be assigned two additional required homework problems related to that assignment (called **"Adaptive Follow-Up"**); these Adaptive Follow-Up assignments are required and count as part of your overall Homework grade and will be due one day after the parent assignment is due. If you **score greater than 90%** on a homework assignment and complete all problems within that assignment, then you will automatically receive 100% credit for the Adaptive Follow-Up associated with that assignment.

Your average homework grade constitutes a significant fraction of your overall course grade, so I strongly urge you to give your full devotion to understanding and mastering the concepts in the homework assignments. Moreover, the exams are based on the concepts in the homework, so as you diligently study to understand the concepts in the homework assignment, you are implicitly studying for the exams. In this “information age” with Google search at our fingertips, it might be tempting to search the internet for solution steps to the homework problems, but **BEWARE: COPYING SOMEONE ELSE’S SOLUTION DESTROYS YOUR INTELLIGENCE.** The main points of engineering education are to learn fundamental principles and to train yourself how to innovate and solve complex problems. If you rely on examples and posted solutions, you rob yourself of the mental effort that is required to force your brain to learn out how to **FIGURE OUT STUFF ON YOUR OWN.** I liken engineering education to wilderness survival training. Of course, you need someone to prepare you with some basic principles and skills of how to search for water, food, and basic shelter, but at some point, you have to be dropped out in the middle of the wilderness to learn how to survive. So, I strongly encourage you to make sure that you understand each homework problem as you solve them!

Quizzes

Quizzes will be conducted through Blackboard. You will be notified when a quiz is posted. Note: submitting answers for a fellow student is considered cheating and a violation of the University Honor Code and the Civil Engineering Honor Code. If you are caught cheating, you will be referred to Office of Student Conflict and Conflict Resolution (OSCCR) for disciplinary action.

Exams

All exams are on-line, open-book, and open-notes; that is, you are allowed to use your textbook and notes in the exam. However, you are not allowed to discuss an exam with anyone other than the instructor while the exam is open. If cheating is suspected, then I will submit a report to the Office of Student Conflict and Conflict Resolution (OSCCR) for their investigation.

Evaluation: Overall Weighted-Average Course Score

Assessment of your performance in this course will be determined by online homework, quizzes, and exams (**No makeup exams will be offered**). The overall weighted-average score is calculated as:

Evaluation	Contribution (%)
Homework	35
Quizzes	10
Midterm Exams (4)	35
Final Exam (comprehensive)	20
<i>Total</i>	<i>100</i>

Final Letter Grade

A final exam score of at least 50% is required to pass the course. The final course letter grade will be determined according to the following:

Course Average (%)	Grade
≥ 90	A
80-89	B
70-79	C
60-69	D
< 60	F

I reserve the right to modify or augment this grading scheme for the sake of improving the educational effectiveness of this course.

Special Accommodations

The University of Texas at El Paso provides, upon request, appropriate academic accommodation for students with disabilities. For more information, contact the Center for Accommodations and Support Services (<https://www.utep.edu/student-affairs/cass/>).

Copyright Statement for Course Materials

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.

Covid-19 Precautions

You must STAY AT HOME and REPORT if you (1) have been diagnosed with COVID-19, (2) are experiencing COVID-19 symptoms, or (3) have had recent contact with a person who has received a positive coronavirus test. Reports should be made at screening.utep.edu. If you know of anyone who should report any of these three criteria, you should encourage them to report. If the individual cannot report, you can report on their behalf by sending an email to COVIDaction@utep.edu.

For each day that you attend campus—for any reason—you must complete the questions on the UTEP screening website (screening.utep.edu) prior to arriving on campus. The website will verify if you are permitted to come to campus. Under no circumstances should anyone come to class when feeling ill or exhibiting any of the known COVID-19 symptoms. If you are feeling unwell, please let me know as soon as possible, and alternative instruction will be provided. Students are advised to minimize the number of encounters with others to avoid infection.

Wear face coverings when in common areas of campus or when others are present. You must always wear a face covering over your nose and mouth if you are in on-campus class. If you choose not to wear a face covering, you may not enter the classroom in campus. If you remove your face covering, you will be asked to put it on or leave the on-campus classroom. Students who refuse to wear a face covering and follow preventive COVID-19 guidelines will be dismissed from the class and will be subject to disciplinary action according to Section 1.2.3 *Health and Safety* and Section 1.2.2.5 *Disruptions* in the UTEP Handbook of Operating Procedures. **Classes with on-campus meetings:** Please note that if COVID-19 conditions deteriorate in the City of El Paso, all course and lab activities may be transitioned to remote delivery.

Resources

UTEP provides a variety of student services and support:

Technology Resources

- [Help Desk](#): Students experiencing technological challenges (email, Blackboard, software, etc.) can submit a ticket to the UTEP Helpdesk for assistance. Contact the Helpdesk via phone, email, chat, website, or in person if on campus.

Academic Resources

- [UTEP Library](#): Access a wide range of resources including online, full-text access to thousands of journals and eBooks plus reference service and librarian assistance for enrolled students.
- [University Writing Center \(UWC\)](#): Submit papers here for assistance with writing style and formatting, ask a tutor for help and explore other writing resources.
- [Math Tutoring Center \(MaRCS\)](#): Ask a tutor for help and explore other available math resources.
- [History Tutoring Center \(HTC\)](#): Receive assistance with writing history papers, get help from a tutor and explore other history resources.
- [RefWorks](#): A bibliographic citation tool; check out the RefWorks tutorial and Fact Sheet and Quick-Start Guide.

Individual Resources

- [Military Student Success Center](#): Assists personnel in any branch of service to reach their educational goals.
- [Center for Accommodations and Support Services](#): Assists students with ADA-related accommodations for coursework, housing, and internships.
- [Counseling and Psychological Services](#): Provides a variety of counseling services including individual, couples, and group sessions as well as career and disability assessments.

Course Schedule: Jan 18, 2021 - May 10, 2021

#	Date	Day	Text	Description	HW
-	Jan 18	Mon	-	<i>Dr. Martin Luther King, Jr. Holiday-No Class</i>	-
1	Jan 20	Wed	1.1-10	Fluid Mechanics: Fundamental Concepts	1
2	Jan 22	Fri	2.1-6	Fluid Statics: Pressure Variation	2
3	Jan 25	Mon	2.7-10	Fluid Statics: Hydrostatic Force on a Surface	3
4	Jan 27	Wed	2.11-12	Fluid Statics: Buoyancy and Stability	4
5	Jan 29	Fri	3.1-3	Kinematics: Fluid Flow	5
6	Feb 01	Mon	3.4-5	Kinematics: Acceleration	6
7	Feb 03	Wed	4.1-2	Conservation of Mass: Flow, Velocity, and Control Volumes	7
8	Feb 05	Fri	-	Exam 1 Review	-
9	Feb 08	Mon	1-3	EXAM 1	1-6
10	Feb 10	Wed	4.3	Conservation of Mass: The Reynolds Transport Theorem	8
11	Feb 12	Fri	4.4	Conservation of Mass: Continuity Equation	9
12	Feb 15	Mon	5.1	Conservation of Energy: Euler's Equations of Motion	10
13	Feb 17	Wed	5.2-3	Conservation of Energy: The Bernoulli Equation	11
14	Feb 19	Fri	5.4	Conservation of Energy: Energy and Hydraulic Grade Lines	12
15	Feb 22	Mon	5.5	Conservation of Energy: The Energy Equation	13
16	Feb 24	Wed	6.1-2	Conservation of Momentum: The Linear Momentum Equation	14
17	Feb 26	Fri	6.3	Conservation of Momentum: Constant Velocity	15
18	Mar 01	Mon	6.4-5	Conservation of Momentum: Angular Momentum, Propellers, and Turbines	16
19	Mar 03	Wed	8.1-4	Dimensional Analysis & Buckingham Pi Theorem	17
20	Mar 05	Fri	-	Exam 2 Review	-
21	Mar 08	Mon	4-6	EXAM 2	7-16
22	Mar 10	Wed	8.5	Similitude	18
23	Mar 12	Fri	9.1,3	Viscous Flow in Closed Conduit: Steady Laminar Flow, Plates and Smooth Pipe	19
-	Mar 15	Mon	-	<i>Spring Break-No Class</i>	-
-	Mar 17	Wed	-	<i>Spring Break-No Class</i>	-
-	Mar 19	Fri	-	<i>Spring Break-No Class</i>	-
24	Mar 22	Mon	9.5-6	Viscous Flow in Closed Conduit: The Reynolds Number	20
25	Mar 24	Wed	9.7-8	Viscous Flow in Closed Conduit: Shear Stress and Turbulent Flow in Pipe	21
-	Mar 26	Fri	-	<i>Cesar Chavez Holiday-no classes</i>	-
26	Mar 29	Mon	10.1	Pipe Flow: Rough Pipes and The Moody Diagram	22
27	Mar 31	Wed	10.2-3	Pipe Flow: Losses in Fittings and Transitions	23
-	Apr 02	Fri	-	<i>Spring Study Day - no classes</i>	-
28	Apr 05	Mon	10.4-5	Pipe Flow: Pipe Systems and Flow Measurement	24
29	Apr 07	Wed	-	Exam 3 Review	-
30	Apr 09	Fri	8-10	EXAM 3	17-24
31	Apr 12	Mon	11.1-2	Viscous Flow over External Surfaces: Laminar Boundary Layers	25
32	Apr 14	Wed	11.4-5	Viscous Flow over External Surfaces: Turbulent Boundary Layers	26
33	Apr 16	Fri	11.6-11	Viscous Flow over External Surfaces: Drag and Lift	27
34	Apr 19	Mon	12.1-3	Open-Channel Flow: Specific Energy	28
35	Apr 21	Wed	12.4-5	Open-Channel Flow: Rises and Sluice Gates	29
36	Apr 23	Fri	12.6	Open-Channel Flow: Steady Uniform Flow (Chezy and Manning Equations)	30
37	Apr 26	Mon	12.8-9	Open-Channel Flow: Hydraulic Jumps and Weirs	31
38	Apr 28	Wed	14.1-5	Turbomachines: Pumps and Turbines	32
39	Apr 30	Fri	14.6-9	Turbomachines: Pump Performance, NPSH, Selection, and Similitude	33
40	May 03	Mon	13.1-3	Compressible Flow: The Mach Number	34
41	May 05	Wed	-	Exam 4 Review	-
42	May 07	Fri	11-12,14	EXAM 4	25-34
43	May 10	Mon	1-6,8-14	FINAL EXAM: 10:00am - 12:45pm (Comprehensive)	1-34