CE 360 FLUID MECHANICS
Summer Session I 2021
(Asynchronous)

INSTRUCTOR: Dr. Alfonso Mejia
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REQUIRED TEXT: Gerhart et al., *Munson, Young and Okiishi's Fundamentals of Fluid Mechanics*, 8th Edition, Wiley, New York, NY, 2018 (E-book available at WileyPLUS)

Videos and guided notes for this class will be made available through Canvas

GRADING:		
	Participation	10% (daily assigned problems)
	Homework 1-5	40% (weekly assigned problem set)
	Quizzes 1-5	50% (weekly)

Final grades will be based on the weighted-average specified above and assigned as follows:

- A = 94-100%
- A- = 90-93%
- B+ = 87-89%
- B = 84-86%
- B- = 80-83%
- C+ = 76-79%
- C = 70-75%
- D = 60-69%
- F < 60%

I reserve the right to adjust your grades. Your grade will only improve if adjustments are necessary. Feel free to contact me during office hours or by appointment if you have grade-related questions or concerns. I will provide regular grade postings to help you keep track of your progress in the course.

COURSE GOALS:
Enable you to understand and apply the fundamental principles governing incompressible fluids to the design of engineering systems. Fluids surround and affect everything in the physical world, consequently every major project you will be participating in as an engineer requires a sound understanding of the material covered in this course. This course represents a stepping stone in your professional development; it is intended to aid you in developing the skills you will need for systematic decomposition and solution of real-world problems.

ABET EDUCATIONAL OBJECTIVES:

- Gain a solid understanding of the basic principles of mathematics, science, and engineering.
- Be able to apply this understanding to advance your technical competency in Civil Engineering.
- Be able to use the techniques, skills, and modern engineering tools learned in this course for practice in Civil Engineering and/or graduate education.

ABET EDUCATIONAL OUTCOMES:

- An ability to apply your knowledge of mathematics, science, and engineering.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

PARTICIPATION:

At the end of each video lecture, I will assign daily 1 or 2 problems for you to apply the concepts covered in the lecture. Your solution to these problems will count as your class participation grade. You will need to make a reasonable attempt at getting the solution in order to get full participation credit for the day. These exercises will require that you **complete the assigned readings** prior to watching each video lecture. **Note that participation counts for 10% of your grade**.

HOMEWORK:
Homework will be assigned every week and due on Tuesday of the subsequent week. Late homework **will not** be accepted. Each assignment requires:

- A legible step-by-step presentation of the solutions (**include problem diagrams**).
- **Boxed answers** presented in proper units.

QUIZZES:
Closed-book quizzes will be given every week through Canvas on the dates listed below. You will be allowed to use **one-side of a 3"x5" note card** as a crib sheet for each quiz. You will need to submit this notecard at the end of the quiz. Make-up quizzes **will not** be given. In extreme cases, a quiz grade will be replaced by the average of your grades on the remaining quizzes (proof of illness or emergency will be required).

EXTRA CREDIT:
This course introduces you to the importance of fluids. I will increase your score on each homework assignment by 10% out of the total points possible (100%), if you find examples in online newspapers, magazines, or journals of real-world problems where the topics covered in this course play a vital role. **This extra credit activity applies to every homework**. Thus, if you successfully complete the extra credit activity with every homework, **you can earn up to 4 additional points** toward your final grade for the course. To complete the extra credit activity, you will need to submit, together with your homework assignment, a 1-paragraph (**between 250 to 350 words**), well-written synopsis that provides:

- A summary of the problem (in your own words).
- A brief discussion of how the problem relates to this class (what principles covered in class are important in solving the problem?).
- A professional reference for where you found the story.

ACADEMIC INTEGRITY
The College of Engineering' statement on academic integrity is available at http://www.engr.psu.edu/faculty-staff/academic-integrity.aspx. Please review this information as it provides details on what constitutes a violation of academic integrity, how violations are dealt with, and penalties for violations.

OFFICE FOR DISABILITY SERVICES
"Penn State welcomes students with disabilities into the University's educational programs. If you have a disability-related need for reasonable academic adjustments in this course, contact the Office for Disability Services (ODS) at 814-863-1807 (V/TTY). For further information regarding ODS, please visit the Office for Disability Services Web site at http://equity.psu.edu/ods/.
In order to receive consideration for course accommodations, you must contact ODS and provide documentation (see the documentation guidelines at http://equity.psu.edu/student-disability-resources/guidelines). If the documentation supports the need for academic adjustments, ODS will provide a letter identifying appropriate academic adjustments. Please share this letter and discuss the adjustments with your instructor as early in the course as possible. You must contact ODS and request academic adjustment letters at the beginning of each semester."

The course schedule is on the next page

COURSE SCHEDULE (subject to change, if topics require more lecture time)

Week	*Date*	*Topic*	*Reading*	*Assignments*
Week 1	M – May 17	Course introduction, dimensions	None	
	T – May 18	Physical properties, viscosity, compressibility	1.1-1.7	
	W – May 19	Vapor pressure, surface tension	1.8-1.9	
	Th – May 20	Fluid statics – hydrostatic distribution, pressure fields	2.1-2.4	
	F – May 21	Fluid statics – manometry	2.5-2.7	
Week 2	M – May 24	Fluid statics – forces on plane surfaces I	2.8	
	T – May 25	Fluid statics – forces on plane surfaces II	2.8	Homework #1 due
	W – May 26	Fluid statics – pressure prisms	2.9	
	Th – May 27	Fluid statics – pressures on curved surfaces	2.10	
	F – May 28	Fluid statics – buoyancy	2.11	Quiz #1
Week 3	M – May 31	Memorial Day Holiday – No Class ☺		
	T – Jun 1	Fluids in motion – Newton's 2nd law, acceleration along streamlines	3.1-3.3	Homework #2 due
	W – Jun 2	Fluids in motion – Bernoulli's equation I	3.4-3.5	
	Th – Jun 3	Fluids in motion – Bernoulli's equation II	3.6	
	F – Jun 4	Fluids in motion – energy & hydraulic grade lines	3.7-3.8	Quiz #2
Week 4	M – Jun 7	Fluids in motion – energy equation I	5.3	
	T – Jun 8	Fluids in motion – energy equation II	5.3	Homework #3 due
	W – Jun 9	Fluid kinematics – velocity and acceleration, control volume representation	4.1-4.3	
	Th – Jun 10	Fluid kinematics – conservation of mass	5.1	
	F – Jun 11	Fluid kinematics – linear momentum I	5.2	Quiz #3
Week 5	M – Jun 14	Fluid kinematics – linear momentum II	5.2	
	T – Jun 15	Fluid kinematics – angular momentum	5.2	Homework #4 due
	W – Jun 16	Dimensional analysis – Buckingham Pi theorem	7.1-7.3	
	Th – Jun 17	Dimensional analysis – modeling, similitude ***also late drop deadline****	7.4-7.6	
	F – Jun 18	Dimensional analysis – similitude	7.7-7.9	Quiz #4
Week 6	M – Jun 21	Viscous flow, boundary layers	9.1-9.2	
	T – Jun 22	Viscous flow in pipes, laminar and turbulent flow in pipes	8.1-8.3	Homework #5 due
	W – Jun 23	Dimensional analysis of pipe flow, Moody diagram	8.4	
	Th – Jun 24	Pipe flow losses, multi-flow pipe systems	8.5	
	F – Jun 25	Course review		Quiz #5