Lawrence Technological University
EME 3123 Fluid Mechanics

Course Description: A study of topics in fluid mechanics covering the areas most commonly used by mechanical and architectural engineers.

Text: *Munson, Young and Okiishi's Fundamentals of Fluid Mechanics*, 8th Edition, Gerhart, Gerhart, & Hochstein, 2016, John Wiley & Sons.

Blackboard: Check Blackboard. I will be using it to post assignments, a practice exam, help sheets, solutions, and announcements. If you do not use your LTU e-mail account, please update your Blackboard settings to the e-mail address that you do use.

Grading: I assume that all students are capable of mastering fluid mechanics and can earn an A if they aspire. The grading system presents an opportunity for students to show the professor that the subject has been mastered. Grades are based on points earned and not on competition between students for a limited number of A's and B's. I would be very pleased if 100% of the students earned A's.

Points Available:

Design	80 pts.	Design project will be assigned in class.
Homework	100 pts.	Actual points when determining grade….
Hour Exams	240 pts.	Three exams at 80 points each.
Quiz	18 pts.	Concepts from Chapters 4 and 6
Final Exam	160 pts.	Mostly comprehensive.
Total	598 pts.	

Bonus points may be available during the semester
(**Note**: Attend class and do your homework; a good grade is sure to follow.)

Grading Scale:

A	[100 – 90%],	A-	[89% – 88%]		
B+	[87 – 85%],	B	[84% – 80%],	B-	[79% – 78%]
C+	[77 – 75%],	C	[74% – 70%],	C-	[69% – 68%]
D+	[67 – 65%],	D	[64% – 60%],	D-	[59% – 58%]
F	< 58%				

Exams, homework, and design project: The first two exams will be closed reference. When these two exams are handed-out, a help sheet and any necessary tables will be included. The help sheet will have any of the basic equations needed, and includes many unit conversions and other useful information. This is the only reference allowed for the first two exams. I will post a sample help sheet on Blackboard prior to the exam for your use while studying, but only the copy distributed in class can be used during the exam. Exam 3 and the Final are open textbook, meaning you can only use the approved textbook for reference. I don't mind if you have notes written in the book, but no self-produced loose papers. Each exam is designed to be one hour in length, although if time permits, I will give you more than an hour to work the exam. The final exam will be comprehensive.

Homework is assigned often. I will collect and grade homework. Although you will be turning-in all

of the assigned problems, I may not grade each problem rigorously. I encourage you to work with other students from this class to brainstorm on how to solve the problems or to help out with learning the material, but do not simply copy from each other. If you choose to work with other students, please write their names on your assignment. Assignments are due at the beginning of the class period. At the very least, turn-in a sheet of paper with your name on it and the given information from each problem for one point each. Solutions to homework problems will be posted on Blackboard. Note: There is a direct correlation between doing your homework rigorously & genuinely and earning respectable grades on exams.

A design project (i.e., open-ended problem) will be assigned soon after the middle of the semester. Approximately one month is allotted for completion. I will check interim progress (e.g., preliminary designs) of your work to give some guidance and direction. The more you have completed for the interim check-ups, the more guidance I can give you, so put in a good effort early.

Academic Honor Code & Fraud Policy: The University has an Honor Code to recognize that academic honesty and integrity are fundamental values of the University Community. Cheating will not be tolerated. This includes plagiarism or copying assignments from any unauthorized source. (And yes, I do know about Chegg….Don't use it!) Anyone caught will be disciplined in accordance with current policies (which could entail an F for the course and a note in your academic record). You are required to have reviewed the Lawrence Tech Academic Honor Code. All undergraduate students are required to write the following pledge on all academic work submitted along with a signature.
"I have neither given nor received unauthorized aid in completing this work, nor have I presented someone else's work as my own."
If the pledge does not accompany an assignment, I can choose to not grade it. Note: It is very easy to unknowingly commit plagiarism on reports. Be very cautious because academic dishonesty will be taken very seriously given the professional nature of this course. Note 2: If I suspect fraud on homework, I reserve the right to discontinue the collection and grading of homework. This is not helpful to your grade for multiple reasons.

Office hours: (redacted)

Course Schedule (Exam dates can be swapped for a later date if necessary)**:**

Session	Date	Text	Topic
1	8/22	1.1-5	Introduction, Dimensions, Units
	8/22	1.1-9	Mechanical Properties of Fluids
2	8/24	1.1-9	Other Fluid Properties
	8/24	2.1-5	Pascal's Law, Pressure Variation in a Static Field
3	8/29	2.6-7	Manometry, Pressure Measurement
	8/29	2.8-9	Pressure Forces on Plane Surfaces
4	8/31	2.10	Pressure Forces on Curved Surfaces
	8/31	2.11	Buoyancy and Stability
5	9/5	3.1-3	A Special Form of the Energy Equation
	9/5	3.4-5	Static/Stagnation/Total Pressure
6	9/7	3.6-8	Bernoulli's Equation Examples
	9/7	3.6-8	Bernoulli's Equation Examples
7	9/12	4.1	Catch-up day and Kinematics
8	9/14		**EXAM 1 (covering Chapters 1-3)**
*** no class**	**9/19**	--	**Assessment Day for Faculty**

9		9/21	4.1-3	Control Volume (vs. System) Methodology,
		9/21	4.1-3	Level of Detail/Point of View
		9/21	4.4	Reynolds Transport Theorem
10		9/26	5.1	Continuity Applications
		9/26	5.2	Linear Momentum
11	**(no class)**	**9/28**	5.2	Momentum and examples
	(no class)	**9/28**	5.2	Momentum – moving control volume
12		10/3	5.3	General Energy and Mechanical Energy Equations
		10/3	5.3	Comparison to Bernoulli's Equation, Putting Continuity, Momentum, and Energy to use; Applications of CV
13		10/5	6.1-3	Differential Approach: Kinematics and Continuity
		10/5	6.1-3	Differential Analysis, Eulerian Derivative
14		10/10	6.4	Inviscid Flow, Euler & Bernoulli Equations
		10/10	6.5, 6.8	Potential Flow (Discussion only), Viscous Flow, Navier-Stokes Equations
15		10/12		**Quiz (Chapters 4 and 6 concepts)**
		10/12	7.1	Dimensional Analysis: Concept and Use
		10/12	7.2-3	The Pi Theorem
16		10/17	7.4-6	Standard Dimensionless Groups
			7.7-10	Modeling and Similitude
17		10/19	8.1	Internal/Pipe Flow
		10/19	8.2	Laminar Pipe Flow
18		10/24		**EXAM 2 (covering Chapters 4-6)**
19		10/26	8.3	Turbulent Pipe Flow
		10/26	8.4	Using the Pipe Flow Models, Moody Chart
20		10/31	8.4	Local/Minor Loss Models, Noncircular Conduits
		10/31	8.6	Flow Measurement
21		11/2	8.5	Pipe System Analysis
		11/2	7 & 8 all	Systems with Pumps, Review
22		11/7	9.1-2	External Flow Boundary Layer
		11/7	9.2	External Flow: Flat Plate
23		11/9	9.2	External Flow: Turbulence
		11/9	9.2-3	Pressure Gradients, Drag
24		11/14	9.3	Drag
		11/14	9.4	Lift
25		11/16	11.1-2,6	Thermodynamics & Flow, Stagnation Properties
		11/16	11.3-4,6	Speed of Sound, Mach Number
26		11/21		**EXAM 3 (covering Chapters 7-9)**
27		11/28	11.5	Shock Waves, Normal Shock
		11/28	11.7	Flow with Area Change
28		11/30	11.7	Converging/Diverging Nozzles
		11/30	--	Mass Flow and Choking
29		12/5	--	Catch-up
30		12/7	--	Catch-up and Review
31		12/13 (Wednesday)		**FINAL EXAM** (1:45 pm – 3:35 pm)