University of Tennessee at Chattanooga
College of Engineering and Computer Science
Department of Mechanical Engineering
Course Syllabus
ENME 3070L – Fluid Mechanics Laboratory 82287
Summer 2025

Instructor Information

Instructor:	Don C. Warrington, PhD., P.E., Adjunct Professor
Office Location:	EMCS 418F
Telephone:	Cell – (423)488-8590
E-mail:	Don-Warrington@mocs.utc.edu
Office Hours:	Online. Meetings (Zoom and face-to-face) can be arranged

Course Information

Course Location:	Online, videos filmed in ECS 105/106[1]
Class Times:	Online
Fee:	Differential course fee[2], $60/credit hour
	Lab/Studio fee, $25.
	Lab safety packet ~ $10

Course Description and Topics

Laboratories that include pressure, quantity and property measurements; impulse, momentum and energy concepts; hydrostatic and buoyancy forces; pump and turbine applications; open channel flow; wind tunnel studies. Design experience. Application of statistics. Fall and spring semesters. Prerequisite: ENCE 2220 or department head approval. Prerequisite or corequisite: ENME 3070 or department head approval. Laboratory/Studio course fee will be assessed. Differential course fee will be assessed.

[1] These videos were filmed while the Fluid Mechanics Laboratory was in both ECS 105 and 106. Since that time we have lost access to ECS 106. This directly affects two experiments: Pressure Gauge Testing and Flow Meters/Moody Chart. We have also switched wind tunnels since that time.

[2] Your instructor paid this for five years (2011-16) while he was pursuing his PhD at UTC. He feels your pain about this.

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Course Resources

- Campus Syllabus: This covers many things that have been mandated for the professor's syllabus but have been moved to one document for everyone. You need to read this, especially as they relate to topics such as academic integrity and student accommodations.
- Textbook: Handouts will be provided for each lab.

Course Technology Requirements

1. Students will need to be proficient in either Microsoft Word and Excel or Google Docs and Sheets. The instructor will be glad to be of assistance with any of these.

2. Many of the instructor's resources are web-based, including Javascript applications and YouTube videos. You will need to be able to access these.

3. Students are encouraged to carry their camera phone to the lab; most of the data is visual without computer output, this makes it much easier to record data, especially when it's moving.

4. Students should be able to read pdf files using Adobe Acrobat or another program suitable for the task. This is the best way to submit your lab reports.

5. If you have technology needs to access your courses and/or complete course requirements in Canvas, submit a request (https://new.utc.edu/information-technology/learning-from-home) with Information Technology.

Course Student Learning Outcomes

1. Course outcomes: After completion of the course students are expected to be able to:[3]
   (a) Determine whether a fluid is Newtonian, pseudoplastic or dilatant using viscosity measurements. (6)
   (b) Determine the buoyancy and stability characteristics of a model boat. (6)
   (c) Determine the lift and drag coefficients of objects in a wind tunnel. (6)

[3] Numbers in parentheses refer to Mechanical Engineering program outcomes, shown at the end of the Syllabus.

(d) Determine the thrust of a propeller in a test stand. (6)

Course Policies

1. You are studying to be a professional; therefore it is important for you to behave like one.
2. This is a completely online course. Each lab has a lab procedure in Canvas, a video with both lecture ("blab in lab") and the experiment performed on the video, and extensive online materials on the instructor's website. You need to read the procedure, watch both parts of the video, review the materials, and write your report based on the data in the video.
3. Questions are welcomed, encouraged, and noticed.
4. Other than the use of a spreadsheet and a word processor, no special technology requirements are required for this course. If you opt to load any of the software on the instructor's web site, the requirements for these are on the site.
5. All laboratory reports, including design proposals and group reports, are to be submitted in the appropriate place in UTC Learn in a format it accepts.. No other submission is allowed. All submissions subject to examination by Unicheck.
6. All laboratory reports will follow the report guidelines (see Report Layout and Guidelines).
7. Due dates: All laboratory reports are due as noted on UTC Learn. Each hour late results in a ½% reduction in the grade. All of the due dates are on Canvas, and they're most easily seen in the Calendar section.
8. If you have accessibility and accommodation requests, contact the Disability Resource Center (https://www.utc.edu/disability-resource-center/index.php) at 423-425-4006 or email DRC@utc.edu.
9. Safety Requirements:

(a) You must complete the CECS Laboratory Safety Quiz and complete and acknowledge the CECS Laboratory Safety Agreement, both of which are found on the UTC Learn site, during the first week of class. Failure to do so will result in your receiving an incomplete and not participating in the lab until you do so. You only need to complete this once during the academic year. If you have done so in a previous semester during the academic year, you are fine.

(b) You will be expected to adhere to these policies and guidelines at all times in the lab. Any employer you end up working for will have their own safety program in effect, so get used to it. It is for your protection and of those around you. Failure to do so may result in your expulsion from the lab.

(c) Food and drink are forbidden in the lab. We are not going to run an experiment to determine how fast drinks can flow on the floor.

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Laboratory Experiment Schedule

Due dates are announced on UTC Learn.

Experiment No.	Title	% of Grade
1	Least Squares Analysis and Curve Fitting	5
2	Calibration of Pressure Gauges	5
3	Viscosity	10
4	Buoyancy and Stability	10
5	Flow Meters, Minor Losses and Moody Chart	25
6	Hydraulic Jump	5
7	Rotating Drum	5
8	Wind Tunnel	15
9	Propeller	20

Please note the following about these experiments:

- Least Squares Analysis and Curve Fitting: this is not really an “experiment” but a data analysis exercise. Read the lab and instructor’s handouts carefully.
- Propeller Experiment: this is the newest experiment, as noted earlier the Flow Meter/Moody Chart and Wind Tunnel experiments have acquired new equipment.

There is no final exam.

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Grades:[4]

- 90 – 100: A
- 80 – 90: B
- 70 – 80: C
- 60 – 70: D
- < 60: F

CECS Laboratory Safety Agreement and Required Student Acknowledgment of Compliance with CECS Open Laboratory Policy

In consideration of my safety and effective education and that of my classmates, I agree to abide by all the following regulations, designed to minimize the hazards inherent in laboratory work.

I recognize that an uninformed, unprepared, or merely careless and inconsiderate person in the laboratory hinders the learning process and is a real danger not only to himself or herself, but to all others as well.

1. General Provisions
   a) Safety glasses, goggles or face shields will be worn at all times in the areas of the specified laboratories and the shop, regardless of what is being done.
   b) Hardhats will be worn at all times in the specified laboratories and the shop.
   c) Closed toe shoes will be worn in the laboratories at all times. Sleeved and collared shirts and long pants are proper laboratory attire.
   d) No horseplay is permitted at any time in the laboratories.
   e) Books, coats, and other personal items should be placed in a safe area of the laboratories. The University is not responsible for personal items left in laboratories.
2. Eating, drinking, smoking or chewing of tobacco is not permitted in the laboratories.
3. The locations of safety equipment (fire extinguisher, safety shower, eye-wash fountain, etc.) and their operation will be learned and committed to memory before

[4] This is for the final grade. Rubrics can be different.

any laboratory work is undertaken. The safety shower and eye-wash fountain will be tested on a regular basis.

4. Reports of cuts, burns, fume inhalation, etc., will be made immediately to the instructor.
5. Tasting of chemicals is forbidden unless otherwise authorized, and great care will be exercised in noting the odor of fumes. Experiments in which noxious or toxic gases may be liberated will be carried out in hoods.
6. Suction bulbs will be used rather than the mouth for filling pipettes.
7. Proper techniques will be observed for routine laboratory operations (boring corks, inserting only lubricated glass into rubber stoppers, etc.).
8. Laboratory bench tops, lockers, balances, reagent shelves, and hoods will be kept orderly at all times, and those responsible for spillage will clean up immediately.
9. No experiment may be performed unless the required study preparation has been completed.
10. If any equipment or apparatus or part is broken or inoperative, report it immediately to the instructor.

I have read, understand, and accept the foregoing as requirements of the course, realizing that failure to adhere strictly to these precautions is sufficient reason for expulsion from the laboratory and possible dropping from the laboratory course.

(To be agreed to on UTC Learn)

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ABET Student Learning Outcomes

1. An ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental and economic factors
3. An ability to communicate effectively with a range of audiences
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies