THE UNIVERSITY of TENNESSEE CHATTANOOGA

Department of Mechanical Engineering
Course Syllabus
ENME 3070L – Fluid Mechanics Laboratory (47425)
Fall 2017

Instructor Information

Instructor:	Don C. Warrington, PhD., P.E., Adjunct Professor
Office Location:	SimCenter 211
Telephone:	Cell – (423)488-8590
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Office Hours:	See schedule posted on UTC Learn.

Course Information

Course Location:	EMCS 106
Class Times:	M 2:00 – 4:50 (1 credit hour)
Fee:	Differential course fee, $56/credit hour and 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 semester. Prerequisite: ENGR 2220 or dept. head approval. Prerequisite or corequisite: ENME 3070 or dept. head approval Fall and spring semesters. Prerequisite: ENGR 2220 or department head approval. Prerequisite or corequisite: ENGR 3070 or department head approval. Fall and spring semesters. Prerequisite: ENGR 2220 or department head approval. Prerequisite or corequisite: ENGR 3070 or department head approval. Fall and spring semesters. Prerequisite: ENGR 2220 or department head approval. Prerequisite or corequisite: ENGR 3070 or department head approval. 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

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Course Resources

- UTC Learn Website – http://www.utc.edu/learn (use UTC id and password.) UTC Learn website includes links to all lab safety material, including the UTC CECS Laboratory Safety Manual, the Laboratory Safety Video, and the Laboratory Safety Test. This also includes a link to the instructor's own website, which has many useful resources (including some that will save a great deal of time and error.)
- Textbook: Handouts will be provided for each lab.
- If you have problems with your UTC email account or with UTC Learn, contact IT Solutions Center at 423-425-4000 or email itsolutions@utc.edu.

Course Student Learning Outcomes

1. Course outcomes: After completion of the course students are expected to be able to:
   (a) Understand the general characteristics of measurement systems
   (b) Understand measurement systems with electrical signals
   (c) Understand and apply knowledge of computerized data acquisitions systems
   (d) Understand and apply knowledge of discrete sampling and analysis of time varying signals
   (e) Apply statistical analysis of experimental data
   (f) Apply experimental uncertainty analysis

(g) Understand, apply & select measurement sensors of solid mechanical quantities

(h) Understand, apply & select measurement sensors of pressure, temperature, and humidity

(i) Understand, apply and select measurement sensors of fluid flow rate, fluid velocity, fluid level and combustion pollutants.

2. The following student outcomes are addressed by the course:

(a) This course supports outcomes (b) (BSME, BSE) An ability to design and conduct experiments, as well as to analyze and interpret data; (k) (BSE) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Course Policies

1. You are studying to be a professional; therefore it is important for you to behave like one.
2. If you are late to class 1 time there is no penalty. If you are late to class (up to 15 minutes) after this 3 points will be taken from the next lab. Over 15 minutes will be 10 points.
3. If you know you will miss a lab let me know as soon as possible. Depending on the reason you may be able to schedule a make-up in one of the other sections.
4. Questions are welcomed, encouraged, and noticed.
5. 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.
6. All laboratory reports, including design proposals and group reports, are to be submitted in pdf (Adobe Acrobat) format via UTC Learn. No other submission is allowed. All submissions subject to examination by SafeAssign.
7. If you have an emergency which requires you to leave your cell phone on please see me before class and sit near an exit.

8. All laboratory reports will follow the report guidelines (see Report Layout and Guidelines).
9. Due dates: All laboratory reports are due one week after experiments are performed unless otherwise stated. One late report will be accepted up to one week after the experiment with a 10% reduction in total available grade. After the second week reports will not be accepted. A second late report will not be accepted.
10. Safety Requirements:
    (a) You must complete and acknowledge the CECS Laboratory Safety Agreement, which is found on the UTC Learn site, during the first week of class. Failure to do so will result in your receiving and incomplete and not participating in the lab until you do so.
    (b) If you have not already done so earlier, you must a) view the Safety Video and b) take the Safety Test, both of which are either found or accessed from the UTC Learn site. Failure to do so will have the same consequences as (a) above.
    (c) 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.
    (d) Food and drink are forbidden in the lab. We are not going to run an experiment to determine how fast drink can flow in the floor.
11. Honor Code Pledge: I pledge that I will neither give nor receive unauthorized aid on any test or assignment. I understand that plagiarism constitutes a serious instance of unauthorized aid. I further pledge that I exert every effort to ensure that the Honor Code is upheld by others and that I will actively support the establishment and continuance of a campus-wide climate of honor and integrity.
12. UTC's Academic Integrity Policy is stated in the Student Handbook.
13. Course evaluations are an important part of our efforts to continuously improve the learning experience at UTC. Toward the end of the semester, you will receive a link to evaluations and are expected to complete them. We value

your feedback and appreciate you taking time to complete the anonymous evaluations.

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Laboratory Experiment Schedule

Due dates are announced on UTC Learn.

Experiment No.	Title	% of Grade
1	Logarithmic Plotting	5
2	Calibration of Pressure Gages	5
3a	Design of Viscosity Experiment	3
3b	Conduct Viscosity Experiment	7
4	Hydrostatic Forces/Body Stability	10
5	Rotational Motion	10
6	Calibration of Flow Meters	15
7	Gate Valve Head Losses	20
8a	Wind Tunnel Experiment Design	10
8b	Wind Tunnel Experiment	15

No final exam.

Grades:

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

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CECS Laboratory Safety Agreement and Required Student Acknowledgement 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 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 or 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)