EN-4112 – Thermo-Fluids Laboratory
Syllabus and Lab Schedule - Fall 2020

INSTRUCTOR: Mark Whalen, P.E.
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508-317-976 (mobile)

OFFICE HOURS: Monday 3-4pm, Tuesday 11am-noon, Wednesday 1-2pm, or by appointment

PREREQUISITES: Thermodynamics EN-3211
Fluid Mechanics EN-4111 (pre- or co-requisite).

LEARNING OBJECTIVES: At the completion of this course, the student should be able to:

- demonstrate knowledge and understanding of the following STCW elements:
  - OICEW-A4.1 Principles of fluid flow
  - OICEW-A5.1 Operational characteristics of pumps
  - OICEW-A5.1 Operational characteristics of piping systems
- write professional technical documents
- organize and display data in a logical and professional manner
- apply fluids and thermodynamic concepts to physical systems
- conduct basic engineering experiments
- analyze data and formulate engineering conclusions
- appreciate the differences between theoretical and actual engineering systems

CLASS FORMAT: This class will be conducted in a synchronous online format that mirrors in-person on-campus classes. You are expected to attend every class on-time and stay until the end; attendance will be graded. Audio and video presence will be required for every class. If you do not have audio and video capability on your laptop, you will need to obtain this capability to pass this course. Student participation in class will be part of your grade. A video presence will be required during all quizzes. No recordings will be made by the professor or allowed by any student during class sessions. The default online class platform will be Blackboard Collaborate with Zoom or Google Meet used as backups if required.

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GRADING: **This laboratory is an STCW knowledge course. A 70% or better overall grade is required to pass this course.**
The overall course grade consists of the following components:

- Lab Worksheets 40%
- Quizzes 40%
- Lab Reports 20% (10% each)

ATTENDANCE: NO LAB MAKE-UPS UNLESS ABSENCE IS DOCUMENTED
(watch, sickness, varsity athletics). **One (1) unexcused absence will result in loss of 10% of overall grade and loss of grade for quizzes administered at that meeting. More than one (1) unexcused absence will result in failure of the laboratory**.

For full attendance credit each student must:

1. Come prepared for lab with the following materials
    - Functional laptops, with video and audio capability, and with Excel spreadsheet software installed
    - Lab notebooks (quizzes are open notes)
    - Calculators (cell phones not permitted for quizzes)
    - Pens, pencils, straight edges for charts.
    - USB sticks for file transfers (optional but helpful)
2. Arrive on time and remain in video and audio attendance until the lab is completed.
3. Be attired in the assigned uniform of the day or suitable professional attire. Boiler suits are not authorized for this lab.
4. Correctly complete and present all assigned lab calculations to the instructor before the end of the lab period.

QUIZZES: Weekly open-note quizzes will be administered based on topics of the previous lab activities. You must have a video presence for the entire quiz. Open notes and textbook are allowed, as long as they are at your desk when the quiz is announced. You are not allowed to leave your desk during quizzes; use the restroom before you come to class.

You will be required to submit a copy of the quiz to Blackboard within 5 minutes of the end of the assigned quiz time, so you will need access to a either a scanner or the capability to take an image with your mobile phone and download the file to Blackboard. If you are absent or do not have a video presence you will get zero credit for the quiz.

LAB ACTIVITY: Data from lab activities will be collected in teams or provided to you, but calculations and Excel work are to be done by each individual student during the lab period. You will receive a 10% reduction if you do not complete the lab during the lab period. You will receive a further 30% deduction if the lab is not received by the end of the day of the lab. Submissions late than one day after the lab will be scored as zero credit.

REPORTS: Students will be required to write two (2) technical reports describing laboratory experiments and findings. Each of these reports shall be done by the individual student. These reports shall be neat, professional, and free of technical, grammatical, and spelling errors. The format of the report will be discussed when the reports are assigned. Use of the Writing Resource Center is not mandatory but is highly encouraged.

All lab worksheets and reports will be submitted electronically by email or to Blackboard, as instructed. Due dates for each report will be provided. Late submissions will not be accepted and a grade of 0 will be applied, no exceptions.

LAB SCHEDULE:

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TOPIC	Tue	Wed	Fri	Assignment
1. Density	8-Sep	9-Sep	11-Sep	Worksheet
2. Calorimetry	15-Sep	16-Sep	18-Sep	Worksheet
3. Ideal Gas Law	22-Sep	23-Sep	25-Sep	Worksheet
4. Refrigeration	29-Sep	30-Sep	2-Oct	Report
5. HVAC & Psychometrics	6-Oct	7-Oct	9-Oct	Worksheet
6. Mass Flow & Mass Conservation	20-Oct	14-Oct	16-Oct	Worksheet
7. Transition Reynolds Number	27-Oct	21-Oct	23-Oct	Worksheet
8. Piping Major Losses	3-Nov	28-Oct	30-Oct	Report
9. Fitting Minor Losses	10-Nov	4-Nov	6-Nov	Worksheet
10. Centrifugal Pump	17-Nov	18-Nov	20-Nov	Worksheet
NO LABS -Thanksgiving Week				
11. NPSH	1-Dec	2-Dec	4-Dec	Worksheet
12. PID	8-Dec	9-Dec	11-Dec	Worksheet