



EML 4147C | Thermal Sciences Design and Laboratory

Class Number: All sections

Instructor Information

Kurt Schulze

Teaching Assistants

Name: TBD

Email: TBD

Office Hours: TBD

Class Number: 17990

Course Details

Catalog Description: Thermodynamics, fluid mechanics, and heat transfer integrated with design and laboratory.

Pre- and Co-Requisites: Prereq: EML 3100 with a minimum grade of C and EML 3301C and EML 4140.

Credit Hours: 3

Course Fees: \$143.73

Additional Course Description

Thermodynamics, fluid mechanics, and heat transfer integrated with design and laboratory, including turbomachinery and heat exchanger design, phase-change heat transfer, thermodynamics of mixtures, psychometry, mass transfer, sensible heat recovery, pipe flow, turbomachinery, refrigeration, and combustion. Topics will vary from semester to semester.

Required Materials

FUNDAMENTALS OF HEAT AND MASS TRANSFER

ISBN: 9781118869437

Authors: INCROPERA, DEWITT, BERGMAN

Publisher: WILEY

Edition: 6

All Access: This course uses UF All Access

FUNDAMENTALS OF THERMODYNAMICS

ISBN: 9780470041925

Authors: BORGNAKKE, SONNTAG

Publisher: WILEY

Edition: 7TH

All Access: This course uses UF All Access

FUNDAMENTALS OF FLUID MECHANICS

ISBN: 9781119547990

Authors: MUNSON

Publisher: WILEY

Edition: 8

All Access: This course uses UF All Access

A Note on Materials

Any recent addition of thermo, heat transfer or fluid mechanics is acceptable.

Course Goals and Objectives

The objective of this course is to provide an intermediate level coverage of thermodynamic, fluid mechanic, and heat transfer topics integrated with design and laboratory experiences. This course stresses fundamental engineering science applied to thermal design and laboratory applications. Students will be exposed to open-ended thermal design topics and will be expected to communicate the design process through written and oral communication. Students are expected to gain a deeper understanding of fundamental thermal concepts via the laboratory experience. The collection procedure and analysis of experimental data will also be communicated through written reports

Expectations and Student Learning Outcomes

See above.

Relation to Program Outcomes (ABET):

ABET Outcomes

ABET Program Outcomes	
Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
1. 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	High
1. An ability to communicate effectively with a range of audiences	High
1. 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	N/A

ABET Program Outcomes	
1. 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	High
1. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	High
1. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	High

Methods of Evaluation

- Pre-lab Quizzes 5%
- Lab Reports 75%
- Design Project 25%

Grading Scale

Letter grade and percentage

Letter	Percentage Value
A	94 - 100%
A -	90 - 93%
B +	87 - 89%
B	83 - 86%
B -	80 - 82%
C +	77 - 79%

Letter	Percentage Value
C	73 - 76%
C -	70 - 72%
D +	67 - 69%
D	63 - 66%
D -	60 - 62%
E	59% and below

Course Schedule

Course Schedule

Date	Course Schedule
Lecture	PowerPoint slides posted in Canvas
5/12	No Powerpoint
5/12	Lab 1 - First Law of Thermodynamics.pptx
5/12	Lab 1 - First Law of Thermodynamics applied to a horizontal pipe and elbow.pptx , Calculation of Head Loss - Effect of diameter Download Calculation of Head Loss - Effect of diameter
5/19	Lab 2 - Turbomachinery 1
5/19	Lab 2 - Turbomachinery 2, Example 14.1, Example_14.1 spreadsheet Download Example_14.1 spreadsheet, h water explanation
5/26	Lab 2 - Turbomachinery 3 - Turbomachine analysis
5/26	Lab 2 - Turbomachinery 4 - Turbomachine analysis mod
5/26	Lab 2 - Turbomachinery 5, Turbocharger calculation Download Turbocharger calculation, Turbocharger animation Links to an external site.
6/2	Lab 2 - Turbomachinery 6 - Cavitation, NPSH
6/2	Cavitation video Links to an external site.
6/2	Lab 3 - Heat Exchanger 1
6/9	Lab 3 - Heat Exchanger 2
6/9	Lab 3 - Heat Exchanger 3
6/9	Lab 3 - Heat Exchanger 4
6/16	Lab 4 - Cooling Tower 1
6/16	Lab 4 - Cooling Tower 2
6/30	Lab 4 - Cooling Tower 3
6/30	Lab 4 - Cooling Tower 4

Date	Course Schedule
6/30	Lab 4 - Cooling Tower 5
7/7	Engine fundamentals
7/14	Lab 5 The Air Standard Cycle
7/31	Design Project
8/1	Design Project
8/1	Design Project

University Policies and Resources

Information about grading policies, support for students with disabilities, course evaluations, the Honor Code, and other course policies and campus resources can be found on the [Syllabus Policies page](#).

Attendance Policy

Excused and Unexcused Absences

Students may only participate in classes if they are registered officially or approved to audit with evidence of having paid audit fees. The Office of the University Registrar provides official class rolls to instructors.

Students are responsible for satisfying all academic objectives as defined by the instructor. Absences count from the first-class meeting.

Acceptable reasons for absence from or failure to engage in class include illness; Title IX-related situations; serious accidents or emergencies affecting the student, their roommates, or their family; special curricular requirements (e.g., judging trips, field trips, professional conferences); military obligation; severe weather conditions that prevent class participation; religious holidays; participation in official university activities (e.g., music performances, athletic competition, debate); and court-imposed legal obligations (e.g., jury duty or subpoena). Other reasons (e.g., a job interview or club activity) may be deemed acceptable if approved by the instructor.

For all planned absences, a student in a situation that allows an excused absence from a class, or any required class activity must inform the instructor as early as possible prior to the class. For all unplanned absences because of accidents or emergency situations, students should contact their instructor as soon as conditions permit.

Students shall be permitted a reasonable amount of time to make up the material or activities covered during absence from class or inability to engage in class activities because of the reasons outlined above.

If a student does not participate in at least one of the first two class meetings of a course or laboratory in which they are registered, and they have not contacted the department to indicate their intent, the student can be dropped from the course. Students must not assume that they will be dropped, however. The department will notify students if they have been dropped from a course or laboratory.

The university recognizes the right of the instructor to make attendance mandatory and require documentation for absences (except for religious holidays), missed work, or inability to fully engage in class. After due warning, an instructor can prohibit further attendance and subsequently assign a failing grade for excessive absences.

Religious Holidays Guidelines

At the University of Florida, students and faculty work together to allow students the opportunity to observe the holy days of their faith. A student should inform the faculty member of the religious observances of their faith that will conflict with class attendance, with tests or examinations, or with other class activities prior to the class or occurrence of that test or activity. The faculty member is then obligated to accommodate that particular student's religious observances. Because students represent a myriad of cultures and many faiths, the University of Florida is not able to assure that scheduled academic activities do not conflict with the holy days of all religious groups. Accordingly, individual students should make their need for an excused absence known in advance of the scheduled activities.

The Florida Board of Education and state law govern university policy regarding observance of religious holidays.

Guidelines

- Students, upon prior notification to their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith.
- Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.
- Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances.

If a faculty member is informed of or is aware that a significant number of students are likely to be absent from class because of a religious observance, the faculty member should not schedule a major exam or other academic event at that time.

A student who is to be excused from class for a religious observance is not required to provide a second party certification of the reason for the absence. Furthermore, a student who believes that they have been unreasonably denied an education benefit due to religious beliefs or practices may seek redress through the student grievance procedure.

Absence due to Illness

A student who is absent from class or any required class-related activity because of illness should contact their instructor, if feasible, as early as possible prior to the missed class or activity.

Students shall be permitted a reasonable amount of time to make up the material or activities covered during an excused absence.

Students should contact their college by the deadline to drop a course for medical reasons. Students can petition the Dean of Students Office to drop a course for medical reasons. The university's policy regarding medical excuse from classes is maintained by the Student Health Care Center.

Twelve-Day Rule

Students who participate in university-sponsored athletic or scholarly activities are permitted to be absent 12 scholastic days per semester without penalty. A scholastic day is any day on which regular class work is scheduled as defined in the approved university calendar.[More Info](#)

The student or student's advisor must notify the instructor as early as possible prior to the anticipated absence to allow ample time for accommodations. Instructors must be flexible and not penalize students when re-scheduling during-term and final exams, class assignments, and other required activities and must follow the UF Attendance Policy herein and UF Examination Policies. As noted in the UF Examination Policies, during-term exams should be re-scheduled no later than before the end of the semester, while final exams no later than 90 days after the originally scheduled exam time. However, instructors are encouraged to re-schedule final and during-term exams, assignments, and other activities as soon as possible after the last day of the absence and must not penalize the student in any way.[More Info](#)

A group's schedule that requires absence of more than 12 scholastic days should be adjusted so that no student is absent from campus more than 12 scholastic days. Students who previously have been warned in writing by their instructor about the impact of absences on their individual class performance should not incur additional absences, even if they have not been absent 12 scholastic days. The student is responsible to maintain satisfactory academic performance and attendance.

Course Policies and Resources

It is the policy of the University of Florida that you attend all classes. Attendance will be recorded for all laboratory periods and design activities. You must complete pre-lab assessment and perform each lab to receive credit for the lab. You must perform the lab during your regularly scheduled period. Re-scheduling of labs will be in accordance with the policy shown on the course website.

Important: In this course, all lab reports are group lab reports. That means that all the analysis and write-up is to be the groups own individual work. Information (including data) may not be shared among groups. You may discuss lab concepts and procedures with classmates, and you may get help on how to perform an analysis, but whatever work you turn in, ultimately must be work performed only by members of the group. You may not share tables, graphs, spreadsheets, etc., with other groups unless specifically authorized. You may not refer to or use old lab reports from previous semesters in any way even if you were the author. You may not refer to a lab report from the current semester unless it is your own. Any plagiarism on a group report will be the responsibility of the whole group, not just one individual. One person cannot assume responsibility for the group. If you as an individual plagiarize, you are putting your whole group at risk, and all members will share in the consequences.

Late and Make Up Work Policy

If you have an event that causes you to be absent from any lab period, you may make up the lab. For example, if you have a job interview that causes you to miss Week 2 of a lab, that counts as a missed lab, but you can make it up. To be eligible for the make-up option, you must let your undergraduate TA know at least 24 hours in advance of the lab. If your lab partners are willing to be re-scheduled with you, you can still work together. If your partners are not able to re-schedule, you will have to do the lab and report by yourself.

Classroom Behavior

Class is started on time. On many occasions, notes have already been placed on the board to expedite starting on time. Students are expected to be on time or early. Engineers are expected to be on time for meetings and you are expected to be on time for classes. Cell phones need to be silent or off.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted, please contact your instructor or any of the following:

- Your academic advisor or Undergraduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu

Course Outline

There is one extended lecture per week, 1st and 2nd period.. On the Canvas website under "Modules", "Labs" are the topics and activities that will be covered during the laboratory sections. There is a pre-lab video and pre-lab quiz associated with each lab session that must be completed prior to performing the lab. You will have one period to perform each experiment. Therefore, it is very important you work out your protocol prior to the lab so that you can expedite the actual experiment when that time comes. Attendance is expected for all classes.

This course also includes a design activity. The scope of the design will be assigned during the first part of the semester.

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Required Computer

Recommended Computer Specifications: <https://it.ufl.edu/get-help/student-computer-recommendations/>

HWCOE Computer Requirements: <https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/>