Thermodynamics 1

EML 3100 Section 4594
Class Periods: T, 11:45 AM - 1:40 PM, H, 12:50 PM - 1:40 PM,
Location: Weil 0270
Academic Term: Fall 2025

Instructor:
Dr. Jonathan Scheffe
jscheffe@ufl.edu
352-392-0839
NEB 229
Office Hours: M (10:00 am – 11:30am), W (3:00 pm – 4:30pm), Location – Office, NEB 229

Teaching Assistant/Peer Mentor/Supervised Teaching Student:
Please contact through the Canvas website

- Grad TA - Lucas Brauchli, lbrauchli@ufl.edu
- Paula Aguirre Gonzalez, paguirregonzalez@ufl.edu
- Adam Gulde, adamgulde@ufl.edu
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- Natalya Medina, natalyamedina@ufl.edu
- Samuel Palleija, spalleija@ufl.edu
- Office Hours: TBD – NEB 526

Course Description
Application of the first and second laws of thermodynamics to closed and open systems and to cyclic heat engines. Includes the development of procedures for calculating the properties of multiphase and single-phase pure substances.

Course Pre-Requisites / Co-Requisites
Prerequisites: CHM 2045, MAC 2313 and PHY 2048. Credits: 3

Course Objectives
The objective of this course is for students to learn about energy conversion to describe physical systems relevant to today's world. Such systems include, but are not limited to, fossil fuel powered fired power plants, renewable power plants, combustion engines, Stirling engines, refrigeration, heat pumps and chemical reactors. Systems will be described applying the laws of energy and mass conservation and their application to of the Second Law of Thermodynamics. This class will provide a framework to understand the fundamentals of energy conversion from a somewhat broad and macroscopic perspective, going into fine mechanistic details of specific systems only sporadically. With the skillset obtained in this class, students will have the necessary tools to understanding and analyze a broad range energy conversion processes, a necessary prerequisite for the ultimate design and engineering of more cost effective and efficient systems in the future.

Materials and Supply Fees
NA

Relation to Program Outcomes (ABET):
The table below is an example. Please consult with your department's ABET coordinator when filling this out.

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
2. An ability to apply engineering design to produce solutions that meet specified needs with	Low

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	Low
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	Low
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	Medium
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Medium
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- *Python 3, Anaconda, Jupyter Lab, https://scheffelab.com/html*

Recommended Materials

- *Thermodynamics, An Engineering Approach,* Cengel, Boles, and Kanoglu,10th Edition, ISBN10: 1265903530 | ISBN13: 9781265903534

Course Schedule

Week 1 – Introductory Concepts
Week 2 – Energy Transfer and the First Law of Thermodynamics
Weeks 3 and 4 – Properties of Pure Substances, **Exam 1 Sept. 23rd, 2025**
Weeks 5 and 6 – Closed System Analysis
Weeks 7 and 8 – Open System Analysis - **Exam 2 Oct. 21st, 2025**
Week 9 – Second Law of Thermodynamics
Week 10 – Spring Break
Week 11 and 12 – Entropy
Week 13 – Gas Power Cycles
Weeks 14 and 15 – Vapor and Combined Power Cycles - **Exam 3 Nov. 20th, 2025**
Week 16 – Refrigeration Cycles (time permitting)
Final Exam - 12/12/2025 @ 7:30 AM - 9:30 AM

Attendance Policy, Class Expectations, and Make-Up Policy

Regular attendance is expected but attendance is not factored into the grade for the course. Contact the instructor in a timely manner to arrange any make-up work.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies: https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/

If you need extra accommodations for homework or exams please reach out to the Disability Resource Center by visiting https://disability.ufl.edu/students/get-started/ - more information below.

Evaluation of Grades

Assignment	Percentage of Final Grade
Homework	25%
Exam 1	15%
Exam 2	15%
Exam 3	15%
Final Exam	30%

Homework

A series of small homework questions will be provided every couple of lectures complete. Assignments will be given one week prior to their due date (during class and posted on Canvas), and must be turned in prior to the assigned due date. 50% of the grade will be based on correctness of a randomly determined question and 50% based on effort. All homework must be submitted electronically as a pdf that is easily legible. Answers should be clearly indicated.

Exams

Three mid-term exams and one final exam will be given. Each mid-term examination is worth 15% of the course grade and the final exam is worth 30%. All exams will be graded based on the correctness of final answers, but partial credit will be given. Full credit will be given for answers that are incorrect because of previously incorrect answers (i.e. cascading effects will not be possible). No examinations will be dropped, however one of the two scenarios (whichever results in a greater course average) will be used to amend your final course average:

1) If the final exam score is higher than any of the three midterms, the final exam score will be used in place of the lowest midterm.
2) The standard deviation of all midterm exam scores will be taken and added to your lowest midterm exam.

All exams will be performed in-class on the dates indicated in the course schedule. More details to follow as the semester progresses.

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Students Requiring Accommodations
Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting https://disability.ufl.edu/students/get-started/. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Academic Policies & Resources
To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

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