

Thermodynamics 1

EML 3100 Section 132B

Class Periods: MWF, Period 3, 9:35 AM - 10:25 AM

Location: FLG 0230

Academic Term: Spring 2024

Instructor:

Dr. Jonathan Scheffe

jscheffe@ufl.edu

352-392-0839

Office Hours: T (10:00 am – 11:30am), H (2:00pm – 3:30 pm), MAE-A 208

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

- Taylor Johnson, johnsontaylor@ufl.edu
- Jason Hackett, jason.hackett@ufl.edu
- Jazmine Sandoval, jazminesandoval@ufl.edu
- Sanjeev Saravanan, sanjeevg.saravan@ufl.edu

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	High
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	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	
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	Low

*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

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

Recommended Materials

- NA

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 January 31st, 2024**

Weeks 5 and 6 – Closed System Analysis

Weeks 7 and 8 – Open System Analysis - **Exam 2 February 29th, 2024**

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 April 11th, 2024**

Week 16 – Refrigeration Cycles (time permitting)

Final Exam - 4/30/2024 @ 10:00 AM - 12:00 PM

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 Project	30%

Homework

A series of small homework questions will be provided most weeks to 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.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive 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, including the elimination of discrimination.

It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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

- Your academic advisor or Graduate Program Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

On-Line Students Complaints: <https://distance.ufl.edu/getting-help/>; <https://distance.ufl.edu/state-authorization-status/#student-complaint>.