

Thermodynamics EML 3100 Section 27G3



Syllabus

M-W-F Period 7 (1:55 PM – 2:45 PM), FLG 280

Catalog 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. *Prerequisites:* CHM 2045, MAC 2313 and PHY 2048. *Credits:* 3

Instructor: Subrata Roy, Professor, Department of Mechanical and Aerospace Engineering,
Office: MAE-B 336, *Email:* roy@ufl.edu, *Office Phone:* 352-392-9823

Supervised Teaching Assistants: Arman Ghannadian (ghannadian.arman@ufl.edu)
Riddhideep Biswas (rbiswas@ufl.edu)

Textbook:

“Thermodynamics: An Engineering Approach”; Yunus Cengel and Michael Boles; McGraw Hill; Ninth Edition or higher, ISBN: 9781260048360

Office Hours: Prof. Roy: NEB 435 Monday 12:50 PM – 1:40 PM (also available over email roy@ufl.edu)

Supervised Teaching Assistants:

Arman Ghannadian (ghannadian.arman@ufl.edu) : TBA
Riddhideep Biswas (rbiswas@ufl.edu) : TBA

Online Course Information:

Course Objectives: The objective of this course is for students to learn about energy conversion in order 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, sterling 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.

Relevance: All (or almost all) energy ultimately is derived from the sun. The suns photons are converted in nature to heat, wind, biomass and rain, all of which can be further transformed into heat, work or electricity via a number of processes and thermodynamic cycles. As such, energy and energy conversion surround and sustain our daily lives, from the sunlight used to grow food, to its transportation via rail, ship or truck, to its storage in our refrigerators, to electricity provided from fossil or renewable sources. Our metabolic cycles convert the energy stored in our food to do work, analogously to the way a combustion engine converts the energy stored in gasoline to drive a car. Understanding the concept of energy and mass conservation will allow one to approach, analyze and appreciate these systems from a simplified energetic point of view to the more complex underlying mechanisms driving them.

Grading: A: 93-100, A-: 90-92, B+: 87-89, B: 83-86, B-: 80-82, C+: 77-79, C: 73-76, C-: 70-72, D+ 67-69, D: 63-66, D-: 60-62, Fail: <60

Grading Scale:

Homework: 10%,

Exam 1: 20%, February 7, 2025 (In class)

Exam 2: 20%, March 7, 2025 (In class)

Exam 3: 20%, April 11, 2025 (In class)

Final Exam: 30% **May 1, 2025 @ 0730-0930 AM (FLG 280)**

Homework: A series of small homework questions will be provided to complete. Assignments will be posted on Canvas at least one week prior to their due dates, and must be turned in prior to class on the due date. **Maximum of ten homework assignments total. Only one problem from each homework assignment will be graded.** *Show all work, clearly mark answers, state assumptions, and be neat.* 50% of the grade will be based on correctness of the work and 50% based on effort. All homework must be turned in on ruled, printer or engineering paper and stapled, with your name clearly labeled on all pages. Answers should be clearly indicated. Paper torn from spiral notebooks or not stapled will not be graded.

Exams: Three mid-term exams and **one comprehensive final exam** will be given. Each mid-term examination is worth 20% of the course grade and the final exam is worth 30%. Final Exam will be comprehensive. *Show all work, clearly mark answers, and be neat.*

All exams will be graded based on the correctness of final answers but partial credit will be given. 100% credit will be given for correct answers with appropriate work shown. 75% credit will be given for correct work shown with calculator errors. A range from 0-75% will be awarded for incorrect work shown. Full credit will be given for answers that are incorrect because of previously incorrect answers (i.e. cascading effects will not be possible). **No examination will be dropped.**

Attendance Policy, Class Expectations, and Make-Up Policy

Lecture attendance is imperative. Although attendance will not be taken or used in assigning grades, students will be held responsible for knowing all changes made to scheduling and all class announcements. There is a direct correlation between class attendance and class success. During class, cell phones must be turned off or muted. Don't bring food to class.

Note: Although information will be posted on the website, class announcement prevails in case there are discrepancies.

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/>

Make-up Policy: Late homework will not be accepted, except under extenuating circumstances. Make-up exams will not be granted except in cases of emergency and will be handled on a case-by-case basis.

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>.