



## EML 3100 | Thermodynamics

Class Number: 13788

### Instructor Information

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Bruce Carroll

### Course Details

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**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.

**Pre- and Co-Requisites:** Credits: 3; Prereq: CHM 2045, MAC 2313 and PHY 2048.

**Credit Hours:** 3

**Course Fees:** \$0.00

### Additional Course Description

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This course provides intermediate-level coverage of thermodynamics. Students will learn concepts such as system and control volume analyses, evaluation of thermodynamic properties, application of conservation of mass, energy, and the second law of thermodynamics, the use of entropy, the application of availability and irreversibility to engineering problems, and analysis of power and refrigeration cycles.

### Required Materials

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**THERMODYNAMICS AN ENGINEERING APPROACH**

**ISBN:** 9781265259570

**Authors:** CENGEL, BOLES, KANOGLU

**Publisher:** MCGRAW HILL

**Edition:** 10TH

**All Access:** This course uses UF All Access

## Course Goals and Objectives

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At the end of this course, the student will be able to:

- Describe and analyze closed and open systems.
- Apply conservation of mass, the first law of thermodynamics, and the second law of thermodynamics to engineering problems.
- Identify and utilize thermodynamic properties of solids, liquids, and gases
- Solve thermodynamic cycle problems for internal combustion engines, power plants, and refrigeration systems

## Expectations and Student Learning Outcomes

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See above.

## Methods of Evaluation

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- Course Readings 10%
- Homework 15%
- Exam 1 25%
- Exam 2 25%
- Exam 3 25%

## Grading Scale

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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%
C	73 - 76%

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

## Course Schedule

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### Course Schedule (Tentative)

Day	Date	Topics
M	5/11	Introduction and Basic Concept (Chap 1)
W	5/13	Basic Concept (Chap 1), Forms of Energy (Chap 2)
F	5/15	Forms of Work, First Law of Thermodynamics (Chap 2)
M	5/18	Example Problems
W	5/20	Pure Substances, Phase-Change and Diagrams (Chap 3)
F	5/22	T-v, P-v, P-T diagrams, Property Tables (Chap 3)
M	5/25	Holiday
W	5/27	Saturation Liquid and Saturated Vapor (Chap 3)
F	5/29	Equations of State (Chap 3)
M	6/1	Examples
W	6/3	<b>Exam 1</b>
F	6/5	Energy Analysis of Closed Systems (Chap 4)
M	6/8	Specific Heat, Internal Energy, Enthalpy (Chap 4)
W	6/10	Control Volume Analysis, Conservation of Mass (Chap 5)
F	6/12	Flow Work, Energy Analysis of Steady-Flow Systems (Chap 5)
M	6/15	Examples
W	6/17	Second Law of Thermodynamics (Chap 6)
F	6/19	Holiday
M	6/22	Summer Break
W	6/24	Summer Break
F	6/26	Summer Break
M	6/29	Heat Engines (Chap 6)
W	7/1	Refrigerators and Heat Pumps (Chap 6)
F	7/3	Holiday
M	7/6	Reversible and Irreversible Processes, Carnot Cycle (Chap 6)

Day	Date	Topics
W	7/8	<b>Exam 2</b>
F	7/10	Entropy, Clausius Inequality (Chap 7)
M	7/13	Entropy Change of Pure Substances (Chap 7)
W	7/15	Entropy Change of Liquids, Solids, and Ideal Gases (Chap 7)
F	7/17	Reversible Flow, Compressor Work, Isentropic Efficiency (Chap 8)
M	7/20	Entropy Balance for Closed and Open Systems (Chap 8)
W	7/22	Gas Power Cycles (Chap 10)
F	7/24	Otto, Diesel, Brayton Cycles (Chap 10)
M	7/27	Examples
W	7/29	Rankine Cycles (Chap 11)
F	7/31	Rankine Cycles (Chap 11)
M	8/3	Refrigeration Cycles (Chap 12)
W	8/5	Refrigeration Cycles (Chap 12)
F	8/7	<b>Exam 3</b>

## University Policies and Resources

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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

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### 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**

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Regular class attendance is expected as it will improve your performance in the course.

## **Late and Make Up Work Policy**

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Late HW and makeup exams are only allowed for students with documented circumstances consistent with UF policy. Students must contact the instructor as soon as possible to provide documentation and request a make-up exam. Excused absences must be consistent with university policies in the undergraduate catalog and require appropriate documentation. For more information on UF policies see <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

## **Relation to Program Outcomes (ABET)**

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This course achieves the following ABET outcomes [note that the outcome number corresponds to the respective ABET outcomes (1) through (7)]:

(1) Outcome 1: Ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (High)

(2) Outcome 3: Ability to communicate effectively with a range of audiences (Low).

(3) Outcome 4: 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).

(4) Outcome 7: Ability to acquire and apply new knowledge as needed, using appropriate learning strategies (Low)

## **Commitment to a Positive Learning Environment**

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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 by discrimination or harassment of any kind, 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

## **Important Dates**

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- 6/2/2026 Exam 1
- 7/7/2026 Exam 2
- 8/6/2026 Exam 3

## **Required Computer**

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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/>