Elements of Thermodynamics and Heat Transfer
EML 3007  Section 107H, 2F69

Class Periods:  MWF, 4th period, 11:45 am – 12:35 pm
Location:  CSE E122
Academic Term:  Fall 2019

Instructor:
Philip B. Jackson, Ph.D.
philipb@ufl.edu
(352) 392 - 4521
Office Hours:  MW, 1:00 pm – 3:00 pm, NSC 202E

Teaching Assistants:
Please contact through the Canvas website
- Ryan Winslow, rwins88@ufl.edu, see Canvas for office hours
- Amanda Goldberg, amandagoldberg@ufl.edu, see Canvas for office hours

Course Description
Credits: 3
Applications of the first and second laws of thermodynamics to closed and open systems. Steady one-dimensional conduction, lumped parameter analysis, convection, radiation. Intended for non-mechanical engineering students.

Course Pre-Requisites / Co-Requisites
CHM 2045, MAC 2313, and PHY 2048

Course Objectives
This course provides an undergraduate coverage of basic thermodynamic processes. The course emphasizes the fundamental principles of control volume analysis to both open and closed systems, the application of conservation of energy and conservation of mass, the concept of entropy and thermodynamic losses, and the general calculation of various state properties. Students will learn to apply these concepts through exposure to numerous practical engineering problems. Upon completion of the course, students are expected to have developed a thorough understanding of the fundamentals of thermodynamics and problem solving techniques applicable to heat and fluid transfer systems.

Materials and Supply Fees
None

Professional Component (ABET):
None

Relation to Program Outcomes (ABET):

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Coverage*</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Apply knowledge</td>
<td>Medium</td>
</tr>
<tr>
<td>b1. Conduct experiments</td>
<td></td>
</tr>
<tr>
<td>b2. Statistical design of experiments</td>
<td></td>
</tr>
<tr>
<td>c. Design</td>
<td>Low</td>
</tr>
<tr>
<td>d. Function on teams</td>
<td></td>
</tr>
<tr>
<td>e. Solve problems</td>
<td>High</td>
</tr>
<tr>
<td>f. Professional and ethical responsibility</td>
<td>Low</td>
</tr>
<tr>
<td>g. Communicate</td>
<td></td>
</tr>
<tr>
<td>h1. Economic impact</td>
<td>Low</td>
</tr>
<tr>
<td>h2. Global, societal, and environmental impact</td>
<td>Low</td>
</tr>
<tr>
<td>i. Lifelong learning</td>
<td></td>
</tr>
</tbody>
</table>
j. Contemporary issues | Low
k. Techniques, skills, and tools for degree program | High

'Coverage is given as high, medium, or low. An empty box indicates that this outcome is not part of the course.

**Required Textbooks and Software**
- Fundamentals of Thermal-Fluid Sciences
- Cengel, Y., Cimbala, J., and Turner, R.
- 2016, 5th Edition
- 9781259934025

(course notes are developed by the instructor)

**Recommended Materials**
- None

**Course Schedule**
- Week 1: Introduction, Laws, Basic Definitions, Units, Thermodynamic Properties
- Week 2: Properties of pure simple substances, Thermodynamic Processes
- Week 3: Work and Heat
- Week 4: First Law, Enthalpy, Internal Energy, Specific Heat, Conservation of Mass
- Week 5: First Law Analysis for a Closed System
- Week 6: First Law Analysis for an Open System
- Week 7: Second Law of Thermodynamics, Entropy
- Week 8: Second Law Analysis of Open Systems
- Week 9: Power and Refrigeration Cycles
- Week 10: Thermodynamics of environmental systems
- Week 11: Internal combustion thermodynamics
- Week 12: The Mechanisms of Heat Transfer
- Week 13: Steady-State Heat Conduction
- Week 14: Convection Heat Transfer
- Week 15: Thermal Radiation

**Attendance Policy, Class Expectations, and Make-Up Policy**
Class attendance is optional. Those who have no scheduling conflicts with the recording of live lectures are encouraged to attend but doing so is not mandatory. All homework will be submitted electronically and all quizzes will be administered through Canvas.

**Evaluation of Grades**

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Total Points</th>
<th>Percentage of Final Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework Sets (6-8)</td>
<td>100 each</td>
<td>20%</td>
</tr>
<tr>
<td>Quizzes (4-6)</td>
<td>100 each</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 1</td>
<td>100</td>
<td>20%</td>
</tr>
<tr>
<td>Exam 2</td>
<td>100</td>
<td>20%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>100</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Grading Policy**

<table>
<thead>
<tr>
<th>Percent</th>
<th>Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>90.0 - 100</td>
<td>A</td>
<td>4.00</td>
</tr>
<tr>
<td>89.0 - 89.9</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>87.0 - 88.9</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>80.0 - 86.9</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>79.0 - 79.9</td>
<td>B-</td>
<td>2.67</td>
</tr>
</tbody>
</table>
Students Requiring Accommodations
Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [https://www.dso.ufl.edu/drc](https://www.dso.ufl.edu/drc)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Course Evaluation
Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at [https://evaluations.ufl.edu/evals](https://evaluations.ufl.edu/evals). Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at [https://evaluations.ufl.edu/results/](https://evaluations.ufl.edu/results/).

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/policies/student-honor-code-student-conduct-code/](https://sccr.dso.ufl.edu/policies/student-honor-code-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 broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

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
• Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@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](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:** [http://www.counseling.ufl.edu/cwc](http://www.counseling.ufl.edu/cwc) 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/](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](https://lss.at.ufl.edu/help.shtml).


- **Library Support**, [http://cms.uflib.ufl.edu/ask](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/](https://teachingcenter.ufl.edu/).

