Thermodynamics ENGR 3316
Department of Mechanical Engineering
Spring 2020

A. COURSE INFORMATION

Course number/section:  ENGR 3316.001
Class meeting time:  LEC: MWF 01:00-01:50 P.M.
Class location:  OCNR-117
Course Website:  Blackboard

B. INSTRUCTOR INFORMATION

Instructor:  Zhaorui Li Ph.D.
Office location:  EN-316R
Office hours:  TR 09:00 A.M -11:30 A.M
Telephone:  361-825-4170
E-mail:  zhaorui.li@tamucc.edu
Appointments:  Correspond using ISLANDER email

C. COURSE DESCRIPTION

Introduction to the basic concepts of thermodynamics and laws governing the conservation of mass and energy in open and closed systems. Emphasis on thermodynamic properties of steam vapor and ideal gas. Theory and application of the first and second laws of thermodynamics into analysis of basic power and refrigeration cycles.

D. PREREQUISITES AND COREQUISITES

Prerequisites
PHYS 2425 – University Physics I and MATH 2414 – Calculus II

Corequisites
None

E. REQUIRED TEXTBOOK(S), READINGS AND SUPPLIES


Or


Optional Textbook(s) or Other References
None
Supplies
None
F. **STUDENT LEARNING OUTCOMES AND ASSESSMENT**

Assessment is a process used by instructors to help improve learning. Assessment is essential for effective learning because it provides feedback to both students and instructors. A critical step in this process is making clear the course’s student learning outcomes that describe what students are expected to learn to be successful in the course. The student learning outcomes for this course are listed below. By collecting data and sharing it with students on how well they are accomplishing these learning outcomes students can more efficiently and effectively focus their learning efforts. This information can also help instructors identify challenging areas for students and adjust their teaching approach to facilitate learning.

By the end of this course, students should be able to:

1. Understand basic concepts of systems & properties and define states, processes, and cycles as per thermodynamics
2. Demonstrate the ability to determine the properties of real substances, such as steam and refrigerant 134-a, and ideal gases from either tabular data or equations of state.
3. Identity and define the closed systems and open systems or control volumes.
4. Define and apply the First Law (or energy conservation) and Second Law principles (or concept of entropy) to open and closed systems.
5. Understand the concept of irreversibility and thermal efficiencies of various cycles and devices.
6. Apply thermodynamic knowledge to analyze gas/vapor power cycles and refrigeration cycles as used to model internal combustion engines, power cycles (turbines) used in power plans, and refrigerator.

G. **INSTRUCTIONAL METHODS AND ACTIVITIES**

Lectures, group discussions, home assignments, spreadsheet-based calculations, textbook software for computer-aided solutions. Students are expected to have read/review the chapter before coming to the class.

H. **MAJOR COURSE REQUIREMENTS AND GRADING**

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
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</thead>
<tbody>
<tr>
<td>Homework</td>
<td>10</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10</td>
</tr>
<tr>
<td>Exams (2 @ 25% each)</td>
<td>50</td>
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<tr>
<td>Final Exam</td>
<td>30</td>
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</tbody>
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# I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>WEEK</th>
<th>Days/Date</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>01/22 &amp; 01/24</td>
<td>Intro &amp; Chap 1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>01/27 &amp; 01/29 &amp; 01/31</td>
<td>Chap 1 &amp; Chap 2</td>
<td>HW, Quiz</td>
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<tr>
<td>3</td>
<td>02/03 &amp; 02/05 &amp; 02/07</td>
<td>Chap 2 &amp; Chap 3</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>4</td>
<td>02/10 &amp; 02/12 &amp; 02/14</td>
<td>Chap 3</td>
<td>HW, Quiz</td>
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<tr>
<td>5</td>
<td>02/17 &amp; 02/19 &amp; 02/21</td>
<td>Review &amp; Exam 1* (02/21)</td>
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<tr>
<td>6</td>
<td>02/24 &amp; 02/26 &amp; 02/28</td>
<td>Chap 4</td>
<td></td>
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<tr>
<td>7</td>
<td>03/02 &amp; 03/04 &amp; 03/06</td>
<td>Chap 4 &amp; Chap 5</td>
<td>HW, Quiz</td>
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<tr>
<td>8</td>
<td>03/16 &amp; 03/18 &amp; 03/20</td>
<td>Chap 5 &amp; Review</td>
<td>HW, Quiz</td>
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<tr>
<td>9</td>
<td>03/23 &amp; 03/25 &amp; 03/27</td>
<td>Exam 2* (03/23) &amp; Chap 6</td>
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<td>10</td>
<td>03/30 &amp; 04/01 &amp; 04/03</td>
<td>Chap 6</td>
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<tr>
<td>11</td>
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<td>Chap 6 &amp; Chap 7</td>
<td>HW, Quiz</td>
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<td>Chap 7</td>
<td>HW, Quiz</td>
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<td>13</td>
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<td>Chap 7 &amp; Chap 9</td>
<td>HW, Quiz</td>
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<td>14</td>
<td>04/27 &amp; 04/29 &amp; 05/01</td>
<td>Chap 9</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>15</td>
<td>05/04 &amp; 05/06</td>
<td>Chap 9 &amp; Review</td>
<td>HW, Quiz</td>
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<td>FE</td>
<td>May 13</td>
<td>11:00am-1:30pm</td>
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*Target dates may be adjusted depending on material covered.

Note: Changes in this course schedule may be necessary and will be announced to the class by the Instructor. The assignments and exams shown are directly related to the Student Learning Outcomes described in Section F.

# J. COURSE POLICIES

**Attendance/Tardiness**

Attendance is mandatory and any absences should have university approval and inform instructor in advance. Showing up to take the quiz and leaving will not count as attendance, will be factored into grade at the end of semester.

**Quizzes:** Closed book and notes. Concept, vocabulary, brief workout, and problems are set up based on lectures and examples from the class and/or homework from previous weeks. Some may require calculators, some may not. Among those 10 quizzes, only 8 of them with higher scores will be averaged and factored into the final grade at the end of term.
Exams:

- **Closed book and notes**: necessary equations and property tables will be provided
- workout problems only.
- Only calculators (recommend ones that can interpolate) are allowed. No smart devices, tablets, computers, etc. are allowed.
- **Final example is comprehensive and will cover all chapters** taught

Assignments: Homework due day will be announced/printed on each assignment. Multiple problems will be assigned and all of them will be graded. So, to avoid missing grade, students should complete all assigned problems. The neater and more coherent the work, the better grade may be expected.

Late Work and Make-up Exams

**Late Homework**: Late submission of homework will be subjected to lowering of Maximum points (1 day late, 15% off, 2-3 days late, 30% off, 4+ days late, 60% Off). Homework submission is not accepted after the graded work has been returned to the class.

**Make-up Exam**: will only be allowed with a valid (university approved) excuse. Exams need to be made up within one week from the missed time. Make-up exam may be different with what was given to other students.

Extra Credit

Up to 5 points extra credit may be granted to some students who show excellent behavior in the classes, which include answering instructor’s questions actively (1 pt.), having perfect attendance record (2 pts), completing course evaluation on time (2 pts).

Cell Phone Use

During the class, cell phone should be muted and can only be used for emergency purposes. If you have a potential need, set it to vibrate only and speak to phone outside the classroom. No recording of the lectures is allowed without express written consent of the instructor or expressed authorization by disability services.

Laptop Use

In general, use of laptop is prohibited during class unless have instructor’s approval.

Food in Class

No eating or drinking is permitted during class.

Missed Exam

Make-up exam will only be allowed with a valid (university approved) excuse.

Participation

Students are expected to play an active role in class by asking or answering questions.
Emailing
Must use your Islander Email. If emailing, must include course number and section in subject heading as well as purpose of email. Example: ENGR2316.001: Missed quiz 10.

Others
Blackboard will be used through the semester to provide access to notes, example problems, and notifications regarding quizzes, homework, exams, projects, and so forth.

K. COLLEGE AND UNIVERSITY POLICIES

• Academic Integrity (University)
University students are expected to conduct themselves in accordance with the highest standards of academic honesty. Academic misconduct for which a student is subject to penalty includes all forms of cheating, such as illicit possession of examinations or examination materials, falsification, forgery, complicity or plagiarism. (Plagiarism is the presentation of the work of another as one’s own work.) In this class, academic misconduct or complicity in an act of academic misconduct on an assignment or test will result in a failing grade.

• Classroom/Professional Behavior
Texas A&M University-Corpus Christi, as an academic community, requires that each individual respect the needs of others to study and learn in a peaceful atmosphere. Under Article III of the Student Code of Conduct, classroom behavior that interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of other students to profit from the instructional program may be considered a breach of the peace and is subject to disciplinary sanction outlined in article VII of the Student Code of Conduct. Students engaging in unacceptable behavior may be instructed to leave the classroom. This prohibition applies to all instructional forums, including classrooms, electronic classrooms, labs, discussion groups, field trips, etc.

• Statement of Civility
Texas A&M University-Corpus Christi has a diverse student population that represents the population of the state. Our goal is to provide you with a high-quality educational experience that is free from repression. You are responsible for following the rules of the University, city, state and federal government. We expect that you will behave in a manner that is dignified, respectful and courteous to all people, regardless of sex, ethnic/racial origin, religious background, sexual orientation or disability. Behaviors that infringe on the rights of another individual will not be tolerated.

• Deadline for Dropping a Course with a Grade of W (University)
I hope that you never find it necessary to drop this or any other class. However, events can sometimes occur that make dropping a course necessary or wise. Please consult with your academic advisor, the Financial Aid Office, and me, before you
**decide to drop this course.** Should dropping the course be the best course of action, you must initiate the process to drop the course by going to the Student Services Center and filling out a course drop form. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Please consult the Academic Calendar ([http://www.tamucc.edu/academics/calendar/](http://www.tamucc.edu/academics/calendar/)) for the last day to drop a course.

- **Grade Appeals (College of Science and Engineering)**
  As stated in University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures, a student who believes that he or she has not been held to appropriate academic standards as outlined in the class syllabus, equitable evaluation procedures, or appropriate grading, may appeal the final grade given in the course. The burden of proof is upon the student to demonstrate the appropriateness of the appeal. A student with a complaint about a grade is encouraged to first discuss the matter with the instructor. For complete details, including the responsibilities of the parties involved in the process and the number of days allowed for completing the steps in the process, see University Procedure 13.02.99.C2.01, Student Grade Appeal Procedures. These documents are accessible through the University Rules website at [http://www.tamucc.edu/provost/university_rules/index.html](http://www.tamucc.edu/provost/university_rules/index.html), and the College of Science and Engineering Grade Appeals webpage at [http://sci.tamucc.edu/students/GradeAppeal.html](http://sci.tamucc.edu/students/GradeAppeal.html). For assistance and/or guidance in the grade appeal process, students may contact the chair or director of the appropriate department or school, the Office of the College of Science and Engineering Dean, or the Office of the Provost.

- **Disability Services**
  The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please call (361) 825-5816 or visit Disability Services in Corpus Christi Hall 116.

  If you are a returning veteran and are experiencing cognitive and/or physical access issues in the classroom or on campus, please contact the Disability Services office for assistance at (361) 825-5816.

  [http://disabilityservices.tamucc.edu/](http://disabilityservices.tamucc.edu/)

- **Statement of Academic Continuity**
  In the event of an unforeseen adverse event, such as a major hurricane and classes could not be held on the campus of Texas A&M University–Corpus Christi; this course would continue through the use of Blackboard and/or email. In addition, the syllabus and class activities may be modified to allow continuation of the course. Ideally, University facilities (i.e., emails, web sites, and Blackboard) will be
operational within two days of the closing of the physical campus. However, students need to make certain that the course instructor has a primary and a secondary means of contacting each student.

L. OTHER INFORMATION

- Academic Advising
  The College of Science & Engineering requires that students meet with an Academic Advisor as soon as they are ready to declare a major. The Academic Advisor will set up a degree plan, which must be signed by the student, a faculty mentor, and the department chair. Meetings are by appointment only; advisors do not take walk-ins. Please call or stop by the Advising Center to check availability and schedule an appointment. The College’s Academic Advising Center is located in Center for Instruction 350 or can be reached at (361) 825-3928.

GENERAL DISCLAIMER

I reserve the right to modify the information, schedule, assignments, deadlines, and course policies in this syllabus if and when necessary. I will announce such changes in a timely manner during regularly scheduled lecture periods.