Thermodynamics ENTC 3420
Department of Mechanical Engineering
Spring 2016

A. COURSE INFORMATION

Course number/section: ENTC 3420.001 & ENTC 3420.201
Class meeting time: LEC: TR 02:00-03:15 P.M. LAB: TR 03:30-04:45 P.M.
Class location: EN-106
Lab location: EN-111
Course Website: Blackboard

B. INSTRUCTOR INFORMATION

LEC Instructor: Zhaorui Li Ph.D.
Office location: EN-316R
Office hours: MWF 10:00 A.M-12:00 P.M
Telephone: 361-825-4170
E-mail: zhaorui.li@tamucc.edu
Appointments: Correspond using ISLANDER email

LAB Instructor: Ronald Carlson
Office location: EN-219
Telephone: 361-825-3272
E-mail: ronald.carlson@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

Optional Textbook(s) or Other References
None

Supplies
Lab: Data log book (Composition/Quad ruled, 5 to 1”, sewn bond seam

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 equilibrium.
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 the closed systems and open systems or control volumes.
4. Define and apply the First Law (or energy conservation) to open and closed systems.
5. Define and apply the Second Law principles to open and closed systems.
6. Define and apply the concept of entropy to processes in open and closed systems.
7. Understand the concept of irreversibility and thermal efficiencies of various cycles and devices.
8. Apply thermodynamic knowledges 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

Assignment is based on student’s ability to apply core knowledge and principles as well as ability to identify and present and solve problems.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>% of FINAL GRADE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams (2 @ 20% each)</td>
<td>40</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10</td>
</tr>
<tr>
<td>Homework, Attendance, others</td>
<td>5</td>
</tr>
<tr>
<td>Lab (Log book/quizzes (5%), mini-reports (10%), Project(team) (10%)</td>
<td>25</td>
</tr>
<tr>
<td>Final Exam</td>
<td>20</td>
</tr>
</tbody>
</table>

I. COURSE CONTENT/SCHEDULE

<table>
<thead>
<tr>
<th>WEEK</th>
<th>Days/Date</th>
<th>CHAPTER(S)</th>
<th>ASSIGNMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 21</td>
<td>Intro &amp; Chap 1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Jan 26 &amp; 28</td>
<td>Chap 1 &amp; Chap 2</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>3</td>
<td>Feb 2 &amp; 4</td>
<td>Chap 2 &amp; Chap 3</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>4</td>
<td>Feb 9 &amp; 11</td>
<td>Chap 3</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>5</td>
<td>Feb 16 &amp; 18</td>
<td>Review and Exam 1*</td>
<td>HW, Exam</td>
</tr>
<tr>
<td>6</td>
<td>Feb 23 &amp; 25</td>
<td>Chap 4</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>7</td>
<td>Mar 1 &amp; 3</td>
<td>Chap 5</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>8</td>
<td>Mar 8 &amp; 10</td>
<td>Chap 6</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>9</td>
<td>Spring Break – No classes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mar 22 &amp; 24</td>
<td>Chap 6 and Review</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>11</td>
<td>Mar 29 &amp; 31</td>
<td>Exam 2* (Mar 29) &amp; Chap 7</td>
<td>HW, Exam</td>
</tr>
<tr>
<td>12</td>
<td>Apr 5 &amp; 7</td>
<td>Chap 7</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>13</td>
<td>Apr 12 &amp; 14</td>
<td>Chap 7 &amp; Chap 9</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>14</td>
<td>Apr 19 &amp; 21</td>
<td>Chap 9 &amp; Chap 10</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>15</td>
<td>Apr 26 &amp; 28</td>
<td>Chap 10 &amp; Chap 11</td>
<td>HW, Quiz</td>
</tr>
<tr>
<td>16</td>
<td>May 3</td>
<td>Review</td>
<td></td>
</tr>
<tr>
<td>FE</td>
<td>May 10</td>
<td>Final Exam: 1:45-4:15 pm</td>
<td></td>
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</tbody>
</table>

*Target dates may be adjusted depending on material covered.
<table>
<thead>
<tr>
<th>WEEK</th>
<th>Days/Date</th>
<th>Topic</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Jan 21</td>
<td>Intro to Lab, Lab safety</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Jan 26 &amp; 28</td>
<td>Measurement basics, Instrumentation basics</td>
<td>Research report</td>
</tr>
<tr>
<td>3</td>
<td>Feb 2 &amp; 4</td>
<td>Lab exercise 1 (Temperature measurements part 1)</td>
<td>Quiz, Short report</td>
</tr>
<tr>
<td>4</td>
<td>Feb 9 &amp; 11</td>
<td>Lab exercise 2 (Temperature Measurements part 2)</td>
<td>Short report</td>
</tr>
<tr>
<td>5</td>
<td>Feb 16 &amp; 18</td>
<td>Lab exercise 3 (Non-contact temperature measurements)</td>
<td>Quiz</td>
</tr>
<tr>
<td>6</td>
<td>Feb 23 &amp; 25</td>
<td>Lab exercise 4 (Non-contact temperature measurements)</td>
<td>Report</td>
</tr>
<tr>
<td>7</td>
<td>Mar 1 &amp; 3</td>
<td>Digital measurements discussion</td>
<td>Quiz, Research report</td>
</tr>
<tr>
<td>8</td>
<td>Mar 8 &amp; 10</td>
<td>Digital lab exercise 1</td>
<td>Report</td>
</tr>
<tr>
<td>9</td>
<td>Spring Break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Mar 22 &amp; 24</td>
<td>Digital lab exercise 2</td>
<td>Quiz Report</td>
</tr>
<tr>
<td>11</td>
<td>Mar 29 &amp; 31</td>
<td>Design considerations/Project discussion</td>
<td>Quiz</td>
</tr>
<tr>
<td>12</td>
<td>Apr 5 &amp; 7</td>
<td>Project Proposal</td>
<td>Proposal rep</td>
</tr>
<tr>
<td>13</td>
<td>Apr 12 &amp; 14</td>
<td>Project</td>
<td>Prog report</td>
</tr>
<tr>
<td>14</td>
<td>Apr 19 &amp; 21</td>
<td>Project</td>
<td>Prog report</td>
</tr>
<tr>
<td>15</td>
<td>Apr 26 &amp; 28</td>
<td>Project</td>
<td>Quiz, Final Report</td>
</tr>
<tr>
<td>16</td>
<td>May 3</td>
<td>Present project</td>
<td></td>
</tr>
</tbody>
</table>

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 term.

**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 week. 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.
- Combination of concept questions (fill in blank, TF, multiple choice, short answer) and workout problems.
- 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 is due on every **Tuesday at the start of class.** Multiple problems will be assigned but may be randomly selected (still same for all students) for grading. So, to avoid missing grade, students should complete all assigned problems. The neater and more coherent the work, the better grade may be expected.

Laboratory Format and Policy
The laboratory will be a mixture of lectures and lab activities. Students will be required to:
- Apply appropriate safety practices at all times.
- Maintain a lab log book.
- Submit reports as specified by the instructor for the respective activity.
- Generate a project proposal regarding measurements and submit reports accordingly.

Attendance is mandatory.

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
No extra credit is planned at this time.

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: ENTC3420.001: Missed quiz 10.

Safety
The safety of students, faculty, staff and visitors to the ET laboratories is a major issue. You Must follow safety procedures and use personal protective equipment as required. Skateboards and other large cumbersome equipment needs to be kept in the front of the room. All walkways must be kept clear.

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)**
  The grade of W will be assigned to any student officially dropping a course. Please consult with the instructor before you decide to drop to be sure it is the best thing to do. Just stopping attendance and participation WILL NOT automatically result in your being dropped from the class. Should dropping the course be the best course of action, visit the Office of the University Registrar for the Course Drop Form that must submitted. No student is eligible to receive a W without completing the official drop process by this deadline. 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/

- **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.

1. **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.