MEET 3990 APPLIED THERMODYNAMICS

Fall 2015
M W F 8:30-9:20 a.m. NTDP B157

Instructor: Dr. Huseyin Bostanci
Office: NTDP F115L
Office Hours: W 9:30 a.m.-12:30 p.m.
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Course Description
Principles of energy balance and substance behavior as related to different engineering systems. Topics include gas laws, laws of thermodynamics, relationship between thermodynamics variables, thermodynamic tables and charts, power cycle and various applications. Pre-Requisite: CHEM 1410/1430, MATH 1720, PHYS 1710/1730.

Course Objectives (ABET\ASME program outcomes and program educational objectives supported)
1. Know units of pressures and temperatures applicable to thermodynamics. (a,b,f,l,m)
2. Understand the properties of pure substances. (a,b,f,l,m)
3. Know energy transfer by heat and mass. (a,b,f,l,m)
4. Understand the first law with respect to energy balances. (a,b,f,l,m)
5. Know the second law to find efficiencies including the Carnot cycle for heat engines and refrigerators. (a,b,f,l,m)
6. Understand the concept of entropy and reversible processes. (a,b,f,l,m)
7. Understand gas power cycles. (a,b,f,l,m)
8. Understand vapor and combined power cycles. (a,b,f,l,m)
9. Know the refrigeration cycles. (a,b,f,l,m)

Student Learning Outcomes (Course objectives supported)
a. Convert from different systems of units and use the most applicable. (1)
b. Calculate material properties. (1,2)
c. Manipulate energy conversations. (1,3)
d. Use the first law and calculate temperature changes. (1, 2, 3,4)
e. Calculate the efficiency of Carnot engines and refrigerators. (1, 2, 3,5)
f. Use the concept of entropy to analyze cycles. (1, 2, 3,6)
g. Calculate the power output and efficiencies of gas power systems. (1, 2, 3,7)
h. Calculate the power output and efficiencies of vapor power systems. (1, 2, 3,8)
i. Calculate the coefficients of performance for refrigerators. (1, 2, 3,9)

Required Text/Associated Software

Course Outline
This is a tentative course outline. Instructor will attempt to follow it closely, and reserves the right to substitute any other relevant material at any point throughout the course.
University of North Texas

Grading Criteria

<table>
<thead>
<tr>
<th>Homework</th>
<th>5%</th>
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<tbody>
<tr>
<td>Exam 1</td>
<td>25%</td>
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<tr>
<td>Exam 2</td>
<td>25%</td>
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<tr>
<td>Final Exam</td>
<td>40%</td>
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<tr>
<td>Attendance, Attitude, Participation</td>
<td>5%</td>
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Expected Grade Distribution

A: ≥90%, B: 80-89%, C: 70-79%, D: 60-69%, F: <60%

Policies and Procedures

1. Attendance is required, and will be taken regularly at the beginning of the classes. Discussions and demonstrations during lecture contain important information to do well on exams.
2. The course website, Blackboard Learn, at learn.unt.edu will be used for posting course materials, assignments, and grades, as well as for email communications. Students are encouraged to check the course website often.
3. Students will complete regularly assigned homework that has to be submitted on time -by the following week on Friday at the beginning of class (8:30 a.m.)- for grading. Late submissions will get zero grade. The lowest grade from the homework assignment will be dropped when calculating the average grade at the end of the semester.
4. This course provides opportunities for students to take advantage of several software packages supported by the department in the classroom or in lab experiments, in simulation studies, homework assignments, or in projects.
5. There will be no make-up exams or assignments unless you have a documented university excused absence. If you know in advance that you will miss an exam, you must contact instructor before the scheduled exam.

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<thead>
<tr>
<th>Week of</th>
<th>Lecture content</th>
<th>Chp.</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1 08/24/15</td>
<td>Chp. 1,2</td>
<td>1</td>
<td>Introduction and Basic Concepts</td>
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<tr>
<td>2 08/31/15</td>
<td>Chp. 2,3</td>
<td>2</td>
<td>Energy, Energy Transfer, and General Energy Analysis</td>
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<tr>
<td>3 09/07/15</td>
<td>Chp. 3</td>
<td>3</td>
<td>Properties of Pure Substances</td>
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<td>4 09/14/15</td>
<td>Chp. 4</td>
<td>4</td>
<td>Energy Analysis of Closed Systems</td>
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<tr>
<td>5 09/21/15</td>
<td>Chp. 4, Review (Chp. 1-4)</td>
<td>5</td>
<td>Mass and Energy Analysis of Control Volumes</td>
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<tr>
<td>6 09/28/15</td>
<td>Exam 1 (Chp. 1-4), Chp. 5</td>
<td>6</td>
<td>The Second Law of Thermodynamics</td>
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<td>7 10/05/15</td>
<td>Chp. 5,6</td>
<td>7</td>
<td>Entropy</td>
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<tr>
<td>8 10/12/15</td>
<td>Chp. 6,7</td>
<td>9</td>
<td>Gas Power Cycles</td>
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<td>9 10/19/15</td>
<td>Chp. 7</td>
<td>10</td>
<td>Vapor and Combined Power Cycles</td>
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<td>10 10/26/15</td>
<td>Chp. 7,9</td>
<td>11</td>
<td>Refrigeration Cycles</td>
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<td>11 11/02/15</td>
<td>Chp. 9</td>
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<td>12 11/09/15</td>
<td>Review (Chp. 5-9), Exam 2 (Chp. 5-9), Chp. 10</td>
<td>12</td>
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<td>13 11/16/15</td>
<td>Chp. 10</td>
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<td>14 11/23/15</td>
<td>Chp. 10,11</td>
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<td>15 11/30/15</td>
<td>Chp. 11, Review (all chps.)</td>
<td>15</td>
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Final Exam (all chps.) 12/07/15 Mon 8:30 -10:30 a.m.
6. This syllabus is subject to change at any time during the semester with changes to be announced in class.
7. The instructor reserves the right to change the grade distribution at the end of the semester. If any changes occur, the changes will be less stringent that the distribution above.
8. All rules relating to academic dishonesty will be enforced in accordance with University policies. Cheating on examinations and laboratory assignments, and plagiarism on various papers and reports are types of disciplinary misconduct for which penalties are assessed under the UNT Code of Student Conduct and Discipline. Major responsibility for implementing the University's policy on scholastic dishonesty rests with the faculty. Be advised that the instructor of this course supports and fully implements this policy. The following actions will be taken when evidence of such misconduct is observed. The student will be presented with the evidence of misconduct and given an opportunity to explain the same. Based on the outcome of this private conference, the matter will be either dropped or the student will be given a grade of "F" in the course and be referred to the Dean of Students for further counseling and/or disciplinary action.
9. Students are responsible to protect their work so it is not available to others for submission as their efforts. This is especially true of files that are generated on the computer. Students who knowingly allow others to use their work are partners in this unethical behavior.
10. An I (incomplete) grade is given only for extenuating circumstances and in accordance with University and Departmental Policies.
11. Discussion and exchange of ideas are important parts of the learning process and I encourage collaboration in a community of scholars. However, you must be sure the work you submit for grading is your own. Submitted works that are copies from solution manuals or website solutions or your classmates will be treated as plagiarism.
12. Grades are based in part on the student's ability to communicate. You must present your entire solution in an orderly way for each problem. Full grade points will be assigned only on the correct final answers with correct steps. You must show complete process of your solution. Partial credits will be assigned for correct steps taken towards the solution.
13. Requests for the review of a graded exam/assignment must be made within one week of the grade announcement. Upon review, the exam/assignment score may increase, remain the same, or decrease.
14. The Student Evaluation of Teaching Effectiveness (SETE) is a requirement for all organized classes at UNT. This short survey will be made available to you at the end of the semester, providing you a chance to comment on how this class is taught. I am very interested in the feedback I get from students, as I work to continually improve my teaching. I consider the SETE to be an important part of your participation in this class.

Disabilities Accommodation
The University of North Texas complies with Section 504 of the 1973 Rehabilitation Act and with the Americans with Disabilities Act of 1990. The University of North Texas provides academic adjustments and auxiliary aids to individuals with disabilities, as defined under the law. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodations of their disabilities. If you believe that you have a disability requiring accommodation, please see the instructor and/or contact the Office of Disability Accommodation at 940 565-4343 during the first week of class.