

**Western New England University**  
**Springfield, Massachusetts**  
**College of Engineering**  
**ME-303 Thermodynamics I**  
**Course Policies**  
**Fall 2017**

**Lectures:** Room # S111  
Tuesday, Thursday 8:00-9:20 (ME 303-01)  
Tuesday, Thursday 9:30-10:50 (ME 303-03)

**Instructor:** Mehdi Mortazavi, Assistant Professor  
office # S209  
office: 413-782-1490  
email: mehdi.mortazavi@wne.edu

**Office Hours:** Monday 2:00-3:00 pm;  
Tuesday 2:00-4:00 pm;  
Thursday 2:00-4:00 pm;  
Other hours by appointment

**Prerequisites:** CHEM 105; MATH 235

**Course Description:** This introductory course is offered to both mechanical engineering majors and non-majors. It is intended to familiarize students with the fundamental concepts of the first and second laws of thermodynamics. Students will learn how to determine thermodynamic properties of real and ideal substances by using thermodynamic property tables and mathematical relationships. The concepts of energy, heat, work, entropy, reversible and irreversible processes are introduced and applied to real engineering systems and thermodynamic cycles. The methods of assessing students include homework assignments, quizzes, examinations, projects, and a final exam. (3 credits)

**Materials: Required:**  
Cengel, Yunus A., Boles, Michael A., **Thermodynamics: An Engineering Approach**  
**8th edition**, McGraw-Hill

**Supplementary:**  
Scientific calculator, hand-held, self-powered  
Students are expected to have thermodynamics property tables for all sessions for in class activities.

**Learning Objectives and Outcomes:**

The primary objective of this course in thermodynamics is to enable the student to enhance their engineering problem solving skills, to analyze problems in a systematic and logical manner, and develop a clear understanding of the theory and application of the principles of thermodynamics. After having successfully completed this course, the student will be able to:

1. Determine the thermodynamic properties of real and ideal substances by using thermodynamic property tables and mathematical relationships, and then apply them to various thermodynamic equations of state [a].
2. Apply the First Law of Thermodynamics (Conservation of Energy principle) and the Conservation of Mass principle to model, analyze, and design a variety of open and closed thermodynamic systems such as nozzles, turbines, throttling valves, heat exchangers, refrigeration systems, vapor cycle power plants, etc. [a].

3. Explain and apply the Second Law of Thermodynamics to a variety of thermodynamic processes, model a variety of open and closed thermodynamic systems such as nozzles, turbines, throttling valves, heat exchangers, refrigeration systems, vapor cycle power plants, etc., and describe its implications and influences [a, c, e, k].
4. List, describe, and apply the various equations of state to model non-measurable properties in terms of measurable properties for incompressible substances and ideal gases [a, e, k].

*Note: [ ] corresponds to ABET Criterion for Program Outcomes and Assessment.*

**Assessment:** Students will be evaluated on their performance on homework assignments, quizzes, examinations, and projects. Work will ordinarily be available for student review within one week of submission. **All in-class quizzes and examinations are closed book.**

### **Requirements:**

#### **A. Assignments and Examinations**

The written work for the course will consist of daily homework assignments, in-class quizzes, in-class projects, three examinations, and a two-hour comprehensive final examination. Homework assignments will consist of both a reading and writing component; the student is responsible for reading the material that will be discussed in the following class and for reviewing in detail, prior to the class session, the example problems illustrated in the text. Each student is responsible for his or her own work. The use of the students calculator for all quizzes and examinations is required. The attached Course Syllabus outlines the material that will be covered during each class session.

#### **B. Writing Component**

All written work is to be of the highest quality. Each student is expected to demonstrate, in writing, an appropriate understanding of the concepts of thermodynamics in the assigned projects. All written reports will be evaluated on the basis of appropriate organization, proper communication, neatness, grammar, spelling, and punctuation.

#### **C. Computer Usage**

When appropriate, computer use is encouraged.

#### **D. Attendance and Assignments** Students are expected to:

1. Be punctual and attend all class sessions;
2. Complete all assigned homeworks which will be collected and graded;
3. Take all quizzes, in-class exams, and the scheduled final examination;
4. Satisfy the reading requirement for all assigned chapters; and,
5. Complete the assigned project.

#### **E. Policy:**

1. Non-compliance of ANY item in Section D is grounds for course failure;
2. Missed lectures and quizzes will NOT be made up. A student missing an examination will be given the opportunity to make up the exam ONLY if he/she presents satisfactory evidence that his/her absence was unavoidable. It is the obligation of the student to notify the instructor prior to the exam, at which time, arrangements will be made for a make-up exam. Students will receive an exam grade of 0 for all unexcused absences;
3. Students are responsible for the material contained in the text as well as for all the material discussed in class;
4. Each homework problem is to be individually done in a neat, logical and orderly manner on engineering paper (i.e., an Engineers Computation Pad) following the format outlined in ENGR 103.

Step 1: Restate problem

Step 2: List assumptions and make a sketch

Step 3: Work problem sequentially and orderly

Step 4: Box answers

Step 5: THINK, Does the answer make sense?

Problems must be submitted on only **one side** of sheets (although multiple problems can be put on one sheet if done neatly and clearly). Put the homework sheet (homework statement posted on Kodiak) and staple your worked sheets into it. Write your name on the top right of all pages **including the cover page**. All sheets must be **stapled** together in the upper left corner.

- Homeworks are due at the **beginning of the class**. Homeworks submitted after that (still within the class) will be graded out of 80% of the full credit.
- Late homeworks that are submitted after the class are not accepted under any circumstances. If you have missed the deadline **for ANY reasons**, you need to submit the *extra activity assignment* which includes more number of questions and will be graded out of 60% credit of the original homework.
- Submit your homework on letter size papers (any pattern is acceptable). Homeworks done on pages torn from spiral notebooks or pad will be graded out of 60% of the full credit.
- Please staple all papers properly. Folding edge of sheets together or any other *masterpiece* is not accepted (they get 60% of the full credit).
- Write on one side of each sheet. However, you can solve multiple questions on the same sheet (questions solved on the back side of papers will get 60% of the full credit).
- Homeworks should be submitted in hard copy format. Homeworks sent by email are not accepted (under any circumstances).
- It is highly recommended (not mandated) that you solve homeworks (and exams) by pencils. We are engineers and it is likely to make mistakes as we start solving a problem.

5. Homework will generally be assigned each week and must be submitted at the beginning of the class period for which it is due. **Late homework will NOT be accepted.**

**Methodology:** Class lectures, experiments, discussion, problem solving, quizzes, projects, and exams.

**Grading:**

Exams during the semester	30%
Homeworks	25%
Project	10%
Quizzes	10%
Final Exam	25%
Final Grade	100%

**Grading Policy**

Numerical grades earned throughout the semester will be averaged in the proportions noted above and converted to a final letter grade based on the ranges shown below:

A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	65-69
D	60-64
F	0-59

**Significance of Numerical Results:**

When solving an engineering problem, the accuracy of the solution cannot be greater than that of the data provided. Numerical answers to problems must always be given using the number of significant figures appropriate to the problems statement and data used.

**Course Policies (continued)**

Other:

- You are not permitted to borrow your friend’s calculator during a quiz or exam.
- Questions are always welcomed.
- The instructor reserves the right to change both the course policy and syllabus as the need arises. Students will be notified of any such changes.

**Integrity and Scholarship:**

The policy on Integrity of Scholarship is stated on page 26 of the Western New England University 2012-2013 Catalogue (available at <http://www1.wne.edu/catalogue/>). "Honesty in all academic work is expected of every student. This means giving ones own answers in all class work (including reports), quizzes, and examinations without help from any source not approved by the instructor. Written material is to be the students original composition. Appropriate credit must be given for outside sources from which ideas, language, or quotations are derived. Dishonesty is cause for failure and/or dismissal.

**Absence Dictated by Religious Beliefs:**

Any student who is unable, because of his/her religious beliefs, to attend classes or to participate in any examination, study, or work requirement on a particular day shall be excused from any such examination or study or work requirement which he or she may have missed because of such absence on a particular day, provided, however, that such makeup examination or work shall not create an unreasonable burden upon such school. **It is the responsibility of the student to make arrangements prior to the date of absence for completing the missed work.**

**Student Disability Services:**

The Department of Mechanical Engineering complies with the Americans With Disabilities Act in making reasonable accommodations for qualified students with disabilities. To request academic accommodations, the SDS Office in Deliso G05 can be contacted for information.

**Class Cancellation:**

When classes are cancelled, work that was due on the cancelled date will be collected at the next class meeting; quizzes (if any) and examinations that were scheduled on that date will be administered during the next class meeting.

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 Course Syllabus\*  
 Fall 2017

**Textbook** Cengel, Yunus A., Boles, Michael A., **Thermodynamics: An Engineering Approach 8th Edition**

Week	Lecture	Date	Topic	Reading Assignments
1	1	8/29	Introduction / Units / Systems & CVs Process and Cycles	1.1-1.6
	2	8/31		1.7-1.11
2	3	9/5	Energy and Energy Transfer First Law	2.1-2.5
	4	9/7		2.6
3	5	9/12	Energy Efficiency and Environment Phase / Phase Change / Property Diagrams	2.7-2.8
	6	9/14		3.1-3.4
4	7	9/19	Enthalpy / Property Tables Compressibility Factor / Other EOS	3.5
	8	9/21		3.6-3.8
5	9	9/26	Review Session / Work Problems <b>Exam #1 (Chapters 1,2,3)</b>	-
	10	9/28		-
6	11	10/3	Moving Boundaries / Energy Balances Specific Properties	4.1-4.2
	12	10/5		4.3-4.5
7	-	10/10	<b>Fall Recess</b> Conservation of Mass	-
	13	10/12		5.1
8	14	10/17	Steady-Flow Systems Steady-Flow Systems (cont.)	5.3-5.4
	15	10/19		5.3-5.4
9	16	10/24	Review Session / Work Problems <b>Exam #2 (Chapters 4 &amp; 5)</b>	-
	17	10/26		-
10	18	10/31	Second Law / Engines Refrigeration / Heat Pumps	6.1-6.3
	19	11/2		6.4-6.5
11	20	11/7	Irreversibility / Carnot Cycle Carnot Heat Engines and Refrigerators	6.6-6.8
	21	11/9		6.9-6.11
12	22	11/14	Review Session / Work Problems <b>Exam #3 (Chapter 6)</b>	-
	23	11/16		-
13	24	11/21	Entropy <b>Thanksgiving Recess</b>	7.1-7.4
	-	11/23		-
14	25	11/28	Property Diagram Involving Entropy Tds Equations / Entropy Balance	7.5-7.7
	26	11/30		7.13
15	27	12/5	Review Session / Work Problems Review Session / Work Problems	-
	28	12/7		-
16	-	12/11-12/15	<b>Final Exam (Comprehensive)</b>	-

\*Note: This is not a firm list. There may be addition and/or deletions and/or any other modifications during the semester.