



THERMODYNAMICS – AE 209

CHAPTER 0

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Course Objectives and Syllabus

by

Dr. Emre Kara , Univ. of Gaziantep, TURKEY

Instructor

Asst. Prof. Dr. Emre Kara

Office: Z04

Email: emrekara@gantep.edu.tr

Lecture webpage:

<http://www1.gantep.edu.tr/~emrekara/index.php/ae209/>

Lecture Assistant: Burak ÇİFTÇİOĞLU





Course Information



Class Hours: Mon (A02) – 14:25-17:00

Tues (A12) – 11:15-12:00 (PROBLEM & QUIZ)

Number of Credit Hours: 4 hr credit

Compulsory Texts

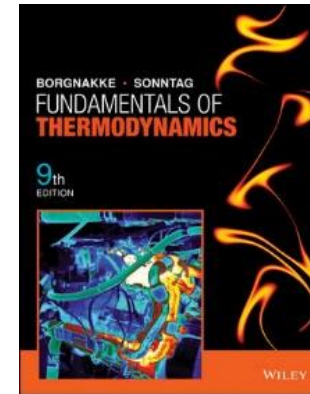


1. Fundamentals of Thermodynamics

Borgnakke, Claus; Sonntag, Richard E.

John Wiley & Sons, Inc., 2002 or newer

(Superior exercises and problems)



2. Thermodynamics, an Engineering Approach Cengel, Y.A.

McGraw-Hill, 2006 or newer

(Superior expressions and easier to understand)



3. Buy Aksel Öztürk's Free Thermodynamics Property Table from Bookstore or Download Free Thermodynamics Property Table (Y. Çengel) from the following link:

http://highered.mheducation.com/sites/dl/free/0073398179/1042936/Appendix1_SIunits.pdf



Recommended Texts



- Fundamentals of Engineering Thermodynamics, 8th ed. Moran, Michael J.; Shapiro, Howard N.; Boettner, Daisie D; Bailey, Margaret B. WILEY, 2014
- Thermodynamics and Chemistry, 2nd ed., Version 4 Howard DeVoe, 2012 Available online free by the author at:
<http://www2.chem.umd.edu/thermobook/downloads.htm>
- Thermodynamics: An Interactive Approach with Mastering Engineering, Global Edition Subrata Bhattacharjee, Pearson, 2015
- Thermodynamics for Engineers, 2nd Ed., Wong, K. V., CRC Press, 2011



Course Objectives



This course deals with the fundamentals of Thermodynamics including:

- thermodynamic systems and properties,
- relationships among the thermo-physical properties,
- the laws of thermodynamics and
- applications of these basic laws in thermodynamic systems.



Expected Learning Outcomes



After successful completion of this course the students will be able to:

1. Explain fundamental concepts relevant to thermodynamics.
2. Explain the concepts of work, power, and heat in thermodynamics; determine work and heat sign conventions; determine work involved with moving boundary systems (graphical and analytical methods).
3. Explain the first law of thermodynamics for a closed system.
4. Perform energy analysis of refrigeration and heat pump thermodynamic cycles.
5. Determine thermodynamic properties of pure substances.



Expected Learning Outcomes



After successful completion of this course the students will be able to:

6. Apply the first law of thermodynamics for a control volume, including with turbines, compressors, nozzles, diffusers, heat exchangers, and throttling devices.

7. Explain the second law of thermodynamics, including why it is necessary, how it is defined (Kelvin-Planck and Clausius), the nature of irreversibility, and the Carnot cycle.

8. Explain the concept of entropy, including the Clausius Inequality, using thermodynamic tables, setting up entropy balances, and calculating isentropic efficiency of pumps, compressors, turbines, and heat exchangers.



Assessment (LOOK OUT !)



- Quizzes
- Attendance
- Examinations
- Final Grades



Quizzes and Problem Hours



- Quizzes and Problem Hours:

QUIZ 1	–	24.09.2019 TUESDAY
QUIZ 2	–	01.10.2019 TUESDAY
QUIZ 3	–	08.10.2019 TUESDAY
QUIZ 4	–	15.10.2019 TUESDAY
PROBLEM HOUR 1	–	22.10.2019 TUESDAY
QUIZ 5	–	12.11.2019 TUESDAY
QUIZ 6	–	19.11.2019 TUESDAY
QUIZ 7	–	26.11.2019 TUESDAY
PROBLEM HOUR 2	–	03.12.2019 TUESDAY
QUIZ 8	–	10.12.2019 TUESDAY
QUIZ 9	–	17.12.2019 TUESDAY
PROBLEM HOUR 3	–	23.12.2019 MONDAY
QUIZ 10	–	24.12.2019 TUESDAY



Assessment (LOOK OUT !)



- Attendance:

Regular attendance is **strictly required (at least 70 %)**.

In case you have to miss a class, **you are responsible for keeping up** with the class work and being informed of all announcements made in the class, quizzes, tests, etc.

If you encounter difficulties of any kind, feel free to come and see me in my office.



Assessment (LOOK OUT !)



- Examinations:

Two term tests are scheduled. A final comprehensive examination will be given according to the school schedules based on the same format as the term tests.

They will consist of a section on concepts, definitions, and short exercises plus section with numerical problems. **Both will be closed-book, closed-notes and open-thermodynamics-table-book (preferably from either Y. Çengel's Thermodynamics Book table or Aksel Öztürk's table. You can have them from any bookstores or as a 2nd hand from higher class students).**

Make-up exams may be given for legitimate excuses if you contact the instructor as soon as you return to the school.



Assessment (LOOK OUT !)



- Final Grades:

Quizzes	20%
Midterm 1	15%
Midterm 2	25%
Final Comprehensive Exam	40%

Total	100%
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Letter grades will be given relative to the average of the class !



Tentative Schedule



- Introduction and Basic Concepts (2 three-hour lecture)
- Energy, Energy Transfer, and General Energy Analysis (3 three-hour lecture)
- Properties of a Pure Substance (1 three-hour lecture)
- MIDTERM 1 – 04.11.2019 MONDAY
- Energy Analysis of Closed Systems (1 three-hour lecture)
- Mass and Energy Analysis of Control Volumes (1 three-hour lecture)
- The Second law of Thermodynamics (1 three-hour lecture)
- Entropy (1 three-hour lecture)
- MIDTERM 2 – 09.12.2019 MONDAY
- Exergy (Availability) (1 three-hour lecture)
- Otto, Brayton and Rankine Cycles (1 three-hour lecture)

- **NOTE: THERE WILL BE 1 HOUR QUIZZES AND/OR PROBLEM HOURS EVERY TUESDAY. SCHEDULE IS GIVEN ON «Quizzes and Problem Hours» SLIDE.**



Next Lecture



→ Chapter 1: Introduction and Basic Concepts

- Identify the unique vocabulary associated with thermodynamics through the precise definition of basic concepts.
 - Review the metric SI and the English unit systems.
- Explain the basic concepts of thermodynamics such as system, state, state postulate, equilibrium, process, and cycle.
 - Review concepts of temperature, temperature scales
- Review concepts of pressure, absolute pressure and gage pressure.