

ENG ME 304 B1 – Energy and Thermodynamics

Fall 2017

Instructor

Prof. **Chuanhua Duan** (Course coordinator)

Lecture Section B1: MW 8- 9:45 am, PHO 210

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Office: 110 Cummington Mall, ENG 415

Office hours: **Tue 1-3 pm and Thu 1-2 pm**

Graduate Teaching Fellow

Sean (Siyang) Xiao (seanxiao@bu.edu) and Shivangi Kataria (sk18@bu.edu)

Discussion Section: B2 Tue 6:30-7:20 pm, PHO 211

B3 Thu 11:15 am-12:05 pm PHO 201

A2 Tue 11:15 am-12:05 pm PHO 201

A3 Wed 2:30-3:20 pm MCS B21

Office hours: **TBD**

Course Objectives

To deliver a broad and in-depth presentation of modern thermodynamics with sufficient coverage of cycles as a prerequisite for focused study of energy conversion and propulsion.

Course Prerequisites

- 1) Differential and integral calculus, multivariate calculus
- 2) One-semester college physics (calculus based)

Course Website

learn.bu.edu

Textbook

Fundamentals of Engineering Thermodynamics by Moran, Shapiro, Boettner, and Bailey, 8th Edition, Wiley

Class/Laboratory Schedule

Two lectures (1 hour and 45 minutes each) and one discussion (50 minutes) per week. There are two lab exercises for this course. Sign-up sheets will be posted once the labs are scheduled. The experiments will be done in groups, but reports are individual. This class has homework every week. Homework assignments and deadlines will be announced in class, as well as on the course webpage. Homework submitted late will not receive credit.

Exams

There will be three exams, including two midterms and one final exam. The exact dates are listed in the syllabus. All exams are **closed book, but allowed two-page (8.5" x 11") formula sheet**. Calculators are allowed to use during exams but other electronic devices (cell phones, PDAs, laptops, etc.) are prohibited. The only valid reasons for missing an exam are: death in the immediate family, serious illness (documented by a physician), or

¹ Subject to change. Check the course website for the latest version.

a conflict with a scheduled Boston University event. If you feel that you have a valid reason for missing an exam, you must petition to Prof. Duan for permission to take the make-up exam. This petition must be received **BEFORE** the regularly scheduled exam. Petitions are not always granted! If the petition is granted, a mutually convenient time for the make-up exam will be arranged. Make-up exams will be more difficult than the regularly scheduled exams.

Collaboration Policy

Students are allowed (in fact, encouraged) to work together on the homeworks and on the lab worksheets. Working together means truly working together, exchanging ideas, NOT copying. Copying another's work is cheating, as is allowing someone else to copy your work. All exams must be done by each student individually. Anyone caught cheating may be subject to disciplinary action by the Committee on Student Conduct of the College of Engineering. Also, anyone found guilty of cheating will receive a 0 for that particular grade. When in doubt, ask before you collaborate!

Grading Policy¹

Three exams	70%
Labs	20%
Homework	10%

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Lecture and Exam Schedule¹

Lecture	Date	Topics	Reading	Other
1	09/06	Introduction to Thermodynamics?	1.1-1.9	
2	09/11	The 1 st Law of Thermodynamics I	2.1-2.7	
3	09/13	The 1 st Law of Thermodynamics II	2.1-2.7	
4	09/18	The 1st Law of Thermodynamics III and Thermodynamic Properties I	3.1-3.11	
5	09/20	Thermodynamic Properties of Pure Substances I	3.1-3.11	
6	09/25	Thermodynamic Properties of Pure Substances II	3.1-3.11	
7	09/27	Properties of solids/liquids & Control Volume Analysis I	3.1-3.11; 4.1-4.12	TAs or Prof. Nagem will cover my lecture
	10/02	Control Volume Analysis II - Applications	4.1-4.12	
8	10/04	Midterm exam I		
9	10/10	Control Volume Analysis III - Applications	4.1-4.12	Lab 1 starts
10	10/11	Control Volume Analysis IV_Transient Cases	4.1-4.12	
11	10/16	Control Volume Analysis V_Transient Cases	4.1-4.12	
12	10/18	Second law of thermodynamics	5.1-5.10	
13	10/23	Carnot cycle, thermal efficiency	5.1-5.10	
14	10/25	Carnot Corrolary and Introduction to Entropy	5.1-5.10; 6.1-6.13	
15	10/30	Entropy Calculation	6.1-6.13	
16	11/01	Entropy balance	6.1-6.13	
17	11/06	Isentropic processes	6.1-6.13	Lab 2 starts, TAs or Prof. Nagem will cover my lecture TAs will hold the exam
18	11/08	Refrigerator system	10.1-10.3	
19	11/13	Improving refrigerator system	10.1-10.3	
	11/15	Midterm exam II		
20	11/20	Vapor power system & review	8.1-8.3	
	11/22	Thanksgiving Recess		
21	11/27	Improving vapor power system	8.1-8.3	
22	11/29	Gas Power systems I (Gas Turbine Power Plants I)	9.1-9.8	
23	12/04	Gas Power systems II (Gas Turbine Power Plants II)	9.1-9.8	
24	12/06	Gas Power systems III (Automobile engines I)	9.1-9.8	
25	12/11	Gas Power systems IV (Automobile engines II)/Review	9.1-9.8	

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