ENG ME 304 A2 – Energy and Thermodynamics

Fall 2019

Instructor
Prof. **Chuanhua Duan** (Course coordinator)
Lecture Section A2: MW 8- 9:45 am, PHO 210
Contact info: duan@bu.edu
Office: 110 Cummington Mall, ENG 415
Office hours: Thu 1-3 pm

Graduate Teaching Fellow
Xiaozhu Liu (xzliu@bu.edu) and Angel Rubio (ajrubio@bu.edu)

Discussion Section:	B4 Tue 6:30-7:20 pm, CAS B06A	Xiaozhu Liu
	B5 Thu 11:15 am-12:05 pm PHO 201	Angel Rubio
	B2 Tue 11:15 am-12:05 pm PHO 201	Xiaozhu Liu
	B3 Wed 2:30-3:20 pm CAS 324	Angel Rubio
Office hours:	Tue 4:00pm - 6:00 pm ENG 410	Xiaozhu Liu
	Thu 10:00 am – 11:00 am ERB B01	Angel Rubio
	Thu 12:00 pm to 1:00 pm ERB B01	Angel Rubio

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, 9th 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")

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

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 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 Policy[1]

Three exams	70%
Labs	20%
Homework	10%

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Lecture and Exam Schedule[1]

Lecture	Date	Topics	Reading	Other
1	09/04	Introduction to Thermodynamics	1.1-1.9	
2	09/09	The 1st Law of Thermodynamics I	2.1-2.7	
3	09/11	The 1st Law of Thermodynamics II	2.1-2.7	
4	09/16	The 1st Law of Thermodynamics III and Thermodynamic Properties I	3.1-3.11	
5	09/18	Thermodynamic Properties of Pure Substances I	3.1-3.11	
6	09/23	Thermodynamic Properties of Pure Substances II	3.1-3.11	
7	09/25	Properties of solids/liquids & Control Volume Analysis I	3.1-3.11; 4.1-4.12	
8	09/30	Control Volume Analysis II - Applications	4.1-4.12	
	10/02	**Midterm exam I**		
9	10/07	Control Volume Analysis III - Applications	4.1-4.12	Lab 1 starts
10	10/09	Control Volume Analysis IV_Transient Cases	4.1-4.12	
11	10/15	Control Volume Analysis V_Transient Cases	4.1-4.12	
12	10/16	Second law of thermodynamics	5.1-5.10	
13	10/21	Carnot cycle, thermal efficiency	5.1-5.10	
14	10/23	Carnot Corrolary and Introduction to Entropy	5.1-5.10; 6.1-6.13	
15	10/28	Entropy Calculation	6.1-6.13	
16	10/30	Entropy balance	6.1-6.13	
17	11/04	Isentropic processes	6.1-6.13	Lab 2 starts
18	11/06	Vapor power system	8.1-8.3	
19	11/11	Improving vapor power system	8.1-8.3	
	11/13	**Midterm exam II**		
20	11/18	Gas Power systems I (Gas Turbine Power Plants I)	9.1-9.8	
	11/20	Gas Power systems II (Gas Turbine Power Plants II)	9.1-9.8	
21	11/25	Gas Power systems III (Automobile engines I)	9.1-9.8	
22	11/27	**Thanksgiving Recess**		
23	12/02	Gas Power systems IV (Automobile engines II)	9.1-9.8	
24	12/04	Refrigerator system	10.1-10.3	
25	12/09	Improving refrigerator system & review	10.1-10.3	
26	12/11	Final review		

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