

ME 201 Introduction to Thermal Science
The Pennsylvania State University
Department of Mechanical and Nuclear Engineering
Spring 2008, Section 001

Time and Location: Monday, Wednesday, and Friday, 1:25-2:15pm, 112 Buckhout

Textbook: Turns, Stephen R. *Thermal-Fluid Sciences*.
Cambridge University Press, 2006. ISBN – 0-521-85043-6

Prerequisite: CHEM 12

Instructor: Michael J. Hargather
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Office Hours: 337 Reber Building
Monday, 3:00-4:15pm
Tuesday, 2:30-3:30pm
Other days and times available by appointment

Office hours for the Teaching Assistant will be posted on ANGEL
the first week of class

Course Objectives:

1. Develop an appreciation for the application of fundamental principles to solve and understand engineering problems and everyday phenomena
2. Develop an appreciation for the role of experiment and empiricism as a bridge between incomplete theory and information needed for engineering design
3. Develop an understanding of how various energy conversion devices and systems operate, e.g. power plants, engines, and heating/cooling systems
4. Understand the relationship of thermal-fluid sciences to other engineering and non-engineering disciplines

Grading:

Homework	-	30%
Quizzes	-	10%
Exam 1	-	18%
Exam 2	-	18%
Final Exam	-	24%

Homework will be assigned approximately weekly and collected at the beginning of class on the due date. Each assignment will include textbook problems designed to reinforce ideas covered in class and will reflect knowledge required for exams. Students are encouraged to work together to solve homework problems, but each student is required to turn in his or her own completed assignment. Problems should be solved showing all work, solutions with no work will receive no grade. Late assignments lose 10% of the total grade per day late.

Quizzes will be given in class approximately bi-weekly. The quizzes will be brief and will cover topics discussed in class and covered on homework. Regular class attendance and homework completion will ensure students are prepared for the quizzes. Quizzes will typically be announced one class period before occurrence. Make up quizzes will not be given.

Exams will be given at the end of major sections of the class and will be announced at least 1 week in advance. Exams, with the exception of the final, will be given during a normal class period. The exams will be written to thoroughly cover the knowledge required to meet course objectives. Make up exams must be scheduled 1 week prior to the exam and following university policy for the final exam.

Final grades will be assigned based on a student's total earned points throughout the semester. Grades may be adjusted upwards at the discretion of the professor but never below the following scale.

93<100	-	A
90<93	-	A-
87<90	-	B+
83<87	-	B
80<83	-	B-
77<80	-	C+
70<77	-	C
60<70	-	D
<60	-	F

ANGEL:

Penn State's ANGEL system will be used in this course for various announcements and the posting of information for student use. Students are encouraged to set up and check their ANGEL accounts regularly.

<http://cms.psu.edu>

Academic Integrity:

Academic integrity is expected of all students and will be strictly enforced. Information on the university's policy can be found at:

<http://www.engr.psu.edu/CurrentStudents/acadinteg.asp>

Students are encouraged to work together on homework, but all tests and quizzes are to be completed by each student individually.

Tentative Course Outline and Schedule:

Class #	Date	Day	Topic	Reading
1	1/14/2008	Monday	Course Introduction	1.1, 1.2, 1.7-1.9
2	1/16/2008	Wednesday	Control systems and volumes	1.3-1.6
3	1/18/2008	Friday	Conservation principles and definitions	1.3-1.6
	1/21/2008	Monday	No Class - MLK Day	
4	1/23/2008	Wednesday	Thermodynamic properties and states	2.1, 2.2a-b, 2.3
5	1/25/2008	Friday	Ideal gases, introduction to thermo tables	2.4a-d, Tutorials 1, 2
6	1/28/2008	Monday	Review of h, cp, cv	2.2d, 2.4d
7	1/30/2008	Wednesday	Example problems	
8	2/1/2008	Friday	Introduction to entropy	2.2c, 2.3d, 2.4e-h
9	2/4/2008	Monday	Entropy	2.2c, 2.3d, 2.4e-h
10	2/6/2008	Wednesday	Non-ideal gases, multi-phase substances, quality	2.5, 2.6, Tutorial 3
11	2/8/2008	Friday	Quality, examples	2.5, 2.6, Tutorial 3
12	2/11/2008	Monday	Conservation of Mass	3.1, 3.2, 3.3a-c
13	2/13/2008	Wednesday	Conservation of Mass	3.3d-3 up to p200
14	2/15/2008	Friday	Conservation of Mass review	
15	2/18/2008	Monday	Introduction to Energy	4.1, 4.2
16	2/20/2008	Wednesday	Exam 1 Chapters 1-3	
17	2/22/2008	Friday	Heat and Work	4.3, 4.4
18	2/25/2008	Monday	Conduction and Convection	4.5a-b
19	2/27/2008	Wednesday	Radiation	4.5c
20	2/29/2008	Friday	Conservation of Energy	5.1, 5.2a
21	3/3/2008	Monday	Conservation of Energy: control systems	5.2c
22	3/5/2008	Wednesday	1D Conduction	5.2c
23	3/7/2008	Friday	Electrical circuit analogy	5.2c

Class #	Date	Day	Topic	Reading
	3/10/2008	Monday	No Class - Spring Break	
	3/12/2008	Wednesday	No Class - Spring Break	
	3/14/2008	Friday	No Class - Spring Break	
24	3/17/2008	Monday	Conservation of Energy: Control volumes	5.3a-b
25	3/19/2008	Wednesday	Conservation of Energy: Control volumes	5.3a-b, 11.1
26	3/21/2008	Friday	Steady flow processes	11.1
27	3/24/2008	Monday	2nd Law of Thermodynamics	7.1-7.4a
28	3/26/2008	Wednesday	2nd Law of Thermodynamics	7.1-7.4a
29	3/28/2008	Friday	Entropy	7.4b-c, 7.5, 7.6a-e
30	3/31/2008	Monday	Entropy	7.4b-c, 7.5, 7.6a-e
31	4/2/2008	Wednesday	Conservation of Momentum	6.1, 6.2, 6.3a up to p422
32	4/4/2008	Friday	Exam 2 Chapters 4, 5, 7, 11	
33	4/7/2008	Monday	Conservation of Momentum	6.4, 6.5a-b
34	4/9/2008	Wednesday	Bernoulli Equation	6.6, 6.7
35	4/11/2008	Friday	Bernoulli Equation	6.6, 6.7
36	4/14/2008	Monday	Dimensionless Numbers	8.1-5
37	4/16/2008	Wednesday	Dimensionless Numbers	8.1-5
38	4/18/2008	Friday	External Flow	9.1, 9.2
39	4/21/2008	Monday	External Flow	9.3, 9.4, 9.5
40	4/23/2008	Wednesday	External Flow	9.3, 9.4, 9.5
41	4/25/2008	Friday	Internal Flow	10.1-4
42	4/28/2008	Monday	Internal Flow, Mechanical Energy equation	10.2d
43	4/30/2008	Wednesday	Compressible Flow, special topics	11.2d up to p845
44	5/2/2008	Friday	Review for Final	
	TBA		Final Exam - Comprehensive with a focus on Chapters 6, 8-10	