

ECE 309
THERMODYNAMICS & HEAT TRANSFER
Spring 2007

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Textbook: *ECE 309 Introduction to Thermodynamics and Heat Transfer, Vols. 1 & 2*
 (Custom Publication for University of Waterloo)
 Yunus A. Cengel and Robert H. Turner, McGraw-Hill, 2007.

Alternate Text *Fundamentals of Thermal-Fluid Sciences, 2nd Edition*
 Yunus A. Cengel and Robert H. Turner, McGraw-Hill, 2005.

Other Reading

- 1) *Fundamentals of Engineering Thermodynamics, 5th Edition*
 Michael J. Moran and Howard N. Shapiro
 John Wiley and Sons Inc., New York, NY, 2004.
- 2) *Fundamentals of Thermodynamics, 6th Edition*
 Richard E. Sonntag, Claus Borgnakke and Gordon J. Van Wylen
 John Wiley and Sons Inc., New York, NY, 2003
- 3) *Fundamentals of Heat and Mass Transfer, 5th Edition*
 Frank P. Incropera and David P. DeWitt
 John Wiley and Sons Inc., New York, NY, 2002

Outline:	Chapter 2 -	Basic Concepts of Thermodynamics	
	Chapter 3 -	Properties of Pure Substances	
	Chapter 4, 5 -	First Law of Thermodynamics	
	Chapter 6, 7 -	Second Law of Thermodynamics	midterm
	Chapter 17, 18 -	Conduction Heat Transfer	
	Chapter 19, 20 -	Convection Heat Transfer	
	Chapter 21, 22 -	Radiation Heat Transfer	final

Web page: <http://www.mhtlab.uwaterloo.ca/courses/ece309/index.html>

Tutorials: T.A.'s will work through selected problems and answer questions about lecture material or assignments. They will also give individual help.

Assessment:

Tutorial Quiz (4 × 2.5% each)	10%
Projects (2 × 7.5% each)	15%
Midterm	35%
Final	40%

The midterm and final are open book examinations of the course material. The midterm exam will cover thermodynamics (chapters 2-7) and the final exam will cover heat transfer (chapters 17-22). **You will need a copy of the course text book (or alternate text book) to successfully complete these exams.** In addition, you are permitted to use a calculator but no other aids are allowed in the examination.

Assignments: Problems from each chapter will be assigned on a regular basis. These problems will **NOT** be marked but questions used for the tutorial quizzes will be selected directly from these problem assignments. It is important that you keep up with the material by doing the problems - **REGULARLY, ON YOUR OWN**. To do well in exams, you must develop problem solving skills, week by week, throughout the term.

Tutorial Quiz: Four tutorial quizzes will be assigned throughout the term. Each quiz will consist of a single question that must be answered during the weekly tutorial. Typically, the TAs will present material during the first 20 minutes of the tutorial and the last 30 minutes will be used to complete the quiz. Make sure you bring your textbook each week, it will be needed to complete the quiz.

Quiz Schedule

Quiz	Topic	T105 & T106
1	Basic Concepts and Properties	May 14
2	1st Law of Thermodynamics	May 28
3	Conduction Heat Transfer	July 9
4	Convection Heat Transfer	July 23

ECE 309 Projects

Two projects will be assigned throughout the term.

- All projects must be completed individually.
- Anyone suspected of copying or cheating will be assigned a grade of zero.
- All projects must be handed in immediately following the lecture on the Due Date.
- No extensions will be granted.
- Failure to hand the project in on time will result in a grade of zero for that project.

Schedule

Project #1: Topics in Thermodynamics

Assigned Date: May 25, 2007
Due Date: June 8, 2007
Grade: 7.5%

Project #2: Topics in Heat Transfer

Assigned Date: July 6, 2007
Due Date: July 20, 2007
Grade: 7.5%

ECE 309 Course Schedule

Week	Days	Topics	Text Sections
1	May 02 - 04	Basic concepts of thermodynamics - thermodynamic systems and properties	2-1 → 2-10
2	May 07 - 11	Properties of pure substances - equations of state	3-1 → 3-7, 3-9 → 3-11
3	May 14 - 18	Energy Transfer - heat and work	4-1 → 4-6
4	May 23 - 25	First law of thermodynamics - open and closed systems	5-1 → 5-5
5	May 28 - June 01	Second law of thermodynamics	6-1, 6-2, 6-7, 6-8, 6-11
6	June 04 - 08	Entropy - control mass and control volume	7-1 → 7-10, 7-12, 7-13
midterm exam			
8	June 18 - 22	Conduction heat transfer - steady state	17-1 → 17-6
9	June 25 - 29	Conduction heat transfer - transient	18-1 → 18-2
10	July 04 - 06	Convection heat transfer - forced convection	19-1 → 19-8
11	July 09 - 13	Convection heat transfer - natural convection	20-1 → 20-6
12	July 16 - 20	Radiation heat transfer - properties	21-1 → 21-6
13	July 23 - 27	Radiation heat transfer - exchanged between surfaces	22-1 → 22-5

ECE309 Recommended Problems

Weeks	Section	Problems
1	May 02 - 11	Chapters 2 and 3 2-44, 2-59, 2-78, 2-98 3-49, 3-52, 3-57, 3-70, 3-75, 3-106, 3-121, 3-123
3-4	May 14 - 25	Chapters 4 and 5 4-19, 4-24, 4-42, 4-61, 4-65 5-37, 5-67, 5-84, 5-104, 5-120, 5-141, 5-213
5-6	May 28 - June 08	Chapters 6 and 7 6-81, 6-87, 7-39, 7-46, 7-61, 7-89, 7-111 7-122, 7-124, 7-130, 7-155, 7-158
8-9	June 18 - 29	Chapters 17 and 18 17-35, 17-57, 17-68, 17-81, 17-88, 17-110 18-14, 18-20, 18-34, 18-52, 18-80, 18-104
10-11	July 04 - July 13	Chapters 19 and 20 19-15, 19-24, 19-35, 19-47, 19-53, 19-69 19-77, 20-21, 20-28, 20-44, 20-57, 20-79
12-13	July 16 - 27	Chapter 21 and 22 21-21, 21-24, 21-41, 21-61, 21-69 22-11, 22-17, 22-26, 22-36, 22-71, 22-72