

Spring 2008
COURSE INFORMATION SHEET
ME 210 / Advanced Thermodynamics
(Lecture 3 hrs/week, 3 units)

Prerequisite: ME 113 (Thermodynamics) & ME 114 (Heat Transfer), or equivalents

Instructor: Ab Hashemi, Ph.D., P.E.

Class Hours: **Section 01:** T, Th 19:00-20:15, Room ENG 327

Office Hours: T, Th 7:30-8:00 & 9:15-9:45 Room ENG 348
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Description: This graduate level course offers an in-depth understanding of principles of thermodynamics and their application for thermal design of equipment and systems, with emphasis on fundamental analytical approach based on physical principles. Closed form and numerical solutions techniques to thermodynamic problems are included.

Textbook: Thermodynamics: An Engineering Approach, by Cengel, Y.A., Boles, M.A. McGraw-Hill Science/Engineering/Math; 5th edition (June 3, 2005), ISBN: 0073107689

Grading:

Homework:	15%	Due date noted on assignment
Individual Projects	15%	15-minute presentation
Mid-term exam:	30%	Class hour, Thursday, March 20
Final Exam:	40%	19:45-22:00, Tuesday, May 20

Learning Objectives: Apply fundamentals of thermal sciences to design, analyze and predict the thermal performance of components, systems and subsystems.

References: Fundamentals of Classical Thermodynamics, by Van Wylen & Sonntag and Borgnakke, 4th ed., 1994, John Wiley & Sons, New York.

Fundamentals of Engineering Thermodynamics, by Howell & Buckius, 2nd ed., 1992, McGraw-Hill, New York.

Fundamentals of Engineering Thermodynamics, by Moran & Shapiro, 2nd ed., 1992, John Wiley & Sons, New York.

Engineering Thermodynamics, by Burghardt & Harbach, 4th ed., 1993, Harper Collins, New York.

Engineering Thermodynamics, by Reynolds & Perkins, 2nd ed., 1970, McGraw-Hill, New York.

Heat Transfer, by J.P. Holman, McGraw-Hill Science/Engineering/Math; 9th edition (October 10, 2001). ISBN: 0072406550.

Fundamentals of Heat and Mass Transfer, by David P. DeWitt, Theodore L. Bergman, and Adrienne S. Lavine, John Wiley & Sons; 6 edition (March 10, 2006). ISBN: 0471457280.

Basic Heat and Mass Transfer. A. F. Mills, A.F., Prentice Hall; 2nd edition (August 12, 1998). ISBN: 0130962473.

Principles of Heat Transfer, by M. Kaviany, Wiley-Interscience; Bk&CD-Rom edition (June 7, 2001). ISBN: 0471434639.

Heat Transfer, by Adrian Bejan, John Wiley & Sons; Book&Disk edition (June 1993). ISBN: 0471595039.

Fluid Mechanics, by Victor L. Streeter, E. Benjamin Wylie, and Keith W. Bedford, McGraw-Hill Companies; 9th edition (December 1, 1997). ISBN: 0070625379

Flow of Fluids Through Valves, Fittings & Pipe TP-410, by Crane Company, ISBN: 1400527120

COURSE SCHEDULE
ME 210 / Advanced Thermodynamics

<u>Week</u>	<u>Date</u>	<u>Topic</u>
1	1/24	N/A
2	1/29	N/A
2	1/31	N/A
3	2/5	Introduction
3	2/7	Overview of Thermodynamics
4	2/12	Pure Substance
4	2/14	First Law
5	2/19	Second Law & Entropy
5	2/21	Second Law & Entropy
6	2/26	Rankine Cycle
6	2/28	Brayton Cycle
7	3/4	Stirling Cycle
7	3/6	Refrigeration Cycle
8	3/11	Ideal Gases
8	<u>3/13</u>	<u>Project Plan Presentations</u>
9	3/18	Real Gases & Gas Mixtures
9	<u>3/20</u>	<u>Mid-Term Exam</u>
10	<u>3/25</u>	<u>Spring Break</u>
10	<u>3/27</u>	<u>Spring Break</u>
11	4/1	Maxwell's Equations
11	4/3	Clapeyron Equations & Gibbs Function
12	4/8	Mathematical Solution Techniques
12	4/10	Chemically Reacting Processes
13	4/15	Unsteady Processes & Analysis
13	4/17	Combustion

14	4/22	Nuclear Power
14	4/24	Photovoltaic Energy Conversion
15	4/29	Geothermal Power Generation
15	5/1	Ocean Thermal Energy Conversion
16	5/6	Alternate Energy Resources & Optimization
16	5/8	Thermal Management Devices (Heat pipes, radiators, collectors, insulators, etc.)
<u>17</u>	<u>5/13</u>	<u>Project Presentation</u>
17	5/15	Review & Summary
<u>18</u>	<u>5/20</u>	<u>Final Exam: 19:45-22:00 Tuesday, May 20</u>