

MS/ME 505
Thermodynamics and Statistical Mechanics of Materials

Instructor: Prof. Uday B. Pal

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Office Hours: Friday 3:30-5 PM

Notes and Handouts:

- Required Text:

Introduction to the Thermodynamics of Materials

by David R. Gaskell, Prentice Hall

- Reference Texts:

1. C.H.P. Lupis, Chemical Thermodynamics of Materials, Prentice-Hall, Englewood Cliffs, NJ.

2. D. Tabor, Gases, liquids, and solids and other states of matter, Cambridge University Press Syndicate, Cambridge

3. David Chandler, Introduction to Modern Statistical Mechanics, Oxford University Press, Oxford, New York.

Course Grading:

- **Homework: 10% (Group Activity Class Presentation)**
- **Test 1: 25% (Oct. 17, 2011)**
- **Test 2: 25% (Nov. 16, 2011)**
- **Final Exam: 40% (Take Home Due Dec. 13 by 5 PM)**

LECTURE, HOMEWORK AND EXAM SCHEDULE

Date	Lecture Topic	
Sept. 6	Introduction (First Law)	Chapters 1 and 2
Sept. 12	Second Law, Statistics of Entropy I	Chapters 3
Sept. 14	Statistics of Entropy II	Chapter 4
Sept. 19	Auxiliary Thermodynamic Functions Chemical Potential, Maxwell's Relations	Chapters 5
Sept. 21	Heat Capacity, Enthalpy, Entropy and 3 rd Law I	Chapter 6
Sept. 26		Discuss Homework set 1
Sept. 28	Heat Capacity, Enthalpy, Entropy and 3 rd Law II	Chapter 6
Oct. 3	One Component Phase Diagrams I	Chapter 7
Oct. 5	One Component Phase Diagrams II	Chapter 7
Oct. 11	No Class	
Oct. 12		Discuss Homework set 2
Oct. 17	1 st Test	
Oct. 19	Treatment of Gas Mixtures I	Chapter 8
Oct. 24	Treatment of Gas Mixtures II	Chapter 8 and Notes
Oct. 26	Treatment of Condensed Systems I	Chapter 9
Oct. 31		Discuss Homework set 3
Nov. 2	Treatment of Condensed Systems II	Chapter 9 and Notes
Nov. 7	Binary Phase Diagrams I	Chapter 10
Nov. 9	Multi-component Phase Diagrams II	Chapter 10 and Notes
Nov. 14		Discuss Homework set 4
Nov. 16	2 nd Test	
Nov. 21	Gas Reactions	Chapter 11
Nov. 23	Gas-Condensed Phase Reactions	Chapter 12
Nov. 28		Discuss Homework set 5
Nov. 30	Multi-component reaction equilibria	Chapter 13
Dec. 5	Electrochemistry I	Chapter 15
Dec. 7	Electrochemistry II	
Dec. 12	Take Home Final Exam (Comprehensive)	Discuss Homework set 6
Final Exam Due December 13 (by 5 PM)		

Required Text: Introduction to the Thermodynamics of Materials by David R. Gaskell, Prentice Hall (5th edition).

Reference Texts:

1. C.H.P. Lupis, Chemical Thermodynamics of Materials, Prentice-Hall, Englewood Cliffs, NJ.
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