Course Description:
The fundamentals of thermodynamics include basic terminology, three laws of thermodynamics and key thermodynamic variables. The application of thermodynamics to phase diagrams, behavior of solutions, and metallurgical processes and reactions. Emphasis is placed on the use of basic thermodynamic data, graphical representations of thermodynamic data and equilibrium, and the application of using computational tools to solve problems. Computing proficiency is required for a passing grade in this course.

Class schedule:
Lecturer: Lin Li
Lecture: MTWR 1:00 pm - 1:50 pm at Houser Hall 3031
Office hours: Thursday after lecture at NERC 2007
or by appointment via lin.li@eng.ua.edu

Prerequisites:
MTE 252: Metallurgical Process Calculations (the course will also heavily rely on material from CH 102 & MA 125)
ENGR 103: Engineering Foundations (computer-based prerequisite for this course)

Required Textbook/References:
- Syllabus, lecture notes, homework assignments, exams, and solutions will be posted on the website of blackboard

Grading:
- Homework 10%
- Quiz 5%
- Computational Assignment 5%
- Three Exams 80%

Attendance: Class attendance at all lectures is a course requirement. The reason for each absence should be discussed with me. You are permitted to make up work missed for excused absences.

Homework: Homework constitutes 10% of your grade. Three to five problems will typically be assigned weekly. Each assignment is due at the beginning of the class on the date specified in the problem set. Assignments will usually be graded on the basis of 10 points. Late assignments will be graded on the basis of 7 points. Exams will depend heavily on the concepts and examples covered on the homework.

Readings: For greater understanding and to give better opportunity to ask questions you should read the book chapters in advance of class. “Numerical Examples” included at the end of most chapters are worthy of studying very closely in order to assist you in understanding the material in each chapter.
Use of Computers: Matlab will be taught and required to solve problems and postprocess thermodynamic data, e.g., plotting phase diagram. Computational assignments will be given based on the use of Matlab.

Missing Classes or Exams: Make-up exams will only be given in extraordinary circumstances and, if possible, arrangements must be made in advance. Written excuses from doctors are required.

Final Exam: May 5th Thursday, 11:30 a.m. - 2:00 p.m.: (Classes which first meet MWF between 1:00 p.m. - 1:50 p.m.)

Course Web Site:
All the materials will be available on the blackboard course web site.

Course Schedule (subject to change):
Week 1 (Jan. 13, 14)
- Chapter 1: Introduction and definition of terms
Week 2 (Jan. 18~21)
- Chapter 2: The first law of thermodynamics
Week 3 (Jan. 25~28)
- Chapter 2: summery
- Chapter 3: The second law of thermodynamics
Week 4 (Feb. 1~4)
- Chapter 3: summery
- Chapter 4: The statistical interpretation of entropy
Week 5 (Feb. 8~11)
- Chapter 5: Auxiliary function
Week 6 (Feb.15~18)
- Feb. 15 1st Midterm (1pm to 230 pm)
- Feb. 16 Computer lab: Introduction to Matlab I (256 Hardaway)
- Chapter 6: Heat capacity, enthalpy, entropy
Week 7 (Feb. 22~25)
- Chapter 6: summery
- Chapter 7: Phase equilibrium in one-component system
- Feb. 25 Computer lab: Introduction to Matlab II (256 Hardaway)
Week 8 (Feb. 29~Mar. 3)
- Chapter 7: summery
- Chapter 8: The behavior of gasses
- Mar 3 Computer lab: Introduction to Matlab III (256 Hardaway)
Week 9 (Mar. 7~Mar. 10)
- Chapter 8: summery
- Mar 9 2nd Midterm (1 pm to 230 pm)
- Mar 10 Computer lab: Introduction to Matlab IV (256 Hardaway)
Week 10 (Mar. 11 ~ Mar. 18)
- Spring break
Week 11 (Mar. 21~24)
- Chapter 9: The behavior of solutions
Week 12 (Mar. 28 ~ 31)
- Chapter 10: Gibbs free energy composition and phase diagrams of binary system
- Mar 31 Computer lab: Application of Matlab to phase diagram calculations (256 Hardaway)
Week 13 (April 4~7)
- Chapter 11: Reaction involving gases
Week 14 (April 11~14)
- Chapter 12: Reaction involving pure condensed phases

Week 15 (April 18 ~ 21)
- Chapter 13: Reaction equilibria in systems containing components in condensed solution
- Summery

Class Policies:
Attendance at examinations and laboratories is mandatory. If you must miss a scheduled laboratory or quiz due to serious illness, family death, accident, etc., notify Professor Li as soon as possible. Excuses of a non-urgent nature will not be accepted.

Disabilities:
Students with disabilities who may require more time than is allotted for the exams/quizzes must contact the UA Office of Disability Services (ODS) to obtain PRIOR APPROVAL and THE PROPER PAPERWORK in accordance with the rules and regulations of The University of Alabama. Alternate exams/quizzes must be scheduled through the ODS (348-4285).