

MATE 203
Thermodynamics of Materials I

Fall 2011 - Course Syllabus

Instructor: Assist. Prof. Erkan KONCA

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Course Website: <http://www.atilim.edu.tr/~ekonca/Courses/MATE203/MATE203.htm>

Schedule: Wednesdays 13:30-14:20 pm at B-1008, Fridays 14:30-16:20 pm at 1009

Course Description:

Thermodynamics concepts and definitions. The first law of thermodynamics: the concepts of internal energy, heat and work, basics of transport mechanisms and heat transfer, heat capacity, enthalpy. The second law of thermodynamics: Carnot cycle, the concept of entropy, The statistical interpretation of entropy, thermal equilibrium and the Boltzmann equation, The third law of thermodynamics. Gibbs and Helmholtz energies. Maxwell relations. Phase equilibrium in a one component system, Reaction equilibria in gas mixtures, the P-V-T relation of gases.

Textbook: “*Introduction to the Thermodynamics of Materials*” D.R. Gaskell (4th ed.), Taylor and Francis, 2003. 5th edition (2008) is also available.

Additional Sources:

1. *Thermodynamics in Materials Science*, Robert T. DeHoff, McGraw-Hill, 1993.
2. *Thermodynamics of Materials*, Volumes I & II, David V. Ragone, John Wiley, 1995.
3. *Thermodynamics of Solids*, Richard A. Swalin, John Wiley, 1970.
4. *Chemical Thermodynamics of Materials*, C.H.P. Lupis, , North-Holland, 1983
5. *Materials Thermochemistry*, O. Kubashevski, C.B. Alcock,, and P.J Spencer, Pergamon Press, 1993

Grading: Two Midterms (25% each), Final Exam (35%), Assignments & Quizzes (10%), Attendance (5%)

COURSE OUTLINE

1. Introduction and Definition of Terms
2. The First Law of Thermodynamics
3. The Second Law of Thermodynamics

Midterm I

4. The Statistical Interpretation of Entropy
5. Auxiliary Functions
6. The Third Law of Thermodynamics

Midterm II

7. Phase Equilibrium in a One-Component System
8. The Behavior of Gases

Final Examination will cover ALL chapters.