THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Thermodynamics of Materials

MATSCEN 2251

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture

Course Description:
Fundamental basis of three laws of thermodynamics, phase equilibria, reaction equilibria, solution theory, and phase diagrams and electrochemistry.

Prerequisites and Co-requisites:
Prereq: 2010, Physics 1250 or 1260, Math 1151 or 1161, and Chem 1210 or 1250; and enrollment as MatScEn-BS or WeldEng-BS student; or permission of instructor.

Course Goals / Objectives:
- Learn basic concepts related to three laws of thermodynamics, phase equilibria, reaction equilibria, solution theory, phase diagrams and electrochemistry
- Learn to calculate a wide range of thermodynamic properties from a limited number of experimental data
- Learn how to determine stability of materials under a given condition
- Learn how to determine what reactions will or will not occur under a specified condition

Course Topics:

- Introduction: criterion for stability of materials, basic concepts, definition of processes and systems
- First Law and its applications
- Enthalpy and Heat capacity
- Calculation of enthalpy changes
- Entropy and the Second law
- Calculation of entropy changes
- Second law and free energy
- Stability diagrams and stability boundaries
- Thermodynamics of mixing and solution thermodynamics
- Phase diagrams including ternary and alloy phase diagrams
- Reaction equilibria
- Thermodynamics of electrochemistry

Designation:

Required