ME 438
INTRODUCTION TO PHYSICAL METALLURGY

1999-2000

ME 438: Introduction to Physical Metallurgy. 3-0-3


Coordinator: Dr. R. Dubrovsky, Associate Professor of ME.
Location: MEC 309
Tel: 973-596-3337

Goal: This course is designed to give students in ME an ability to understand the principles of metal alloying and heat treatment and integrate this knowledge in machine design.

Prerequisites Topics:
1. Solidification of liquids.
2. Imperfection in Crystals.
3. Equilibrium diagrams.

Topics:
1. Role of Materials in Engineering, (3 h.; * 1.5 h.).
2. Elements of Crystalline Structures, (3 h.; * 1 h.).
3. Material Transport in Engineering Solids, (3 h.; * 0 h.).
4. Mechanical Testing, Selection, and Failure of Engineering Materials, (3 h.; * 2 h.).
5. Strengthening Mechanisms and Response to Thermal Treatment, (3 h.; * 1 h.)
7. Non-equilibrium cooling processes, (3 h.; * 1 h.).
8. Heat Treatment Processes. Surface and Diffusion Heat Treatment Processes, (3 h.; * 1 h.).
9. Classification of Ferrous Materials. Steels, microstructures, properties, and application, (3 h.; 1 h.).
10. Cast Irons, microstructure, properties and application, (3 h.; * 1 h.).
11. Non-ferrous materials, properties, and application, (3 h.; * 1 h.).
12. Powder Metallurgy and Engineering Ceramics, (3 h.; * 1 h.).
13. Composite Materials, properties and application, (3 h.; * 1 h.).
15. Exams (6 h.; * 2 h.)

Laboratory Projects:
1. Microstructure Studies. Optical Microscopes, Image Analyzer, Samples preparation equipment
4. Heat Treatment Heating Furnaces, Hardness Testers (Rockwell, Brunell)
5. Quenching and Tempering. Heating Furnaces, Hardness Testers
ABET category content as estimated by faculty member who prepared this course description:

Engineering Science: 2 credits or 66%.
Engineering Design: 1 credit or 33%.

Note: * Design content

The NJIT Honor Code and Professional Conduct will be strictly enforced.