

MSE 313 – Physical Metallurgy

Course Information:

Course Title: Physical Metallurgy
Course Number: MSE 313
Course Credits: 4 credits
Prerequisite: MSE 201
Course Venue: BEL 346
Course Timing: Class - 9:30-10:20 am (Mon, Wed and Fri),
Lab – 11:30 am-1:20 pm (Tuesday)

Instructor Information:

Dr. Indrajit Charit, Assistant Professor, Materials Science and Engineering, University of Idaho McClure Hall Room 405D, Tel: 208-885-5964, Fax: 208-885-0154. E-mail: icharit@uidaho.edu
Office Hours: 11:00 am-1:00 pm (Friday). I will keep an open-door policy for this course. I have posted my schedule on the office door. Please feel free to check whether I am available in times other the office hours. If I am busy and not able to talk, I shall suggest you another time.

Assigned Text:

R.E. Reed-Hill and R. Abbaschian, Physical Metallurgy Principles, 3rd Edition, PWS Kent Publishing Company, 1992.

Class lectures and additional documents will be posted on the UI *Blackboard*.

Course Scope:

This course is intended as an introductory compulsory course in Physical Metallurgy for Materials Science and Engineering Majors and Metallurgical Engineering Minors. This course can be taken as an elective by all engineering and science students.

Course Learning Objectives:

By completion of this course, students are expected to:

- a) Describe the structure of crystalline materials using the nomenclature of Bravais lattices and Miller Indices.
- b) Quantitatively describe the compositions, phases, and microstructures developed during heat treatments of binary solid systems with the use of binary phase diagrams.
- c) Be able to design and conduct hands-on metallographic practices
- d) Understand the nature of the solid phases in alloys.
- e) Apply the principles of basic thermodynamics and solid state diffusion to explain various phase transformations in metallic solids.

Broad Course Topics:

Crystal Structure, Microstructure, Phase, Thermodynamics of Phase Diagram, Binary Phase Diagrams, Diffusion, Iron-Carbon System, Strengthening Mechanisms, Hardening of Steels and Precipitation Hardening in Aluminum Alloys

Course Schedule:

Week # (Dates, 2010)	Topics to Be Covered
1 (Aug. 23 - Aug. 24)	Crystal Structure
2 (Aug. 30 - Sep.3)	Microstructure / Characterization Techniques
3 (Sep. 6 – Sep. 10)	Crystal Defects
4 (Sep. 13 - Sep. 17)	Thermodynamics/Phase Diagrams / Invariant Reactions
5 (Sep. 20 – Sep. 24)	Fe-C phase diagram and Different Phases
6 (Sep. 27 – Oct. 1)	Effects of Alloying Elements in Steel / Solid Solution
7 (Oct. 4 to Oct. 8)	Diffusion
8 (Oct. 11 – Oct. 15)	Phase Change - Solidification
9 (Oct. 18 - Oct. 22)	No class on Monday/Wednesday, Mid-Term Exam on Friday
10 (Oct. 25 - Oct. 29)	Heat Treatment of Steel
11 (Nov. 1 - Nov. 5)	Heat Treatment of Steel
12 (Nov. 8 - Nov. 12)	Age Hardening of Aluminum Alloys
13 (Nov. 15 – Nov. 19)	Strengthening Mechanisms
14 (Nov. 22 – Nov. 26)	Fall Recess (No Class)
15 (Nov. 29 – Dec. 3)	Classes
16 (Dec. 6 – Dec. 10)	Classes (No-Exam Week)
17 (Dec. 13 to Dec. 17)	Final Exam (date/time TBD)

Note: The above schedule is subject to change depending on the progress of the class. You will get a separate sheet with detailed information on the laboratory section of this course.

Final Grade:

Exams : One mid-term (25%) and one final (30%)

Homework: Five (15%)

Quizzes: Given during the class period without notice (5%)

Lab: 25%

Standard University of Idaho policies of grading and academic honesty apply.

Disability Support Services Reasonable Accommodations Statement:

Reasonable accommodations are available for students who have documented temporary or permanent disabilities. Please notify your instructor(s) during the first week of class regarding accommodation(s) needed for the course. All accommodations must be approved through Disability Support Services located in the Idaho Commons Building, Room 306.

- 885-6307email at <dss@uidaho.edu>
- website at <www.access.uidaho.edu> or <www.webs.uidaho.edu/taap>