ME306 Materials Science

Fall 2015

Course Syllabus

REFERENCE TEXT BOOK

Donald R. Askeland and Pradeep P.Fulay, "Essentials of Materials Science and Engineering", Second Edition, *Cengage Learing,* 2009

SUPPLEMENTARY REFERENCES ON RESERVE

1. James F. Shackelford, "Introduction to Materials Science for Engineering, *Pearson (Prentice Hall*), Sixth Edition, 2005
2. William D. Callister Jr., and David G. Rethwisch "Materials Science and Engineering, An Introduction", Eight Edition, *John Wiley and Sons, Inc*., 2010

CLASS SCHEDULE

Lecture: Classroom PHO 205; Tuesday and Thursday 8:00 – 10:00
Discussion: Room PHO 205, Friday 1:00 – 2:00
Laboratory: EPIC 105/102 Design Studio One

INSTRUCTOR

Professor: V. K. Sarin (Tel.: 617-353-6451, e-mail: sarin@bu.edu)
Office: Room 208, 730 Commonwealth Ave.
Office Hours*: Wednesday 10:00 – 12.00 pm

**Other appointments must be scheduled in advanced.*

GTF: Azat Abdyrakhmanov <aazat@bu.edu>
Office: Room B07, 750 Commonwealth Ave.
Telephone:

GRADING

There will be two examinations as noted in the schedule. Each will cover approximately 1/2 of the course and will account for 30% (each) of the total grade.

There will be approximately 10 homework assignments (10%) handed out in class. These will be due in class on the due date stated on the assignment. Late submissions will not be graded.

A comprehensive safety training session will be conducted on the first week of laboratory classes and all students are required to attend this session before being allowed to conduct experiments. Five scheduled laboratory experiments will be conducted Laboratory reports are due at the next scheduled laboratory session, except for the last one (see schedule). Late reports will not be graded. The total laboratory grades will account for 10% of the final grade. There will be 3-4 unscheduled quizzes on subject matter covered that week. The quizzes will account for 5% of the total grade.

A group project (3/4 people) will account for the remaining 15% of the final grade. A pre-proposal, outlining the design of your experimental work and the objective of your project, needs to be submitted before you can begin project related experiments. An intermediate project report (Introduction, including a detailed Literature Review, and Experimental Design) are due prior to the final report submission as detailed in the laboratory schedule. The group project will require a final oral presentation and submission of a typed final report.

Grading Summary:

First Exam	30 %
Second Exam	30 %
Homework	10 %
Laboratory Reports	10 %
Quizzes	5 %
Project/ Labs	15 %

COURSE TOPICS

1.	Introduction to Materials	Chapter 1
2.	Atomic Structure and Bonding	Chapter 2
3.	Crystal Structure and Crystal Geometry	Chapter 3
4.	Crystalline Imperfection	Chapter 4
5.	Diffusion	Chapter 5
6.	Mechanical Properties	Chapter 6
7.	Strain Hardening and Annealing	Chapter 8
8.	Solidification and Solid Solution Strengthening	Chapter 9
9.	Phase Diagrams	Chapter 10
10.	Dispersion Strengthening by Solidification (Kinetics)	Chapter 11
11.	Dispersion Strengthening by Phase Transformation	Chapter 12
12.	Ferrous Alloys	Chapter 13
13.	Nonferrous Alloys	Chapter 14
14.	Ceramics	Chapter 15
15.	Composites	Chapter 17

LECTURE SCHEDULE (SPRING 2015)

Class	Day	Month	Date	Comments
1	Thursday	September	3	Introduction
2	Tuesday		8	Homework 1
3	Thursday		10	Homework 2
4	Tuesday		15	
5	Thursday		17	Homework 3
6	Tuesday		22	
7	Thursday		24	Homework 4
8	Tuesday		29	
9	Thursday	October	1	Homework 5
10	Tuesday		6	
11	Thursday		8	Homework 6
12	Tuesday	Monday Classes	13	
13	Thursday		15	**EXAM 1**
14	Tuesday		20	
15	Thursday		22	Homework 7
16	Tuesday		27	
17	Thursday		29	Homework 8
18	Tuesday	November	3	
19	Thursday		5	Homework 9
20	Tuesday		10	
21	Thursday		12	Homework 10
22	Tuesday		17	
23	Thursday		19	Homework 11
24	Tuesday		24	
	Wednesday	Thanksgiving Break	25	
25	Tuesday	December	1	**EXAM 2**
26	Thursday		3	Project Presentations
27	Tuesday		9	Project Presentations

LABORATORY SCHEDULE

1. Sept. 14 – Sept.18	**Lab Safety/Metallography Demo**
2. Sept. 21 – Sept. 25	**Microstructural Characterization** Assignment: Lab Report (Due: Sept. 28/Oct. 2)
3. Sept. 28 – Oct. 2	**Structural Analysis by X-Ray** Assignment: Lab Report (Due: Oct. 5/9)
4. Oct. 5 – Oct. 9	**Diffusion / Solid Solution** Assignment: Lab Report (Due: Oct. 12/16)
5. Oct. 12 – Oct. 16	**Project Discussion**
6. Oct. 19 – Oct. 23	**Project Set-up**
7. Oct. 26 – Oct. 30	**Projects**
8. Nov. 2 – Nov. 6	**Phase Diagrams** Assignment: Lab report (Due: Nov. 9/13)

PROJECT SCHEDULE

1. Oct. 8 (In Lecture)	**Pre-proposals due**
2. Oct. 12 – Dec. 2	**Project work**
3. Dec. 10	**Final project reports due**

NOTE:

1. All labs are in EPIC 105
2. Lab reports are due in lab during your respective lab hours unless otherwise mentioned.
3. Unless previously arranged with the TA, you are not allowed to attend other lab sections.