

Coordinator - Dr. G.E. Talia

Course Objective :

This is a undergraduate course that covers a range of basic concepts in materials engineering. These concepts are essential for further studies in materials and to initiate the student in the design process with emphasis in the selection of materials based on their properties, environment (degradation), cost, etcetera.

The course is designed for both mechanical engineering undergraduates and undergraduates with other engineering or scientific backgrounds. Emphasis will be placed on developing and understanding the significance of the basic concepts and methods for engineering problem solving. Additional detailed studies of particular materials systems will be performed by the students in design projects as their basic understanding of the materials properties is developed. However, important applications of the basic concepts to engineering materials will be covered. All students are expected to have backgrounds in physics, chemistry, and mathematics.

Notes:

1. Homework problems will be assigned during the course. A one week time will be given to do the homework.
2. Partial credit is not guaranteed.
3. Reading assignments include the text + course notes + handouts.
4. Incomplete (I) grades will not be given (except for medical reasons).
5. All reports and homeworks should be given to the instructor before or during the class of the due day. Late work or work given to a second party will not be accepted.
6. Whining is not allowed.
7. A written open ended project on material selection (selected by the student and approved by the instructor) and presentation of that project using transparencies or slides is required. All the reference materials should be attached to the project. The project will be graded on reference materials, write up and presentation.
8. The course will taught in a combination of lecture, group discussion and questions-answers. This will aid a better understanding and retention of the subject matter.

9. Grading:

HOMEWORK (10)	10
TESTS (3)	60
DESIGN PROJ.	30

8. Final Grade *

over/or % 90	A
less than 90 % but over/or % 80	B
less than 80 % but over/or % 70	C
less than 70 % but over/or % 60	D
less than 60 %	F

(*) The instructor reserves the right to improve/deduct a student's final grade by a grade for exceptional participation/lack of preparation.

10. Office Hrs.

T. and Th. 3:00 - 4:00 or by app.

11. Text: (required)

"Introduction to Materials Science for Engineers", J.F. Shackelford

12. Reference Sources: (not required)

"The Science and Engineering of Materials," Donald R. Askeland

"Elements of Materials Science and Engineering", L.H. Van Vlack

"The Nature and Properties of Eng. Materials", Z.D. Jastrzebski

"Phase Transformations in Metals and Alloys", D.A. Porter and K.E. Easterling

"Engineering Materials", M.F. Ashby and D.R.H. Jones

"Introduction to Dislocations", D. Hull and D.J. Bacon

"The Principals of Engineering Materials", C.R. Barrett, W.D. Nix and A.S. Tetelman

"Introduction to Materials Science", A.G. Guy

Syllabus

Class #	Date	Topic	Chapt.	Assignment
1.	08-21	Materials for Engr.		1
2.	08-23	" "		
3.	08-28	Atomic Bonding		2
4.	08-30	" "		
5.	09-04	Crystalline Structure		3
6.	09-06	" "		HW 1
7.	09-11	" "		
8.	09-13	Noncryst. Structure		4
9.	09-18	" "		HW 2
10.	09-20	" "		
11.	09-25	Diffusion		5
12.	09-27	Test I on Chapters 1, 2, 3, 4 and 5		
13.	10-02	Mech. & Thermal Behavior		6,7
14.	10-04	" "		HW 4
15.	10-09	Failure Analysis		8
16.	10-11	Phase Diagrams		9
17.	10-16	" "		HW 5
18.	10-18	Kinetics Heat Treatment		10
19.	10-23	" "		HW 6

20.	10-25	Test II on Chapters 6,7, 8, 9 and 10		
21.	10-30	Metals	11	HW 7
22.	11-01	" "		Proj. due
23.	11-06	Presentation of projects		
24.	11-08	" "		HW 8
25.	11-13	Ceramics and Glasses	12	
26.	11-15	" "		
27.	11-20	Polymers	13	HW 9
28.	11-27	Polymers		
29.	11-29	Composites	14	
30.	12-04	" "		HW 10
31.	12-06	Test III on chapters 11,12,13 and 14		

Homeworks

HW 1 : Summary Chapters 1 and 2 - 2.10 - 2.11 - 2.23 - 2.27 - 2.31 - 2.41 - 2.47 - 2.48 - 2.51

HW 2 : Summary Chapter 3 - 3.4 - 3.8 - 3.11 - 3.18 - 3.54 - 3.55 - 3.71 - 3.79 - 3.85

HW 3 : Summary Chapter 4 - 4.3 - 4.18 - 4.21 - 4.24 - 4.28 - 4.33 - 4.34 - 4.41 - 4.43

HW 4 : Summary Chapters 5 and 6 - 5.1 - 5.12 - 5.22 - 5.23 - 5.31 - 6.9 - 6.13 - 6.31 - 6.52

HW 5 : Summary Chapters 7 and 8 - 7.4 - 7.12 - 7.16 - 7.18 - 8.1 - 8.3 - 8.4 - 8.35 - 8.37

HW 6 : Summary Chapter 9 - 9.5 - 9.7 - 9.11 - 9.20 - 9.26 - 9.29 - 9.36 - 9.40 - 9.53

HW 7 : Summary Chapter 10 - 10.6 - 10.7 - 10.16 - 10.21 - 10.29 - 10.37 - 10.42 - 10.43 - 10.48

HW 8 : Summary Chapter 11 - 11.2 - 11.4 - 11.6 - 11.7 - 11.10 - 11.12 - 11.13 - 11.15 - 11.16

HW 9 : Summary Chapter 12 - 12.1 - 12.1 - 12.5 - 12.9 - 12.11 - 12.12 - 12.13 - 12.21 - 12.25

HW 10 : Summary Chapters 13 and 14 - 13.6 - 13.9 - 13.21 - 13.35 - 13.39 - 14.19 - 14.33 - 14.34 - 14.41 - 14.50

ME 250 MATERIALS ENGINEERING

Written Report Notes

These notes are intended to supplement the information contained in "A Student Guide to Engineering Report Writing" and describe some important items expected in your reports. The basic format for the reports is that specified by Brown in Chapter 4. There are, however, a few differences that are described below. The reports should contain:

Title Page with experiment title, group members names, date and location of the experiment, and submission date of report.

Abstract

Nomenclature with list of all variables and symbols used in report.

I. Introduction with summary of purpose, background, and method of experiment.

II. Theory review of applicable background theory, derivation or citing of mathematical relations used in experimental analysis.

III. Test Procedure and Equipment description of the equipment and procedure used in the experiment, typically with supporting sketch, to give reader a clear idea of how experiment was performed.

IV. Results and Discussion quantitative description of results of experiment that are also presented in graphical or tabular form as appropriate. Note that all figures and graphs should be referred to in this narrative presentation of results. This section should also include quantitative evaluation of at least two sources of error that contribute to the differences between theory and experimental results.

V. Conclusions review of stated purpose and method of experiment and discussion of how experiment satisfied or did not satisfy its goals. A quantitative summary of the experimental results should be included. Recommendations for improvements to the experiment may also be included.

VI. References (Attach all the references)

VII. Appendices for extensive derivations, sample data reduction, tables of results to "uncluttered" the body of the report.

ME 250 MATERIALS ENGINEERING

Written Report Grading Break-down

Name/s: _____

1. Overall Organization and Neatness (5 points) _____

2. Introduction (10 points) _____

3. Procedure and Equipment (10 points) _____

4. Results (30 points) _____

5. Discussion (30 points) _____

6. Conclusions (10 points) _____

7. Figures and Appendices (5 points) _____

TOTAL _____

Comments: