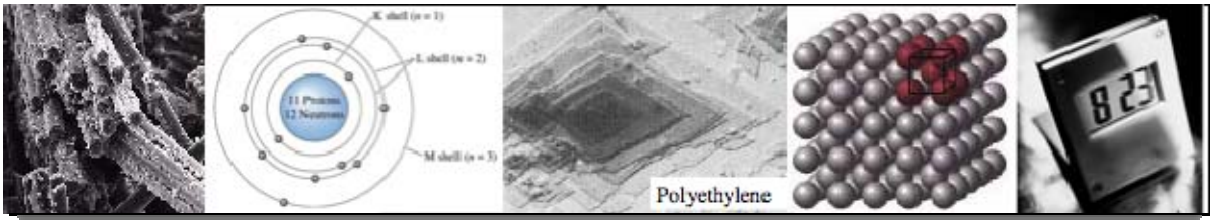

MECH340 Syllabus

Fall 2011

INSTRUCTOR

Dr. Salem Seifeddine, Mech.Eng.
Room 111, phone ext. 3479
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TEXTBOOK

Materials Science and Engineering: An Introduction, by W.D. Callister, 8th Ed., Wiley.

GOALS

The course introduces fundamental concepts in materials science as applied to engineering materials. It also introduces to sophomore students how the structure of metals, ceramics, polymers, and composite materials and their engineering properties, specifically mechanical properties, are related. The effect of the processing route on the structure and therefore properties of materials is also discussed.

The course seeks to impart an understanding of the fundamental nature of materials both metallic and non-metallic. It also introduces the sophomore engineering students to the mechanical, thermal, electrical properties of materials. Furthermore, some key applications of those materials are treated as well as common manufacturing processes used in the fabrication of products.

CONTENTS

Atomic structure, atomic bonding, the structure of solids; mechanical properties (strength, toughness, hardness, creep and fatigue); Deformation and dislocation mechanisms; Strengthening mechanisms; Phase diagrams, heat treatment; Ferrous and non-ferrous alloys; Ceramics; Polymers and Composites.

GENERAL INFORMATION

Students should attend all classes on time. An excessive number of absences will hurt student grades, especially the class participation portion. It is the responsibility of the students to get all lecture notes.

ASSESSMENT AND EVALUATION

Many aspects of the course will receive on-going, real-time assessments and feedback to help improve students' performance. This will be done by discussing performance in class and by arranging individual meetings.

Homework and class quizzes	20%
Exam I **2011-11-01 at 18.30-20.30** (Chapters 2 - 5)	20%
Exam II **2011-12-01 at 18.30-20.30** (Chapters 6 - 9)	20%
Final Exam (Material covered chapters 6-9, but ***focusing*** on chapters 11-16)	40%
	100☺

WEB SITE

A web site is also available for the course using Moodle

INDIVIDUAL MEETINGS

Please do not hesitate to contact me whenever you would like to discuss course related matters, preferably

Time	Days
13:00 – 14:00	Mondays & Wednesdays
11:00 – 12:00	Fridays

Lecture schedule

A number of lectures, MWF, will be held on a weekly basis in **room 541.**

*All homework could be done in groups of max 3 students/group.

**A number of groups are to be presenting. The time allocated is max 10 min/group.

Lecture	Date and Time	Topic	Homework & Exercises
Lecture 1	Monday 2011-09-26	Course overview and introduction to materials science and engineering, Chapter 1	Homework*1 to be handed out and discussed on 2011-10-05
Lecture 2	Wednesday 2011-09-28	Atomic structure and Interatomic bonding, Chapter 2	2.1-2.10 & 2.17-2.23
Lecture 3	Friday 2011-09-30	The structure of crystalline solids, Chapter 3	Homework 2 to be handed out and discussed on 2011-10-12
Lecture 4	Monday 2011-10-03	The structure of crystalline solids, Chapter 3	3.1-3.14, 3.27-3.31, 3.35, 3.38-3.44, 3.50-3.52
Lecture 5	Wednesday 2011-10-05	Homework 1 to be presented**	Homework 1 to be handed in.
Lecture 6	Friday 2011-10-07	Imperfections in solids, Chapter 4	4.1-4.4, 4.6-4.10, 4.22-4.23, 4.26, 4.29, 4.30-4.34
Lecture 7	Monday 2011-10-10	Diffusion, Chapter 5	5.1-5.6, 5.10-5.13. 5.17-5.20, 5.27-5.28.
Lecture 8	Wednesday 2011-10-12	Diffusion & presentation** of homework2	Homework 2 to be handed in.
Summary	Friday 2011-10-14	Summary Chapters 3-5 & exercises	
Lecture 9	Monday 2011-10-17	Mechanical properties of metals, Chapter 6	Homework 3 to be handed out. In: 2011-11-04 6.1-6.10, 6.15-6.20, 6.25-6.27, 6.30
Lecture 10	Wednesday 2011-10-19	Cont Chapter 6 & Dislocation and strengthening mechanisms, Chapter 7	7.1-7.8
Lecture 11	Friday 2011-10-21	Dislocation and Strengthening mechanisms, Chapter 7	7.18-7.30
Lecture 12	Monday 2011-10-24	Dislocation and Strengthening mechanisms, Chapter 7	8.1-8.11, 8.14-8.17
Lecture 13	Wednesday 2011-10-26	Chapter 7 (15 min) Failure, Chapter 8	8.24-8.27
Lecture 14	Friday 2011-10-28	Failure, Chapter 8	
Summary & repetition	Monday 2011-10-31	Repetition 2-5	
Lecture 15	Wednesday 2011-11-02	Cont. Failure, Chapter 8, Phase diagrams, Chapter 9	Homework 4 to be handed out. In: 2011-11-18 9.1-9.15
Lecture 16	Friday 2011-11-04	Phase diagrams, Chapter 9	Homework 3 to be handed in! 9.25-9.32
Lecture 17	Wednesday 2011-11-09	Phase diagrams, Chapter 9	9.25-9.32
Lecture 18	Friday 2011-11-11	Fe-C phase diagram, Chapter 9	9.45-9.50
Repetition	Monday 2011-11-14	Fe-C phase diagram, Chapter 9	
Lecture 19	Wednesday 2011-11-16	Applications and processing of metal alloys, Chapter 11 Ferrous and Nonferrous	11.1-11.16, 11.19-11.20
Lecture 20	Friday 2011-11-18	Applications and processing of metal alloys, Chapter 11 Thermal processing	Homework 4 to be handed in! 11.23, 11.24-11.27, 11.30-11.31

Lecture 21	Monday 2011-11-21	Structure and properties of Ceramics, Chapter 12	12.1-12.5, 12.15, 12.16, 12.26, 12.28
Lecture 22	Wednesday 2011-11-23	Structure and properties of Ceramics, Chapter 12	12.36-12.37, 12.39-12.40, 12.45-12.47
Lecture 23	Friday 2011-11-25	Applications and processing of Ceramics, Chapter 13	13.1-13.4

Lecture 24	Monday 2011-11-28	Applications and processing of Ceramics, Chapter 13	13.8-13.13, 13.19-13.22, 13.25
Repetition	Wednesday 2011-11-30	Repetition chapter 8-9	
	Friday 2011-12-02	☺	

Exercises	Monday 2011-12-5	Exercises Chapters 11 & 12	
Lecture 25	Wednesday 2011-12-07	Polymers Structures, Chapter 14	14.1-14.4, 14.7, 14.11-14.18
Lecture 26	Friday 2011-12-09	Polymers Structures, Chapter 14	14.20-14.23

Lecture 27	Monday 2011-12-12	Characteristic, application and processing of polymers, Chapter 15	15.1, 15.5-15.7, 15.10-15.17
Exercises	Wednesday 2011-12-14	Characteristic, application and processing of polymers, Chapter 15	15.30-15.34
Exercises	Friday 2011-12-16	Exercises Chapters 12&13	

Exercises	Monday 2011-12-19	Exercises Chapters 14&15	
Quiz	Wednesday 2011-12-21	A part of chapter 10 and chapter 11	

Lecture 28	Monday 2012-01-02	Composites, Chapter 16	16.1-16.10, 16.16-16.20
Lecture 29	Wednesday 2012-01-04	Composites, Chapter 16	16.22-16.30

Lecture 30	Monday 2012-01-09	Composites, Chapter 16	16.22-16.30
Exercises	Wednesday 2012-01-11	Exercises Chapter 16	
Summary	Friday 2012-01-13	Summary Chapters 14-16	