



**ÇANKAYA UNIVERSITY**  
**MSE 125- Materials Science and General Chemistry**  
**(2014-2015 Spring)**

Methods of Instruction	Theor.	Appl.	Lab.	Total	Credit	ECTS Credit
	42	28	-	70	(3 2 4)	6
Semester	Spring 2014 – 2015					
Instructor	Assoc. Prof. Dr. Ziya Esen, Materials Science and Engineering Dept. Room: NB-16, e-mail: <a href="mailto:ziyaesen@cankaya.edu.tr">ziyaesen@cankaya.edu.tr</a>					
Assistant	Ezgi Bütev, Materials Science and Engineering Dept. Room: NC-09, e-mail: <a href="mailto:ebutev@cankaya.edu.tr">ebutev@cankaya.edu.tr</a>					
Schedule	Section 02: Lecture Hours: Tuesday 14:20-17:10 Recitation Hours : Thursday 09:20-11:10					

### Course Description

Classification of materials, atomic structure, periodic table, molecular structure, bonding in solid materials, structure of crystalline solids, mechanical properties and failure of materials, phase diagrams, properties and use of polymers, ceramics, glasses and composites.

### Course Objective

The properties and characteristics of the materials are important in almost every modern engineering design. The study of solids and relationships between structure and physical properties is therefore an important component of engineering education. This course provides a conceptual framework for understanding the behavior of engineering materials by emphasizing important relationships between internal structure and properties. It also attempts to present a general picture of material nature and mechanisms that act upon, modify and control their properties.

### Textbook

-William D. Callister, Jr. Materials Science and Engineering: An Introduction, 7<sup>th</sup> or any other upgrade edition, John Wiley and Sons, 2000.

### Reference Books

- James F. Shackelford, Introduction to Materials Science for Engineers, 7<sup>th</sup> Ed., Prentice Hall, 2000,
- William F. Smith, Foundations of Materials Science and Engineering, 3<sup>rd</sup> Ed., McGraw-Hill, 2004,
- Larry D. Horath, Fundamentals of Material Science, 3<sup>rd</sup> Ed., Prentice Hall, 2006.

### Attendance

70% attendance of all lecture hours and 80% attendance of all recitation hours is required by the university's regulations. Absence from a quiz, lab. or an examination will result in zero grade.

### Grading Policy

Homework + Quiz.....	10%
Attendance.....	5%
Midterms (I&II).....	50%
Final.....	35%



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**Tentative Course Outline**

<b><u>Week</u></b>	<b><u>Topics covered</u></b>	<b><u>(7<sup>th</sup> Ed.)</u></b>
<b>1</b> (09-13 Feb)	Definition and classification of materials	Chapters 1, 13, 15, 16
<b>2</b> (16-20 Feb)	Atomic structure, periodic table, molecular structure, bonding	Chapter 2
<b>3</b> (23-27 Feb)	Structure of Crystalline Solids	Chapter 3
<b>4</b> (2-6 Mar)	Imperfections in Solids	Chapter 4
<b>5</b> (9-13 Mar)	Diffusion in Solids	Chapter 5
<b>6</b> (16-20 Mar)	Mechanical Properties of Metals I (Test methods; Stress-strain curves)	Chapter 6
<b>7</b> (23-27 Mar)	Mechanical Properties of Metals II (Strength, ductility, toughness, resilience; Dislocations and Strengthening Mech.)	Chapters 6, 7
<b>8</b> (30 Mar-3 Apr)	Failure I (Fracture, types of fracture, fracture mechanisms, impact test)	Chapter 8
<b>9</b> (6-10 Apr)	Failure II (Fatigue and creep)	Chapter 8
<b>10</b> (13-17 Apr)	Phase Diagrams I (basics)	Chapter 9
<b>11</b> (20-24 Apr)	Phase Diagrams II (Iron-carbon) (23th April-No Lecture)	
<b>12</b> (27 Apr-1 May)	Ceramics, Polymers and Metals	Chapter 9
<b>13</b> (4-8 May)	Composites and Advanced Materials	Chapters 11, 13, 15
<b>14</b> (11-15 May)	Overview (14-15 <sup>th</sup> May-NO LECTURE MTS-8)	Chapter 16