Alanya Alaaddin Keykubat University | Rafet Kayış Faculty of Engineering
Mechanical Engineering Department

SYLLABUS

Code/Name	MCE 207/ Material Science
Type	Required
Credit/ECTS	4/5
Hour per Week	4 (4+0+0)
Level/Year	Undergraduate/2
Semester	Fall
Classroom	A203
Content	Relationship between structure and properties of materials. Atomic bonding, crystalline structures, crystal defects and imperfections. Phase diagrams and equilibrium. Microstructural development. Properties of engineering materials. Metals and alloys. Production of iron, steel and non-ferrous metals. Steel alloys and nonferrous alloys. Deformation of metals. Failure and testing. Heat treatment of metals. Ceramics, mechanical properties of ceramics, and applications and processing of ceramic materials. Polymers, mechanical properties of polymers, and applications and processing of polymeric materials.
Prerequisites	
Textbooks	***Primary*** JJ William D. Callister, Jr. Materials Science and Engineering: An Introduction, 5 th or any other upgrade edition, John Wiley and Sons, 2000. ***Supplementary*** - James F. Shackelford, Introduction to Materials Science for Engineers, 5th Ed., Prentice Hall, 2000, - William F. Smith, Foundations of Materials Science and Engineering, 3rd Ed., McGraw-Hill, 2004, - Larry D. Horath, Fundamentals of Material Science, 3rd Ed., Prentice Hall, 2006.
Objectives	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
Course Outcomes	In this course you will be able to: CO1 To review physics and chemistry in the context of materials science & engineering. CO2 To describe the different types of bonding in solids, and the physical ramifications of these differences. CO3 To describe and demonstrate diffraction, including interpretation of basic x-ray data. CO4 Introduce metals, ceramics, polymers, and electronic materials in the context of a molecular level understanding of bonding. CO5 Introduce the relation between processing, structure, and physical properties.

Weekly Schedule of Topics

W	Topic
1	Introduction and Atomic Structures
2-3	Crystalline Solids
4	Defects in Solids
5	Diffusion
6-7	Mechanical Properties of Metals

8	Failure
9-10	Phase Diagrams
11	Phase Transformations
12	Thermal Properties
13	Ceramics
14	Polymers

Contribution to Program Outcomes*

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3	1	3	1	2	2	0	3	2
CO2	3	3	3	1	3	1	2	2	0	3	3
CO3	3	3	3	1	3	1	3	0	0	4	1
CO4	3	3	3	1	3	1	1	0	0	2	0
CO5	3	3	3	1	3	1	4	2	0	5	0

* Contribution Level | 0: None | 1: Very Low | 2: Low | 3: Medium | 4: High | 5: Very High

Special Conditions	• Students work in groups for presentation and assignment. • The consequence of violation of the attendance rule is to receive a grade of **NA.**
Requirements	Basic knowledge of a dynamic analysis software
Evaluation	Midterm Exam 50% Quizzes 25% Final Exam 50% Total 100%
Course Policy	1. You must attend at least 70% of the sessions including add-drop period. 2. Be in the class on time. 3. English should always be used to communicate with one another. 4. Mobile phone should be switched off and put away during the class. 5. You cannot talk to your friends during class no matter what the subject is.
Cheating & Plagiarism	• Copying or letting someone to copy your work on exams, assignments, or reports is cheating. • Cutting and pasting text, figures and tables from the web sources or any other electronic source is plagiarism. • The consequence of academic dishonesty is to receive a grade of **F** for the course.

Instructor

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Room	233	Office Hours	

Prepared by Bertan Beylergil