

The University of Jordan
Faculty of Engineering & Technology



Department	Course Name	Course Number	Semester
Mechanical Engineering	Materials Science for Mechanical Engineers	0904275	

2019 Course Catalog Description

This course introduces the basic principles underlying the behavior of materials. Provide the scientific foundation for understanding of the relations among material properties, microstructure, macrostructure, and behavior of metals, polymers, and ceramics. Deals with atomic structure and bonding, structure of crystalline solids, imperfection in solid, dislocations and strengthening mechanisms, phase diagrams and alloys formation, ferrous metals and nonferrous metals and alloys.

Instructors

Name	E-mail	Sec	Office Hours (online)	Lecture Time

Text Books

	Text book 1	Text book 2
Title	Materials science and engineering: an introduction	Class Handouts
Author(s)	William D. Callister and David G. Rethwisch	
Publisher, Year, Edition	John Wiley & Sons, 2017, 10th edition	

References

Books	Foundations of Materials Science and Engineering, William F. Smith, McGraw-Hill Education, Sixth Edition
Journals	
Internet links	

Prerequisites

Prerequisites by topic	-
Prerequisites by course	General Chemistry I (0303101) + Strength of Materials I (0934372)
Prerequisite for	Smart Structures (0914587), Rapid prototyping (0914530)

Topics Covered

Week	Topics	Chapter in Text
1	Introduction	Chapter 1
2,3	Atomic Structure and Bonding	Chapter 2
4,5	The Structure of Crystalline Solids	Chapter 3
6	Imperfections in Solids	Chapter 4
7	Diffusion	Chapter 5
8	Mechanical Properties of Metals	Chapter 6
9	Dislocations and Strengthening Mechanisms	Chapter 7
10	Failure	Chapter 8
11,12	Phase Diagrams	Chapter 9
13	Phase Transformations: Development of Microstructure and Alteration of Mechanical Properties	Chapter 10
14	Applications and Processing of Metal Alloys	Chapter 11
15	Structures and Properties of Ceramics	Chapter 12
16	Polymer Structures	Chapter 14

