Jordan University of Science and Technology

Faculty of Engineering

Chemical Engineering Department

CHE311 Materials Science - JNQF Level: 7
Second Semester 2023-2024

Course Catalog
3 Credit Hours. Atomic structure and bonding, crystal structures, solidification, crystalline imperfections and diffusion in solids. Mechanical properties of metals, thermal processing of metals, phase diagrams and engineering alloys, polymeric, ceramic and composite materials.
Teaching Method: On Campus

Text Book	
Title	Materials Science and Engineering an Introduction
Author(s)	W.D. Callister, and D.G. Rethwisch
Edition	10th Edition
Short Name	Course Textbook
Other Information	2018, John Wiley & Sons, Inc.

Course References

Short name	Book name	Author(s)	Edition	Other Information
Ref#1	Foundations of Materials Science and Engineering	William Smith	2nd Edition	
Ref#2	Principles of Phase Diagrams in Materials Systems	P. Gordon	1st Edition	
Ref#3	Understanding Materials Science	R.E. Hummel	1st Edition	

Instructor	
Name	**Prof. Mohammed Osama Azzam**
Office Location	CH2 L2
Office Hours	
Email	azzam@just.edu.jo

Class Schedule & Room
Section 1: Lecture Time: Sun, Tue, Thu : 10:30 - 11:30 Room: CH2109

Tentative List of Topics Covered		
Weeks	**Topic**	**References**
Week 1	General Introduction	From **Course Textbook**
Week 1	Introduction to Materials Selection	From **Course Textbook**
Week 2	Classification of Materials	**Chapter 2** From **Course Textbook**
Week 2	Atomic Structure and Bonding	**Chapter 2** From **Course Textbook**
Weeks 2, 3	Crystal Structures	**Chapter 3** From **Course Textbook**
Week 4	Crystal Imperfections	**Chapter 4** From **Course Textbook**
Weeks 5, 6	Diffusion	**Chapter 5** From **Course Textbook**
Weeks 7, 8	Mechanical Properties of Metals	**Chapter 6** From **Course Textbook**
Weeks 9, 10	Phase Diagrams	**Chapter 9** From **Course Textbook**
Weeks 11, 12	Polymers	**Chapter 14 & 15** From **Course Textbook**
Weeks 13, 14	Ceramics	**Chapter 12 & 13** From **Course Textbook**
Week 15	Composites	**Chapter 16** From **Course Textbook**

Mapping of Course Outcomes to Program Outcomes and NQF Outcomes	Course Outcome Weight (Out of 100%)	Assessment method
To present the basic fundamentals and terminologies of materials sciences and engineering. [5SO1] [1L7K1]	5%	
To study atomic structure and interatomic bonding. [5SO1] [1L7S1]	5%	
To study the structure of crystalline solids. [5SO1] [1L7S1]	13%	
To study imperfections in solids. [5SO1] [1L7S1]	10%	
To study diffusion process in metals. [1SO2] [1L7S2]	11%	
To study the mechanical properties of metals. [1SO2] [1L7S2]	13%	
Study the phase diagrams and relate them to the design and control of heat-treating procedures. [1SO6] [1L7S3]	13%	
To study structures, properties, applications & processing of ceramics. [5SO1] [1L7K1]	10%	
To study polymer structures. [5SO1] [1L7S1]	6%	

To study characteristics, applications and processing of polymers. [1SO2] [1L7S1]	6%	
To study composite materials. [1SO1] [1L7S2]	3%	
Communicate your work (i.e. homework) properly. [3SO3] [1L7C3]	5%	

Relationship to Program Student Outcomes (Out of 100%)						
SO1	SO2	SO3	SO4	SO5	SO6	SO7
52	30	5			13	

Relationship to NQF Outcomes (Out of 100%)				
L7K1	L7S1	L7S2	L7S3	L7C3
15	40	27	13	5

Evaluation	
Assessment Tool	**Weight**
Exam 1	25%

Policy	
Attendance	Attendance will be checked at the beginning of class. University regulations will be followed for students exceeding the maximum number of absences.
Homework	Homework problems are assigned during lecture and usually due one week later. Late homework may not be accepted or severely penalized. Try to solve the problems independently. The assigned problems will be collected, graded, and returned to you in the lecture.
Quizzes	Quizzes will be part of this course. No make-up quizzes will be conducted except in the case of a documented emergency.
Student Conduct	It is the responsibility of each student to adhere to the principles of academic integrity. Academic integrity means that a student is honest with him/herself, fellow students, instructors, and the University in matters concerning his or her educational endeavors. Cheating will not be tolerated in this course. University regulations will be pursued and enforced on any cheating student.
Evaluation	Homework (One week after homework problems are assigned) 10% (including quizzes) Quizzes (Unannounced - at the beginning of lectures) 10% (including homework) First Exam (According to the schedule posted by the Department schedule) 25% Second Exam (According to the schedule posted by the Department schedule) 25% Final Exam (According to the schedule posted by the University for the finals exams) 40%

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