

**The University of Jordan**  
**School of Engineering**



Department	Course Name		Course Number	Semester
Mechanical Engineering	Materials Science for Aeronautical Engineers		0994471	Fall
2025 Course Catalog Description				
Structural materials in aircraft industry, Structure of crystalline solids, Imperfections in solids, Mechanical properties, Strengthening mechanisms, Static and fatigue fracture, Phase diagram, Processing conditions-properties relationship, Creep, Corrosion, Introduction to composite materials				
Instructors				
Name	E-mail	Section	Office Hours	Lecture Time
Text Books				
	Text book 1		Text book 2	
Title	Materials Science and Engineering: An Introduction to Properties Applications and Design			
Author(s)	W. D. Callister			
Publisher, Year, Edition	9 <sup>th</sup> Edition, WILEY.			
References				
Books	1.Introduction to Engineering Materials, V. B. John, 3rd Edition, Springer. 2.Engineering Materials: An Introduction to Properties, Applications and Design, D.R.H Jones and Michael F. Ashby, 4 <sup>th</sup> Edition, Elsevier.			
Journals				
Internet links				
Prerequisites				
Prerequisites by topic				
Prerequisites by course	General Chemistry I 0303101 + Strength of Materials 0934372			
Co-requisites by course				
Prerequisite for				
Topics Covered				
Week	Topics		Chapter in Text	
1	Introduction			
2-3	Crystalline Structures			
4	Imperfections in Solids			
5	Diffusion			
6-7	Mechanical Properties of Metals			
8-9	Dislocations and Strengthening Mechanisms			
10-11	Failure			

**The University of Jordan**  
**School of Engineering**



12-13	Phase Diagrams and Phase Transformation	
14	Application and processing of metal and alloys	
14	Introduction to composite materials	
16	Corrosion and degradation of materials	

Mapping of Course Outcomes to ABET Student Outcomes							
SOs	Course Outcomes						
1	Introduction to composite materials. Explain the types of atomic bonding and crystalline structure of engineering materials. Explain the diffusion concept and its calculations. Explain the mechanical behavior of engineering materials. Explain the mechanical failure in the materials. Explain the phase diagrams in general and specifically the iron-carbon phase diagram. Explain the phase transformation of the iron- carbon and its relation to the phase diagram. Explain the applications and processing of metal alloys. Explain what corrosion and degradation of materials are. Demonstrate the strengthening mechanisms and its relation to dislocations. Classify the types of imperfections in in crystalline solid materials.						
Evaluation							
Assessment Tools				Expected Due Date		Weight	
First Exam						25	
Second Exam						25	
Final Exam						50	
Contribution of Course to Meet the Professional Components							
This course is one of the first opportunities for engineering students to encounter the fundamental principles of design problem solving. It is an important prerequisite course for number of designs related-courses, which occur later in the programs of engineering students.							
Relationship to Student Outcomes							
SOs	1	2	3	4	5	6	7
Availability	X						
Relationship to Aeronautical Engineering Program Objectives (AEPOs)							
AEPO1	AEPO2		AEPO3		AEPO4		AEPO5

**The University of Jordan**  
**School of Engineering**



<b>ABET Student Outcomes (SOs)</b>	
<b>1</b>	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
<b>2</b>	An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
<b>3</b>	An ability to communicate effectively with a range of audiences
<b>4</b>	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
<b>5</b>	An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
<b>6</b>	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
<b>7</b>	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies
<b>Updated by ABET Committee, 2025</b>	