

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



Department	Course Name	Course Number	Semester	
Mechanical Engineering	Special Topics in Aeronautical Engineering	0994594	Fall or Spring	
2025 Course Catalog Description				
The purpose of this course is to provide students a synopsis on material evaluation, begins by considering the various physical properties of materials that may be of interest for materials evaluation and the means for determining these properties by widely used and lesser used non-destructive evaluation methods. The methods will include: Overview of Visual Inspection (VT), Liquid Penetrant Testing (PT), Magnetic Particle Testing (MT), Review of Surface NDT Methods, Radiographic Testing (x-ray) ; (RT), Ultrasonic Testing (UT), Eddy Current Testing (ET), Thermal Testing (TT).				
Instructors				
Name	E-mail	Section	Office Hours	Lecture Time
Text Books				
	Text book 1		Text book 2	
Title				
Author(s)	David C. Jiles			
Publisher, Year, Edition	CRC Press Taylor & Francis Group, 2007, 1 <sup>st</sup> Edition			
References				
Books	1. Nondestructive Testing Radiography Ultrasonics Liquid Penetrant Magnetic Particle Eddy Current. Louis Cartz, 1st Edition, ASM International 1995. 2. Non-Destructive Test and Evaluation of Materials, J Prasad and C. G. Krishnadas Nair, 2nd Edition, McGraw Hill Education (India) 2011. 3. Handbook of Advanced Nondestructive Evaluation, Nathan Ida Norbert Meyendorf Editors, 1st Edition, Springer 2019.			
Journals				
Internet links				
Prerequisites				
Prerequisites by topic				
Prerequisites by course	Department approval			
Co-requisites by course				
Prerequisite for				
Topics Covered				
Week	Topics			Chapter in Text
1	Introduction on Materials Evaluation and Testing Concepts			
2	Mechanical Properties of Materials			
3	Sound Waves: Acoustic and Ultrasonic Properties of Materials			
4	Thermal Properties of Materials			

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6-5	Electrical and Magnetic Properties of Materials	
7-6	Effects of Radiation on Materials	
8	Visual and Liquid Penetrant NDE	
10-9	Ultrasonic Testing Methods	
12-11	Electrical Testing Methods (Eddy Current)	
13	Magnetic Testing Methods	
14-13	Radiographic Testing Methods	
15	Thermal Testing Methods	
16	Destructive vs. Non-destructive Testing	

Mapping of Course Outcomes to ABET Student Outcomes							
SOs	Course Outcomes						
1,2	Introduce the concept of material evaluation and testing concepts.						
	Learn the basic mechanical properties of materials.						
	Learn the Acoustic, Ultrasonic, Thermal, Electrical, Magnetic, and Radiation effect on Materials Properties.						
	Learn the usage of NDE techniques, Visual and Liquid penetrant, Ultrasonic Testing, Electrical Testing, Magnetic Testing, Radiographic Testing, and Thermal Testing Methods						
	Explain the advantages and disadvantages of using destructive and non-destructive testing techniques.						
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	X					
Relationship to Aeronautical Engineering Program Objectives (AEPOs)							
AEPO1	AEPO2	AEPO3		AEPO4		AEPO5	
ABET Student Outcomes (SOs)							

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<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>	