The University of Jordan
School of Engineering

Department	Course Name	Course Number	Semester
Mechanical Engineering	Strength of Materials I	0904372	Fall 2024-2025

2005 Course Catalog Description

Axial loading, Material properties obtained from tensile tests, Stresses and strains due to axial loading, Thermal Stresses, Elementary theory of torsion, Solid and hollow shafts, Thin-walled tubes, Rectangular cross-section, Stresses in beams due to bending, shear and combined forces. Composite beams, Analysis of plane stress, Mohr's Circle, Combined stresses, Thin-walled pressure vessels, Deflection of beams, Buckling of columns, Energy Methods.

Instructors

Name	E-mail	Sec	Office Hours	Lecture Time	
				Sec 1	Sec 2
Prof. Dr. Ibrahim Abu-Alshaikh	i.abualshaikh@ju.edu.jo	1	Available on the Microsoft Teams	Sun/ /Tus/ /Thu: 12:30 - 13:30	Mon/ /Wed/: 11:30-13:00

Text Books

	Text book 1	Text book 2
Title	Mechanics of Materials, Brief Edition	**Download the text from:** **http://160592857366.free.fr/joe/ebooks/Mechanical%20Engineering%20Books%20Collection/STRENGTH%20OF%20MATERIALS/MechaMatBreif.pdf**
Author(s)	J. Gere& B. Goodno	
Publisher, Year, Edition	Cengage Learning, 2011, **Brief Edition**	**Microsoft Teams link:** Mechanics of Materials Fall 2024-2025 | General | Microsoft Teams

References

References	1. R. C. Hibbeler, "Mechanics of Materials", 2. F. P. Beer, and E. R. Johnston, "Mechanics of Materials", McGraw Hill. 3. L. G. Kraige, "Mechanics of Materials", John Wiley and Sons. 4. P. Popov, "Mechanics of Materials", Prentice Hall
Journals	Springer Journal no. 11223:Strength of Materials, ISSN: 1573-9325 (electronic version)
Internet links	http://fetweb.ju.edu.jo/ME/Courses/Mechmovies/

Prerequisites

Prerequisites by topic	-
Prerequisites by course	Statics **(0901241)** or Dynamics **(0904220)**
Co-requisites by course	

Prerequisite for	Applied Mechanics Lab. (1), Manufacturing Processes **(0906310)**,Machine Design (1) **(0904435)**, Design of Machine Elements **(0904437)**, Strength of Materials (2) **(0904472)**, Failure and Fracture Analysis **(0904481)**, Computer-Aided Design **(0904484)**,Engineering Computational Software **(0904522)**, Introduction to Composite Materials **(0904581)**.

Topics Covered

Week	Topics	Chapter in Text	Sections
1	Introduction: Concept of stress and strain at a point of a stressed body, Basic loadings: tension, compression, shearing and bearing.	Chapter 1	1.1, 1.2
2-3	Stress-strain diagram and mechanical behavior of the material, Allowable values of influences and responses and Factors of safety.	Chapter 1	1.3 - 1.8
4-5	Axially loaded members: Deformation, Normal stresses and normal strains, Shear stresses.	Chapter 2	2.1 - 2.4
5	Thermal stresses, Stresses on inclined planes.	Chapter 2	2.5, 2.6
6	Torsion: Pure shear and Transmission of power by circular shafts	Chapter 3	3.1 - 3.8
7-8	Shear force and bending moment diagrams.	Chapter 4	4.1 - 4.5
9-10	Elementary flexure theory of beams: stresses in beams: Assumptions and basic concepts, Curvature, Normal strains and stresses, Shear stresses in beams.	Chapter 5	5.1-5.9
11-12	Analysis of stresses: Transformation equations of plane stresses, Extreme values of stresses: Principal stresses and maximum shear stresses, Mohr's circle for plane stresses.	Chapter 6	6.1-6.6
13	Pressure vessels and combined loading: Cylindrical and spherical vessels analysis; Combined loading analysis in beams.	Chapter 7	7.1-7.4
14	Beam deflection using integration method and other methods	Chapter 8	8.1-8.5
15	Buckling of columns: Introduction, Critical load and Column modes	Chapter 9	9.1-9.4

Mapping of Course Outcomes to ABET Student Outcomes

SOs	Course Outcomes
1	1. An ability to apply knowledge of calculus and differential equations in derivation of some basic equations of strength of materials. 2. Understand mechanical behavior of the material and interpret data to draw Stress-Strain diagram.

2	3. Analyze normal stresses and strains due to axial loading, bending, pressure and combined loading and investigate transformation equations on inclined sections by Mohr's circle. 4. Analyze shear stresses in beams, in shafts due to torsion, principal stresses and maximum shear stresses by Mohr's circle. 5. Understand design of rods, beams, shafts, columns and thin walled-pressure-vessel through computing the maximum normal and shear stresses at a point.

Evaluation

Assessment Tools	Expected Due Date	Weight
First Midterm Exam		20 %
Second Midterm Exam		20 %
Homework Assignments		10%
Final Exam		50 %

Contribution of Course to Meet the Professional Components

Build the fundamental basic concepts of design analysis of structures and basic machine components.

Relationship to Student Outcomes

SOs	1	2	3	4	5	6	7
Availability	X	X					

Relationship to Mechanical Engineering Program Objectives (MEPOs)

MEPO1	ME PO2	MEPO3	ME PO4	MEPO5

ABET Student Outcomes (SOs)

1	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2	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
3	An ability to communicate effectively with a range of audiences
4	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
5	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
6	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Prof. Dr. Ibrahim Abu-Alshaikh, October, 2024