The Hashemite University
Faculty of Engineering
Course Syllabus

Course Title:	Mechanics of Materials 2	**Course Number:**	110402537
Department:	Mechanical Engineering	**Designation:**	Elective
Prerequisite(s):	-		
Instructor:	Dr. Mohammad Gharaibeh	**Instructor's Office:**	E3101
Instructor's e-mail:	mohammada_fa@hu.edu.jo		
Office Hours:	Sun/Tuesday (10:30-12:30pm) or by appointment.		

Course description: Review on Elementary Mechanics of Materials, Theories of Stress and Strain,, Transformations of stress and strain, Principal stresses and strains, 2D and 3D Mohr's Circle for stress and strain, Linear Stress-Strain-Temperature relations, Anisotropic, Isotropic and Orthotropic Materials, Inelastic Material Behavior, Yielding Criteria, Energy Methods, Castigliano Theorems on Deflection and Brief introduction on Fracture Mechanics.

Textbook(s):

1. Boresi, A. P., and R. J. Schmidt. "Advanced mechanics of materials, 2003." *John Wiley & Sons*, Sixth Edition.

Reference(s):

1. Sadd, Martin H. *Elasticity: theory, applications, and numeric*. Academic Press, 2009.

Course Outcomes: After completing the Special Topics in ME course, the students are expected to:

- Analyze axially and torsionally loaded members as well as lateral deflections of beams.
- Calculate and interpret three dimensional states of stress and strains mathematically and using Mohr's circle.
- Be familiar with strain compatibility and equilibrium equations in different coordinate systems.
- Express Hook's law for anisotropic, orthotropic and isotropic materials under triaxial stress state and temperature loadings.
- Learn basics of the inelastic material behavior under different temperatures and strain rates.
- Understand various types of Yielding criteria for different material types.
- Learn the basic principles of energy methods in mechanics and famous theories like Castigliano theorems for deflections
- Be familiar with experimental strain measurements and different strain gage devices..

Class schedule: Three class sessions each week; 50 minutes each

Grading Plan:

First Exam	(30 Points)	**TBA**
Second Exam	(30 Points)	
HWs	(-- Points)	
Final exam	(40 Points)	

Course designation according to the professional component:

Professional Component	Course Designation
General Education	-----
Basic Science and Mathematics	----
Engineering Science	√
Engineering Design	√

Course relationship to program outcomes:

	ME Program Outcomes
√	1. Apply knowledge of science, mathematics (including multivariate calculus, linear algebra, differential equations) and engineering fundamentals to mechanical engineering applications. **(a, ME1)**
	2. Design and conduct experiments, as well as analyze and present results in a professional manner. **(b)**
√	3. Design, model, analyze and realize a component, system (thermal or mechanical), or process to meet specific requirements and realistic constraints. **(c, ME2)**
	4. Communicate effectively, and function in multidisciplinary teams. **(d, g)**
√	5. Identify, formulate, and solve engineering problems. **(e)**
√	6. Understand professional and ethical issues and the responsibilities of the engineering practice. **(f)**
√	7. Recognize contemporary issues and environmental, cultural, and economical consideration of the engineering profession. **(j, h)**
	8. Identify the need for professional development and engage in life-long learning. **(i)**
	9. Use the techniques, skills, and modern engineering and computing tools necessary for engineering practice. **(k)**
√	10. Apply the basics of statistics and probability. **(ME3)**
	11. Recognize the need and engage in solving national environmental issues.

Course relationship to 2006/2007 ABET criteria for mechanical engineering programs:

	Programs must demonstrate that graduates have:
√	A. Knowledge of chemistry and calculus-based physics with depth in at least one;
	B. The ability to apply advanced mathematics through multivariate calculus and differential equations;
√	C. Familiarity with statistics and linear algebra;
√	D. The ability to work professionally in both thermal and mechanical systems areas including the design and realization of such systems.

Prepared by: Dr. Mohammad Gharaibeh **Date:** 01/Oct/2025

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