DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING
MECHANICAL ENGINEERING PROGRAM, BSC.

Course Syllabus

1. **Course number and name**

ME 212 Strength of Materials I

2. **Credits and contact hours**

(3+0) 3 credit hours, 3 contact hours

3. **Course type**

Blended Learning Course (2+1)

4. **Instructor's or course coordinator's name**

Dr. Riyad Abu Mallouh

5. **Textbook information**

Beer, Johnson and DeWolf, Mechanics of Materials , McGraw Hill Companies, 6th Edition, Inc.

   a. **Other supplemental materials**

   Instructor's notes and slides

6. **Specific course information**

   a. **Catalog description**

   States of stress and strain, hook's law, torsional stresses, axial deformation, internal forces in beams; bending and shearing diagrams and stresses, beam design, compound stresses, stress transformation

   b. **Prerequisites or co-requisites**

   Prerequisite: CE 221 Statics

   c. **The course is:**

   Required in Industrial Engineering program.

7. **Specific goals for the course**

   a. **Course outcomes:**

   After completion of the course, students are expected to be able to:

   1. Calculate deformation, strain, and stresses that develop in materials when subjected to various loading conditions.
   2. Analyze torsional stresses
   3. Design simple structural members.
   4. Analyze compound stress
   5. Solve stress transformation problems by equations method and Mohr's circle for Plane stress.

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b. **The following student outcomes are addressed by the course:**

SO-(e) an ability to identify, formulates, and solves engineering problems.

1. Learning Outcomes and their Alignment with Program Educational Objective (PEO's), Methods of Delivery, and Assessment Methods:

Learning Outcomes	Program PEOs	Method of Delivery	Assessment Method
Course Outcomes			
CO-(1): Calculate deformation, strain, and stresses that develop in materials when subjected to various loading conditions.	-	Lectures (Example and Problems)	First Exam
CO-(2): Analyze torsional stresses.	-	Lectures (Example and Problems)	First Exam
CO-(3): Design simple structural members.	-	Lectures (Example and Problems)	Second Exam
CO-(4): Analyze compound stress			Second Exam
CO-(5): Solve stress transformation problems by equations method and Mohr's circle for Plane stress.		Lectures (Example and Problems)	Final Exam
Student Outcomes			
SO-(e) an ability to identify, formulates, and solves engineering problems.	2	Lectures (Example and Problems)	Midterm Exam

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2. Weekly Teaching Plan

Week No.	Lecture	Topic	Method of Delivery
1	Sun (9-10)	Chapter 1: Stress: Equilibrium of a Deformable Body	Lecture
	Tue (9-10)	Chapter 1: Stress: Stress	Lecture
	Thu (9-10)	Chapter 1: Stress: Average Normal Stress in an Axially Loaded Bar	Lecture
2	Sun (9-10)	Chapter 1: Stress: Average Shear Stress	Lecture
	Tue (9-10)	Chapter 1: Stress: Allowable Stress Design	Lecture
	Thu (9-10)	Chapter 2: Strain: Deformation	Lecture
3	Sun (9-10)	Chapter 2: Strain: Strain	Lecture
	Tue (9-10)	Chapter 3: Mechanical Properties of Materials: The Tension and Compression Test	Lecture
	Thu (9-10)	Chapter 3: Mechanical Properties of Materials: The Stress–Strain Diagram	Lecture
4	Sun (9-10)	Chapter 3: Mechanical Properties of Materials: Stress–Strain Behavior of Ductile and Brittle Materials	Lecture
	Tue (9-10)	Chapter 3: Mechanical Properties of Materials: Strain Energy	Lecture
	Thu (9-10)	Chapter 3: Mechanical Properties of Materials: Poisson's Ratio	Lecture
5	Sun (9-10)	Chapter 4: Axial Load: Saint-Venant's Principle	Lecture
	Tue (9-10)	Chapter 4: Axial Load: Elastic Deformation of an Axially Loaded Member	Lecture
	Thu (9-10)	Chapter 4: Axial Load: Principle of Superposition	Lecture
6	Sun (9-10)	FIRST EXAM	Lecture
	Tue (9-10)	Chapter 4: Axial Load: Statically Indeterminate Axially Loaded Members	Lecture
	Thu (9-10)	Chapter 4: Axial Load: The Force Method of Analysis for Axially Loaded Members	Lecture
7	Sun	Chapter 5: Torsion: Torsional Deformation of a Circular Shaft	Lecture

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	(9-10)		
	Tue (9-10)	Chapter 5: Torsion: The Torsion Formula	Lecture
	Thu (9-10)	Chapter 5: Torsion: Power Transmission	Lecture
8	Sun (9-10)	Chapter 5: Torsion: Angle of Twist	Lecture
	Tue (9-10)	Chapter 5: Torsion: Statically Indeterminate Torque-Loaded Members	Lecture
	Thu (9-10)	Chapter 6: Bending: Shear and Moment Diagrams	Lecture
9	Sun (9-10)	Chapter 6: Bending: Graphical Method for Constructing Shear and Moment Diagrams	Lecture
	Tue (9-10)	Chapter 6: Bending: Bending Deformation of a Straight Member	Lecture
	Thu (9-10)	Chapter 6: Bending: The Flexure Formula	Lecture
10	Sun (9-10)	Chapter 6: Bending: Unsymmetric Bending	Lecture
	Tue (9-10)	Chapter 7: Transverse Shear: Shear in Straight Members	Lecture
	Thu (9-10)	Chapter 7: Transverse Shear: The Shear Formula	Lecture
11	Sun (9-10)	Chapter 7: Transverse Shear: Shear Flow in Built-Up Members	Lecture
	Tue (9-10)	Chapter 7: Transverse Shear: Shear Flow in Thin-Walled Members	Lecture
	Thu (9-10)	SECOND EXAM	Lecture
12	Sun (9-10)	Chapter 8: Combined Loadings: Thin-Walled Pressure Vessels	Lecture
	Tue (9-10)	Chapter 8: Combined Loadings: State of Stress Caused by Combined Loadings	Lecture
	Thu (9-10)	Chapter 9: Stress Transformation: Plane-Stress Transformation	Lecture
13	Sun (9-10)	Chapter 9: Stress Transformation: General Equations of Plane-Stress Transformation	Lecture
	Tue (9-10)	Chapter 9: Stress Transformation: Principal Stresses and Maximum In-Plane Shear Stress	Lecture
	Thu (9-10)	Chapter 9: Stress Transformation: Mohr's Circle—Plane Stress	Lecture
14	Sun (9-10)	Chapter 9: Stress Transformation: Absolute Maximum Shear Stress	Lecture

	Tue (9-10)	Chapter 10: Strain Transformation: Plane Strain	Lecture
	Thu (9-10)	Chapter 10: Strain Transformation: General Equations of Plane-Strain Transformation	Lecture
15	Sun (9-10)	Chapter 10: Strain Transformation: Mohr's Circle—Plane Strain	Lecture
	Tue (9-10)	Chapter 10: Strain Transformation: Strain Rosettes	Lecture
	Thu (9-10)	Chapter 10: Strain Transformation: Theories of Failure	Lecture

3. Grade Distribution:

Assessment	Grade	Week No.
- Midterm Exam	30%	7th Week
-Assignments (Reports /Quizzes/ Seminar / Tutorials/ Home works ….)	20%	1-16th Week
- Final Examination	50%	16th Week

Note: Make-up exams will be offered for valid reasons. It may be different from regular exams in content and format.