College of Engineering

Department of Civil Engineering

جـــامــعــة
الملك سعود
King Saud University   1957

CE 302   Mechanics of Materials

Credit and Contact hours	3/ 3(Lectures), 1 (Tutorials), 0 (Laboratory)
Required, or Elective	Required for a BSCE degree
Course Description	Introduction and fundamentals of mechanics of deformable materials. Concept of stress and strain and Hooke's law. Concept of failure, yield and allowable stresses. Factor of safety and allowable stress design. Normal stress under axial loading and bending. Shear stress under shear force and torsion. Shear force and bending moment diagrams. Transformation of stress and strain and Mohr's circle. Buckling of columns.
Prerequisites or Co-requisites	**Prerequisite:** Statics (GE 201) **Co-requisite:** CE 305 (Mechanics of Materials Lab.)
Course Learning Outcomes	Students completing this course successfully will be able to

Course Learning Outcomes	Related Student Outcomes (SO)
CLO1. Determine internal forces in beams, members and shafts using different methods with the verification of the relationships between the axial, shear forces and bending moments.	**SO1**
CLO2. Determine strains, stresses and deformations for structural members under different loading conditions.	**SO1**
CLO3. Evaluate strength of beams under bending and shear conditions based on the concept of factor of safety with the consideration of different alternatives to reach the most economical solution.	**SO4**
CLO4. Perform transformation of stresses in 2-D problems with the application of Mohr's circle	**SO1**
CLO5. Compute buckling critical load for columns with different end conditions.	**SO1**

Student Outcomes related to this Course	**SO1**. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics, [ABET 1] and using modern engineering tools. **SO4**. 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.
Topics Covered	*(see table below)*

List of Topics	Related CLOs
1. Introduction – Concept of Stress-strain relationship under different conditions of loading	CLO1
2. Internal forces in beams and shafts	CLO1
3. Stress and Strain – Axial Loading Conditions	CLO2
4. Stress and Strain – Shear Loading Conditions	CLO2
5. Stress and Strain – Torsion loading conditions	CLO2
6. Stress and Strain - Pure Bending Conditions	CLO2
7. Analysis of beams under bending and shear loadings –Factor of Safety- Different alternatives- Economical Solution.	CLO3
8. Transformation of Stress and Strain – Mohr's circle	CLO4
9. Concept of Buckling in columns- factors affecting buckling critical load- Determination of bucking critical loads for different end conditions.	CLO5

Textbook(s) and Other Required Material	Mechanics of Materials, Latest Edition (6th or 7th) in SI units by Beer, Johnston, Dewolf, and Mazurek, McGraw Hill.
Grading System	Two Mid-term Exams 50 % Quizzes and assignments 10% Final Exam: 40%
Instructors	Prof. Nadeem A. Siddiqui (2A89), email; nadeem@ksu.edu.sa Dr. Ahmet Tuken (2A90), email; atuken@ksu.edu.sa Dr. Saleh Al-Deghaither (2A10), email; deghathr@ksu.edu.sa Dr. Yassir Abbas (2A84/1), email; yabbas@ksu.edu.sa
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