College of Engineering	
Department of Civil Engineering	جـــامـــعـــة الملك سعود King Saud University 1957

CE 564   Advanced Solid Mechanics

Credit and Contact hours	3 / 3 (Lectures), 0 (Tutorials), 0 (Laboratory)
Required, or Elective	Elective
Course Description	Introduction to elasticity: stress; strain; equilibrium; compatibility; constitutive relations. Selected topics in advanced mechanics of materials: torsion of non-circular solid and thin-wall open and hollow sections; unsymmetrical bending; shear center; shear deformations in beams; curved beams; failure theories; beams on elastic foundations.
Prerequisites or Co-requisites	None

Course Learning Outcomes	Students completing this course successfully will be able to:

Course Learning Outcomes (CLOs)	*Related Student Outcomes (SO)*
CLO1. Recognize the principles of solid mechanics and apply them to formulate solid mechanics problems. K1	**SO1**
CLO2. Identify and apply failure criteria to multiaxial stress state. K1	**SO1**
CLO3. Solve problems involving stress and strains of deformable bodies; torsion problems; unsymmetrical bending; shear deformations in beams; curved beams and beams on elastic foundations. S1	**SO2**
CLO4. Idealize problems involving torsion of noncircular shafts; unsymmetrical bending and shear deformations of beams; curved beams and beams on elastic foundation. S1	**SO2**
CLO5. Use the appropriate analytical or numerical techniques, e.g. MATLAB to solve assigned problems. S1	**SO2**
CLO6. Select the appropriate failure criterion to evaluate design stresses of structural member. V2	**SO7**

Student Outcomes related to this Course	SO 1 Recognize advanced engineering knowledge, concepts, and techniques to identify, interpret, and analyze complex and real-life engineering problems. SO 2 Provide solutions for complex and real-life engineering problems through critical thinking and the use of modern engineering tools, and identify their impact on social, global, cultural, environmental, safety, and economic factors. SO 7 Effectively manage, individually or in groups, specialized tasks and activities in coursework, projects, assignments, and research work with a high level of autonomy and responsibility.
Topics Covered	

	List of Topics	Related CLOs
	1. Basic equations of elasticity	**CLO 1**
	2. Torsion of non-circular shafts	**CLO 1, 3, 4, 5**
	3. Torsion of thin-walled open and hollow sections	**CLO 1, 3, 4**
	4. Unsymmetrical bending and shear center	**CLO 1, 3, 4**
	5. Shear deformations in beams	**CLO 1, 3, 4**
	6. Bending of curved beams	**CLO 1, 2, 3, 4**
	7. Failure theories	**CLO 1, 2, 5, 6**
	8. Beams on elastic foundations	**CLO 1, 3, 4, 5**
Textbook(s) and Other Required Material	• A.P. Boresi, R.J. Schmidt, Advanced Mechanics of Materials, John Wiley & Sons, Inc., 6th Edition., 2003. • Ferdinand Beer, Mechanics of Materials, McGraw Hill, latest edition • Free web book on Applied Mechanics of Solids by A.F. Bower (http://solidmechanics.org/contents.php)	
Grading System	Assignments	10%
	Lecture attendance	――
	Midterm exam	40%
	Project presentation	10%
	Final exam	40%
Instructors	Prof. Husain Abbas; Office: 1A65; Email: habbas@ksu.edu.sa	
Date of Review	March, 2025	