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

CE 564 Advanced Solid Mechanics

Credit and Contact hours	3/ 3 (Lectures), 0 (Tutorials), 0 (Laboratory)
Required, or Elective	Required for a MSCE degree
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	Related Program Outcomes
CLO1: Recognize the principles of solid mechanics and apply them to formulate solid mechanics problems	**K1**
CLO2: Identify and apply failure criteria to multiaxial stress state.	**K1**
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**
CLO4: Idealize and solve problems involving torsion of noncircular shafts; unsymmetrical bending and shear deformations of beams; curved beams and beams on elastic foundation.	**S1**
CLO5: Use the appropriate analytical or numerical techniques, e.g. MATLAB to solve assigned problems	**S1**
CLO6: Select the appropriate failure criterion to evaluate design stresses of structural member.	**C2**

Student Outcomes related to this Course	**K1**. Recognize advanced engineering knowledge, concepts and techniques to identify, interpret and analyze complex and real-life engineering problems. **S1**. Provide solution for complex and real-life engineering problems through critical thinking and using modern engineering tools and identify its impact on social and ethical issues. **C2**. Design novel advanced Civil Engineering systems and evaluate its performance and effectiveness for engineering practice and its impact on society.
Topics Covered	<table><tr><th>List of Topics</th><th>Related CLOs</th></tr><tr><td>1. Basic equations of elasticity</td><td>CLO1</td></tr><tr><td>2. Analysis of stresses</td><td>CLO2</td></tr><tr><td>3. Torsion of non-circular shafts</td><td>CLO4</td></tr><tr><td>4. Torsion of thin-walled open and hollow sections</td><td>CLO4</td></tr><tr><td>5. Unsymmetrical bending and shear center</td><td>CLO4</td></tr><tr><td>6. Shear deformations in beams</td><td>CLO3</td></tr><tr><td>7. Bending of curved beams</td><td>CLO3</td></tr><tr><td>8. Failure theories</td><td>CLO6</td></tr><tr><td>9. Beams on elastic foundations</td><td>CLO4</td></tr><tr><td>10. Solution of problems using analytical and numerical techniques</td><td>CLO5</td></tr></table>
Textbook(s) and Other Required Material	• A.P. Boresi, R.J. Schmidt, *Advanced Mechanics of Materials*, John Wiley & Sons, Inc., 6th Edition, 2003.
Grading System	Assignments and Homework 10% Presentation of Project 10% Two Midterm Exams 40% Final Exam 40%
Instructors	Prof. Husain Abbas; Office: 1A65; Email: habbas@ksu.edu.sa
Date of Review	February, 2021