

İzmir Institute of Technology - Department of Civil Engineering

CE 539 Advanced Mechanics of Materials - Fall 2026-2027 Course Outline

COURSE INSTRUCTOR	Dr. İzzet Özdemir Department of Civil Engineering Office Hours: TBA	Office: C 206 E-mail: izzetozdemir@iyte.edu.tr
COURSE SCHEDULE	Thursday 13:30 - 16:15, Room: CZ 16	
COURSE CONDUCT	Teams page is going to be activated and used throughout the semester.	
TEXTBOOK & REFERENCES	There is no particular textbook. The following books are good references covering the course content. • Advanced Strength and Applied Elasticity, A.C. Ugural, S.K. Fenster, 4th Edition, Pearson, 2003. • Advanced Mechanics of Materials, A. Boresi, R.J. Schmidt, 6th Edition, Wiley, 2003. • Advanced Mechanics of Materials, R.D. Cook, W.C. Young, Colliar MacMillan, 1985. • Inelastic Analysis of Structures, M. Jirasek, Z.P. Bazant, Wiley, 2002. • Plastic Methods for Steel and Concrete Structures, S.S.J. Moy, John Wiley & Sons, 1981.	
OBJECTIVES	The course intends to broaden the knowledge of the students in the field of mechanics of materials by teaching selected topics.	
COURSE CONTENT	• Analysis of Stress • Definition of Stress and Stress Notation • Equations of Equilibrium in Differential Form • Two-dimensional Stress at a Point • Mohr's Circle for 2-D Stress State • Three Dimensional Stresses at a Point • Stresses on an Oblique Plane in terms of Principle Stresses • Mohr's Circle for 3-D Stress • Analysis of Strain & Stress-Strain Relations • Definition of Strain • Equations of Compatibility • Generalized Hooke's Law • Strain Energy • Failure Criteria • Failure by Yielding and Fracture • Classical Failure Criteria • Yield Criteria for Ductile and Quasi-brittle Materials • General Structure of Plasticity Models	

- Basic Rheological Models
 - Rheological devices for basic material behaviour
 - Description of elasticity, visco-elasticity and elasto-plasticity
- Introduction to Elasto-plastic Analysis
 - Elasto-plastic Bending of Beams
 - Collapse of Simple Frames
 - Introduction to Limit Analysis
- Introduction to Plasticity for Quasi-brittle Materials (If time permits)

GRADING

The tentative overall grade constitution is as follows:

- Mid-term : 30 %
- Homework sets : 30 %
- Final : 40 %