

# MAK 206 - STENGHT OF MATERIALS

## SYLLABUS

**Instructor:** Dr. Cihan Tekoğlu  
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**Office Hours:** **Monday:** 14:30 – 15:20

**Website:** <https://uzak.etu.edu.tr>

**Contents:** Concepts of stress and strain. Axial load, statically indeterminate axially loaded members, thermal stress. Torsion, angle of twist, statically indeterminate torque-loaded members. Bending, eccentric axial loading of beams. Transverse shear, shear flow in built-up members. Combined loadings. Stress and strain transformation. Deflection of beams and shafts, statically indeterminate beams and shafts.

**Textbook:** “Mechanics of Materials (SI Units)”, R.C. Hibbeler, Prentice Hall

**References:** “Mechanics of Materials”, F.P. Beer and E.R. Johnston, McGraw-Hill  
“Cisimlerin Mukavemeti”, Mustafa İnan, İTÜ Vakfı, 2011

**Course Learning Outcomes:** The main learning outcomes of this course are:

- the ability to determine internal reactions (stress/strain) to external loadings
- the ability to determine the maximum stress/strain values in a structural member
- a thorough understanding of the fundamental principles defining the relations between the mechanical/geometric properties of a structural member and the loadings that the member can safely withstand

**Weekly Lecture Plan:**

Week	Topics
1	STATICS: Equilibrium of a deformable body. STRESS: Average normal and shear stresses, allowable stress, factor of safety.
2	STRESS: Design of simple connections. STRAIN: Deformation, normal and shear strains. MECHANICAL PROPERTIES OF MATERIALS: Tension and compression tests, Hooke's law, Poisson's ratio.
3	AXIAL LOAD: Elastic deformation of an axially loaded member, principle of superposition, statically indeterminate axially loaded members, thermal stress.
4	TORSION: Torsional deformation of a circular shaft, the torsion formula, power transmission, angle of twist, statically indeterminate torque-loaded members.
5	BENDING: Shear and moment diagrams.
6	BENDING: The flexural formula, unsymmetric bending.
7	TRANSVERSE SHEAR: Shear in straight members, the shear formula, shear flow in built-up and thin-walled members.
8	COMBINED LOADINGS: State of stress caused by combined loadings.
9	COMBINED LOADINGS: State of stress caused by combined loadings (continues).
10	STRESS AND STRAIN TRANSFORMATIONS: Plane-stress/plane-strain transformations.
11	STRESS AND STRAIN TRANSFORMATIONS: General equations for stress/strain transformations, Mohr's circle.
12	DEFLECTION OF BEAMS AND SHAFTS: The elastic curve, finding the displacement and slope by using the integration method.

**Performance Measures:**

Midterms	2, each contributes 25 %
Final Exam	1, contributes 35 %
Quizzes/Homework	15 %