

APPLIED SOLID MECHANICS

Instructor: Fazıl Önder Sönmez
Class hours: Mondays 09.00–11.00 (M 2200); Wednesdays 10.00–11.00 (M 1170)
Office hours: Mondays 13.00–15.00, Wednesdays 13.00–15.00, or drop by
Tel: (212) 359-7196, Cellular: (542) 780 6279
E-mail: sonmezfa@boun.edu.tr
Assistants: Necdet Ali Özdür, e-mail: necdet.ozdur@boun.edu.tr, office: KB 243, tel: 4478
Enver Kapan, e-mail: enver.kapan@boun.edu.tr, office: KB 216, tel: 7516
Prerequisite: ME 345, Mechanics of Materials

Catalog Description: Introduction to theory of elasticity; stress, strain, constitutive equations. Topics from advanced strength of materials: bending of unsymmetric cross-sections, curved beams, shear center, thick-walled cylinder. Mechanics of composite materials. Introduction to lamination theory. Application to engineering problems.

Course Objectives: Learning how to analyze common load-carrying components of structures and mechanical systems to determine their response in terms of displacement, strain, and stress states.

Contribution of the course to the program outcomes: 1) Knowledge of linear algebra, depth in physics, advanced calculus, differential equations, and engineering sciences along with the ability to apply these towards solutions of elementary mechanical engineering problems; 5) Ability to use modern computer tools in mechanical engineering

Computer use: The project assignment

Textbook: None. Use your hand notes. As supplementary, you may use the following book: Advanced mechanics of materials and applied elasticity by Ugural and Fenster, 5th ed., Prentice Hall, 2012.

Grading:	Quizzes	20 %
	Project	10 %
	Midterms	30 %
	Final	40 %
	Attendance	± 2 %

Notes: In quizzes, questions will be similar to the homework assignments. The midterms and the final exam are closed book and notes. A formula sheet will be provided.

Tentative Course Schedule:

<u>Week</u>	<u>Topics</u>
1	Introduction (1 hour), deformation of elastic solids, analysis of strain (2 hours)
2	Strain-displacement relations (2 hours), compatibility equations (1 hour)
3	Traction, definition of stress (2 hours), equations of motion and equilibrium (1 hour) Quiz 1
4-5	Tensors (1 hour), transformation of stress (1 hour), principal stresses (2 hours)
5-6	Transformation of strain (1 hour), linear stress- strain- temperature relations (Constitutive equations) (2 hours) Quiz 2 Midterm 1
6-8	Two dimensional problems in elasticity (plane stress and plane strain) Quiz 3 Midterm 2
9	Cylindrical coordinates in two dimensions, Thick-walled cylinders, Curved beams
10-11	Bending of beams with unsymmetric cross-sections Quiz 4
11-12	Shear centers of thin-walled beam cross sections
13	Plates Quiz 5
14	Mechanics of composite materials Final