Course Outline **ME 626**
Fall 2005

MECHANICS OF COMPOSITE MATERIALS

Instructor: Fazıl Önder Sönmez

Class hours: Mondays 4 PM–5 PM (M 2203), Wednesdays 3 PM–5 PM (M 2171)

Office hours: Mondays 10 AM–12 AM, Wednesdays 10AM–12AM

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Prerequisite: ME 345, Mechanics of Materials

Prerequisites by topics: Definition and analysis of stress and strain, constitutive relationship for 2-D isotropic, linearly elastic materials.

Course Description: Types of composite materials; matrix materials, thermosets, thermoplastics, fiber materials. Effective moduli; rule of mixtures. Constitutive relation for anisotropic materials. Laminates; constitutive relations, transformation equations. Strength and failure criteria. Classical theory of laminated plates; governing relations, higher order theories, energy methods. Cylindrical bending and vibration of laminated plates.

Course Objectives: Learning how to analyze mechanical behavior of composite materials and how to design them.

Textbook: Mechanics of Composite Materials, Robert M. Jones, 2nd edition, Taylor & Francis, 1999

Grading:		
	Quizzes	20 %
	Project	10 %
	Midterms	30 %
	Final	40 %
	Attendance	±3 %

In quizzes, questions will be similar to the homework assignments.
Midterm and final are closed book and notes. Only one A4 paper is permitted containing formulas.

Schedule

Week	**Topics**
1	Introduction, (types of composite materials; matrix materials, thermosets, thermoplastics, fiber materials)
2-3	Behavior of a lamina: stress-strain relations for an anisotropic material, effective stiffness
	Quiz 1
4-5	Micromechanics: Determining the properties of a lamina from the properties of its constituents
	Quiz 2
	Midterm 1
6-7	Behavior of a laminated plate: Classical Lamination Theory, laminate stiffness
	Quiz 3
	Midterm 2
8-9	Strength and failure criteria
	Quiz 4
10	Bending and deflection of laminated plates
11	Vibration of laminated plates
	Quiz 5
	Midterm 3
12	Buckling of laminated plates
12-14	Design of Composite Structures