CE 212 ENGINEERING MATERIALS

Required course

Spring 2009

Instructor:	*Name:*	Turan Özturan	Nilüfer Özyurt
	Office Hours:	T 3 Th 3	T 3 Th 3
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Course Data:	Hours:	TTThTh 1212	
	Room:	Özturan TT: M3120, ThTh:2200	
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Course Description (Catalog):

CE212 Engineering Materials **(2+0+2) 3**

Cementing materials, aggregates, concrete, masonry, structural metals, polymers, composites, and timber. Illustration of their applications in engineering. Laboratory sessions on cementing materials, aggregates, concrete, masonry.

Prerequisite: ME 212 Materials Science

Course Objectives (Learning outcomes) :

Provide a connection between empiricism, craft and science in understanding of construction materials and of their treatment in practice.

Develop a knowledge of structure of construction materials

Lay a sound foundation for the materials technology

Textbook:

Construction Materials, Their Nature and Behavior, J.M.Illston&P.L.J.Domone (edts), 3rd Ed., Spon Press

Reference Books:

Properties of Concrete, A.M. Neville, 3rd Ed. Longman Scientific and Technical Boğaziçi University Library Internet (www.concrete.org , www.asce.org)

Curricular context

This course introduces the methods for the mix design of Portland cement and bituminous concretes, polymer and cement based composites, and design of masonry elements. Estimated design content of the course is 20%.

Laboratory and Computer Usage:

Theoretical information given in the classroom is supported with 5 hours (for entire semester) of lab work. The class is divided into a number of small groups and experiments related to lectures are done to closely associate students with engineering materials and experimental study. Students are encouraged to use computer facilities in evaluating the test results and preparing the laboratory reports.

Class Policies:

Class Attendance: 5%

Midterm exams: Two exams, each 25% of the course grade.

Lab. Reports and Attendance : 10%

Final exam: Comprehensive exam at the end of the semester, 35% of the course grade.

Contribution of the Course to Program Outcomes:

(a) An ability to apply knowledge of mathematics, science and engineering

(b) An ability to design and conduct experiments, as well as to analyze and interpret data

(c) An ability to design a system, component, or process to meet desired needs

(d) An ability to function on multi-disciplinary teams

(h) The broad education necessary to understand the impact of engineering solutions in a global and societal context

Course Assessment:

Course will be assessed on the basis of the achievement of course objectives and contribution to program outcomes by the students at the end of the semester. Procedures will be announced in the last week of the course.

Week	Topics	Course Topics and Objectives
1	Introduction	Describe the structure of materials on different dimensional scales.
2	Concrete	Describe the hydration process of cement. Introduce chemical and mineral admixtures. Describe properties and role of aggregates in concrete. Fresh and early age properties of concrete. Fundamentals of deformation of concrete. Basics of stress-strain behavior. Fundamentals of strength and failure of concrete. Fundamentals of durability of concrete. Principles of statistical quality control of concrete. Property-composition relations and basics of concrete mix design.
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7	Bituminous materials	Properties of bitumen and aggregates. Basics of strength and failure of flexible pavements. Property-composition relations for bituminous concrete mix design.
8	Masonry	Materials for masonry. Introduction to masonry construction. Basics of structural behavior and failure of masonry. Allowable stress approach for masonry design. Introduction to reinforced masonry.
9		
11	Polymers and Polymer Composites	Introduce types of polymers and fibers. Structure and design principles of polymer based fiber composites. Examples of end use of polymer composites.
12		
13	Cement Based Fiber Composites	Properties of fibers. Principles of design of cement based fiber composites.
14	Metals	Iron-carbon alloys for structural use. Metal alloys in civil engineering.
14	Timber	Introduction of nature made composite: wood. Structural Properties of timber.