

## **CE 49B PAVEMENT DESIGN & REHABILITATION**

Elective Course

**Spring 2009**

**Instructor(s):** Aybike Öngel

**Course Data:** Hours: WWW456; Room: M2181

### **Course Description (Proposed Catalog):**

#### **CE 49B Pavement Design and Rehabilitation**

Course Credit: 3 (2+2+0)

Design and analysis of flexible and rigid pavements for highways and airports. Types of pavement structures, distresses. Characterization and behavior of pavement materials under various environmental conditions and traffic loading. Pavement maintenance and rehabilitation techniques. The concept of life cycle cost analysis and pavement management systems.

**Course Objectives:** Students completing this course successfully will be able to

- understand the failure modes for flexible and rigid pavements
- analyze stress distribution and deflections throughout multilayer pavements systems
- obtain properties for pavement materials – granular and cohesive soils, stabilized granular soils, asphalt concrete, and PCC
- calculate traffic loads for highway design
- design flexible pavement using AASHTO and the Asphalt Institute Methods
- design flexible pavement using AASHTO and the PCA Methods

**Textbook:** Lecture Notes

**Reference Book:** Pavement Analysis and Design (2<sup>nd</sup> edition) by Yang H. Huang

#### **Curricular Context:**

The course introduces students to the design of highway and airport pavements as well as maintenance and rehabilitation of pavements through a final project which provides the students an opportunity to design an airport pavement with the given field data and using a pavement analysis software. The course content can be characterized as: 30% mathematics and 70 % engineering design.

**Computer Usage:** MS Word, Excel, EverFe, LEAP

#### **Class Policies:**

Homework: Students are assigned bi-weekly homeworks, 20% of the course grade

Midterm exams: Only one exam, 20% of the course grade

Design Projects: Pavement design project, 20% of the course grade

Final exam: Comprehensive exam at the end of the semester, 40% of the course grade

#### **Contribution of the Course to Program Outcomes:**

- (a) An ability to apply knowledge of mathematics, science and engineering
- (c) An ability to design a system, component, or process to meet desired needs such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (e) An ability to identify, formulate and solve engineering problems
- (g) An ability to communicate effectively
- (k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice

<b>Week</b>	<b>Topic</b>	<b>Homeworks, Midterms, and Project</b>
1	Introduction to Pavement Systems	
2	Distresses in Flexible and Rigid Pavements	HW#1
3	Distress Identification	
4	Economical Analysis of Pavement Maintenance and Rehabilitation	HW#2
5	Materials Characterization	
6	Materials Characterization and Asphalt Mix Properties	HW#3
7,8	Load and Traffic Analysis	Midterm
9	Stress and Strain Calculations in Pavements	
10	Flexible Pavement Design	HW#4
11	Rigid Pavement Design	HW#5
12	Airport Pavement Design and Design of Overlays	Project
13	Maintenance and Rehabilitation Techniques	