Tennessee Technological University
Department of Civil & Environmental Engineering
CEE 4610 (5610) – Pavement Design
Elective
Fall Semester 2007

2007Catalog Data: CEE 4610 (5610): Pavement Design. Lecture 3. Credit 3. Structural design of flexible and rigid pavements. Pavement rehabilitation. Properties of subgrades, base courses and paving materials. Prerequisite: CEE 3610.

Textbook: Yoder and Witczak, *Principles of Pavement Design*, Wiley, Second edition, 1975.

Reference: TBA

Coordinator: L.K. Crouch, Professor of Civil Engineering

Goal: To familiarize the student with the techniques and materials used in design, construction and rehabilitation of flexible and rigid pavements.

Course learning objectives:

1. To familiarize the student with properties, specifications, and test methods for pavement subgrades, subbases, bases, and surface courses for flexible and rigid pavements.
2. To show how material selection, design decisions, and the construction process influence pavement stresses, strains, and durability which in turn control distress mode and severity for flexible and rigid pavements.
3. To expose the student to the American Association of State Highway and Transportation Officials (AASHTO), National Asphalt Pavement Association (NAPA), Asphalt Institute (AI), California Bearing Ratio (CBR), and typical sections methods of flexible pavement design.
4. To expose the student to the AASHTO, Portland Cement Association (PCA), Tennessee Ready Mixed Concrete Association (TRMCA), and ACI 330 methods of rigid pavement design.
5. To introduce the students to the basic concepts of pavement management, pavement maintenance, and pavement recycling. The introduction will include five or more techniques for flexible and rigid pavement overlay design.

Course measurable outcomes:

Students will be expected to:

1. discuss properties, specifications, and test methods for pavement subgrades, subbases, bases, and surface courses for flexible and rigid pavements;
2. identify pavement distress types and list probable causes. Further, the student will be able to calculate stresses and strains developed in flexible and rigid pavements and evaluate their effect on pavement performance;
3. design flexible pavements by the AASHTO, NAPA, AI, CBR, and typical sections methods;
4. design rigid pavements by the AASHTO, PCA, TRMCA, and ACI 330 methods; and
5. design overlays for rigid and flexible pavements by several methods and be familiar with pavement management and pavement maintenance basic concepts.

Topics covered: (Two lecture classes per week, 80 minutes each)

1. Background information (subgrades, subbases, bases, pavement distress, traffic and wheel loads (10 classes)
2. Analysis and structural design of flexible pavements by the AASHTO, Asphalt Institute, NAPA, CBR, and typical sections methods (5 classes)
3. Analysis and structural design of rigid pavements by the AASHTO, PCA, TRMCA, and ACI 330 methods (7 classes)
4. Analysis and structural design of pavement overlays (4 classes)
5. Tests (2 classes plus two-hour final exam)

Contribution of the course to meeting professional component:

This course is a part of engineering topics of the curriculum.

ABET category content as estimated by faculty member who prepared this course description:

Engineering science: 1.0 credits (33%)
Engineering design: 2.0 credits (67%)

Relation of course to program outcomes:

Outcome 1: The graduates will have a broad understanding of the relevant principles of mathematics, science, and engineering.
Outcome 2: The graduates will have a general comprehension of four technical areas appropriate to civil engineering.
Outcome 4: The graduates will be capable of design activities and have the ability to identify, formulate, and solve civil engineering problems.
Outcome 5: The graduates will have effective communication skills.
Outcome 8: The graduates will have the ability to use techniques, skills, and modern engineering tools needed for engineering practice.
Outcome 11: The graduates will have an understanding of the importance of fundamental and applied research in the advancement of engineering knowledge.

Relation of course to ABET Criteria:

General Criteria		Bloom's Level of Achievement
(3a)	Knowledge of math, science, engineering	3
(3c)	Design a system, component or process	4
(3e)	Identify, formulate, and solve engineering problems	4
(3g)	Effective communication	3
(3k)	Techniques, skills, modern tools for engineering practice	3

Program Criteria		Bloom's Level of Achievement
1.	Apply knowledge of math and sciences	3
2.	Apply knowledge of four technical areas appropriate to civil engineering	3
3.	Design a system, component or process	4

Computer usage:

1. Word processor and spreadsheet use in homework assignments in topics 1, 2 and 3

Laboratory projects: None

Prepared by: L.K. Crouch Date: September 2007