

CE 774 - Pavement Design
Fall Semester (On sufficient demand)

1990-92 Catalog Data: CE 774. Pavement Design. Credit 3. Methods of evaluating the load-carrying capacity of soil subgrade, subbase, and base courses; critical analysis of the methods of design for flexible and rigid pavements; methods of increasing the load-carrying capacity of highway and airport pavements. Prerequisite: CE 522.

Prerequisites by Topic: 1. Soil Mechanics - I (CE 522)
2. Route Location and Design (CE 411)

Text (s): 1. "Pavement Analysis and Design" by Yang H. Huang. 1st Edn. Prentice Hall, 1993.
2. "Guide for Structural Design of Pavements", AASHTO, 1993.

References: 1. NHI Course No. 13114, FHWA, Sept. 1992.
2. The Engineering and Economics of Concrete Pavements, PCA, July, 1992.

Coordinator: Mustaque Hossain, Associate professor of C.E.

Course Learning Objectives: The objectives of this course are:

1. to educate civil engineering students in the design principles of flexible and rigid pavements in the highway systems.
2. to study and design surface, base, subbase and subgrade layers of pavements,
3. to do economic analysis of alternative designs,
4. to study pavement structural evaluation,
5. to study overlay design, and
6. to use computer software to do pavement/overlay design.

At the end of the course the student should be able to:

specify and interpret materials characteristics and tests needed to design pavements and overlays;

design asphaltic and Portland cement concrete pavements and overlays;

identify the causes of failures of pavements and overlays; and

suggest repairs and/or remedies to prevent failures.

Assessment Methods: Course objectives are assessed through graded performance on several homework assignments and

three exams (could be take home exams).

Topics:

1. Basic principles related to the layered systems, traffic loading, materials and design philosophies for the highway and airport pavements. (7 classes)
2. Subgrade, subbase, bases and drainage. (5 classes)
3. Flexible pavement design; AASHTO (3 classes)
4. Rigid pavement design; design variables (including dowels) (2 classes)
5. Rigid pavement design; AASHTO (3 classes)
6. Rigid pavement design; PCA (1 class)
7. Design alternatives and life cycle costs. (2 classes)
8. Pavement distresses and nondestructive evaluation. (1 class)
9. Overlay design. (3 classes)
10. Rehabilitation measures other than overlays. (3 classes)
11. Test (1 class)

Contribution of Class to Meeting Professional Component:

This class satisfies the engineering design requirements of the professional component.

1. Design of bituminous and Portland cement concrete pavements and overlays, and
2. Pertinent properties to be considered in the selection/specification of Civil Engineering materials for given applications.

Laboratory projects (including major items of equipment and instrumentation used): need computer usage to run the following program:

1. Pavement analysis microcomputer program - ELSYM5, KENLAYER AND KENSLAB
2. Pavement design microcomputer programs - PCA
3. Economic analysis - Spreadsheet

and involve design problems related to the topics 3, 4, 5,6, 7 and 9.

Relationship of Course to Program Objectives:

The following program objectives are satisfied by this course: (2) civil engineering principles; and (3) methodologies of design.

Content:

Engineering Design: 3 credits or 100%

Prepared by: M. Hossain

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