

CE 776 - Pavement Performance and Management Systems  
Fall Semester (in alternate years)

**1990-92 Catalog Data:** CE 776. Pavement Performance and Management Systems. Credit 3. Pavement management systems including pavement condition and structural evaluation, analysis, and optimization. Economic analysis and rehabilitation planning including computer application. Prerequisite: CE 572.

**Prerequisites by Topic:** 1. Highway Planning and Management (CE 572)

**Text:** 1. "Modern Pavement Management" by Haas, Hudson and Zaniewski. Orig. Edn., Krieger, 1994.

**References:**

1. AASHTO Guidelines for Pavement Management Systems, AASHTO, July, 1990.
2. An Advanced Course in Pavement Management Systems, FHWA, 1991.

**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 principles of pavement management system (PMS),
2. to give civil engineering graduates a thorough understanding of the pavement management process,
3. to train the graduates so that they can be expected to assist in the development and implementation of pavement management processes in the agencies they work, and
4. to discuss network and project-level pavement management processes with emphasis on network-level.

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

describe the elements included in project and network-level pavement management process:

define the difference between project and network-level pavement management processes and explain the reasons for the division and the interface required between them;

explain how to determine what data to collect and the methods and equipment available for collecting it at both project and network-level;

explain how to define the condition of a pavement, the advantages and disadvantages of different data collection methods, and how to decide which condition data and collection methods should be used for a given agency;

explain how to store, retrieve, manage and present data for project and network-level analysis;

describe different approaches to analyzing data at each level and discuss the advantages and disadvantages of each;

describe different prioritization approaches along with the benefits and problems of each;

describe how to present the results of analysis to decision making authorities at different levels;

describe typical problems encountered in implementing pavement management processes and approaches which can be used to overcome them, and

understand advanced topics in PMS.

**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 system methodology, pavement design and management systems, pavement performance and failures, pavement management levels, functions and data needs. (6 classes)
2. Pavement performance - roughness, distresses, skid resistance and structural evaluation (6 classes)
3. Prediction models, criteria, network needs, strategies, priority programming, and budgeting for combined maintenance and rehabilitation program (3 classes)
4. Project level PMS - Pavement design, inputs, response models, reliability, and risk. (4 classes)
5. Generation of alternative design strategies for different pavement types and rehabilitation design procedures (2 classes)
6. Economic analysis and optimization (3 classes)
7. Implementation and examples of working PMS (KDOT NOS and APWA PAVER)
8. Test (3 classes or could be take home)

**Contribution of Class to Meeting Professional Component:**

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

1. Design of alternative design procedures, and
2. Network level programming and budgeting.

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

1. Pavement analysis microcomputer program - ELSYM5

2. Software to compute International Roughness Index (IRI)
3. Economic analysis - Spreadsheet

and involve design problems related to the topics 2 and 5.

**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 Principles: 33%  
Engineering Design: 66%

Prepared by: M. Hossain

Date: 11-15-98