

Pavement Rehabilitation & Management

Code CE 861	Credit Hours 3-0
-----------------------	----------------------------

Course Description

This course deals with the management of physical highway infrastructure/ assets in general and pavements infrastructure in particular. It also includes distress survey and structural evaluation of pavement infrastructure, overlay types and design methodologies. It is useful for all graduate students intending to pursue a career in a variety of sectors (including engineering and economics) that are related to highway infrastructure planning, design, construction, preservation, and operations.

Textbook:

The primary text for the course is notes and copies of class presentations. Additional references are as below:

Reference Book:

1. Pavement Management for Airports, Roads, & Parking Lots, by Shahin, M. Y., 2005
2. Pavement Analysis and Design by Yang, H. Huang, Pearson, Printice Hall, 2004
3. Distress Identification Manual for the Long-Term Pavement Performance Program, Federal Highway Administration, FHWA-RD-03-031, 2003.
4. AASHTO Guide for Design of Pavement Structures Washington, D.C., 1986, 2002.
5. Pavement Design & Rehabilitation Manual, The Ohio Department of Transportation, 1999.
6. Pavement Condition Rating System, The Ohio Department of Transportation, 2004.
7. Rehabilitation Strategies for Highway Pavements, National Cooperative Highway Research Program, 2001.
8. Flexible Pavement Rehabilitation Manual, Caltrans, 2001.

Prerequisites

Nil

ASSESSMENT SYSTEM FOR THEORY

Quizzes	10-15%
Assignments	5-10%
Mid Terms	25%
ESE	40-50%
Term Project	10%

Teaching Plan

Week No	Topics	Learning Outcomes
1- 2	Asset/ Pavement Management Concepts	<p>Course outlines, objectives, teaching plan, assessment methods</p> <p>Common Elements across Various Asset Management Components</p> <p>Asset Inventory, Asset Valuation</p> <p>Asset/ Pavement Management Performance Goals and Objectives</p> <p>Asset/ Pavement Data Management</p> <p>Grouping of Assets</p>
3	Distress in Pavements	<p>Types and classes of distress</p> <p>Causes of distresses: (Load related, Environment related, Material related)</p> <p>Mechanics of distresses</p> <p>Severity levels and measurements of distresses</p>
4 - 6	Project Surveys and Evaluation	<p>Distress surveys and evaluation</p> <p>Survey techniques and equipment:</p> <ul style="list-style-type: none"> • Calculation of pavement distress indices • Roughness survey and equipment: • Structural Evaluation: • Surface Friction Measurement and Evaluation: • Drainage Survey and Evaluation
7- 8	Pavement Performance and Cost Evaluation	<p>Performance Modeling and related Statistical Tools</p> <p>Analyzing the Benefits (Effectiveness)of Preservation Actions</p> <p>Analyzing the Costs of Asset Preservation Actions</p>
9	MID SEMESTER EXAM	
10 -11	Selection of Preferred Rehabilitation Alternative	<p>Introduction to Pavement Rehabilitation (restoration, Resurfacing & Recycling)</p> <p>Pavement Maintenance Alternatives</p> <p>Economic Analysis of Alternatives</p> <ul style="list-style-type: none"> • Combining Monetary Costs and Benefits: Life Cycle Cost Analysis (LCCA) • Combining Non-Monetary Costs and Benefits: Multi- Criteria Decision Making (MCDM) • Prioritization and Optimization (Project-level and Network-level Applications of LCCA and MCDM).

12 -14	Asphaltic Concrete (AC) Overlay of Asphalt Pavements	Pavement Response Models (Stress – Strain in Pavements) Pavement Failure Criteria Design of AC Overlays of Asphalt Pavements <ul style="list-style-type: none"> • Structural Deficiency Approach (AASHTO Procedure) • Deflection-Based Approach (Asphalt Institute Procedure) • Mechanistic Approach using Mechanistic-Empirical Models Asphalt Transport/ Construction Practices and Paver Operation
15	Asphaltic Concrete (AC) Overlay of Concrete Pavements	Slab Reduction Techniques Resonant Rubblization and AC Overlay Crack-and-Seat and AC Overlay
16	Other Asset Management Systems	Maintenance Management Systems Bridge Management System etc.
17	Term Project and Presentations	Development of a comprehensive pavement rehabilitation and management related project Application of course concepts to a real-world scenario Group presentations and peer review
18	END SEMESTER EXAM	