

CE 568

Highway Infrastructure Management Systems



Course Syllabus

Samuel Labi

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550 Stadium Mall Drive
W. Lafayette, IN 47907

CE 568

Highway Infrastructure Management Systems

Class Time and Venue:

Contact Information:

Instructors: Sam Labi

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Office Hours: Flexible

Course Type

CE 568 deals with the management of physical highway assets and infrastructure such as pavements, bridges, safety assets and assets related to mobility. The course is useful for all graduate and undergraduate students intending to pursue a career in the public or private sectors related to highway infrastructure planning, finance, design, construction, maintenance, and operations.

Prerequisites

There is no specific pre-required course. However, students are expected to have skills in undergraduate mathematics and statistics. Also, some background knowledge of highway engineering, management principles, economic analysis, data analysis (statistical modeling, etc.), optimization, and stochastic analysis, would be helpful.

Course Objectives

The goal of the course is to examine the process and techniques for managing highway infrastructure. The course will deal with the principles of asset management and will cover how to make good decisions in the maintenance of highway pavements, bridges, safety assets, and congestion assets.

Course Description

The Course Outline document describes the contents of this course. Also, an online video presentation of the course description can be found on Youtube.

The course introduces the fundamental concepts associated with highway systems management. Areas covered are:

Section 1 (asset management general concepts, elements, tools)

Section 2 (the common elements/tools for asset management)

Section 3 (the component systems for asset management);

Section 4 (integration of individual management systems into a total highway asset management system

Section 5 (institutional issues in asset management).

The course comprises lecture presentations, guest lectures, video shows, and jeopardy sessions. Students will be tested through homework assignments, quizzes, and examinations. Details of the term paper requirements are provided in a separate document.

Course Text and Material

The primary text for the course is:

“Highway Infrastructure Asset Management Systems, by Sinha and Labi (due for release in 2015). This will be available online through the Blackboard website. Additional course notes and copies of class presentations will be provided on the course web site. Additional references are:

Texts

The Management and Measurement of Infrastructure by Karlsson, Anderson, Johansson, and Kobayashi, Edward Elgar Publishers, 2007

Infrastructure Management, by Hudson, Haas, and Uddin, McGraw Hill, 1997

Pavement Management for Airports, Roads, & Parking Lots, by Shahin, Chapman and Hall, 1994

Modern Pavement Management, by Hudson, Haas, Zaniewski, Krieger Publ., 1994

Pavement Design and Management Guide, by Transp. Assoc. of Canada, 1997

Journals

Transportation Research Record

ASCE Journal of Transportation

ASCE Journal of Infrastructure Systems

Transportation Research – Parts A and B

European Journal of Transport and Infrastructure Research.

Grading Policy

There will be a mid-term exam and a final exam. With or without prior notification, in-class quizzes may be given at the beginning of any class.

The grading distribution for the course is as follows:

Final Exam	30%
Mid-Term Exam	30%
Term project	30%
Quizzes/attendance	10%

These breakdowns are tentative. Final breakdowns will be at the sole discretion of the instructor.

Grade Limits will be as follows:

90 – 100%	(A)
80 – 89.99%	(B)
70 – 79.99%	(C)
60 – 69.99%	(D)
<60%	(F)

This grading scheme may be modified during the course of the semester at the discretion of the Instructor.

Student Conduct:

Students are expected to abide by the Purdue University Student Conduct Code. Further, it is assumed that each and every student subscribes to a personal code of ethics based on a value system that adheres to the highest standards of academic integrity. Any breach of academic honesty or disruptive classroom behavior will be handled in accordance with established university procedures. You will be required to carry out assignments independently.

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COURSE OUTLINE

SECTION A: ASSET MANAGEMENT – GENERAL CONCEPTS, DIMENSIONS, AND BENEFITS

CHAPTER 1 Asset Management – The Concepts

CHAPTER 2 Asset Management – The Benefits

SECTION B: COMMON ELEMENTS AND TOOLS ACROSS THE COMPONENT SYSTEMS OF ASSET MANAGEMENT

CHAPTER 3 Asset Inventory, Data Collection and Management

CHAPTER 4 Asset Valuation

CHAPTER 5 Performance Goals, Objectives, and Indicators

CHAPTER 6 Performance Modeling

CHAPTER 7 Cost Modeling

CHAPTER 8 Impacts of Preservation Interventions – Benefits (Effectiveness)

CHAPTER 9 Impacts of Preservation Interventions – Costs

CHAPTER 10 Combining the Monetary Costs and Benefits of Interventions

CHAPTER 11 Combining the Non-Monetary Costs and Benefits of Interventions

CHAPTER 12 Physical and Monetary Needs Assessment

CHAPTER 13 Prioritization/Optimization of Preservation Actions at Project- and Network Levels

CHAPTER 14 Role of Risk and Uncertainty in Impacts Modeling and Preservation Decisions

SECTION C: COMPONENT SYSTEMS FOR ASSET MANAGEMENT

CHAPTER 15 Pavement Management Systems

CHAPTER 16 Bridge Management Systems

CHAPTER 17 Safety Management Systems

CHAPTER 18 Congestion Management Systems

CHAPTER 19 Traffic Infrastructure Management Systems

CHAPTER 20 Maintenance Management Systems

SECTION D: INTEGRATION OF MANAGEMENT SYSTEMS INTO A TOTAL HIGHWAY ASSET MANAGEMENT SYSTEM

CHAPTER 21 Database Coordination

CHAPTER 22 Optimization across Management Systems

CHAPTER 23 Tradeoff Analysis

SECTION E: INSTITUTIONAL ISSUES IN ASSET MANAGEMENT

CHAPTER 24 Financial Analysis

CHAPTER 25 Vulnerability and Resilience Considerations

CHAPTER 26 Sustainability Issues in Highway Asset Management

