

INFRASTRUCTURE ASSET MANAGEMENT

Course Number: CEE 5080 (Taught every Spring Semester)

Course Description

Comprehensive systems approach to civil infrastructure system and asset management with emphasis on municipal, highway, building, Dam, and bridge infrastructure. Course will cover various aspects of infrastructure asset management: needs assessment, information technology and management, in-service monitoring and evaluation, condition assessment and performance modeling, failure mode analysis, life cycle cost and benefits analysis, prioritization and optimization, and renewal engineering.

Course objectives

To introduce the concepts of asset management; to provide students with tools and organizational concepts that will assist them in managing infrastructure, which might be utilities, buildings, roads, bridges; and to help place these ideas into an overall structure of facility design, construction, maintenance and operations.

- Enable students to focus on infrastructure as an integrated system.
- Inform students of the social, political, and economic contexts in which infrastructure is provided and decisions are made.
- Prepare students for managing public works budgets, large capital investments, and maintenance expenditures.
- Provide students with background on intergovernmental relationships and governance structures that affect the construction and operation of public works systems.

Topics covered

- Needs Assessments, Impacts, Financing, and Performance Indicators: Factors affecting the demand and supply of public works services; Needs studies; Use analysis; Demand analysis; Impact of infrastructure on economic development; Strategies for financing public works; performance indicators and measures; project-level and network-level perspectives.
- Framework for Infrastructure Management: Design for reliability, maintainability, supportability, and service life; Inventory and database management; Condition assessment; Performance modeling and failure analysis; Maintenance strategies, Life-cycle cost and benefits analysis; Prioritization, optimization and work programs; Maintenance Policies.

- Bridge Management Systems: Project-level deterioration modeling; Bridge elements, inventory and rating systems; M,R&R strategies; Agency and user costs; Network-level deterioration modeling; Optimal maintenance policies; Steady -state condition; Improvement optimization modeling.
- Pavement Management System: Pavement performance, condition and failure; Life-cycle cost analysis; maintenance and rehabilitation practices; Project-level and network-level concepts; condition indices and needs analysis; Prioritization and optimization when budgets are constrained; Impacts analysis.
- Municipal Asset Management: Pipeline performance, condition and failure; Life-cycle cost analysis; maintenance and rehabilitation practices; Project-level and network-level concepts; condition indices and needs analysis; Prioritization and optimization when budgets are constrained; Impacts analysis.
- Hydro-system Asset Management: Project-level deterioration modeling; Water structure elements, inventory and rating systems; M,R&R strategies.

Contribution of course to meeting the professional component

This course contributes primarily to the students' knowledge of engineering topics. The course includes the following considerations:

- economic,
- environmental,
- ethical,
- political,
- societal,
- security/risk
- safety, and
- sustainability

Course Structure

This course will follow the structure of asset management that is gaining acceptance in the civil infrastructure. This is a seven-part structure:

- **Asset Management Framework**
- **Condition Assessment and Evaluation**
- **Performance Measure and Prediction Modeling**
- **Maintenance and Rehabilitation Program**
- **Condition Valuation and Life Cycle Cost Analysis**
- **Security and Safety of Civil Infrastructure**
- **GIS based Information System**

Infrastructure Asset Management Framework

