Department: Civil Engineering

Course Number: 570

Course Title: Infrastructure Management

Designation: Graduate; Technical Elective – UG

Catalog Description: Overview of nation's infrastructure assets and rehabilitation/renovation needs; methodologies for development and implementation of performance monitoring and maintenance management systems for roadways, bridge structures, airports, and other infrastructure facilities; condition assessment and nondestructive evaluation; application of new materials and remote sensing and spatial technologies; Intelligent Transportation System (ITS) and computer applications for infrastructure asset management. (3)

Pre-Requisite: Senior standing or consent of instructor

Textbook and Required Material:

• W.R. Hudson, R. Haas and W. Uddin, Infrastructure Management, McGraw-Hill, 1997

Course Objectives: To introduce the students the concepts of cost-effective life-cycle management of infrastructure assets by integrating design, construction, maintenance, rehabilitation, and renovation strategies. Various analysis and design tools are taught to prevent costly deterioration of infrastructure assets of transportation facilities, utilities, buildings, and parks. Topics include database management, geographical information system (GIS), remote sensing applications, nondestructive evaluation, performance modeling, design of maintenance and rehabilitation; life-cycle economic analysis, and priority ranking.

Topics Covered:

- 1. Overview of infrastructure management system (IMS); infrastructure crisis (2 classes)
- 2. Life-cycle analysis concepts; IMS framework; needs assessment; performance indicators (4 classes)
- 3. Database management; GIS; inventory, historical & environmental data; remote sensing technologies (3 classes)
- 4. In-service monitoring and evaluation; nondestructive evaluation (3 classes)
- 5. Performance modeling; failure analysis (2 classes)
- 6. Mid-term examination (1 class)
- 7. Modeling techniques; sampling design and statistical analysis (2 classes)
- 8. Total quality management; design and construction phases; new materials and concepts (1 class)
- 9. Maintenance, rehabilitation & reconstruction (M,R&R) strategies; intervention policies (3 classes)
- 10. Agency costs; user costs; benefits; life-cycle economic analysis; computer applications (3 classes)
- 11. Establishing priorities; optimization; M,R&R programming and budget analysis (3 classes)
- 12. IMS implementation; interface with other management systems; innovative technologies (4 classes)
- 13. Project report presentation of assigned projects; review (1 class)

Class/Laboratory Schedule: Classes—twice a week and 75 minutes long

Professional Component:

(Highlight those apply)

- differential and integral calculus
- probability
- statistics
- chemistry
- calculus-based physics
- structure
- water resources and environmental engineering
- geotechnical engineering
- transportation and construction management
- laboratory experiment
- critically analyze and interpret data
- design
- professional practice issues
- professional licensure and continuing education

Outcomes:

(Highlight those apply)

- (a) an ability to apply knowledge of mathematics, science, and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs
- (d) an ability to function on multi-disciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills and modern engineering tools necessary for engineering practice

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