

Department: Civil Engineering

The University of Mississippi

Course Number: 481

Course Title: Transportation Engineering I

Designation: Required, Junior

Catalog Description: Major transportation modes and their characteristics; mechanics of motion; geometric and intersection design; traffic flow theory; probabilistic methods; capacity analysis; planning models; environmental impact analysis; economic evaluation; Intelligent Transportation System (ITS) and computer applications. (3)

Pre-Requisite: Corequisite ENGR 310

Textbook and Required Material:

- C.S. Papacostas and P.D. Prevedouros, *Transportation Engineering and Planning*, Third Edition, Prentice-Hall, 2001

Course Objectives: To introduce the major transportation modes and impact of transportation on society, to present methods for the collection and use of traffic data for design and planning needs, and to teach transportation planning models and design methodologies. Topics include capacity analysis and design of freeways, highways, intersections, traffic control devices and traffic signal design, alignment design, curves and geometrical design, and basic pavement thickness design. Lectures are supplemented by extensive class exercises, homework problems, and field traffic data collection projects.

Topics Covered:

1. Overview of transportation modes, historical background of roads and highways; funding sources (1 class*)
2. Transportation technologies; mechanics of motion; and forces of resistance (2 classes)
3. Geometrical design of roads and highways; pavement thickness design (3 classes)
4. Traffic studies and flow models; queuing models (2 classes)
5. Level-of-service and system effectiveness analysis; time-distance diagrams (2 classes)
6. Highway capacity analysis and design of number of lanes; intersection capacity analysis (3 classes)
7. Traffic control devices; traffic signal and intersection design (3 classes)
8. Mid-term examination (1 class)
9. Remote sensing technologies; GIS; Data management for transportation planning and design (1 class)
10. Transportation planning; travel demand forecasting; parking studies (5 classes)
11. Economic evaluation and life-cycle cost analysis; computer applications (3 classes)
12. Transportation impact on environment; environment impact analysis of noise and air quality (3 classes)
13. Intelligent transportation systems (IT); other innovative technologies; pavement management (2 classes)
14. Project report presentation of assigned group 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

Prepared by: Waheed Uddin, Associate Professor of Civil Engineering

Reviewed by: Alex Cheng, Chair, Civil Engineering

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