

Wayne State University
CE 4600: Transportation Engineering
Winter 2004

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Class Hours: M & W, 3:00 pm - 4:50 pm, 037 Manoogian
Office Hours: M & W, 1:00 pm - 3:00 pm, and by appointment.

Objectives: To present an overview of the multimodal transportation system in the US, including highways, railways & airways, and to demonstrate the application of engineering principles in analysis and design of transportation system components.

OUTLINE

Week	Topic	Reference
1	Class Organization , Examination & Assignments. General Discussion , Transportation Modes, Economies of Scale in Transportation	Class Notes Chap. 1, 5 Text Ref. 5
2	Highway Systems Driver, Vehicle & Roadway Characteristics	Chap. 2 Text
3, 4	Highway Systems (Contd.) Sight Distances, Geometric Design, Horizontal Curves	Chap. 2 Text Ref. 1, 2
5, 6	Highway Systems (Contd.) Vertical Curves (Symmetrical & Non-Symmetrical) Integration of Horizontal & Vertical Alignments, Pavement Structures.	Chap. 2 Text Ref. 1, 2
EXAM I		
7, 8	Highway Systems (Contd.) Highway Safety, Traffic Flow, Design Project	Class Notes Chap. 3 Text
8, 9	Pavement Design Flexible Pavement, Rigid Pavement	Class Notes Ref. 3
10	Urban Transportation , Network Analysis, Minimum Path, Maximum Flow, Min. Spanning Tree	Chap. 6, 7 Text Ref. 4
11	Urban Transportation (Contd.) , Trip Generation Trip Distribution, Modal Split, Traffic Assignment	Chap. 8 Text

OUTLINE (Contd.)

Week	Topic	Reference
12	Urban Rail Systems: Planning, Design & Operation	Class Notes
EXAM II		
13	Air Transportation, Air Traffic Control & Operation Runway Configuration & Length	Class Notes Ref. 6
14	Emerging Technologies, Intelligent Transportation Systems (ITS), Technology oriented: ATMS, ATIS, AVCS, Application oriented: APTS, CVO, ARTS	Class Notes Chapter 6

FINAL EXAM

Grading Policy:

Homework	10%
Project	10%
Exam I	20%
Exam II	20%
Final Exam	40%

Text: Transportation Engineering and Planning

By Papacostas and Prevedouros, Prentice Hall, 3rd Edition, 2001.

References:

1. A Policy on Geometric Design of Highways & Streets, AASHTO, 2001.
2. Route Location & Design, By Hickerson.
3. AASHTO Guide for Design of Pavement Structures, 1993.
4. Introduction to Operations Research, By Hillier and Lieberman.
5. Principles of Engineering Economy, By Grant, Ireson and Leavenworth.
6. Transportation Engineering: Planning and Design, By Wright & Ashford.

Important Dates:

Last day to **add** this class: **January 26, 2004**

Last day to **drop** this class: **February 13, 2004**

CE 4600: Transportation Engineering

COURSE LEARNING OBJECTIVES

1. To have a good understanding of the different transportation modes, and to recognize the economies of scale concept in transportation.
2. To be able to define each component of the highway system and to know how each component can affect the performance of the system.
3. The student should be able to recognize the human factors and how the following factors can affect the performance of the driver in a highway system:
 - (a) Perception-Reaction Time
 - (b) Dilemma zones
 - (c) Visual acuity
 - (d) Lateral displacement
4. To be able to classify highways according to the functions they serve (functional classification) and with respect to the entity responsible for their construction, operation, and maintenance.
5. To be able to identify all elements of a highway cross-section, and how each element can affect the design of the highway.
6. The student should be able to design the horizontal alignment of a highway and to determine the following for each situation:
 - (a) The radius of the horizontal curve
 - (b) The superelevation
 - (c) The required length of the superelevation run off
7. The student should be able to design the vertical alignment of a highway and to determine the following for each situation:
 - (a) Stopping sight distance
 - (b) Passing sight distance
 - (c) Length of the vertical curve and if it is symmetrical or non-symmetrical
8. To be able to have full integration of the horizontal and vertical alignments.
9. The student should have an understanding of types of pavements, their structures, and pavement design procedures as per AASHTO guidelines for both Flexible Pavement and Rigid Pavement.
10. To be able to determine the traffic flow characteristics, and how it can be affected by the following:
 - (a) Spacing and concentration
 - (b) Headway and flow
 - (c) Average or mean speed
 - (d) Highway safety

11. For a network, the student should be able to identify the following:
 - (a) Minimum path
 - (b) Maximum flow
 - (c) Minimum spanning tree

12. The student should have good understanding of Trip Generation related to the following:
 - (a) Trip purpose
 - (b) Productions and Attractions
 - (c) Household size and zone criteria

13. The student should be able to define Trip Distribution, and to use the different models, such as the Gravity model and Fratar model for this purpose.

14. The student should be able to use the different Mode Split models and Traffic Assignment procedures.