

CE461 TRANSPORTATION SYSTEMS ENGINEERING

Required Course

Fall 2009

Instructor: Name: Gökmen Ergün
Office Hours: Thu: 10:00-12:00 and 14:00-16:00

Course Data:

Hours: Tue: 14-17:00 and PS 9:00-11:00
Room: 3120

Course Description:

CE 461 Transportation Systems Engineering (3+0+2)4

Principles of the design of transportation facilities with emphasis on highways and airports. Planning, geometric design, drainage, pavement design, air photogrammetry and mapping, geophysical subsurface explorations and sampling of materials and testing and roadway construction.

Course Objectives:

This course is designed to teach civil engineering seniors how to design a highway project including all major phases of planning and design as well as to introduce students to urban traffic engineering design and problems.

Textbook (TB):

Wright, Paul H., "Highway Engineering", 6th edition, John Wiley, 1996, ISBN. 0-471-00135-8

Reference Books (RF):

Papacostas, C.S. and P.D. Prevedouros, "Transportation Engineering and Planning," 2nd edition, Prentice-Hall, 1993, ISBN. 0-13-958075-1

Khisty, C. Jotin, "Transportation Engineering: An introduction," Prentice-Hall, 1990, ISBN. 0-13-929274-8

Design Content: A preliminary design of an approximately 1-km highway segment with horizontal and vertical geometric design and a design of flexible highway pavement is required to be completed and presented at the end of the semester.

Computer Usage: Students are encouraged, but not required, to use software for design and drafting of highway sections. Autocad files for a topographic map is provided.

Laboratory Sessions: The project of Geometric Design of Highway is practiced during the lab sessions as well as some problems related to the topics of geometric design are solved.

Class Policies:

	Percentage of Final Grade	Explanation
Homework:	15% (plus 5% class attendance)	Most homework includes the steps of the geometric design project
Midterm:	two exams, 20% each	
Final:	20%	
Project:	20%	Geometric Design Project

Contribution of the Course to Program Outcomes:

- ✓ (a) An ability to apply knowledge of mathematics, science and engineering
- ✓ (c) An ability to design a system, component, or process to meet desired needs
- ✓ (e) An ability to identify, formulate and solve engineering problems
- ✓ (f) An understanding of professional and ethical responsibility
- ✓ (g) An ability to communicate effectively
- ✓ (j) A knowledge of contemporary issues
- ✓ (k) An ability to use the techniques, skills and modern eng. tools necessary for engineering practice

Course Assessment:

The course will be assessed by the students based on a template prepared by the instructor. The main points of the assessment will pertain to the successes/failures regarding the objectives stated here, and the evaluation of these objectives with respect to the claimed contributions to the program outcomes.

Week	Topics	Reading Assignments	Problem Session: Suggested Problems and Lab (Geometric Design Project)	Objectives
1	Introduction to Transportation Systems, CH1 (TB), CH1 (RF#1)	CH1 (RF#2), CH13 (TB)	Exercises: 1, 2, 3, 4 (Group 1); 5, 6, 7, 8 (Group 2); 9, 10, 11, 13 (Group 3); 12 and 14 (Group 4) from CH1 (RF#2).	To introduce development of transportation systems and basic elements of transportation planning
2	Surveys, Plans, and Estimates, CH13 (TB)	CH7 (TB)	Obtaining alternative routes using the method described in CH7 (RF#4)	To describe how to use surveys and plans in the geometric design of highways
3	Geometric Design of Highways, CH7 (TB)	CH7 (TB)	Improving the alternative routes that have been determined before.	To describe the criteria, standards, and engineering procedures used to design principal elements of the highway alignment, highways cross-sections
4	Geometric Design of Highways will be continued: Roadway alignment	CH17 (TB)	Calculating the properties and drawing the horizontal and vertical curves on the alternative routes that have been determined.	To describe the criteria, standards, and engineering procedures used to design principal elements of the highway alignment, highways cross-sections
5	Earthwork Operations, CH17 (TB)	CH8 (TB)	Drawing the profiles of the three alternative routes.	To present basic earthwork operations and introduce the principal tools and procedures used in earthwork operations
6	Holiday. The celebration of the 80th year of the Foundation of Turkish Republic	----	Mid-term Exam I	
7	Roadside Design, CH8 (TB)	CH11 (TB)	Making improvements on the profiles of the three alternative routes.	To introduce the concepts of designing safer roadsides including design of ditches, drainage structures longitudinal barriers, crush cushions
8	Drainage and Drainage Structures, CH11 (TB)	CH16 (TB)	Making improvements in the plan and the profile of the best route chosen, if necessary.	To introduce the notion of adequate and economic drainage systems to protect the investment made in a highway structure and safeguarding the lives of the persons who use it.
9	Flexible Pavement Design, CH16 (TB)	CH4 (TB)	Drawing cross sections and calculate the earthwork	To introduce the concept and design of flexible pavements.
10	Holiday.		Holiday.	
11	Highway Evaluation, CH4 (TB)	CH5 (TB)	Drawing the mass diagram and balancing the earthwork by determining the proper transportation means (bulldozer, scraper, truck, etc.) to move the earth.	To introduce the techniques and procedures for economically, socially, and environmentally evaluating highway projects
12	Driver, Pedestrian, and Vehicle Characteristics, CH5 (TB)	CH6 (TB)	Designing a flexible pavement for the project.	To introduce driver, vehicle and pedestrian characteristics for the design
13	Traffic Characteristics, CH6 (TB)	Review the matters related to the Project	Making the final check and doing corrections on the project.	To develop a knowledge of traffic characteristics in developing highway and transportation plans
14	Project Presentations	----	Project Presentations	To have students a hands-on experience regarding the professional presentation of a formal project.