

The Pennsylvania State University
CE 421W – Transportation Design
Spring Semester 2007
M W 10:10A - 11:00A 173 Willard
F 12:20P – 215P; 2:30P – 4:25P 228 Sackett

Instructor: Professor Venky Shankar, PhD, PE (shankarv@enr.psu.edu)
226C Sackett Building, 814-865-9434

Teaching Assistant: Michael Keller
110 Arch Eng

Office Hours: F 11:00 am to Noon – Professor will be there the entire lab hours. All labs will take place either in 228 Sackett or on site.

Goals and Objectives:

The main goal of this course is to introduce students to the transportation design process and associated elements through a hands-on term project relevant to the local State College network. Other goals include exposure to an evaluation of design using traffic operations and accident performance criteria. Several objectives arise out of the above-stated goals. A final objective is leverage the team-based knowledge base from a real-world project into a logical suite of key issues, analytical methods and approaches for the consistent evaluation of design problems.

Primary Outcomes:

1. Students will learn the rudiments of design as they pertain to vertical and horizontal alignment, in the context of grade-separated designs.
2. Students will learn the rudiments of transportation design ethics, as they pertain to the discharge of duties of the engineer in the safeguard of public health.
3. Students will be given opportunities to develop their communication skills through presentations, team-based interactions and problem identification and definition exercises. These are important aspects that will be valuable for industry interviews and professional interactions.

Expectations:

1. Students are expected to turn in products that demonstrate mature thought and professional application.
2. Students are expected to respect and value the input of their peers, whether it be in team or class discussions.
3. Class discussion is encouraged.
4. There will be random quizzes that will provide opportunities for students to pursue active learning in the classroom, while enjoying the benefit of peer inputs.
5. Be objective in your response to team members' input and roles. Avoid biases of any kind. Easy to preach and tough to practice, but give this some serious thought when you enter into teamwork environments.

Description:

Transportation design, vertical and horizontal alignment, and interaction between design and operations. Team based term project involving a sub-area planning study.

Prerequisites: C E 321, or equivalent.

Required Texts: Class Notes (1997 – 2007)

Topics:

1. Overview of the geometric design context
2. Vertical alignment
3. Horizontal alignment
4. Common grade-separated concepts
5. Design consistency concepts
6. Design alternatives analysis
7. Design impacts on traffic operations
8. Design impacts on accident occurrence
9. Design ethics
10. Performance based concepts in design

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Table 1. Course Calendar

Date	Day/Week	Topic	Important Dates
January 17	Wed., Week 1	Introduction	Team Lists (no more than four per team, with E-mail)
January 19	Fri., Week 1	Introduction to class project	<i>Assignment 1 given out/site visit</i>
January 22	Mon., Week 2	No class	
January 24	Wed., Week 2	No class	TRB National Conference and Research Meetings
January 26	Fri., Week 2	No class	
January 29	Mon., Week 3	Vertical alignment refresher	
January 31	Wed., Week 3	Vertical alignment refresher	<i>Assignment 2 given out</i>
February 2	Fri., Week 3	Assignment 1 Presentation	Assignment 1 due
February 5	Mon., Week 4	Horizontal alignment refresher	
February 7	Wed., Week 4	Horizontal alignment refresher	
February 9	Fri., Week 4	No class	Research meeting in St. Louis
February 12	Mon., Week 5	Final Project Breakdown	
February 14	Wed., Week 5	Final Project Breakdown – intro to design concepts and design consistency	
February 16	Fri., Week 5	In-Class Work on Design Alternatives	Assignment 2 due
February 19	Mon., Week 6	In-Class Review of Design Alternatives	
February 21	Wed., Week 6	Discussion of Level 1 report	<i>Assignment 3 given out</i>
February 23	Fri., Week 6	In-Class Work on Level 1 report	
February 26	Mon., Week 7	Detail on Preferred Alternative	
February 28	Wed., Week 7	Summary of design parameters on preferred alternative	
March 2	Fri., Week 7	In-class report on level 1 report drawings	
March 5	Mon., Week 8	Level 1 report content checks	
March 7	Wed., Week 8	Level 1 report consistency checks	
March 9	Fri., Week 8	Assignment 3 presentation	Assignment 3 due
March 12	Mon., Week 9	No Class	Spring Break
March 14	Wed., Week 9	No Class	Spring Break
March 16	Fri., Week 9	No Class	Spring Break
March 19	Mon., Week 10	Team-by-team consultation on preferred alternative	
March 21	Wed., Week 10	Progress review on preferred alternative/Final Report Intro	<i>Assignment 4 given out</i>
March 23	Fri., Week 10	In-Class Work on preferred alternative	Complete 90 percent design
March 26	Mon., Week 11	In-Class Review of 90 percent design	
March 28	Wed., Week 11	Revise 90 percent design	
March 30	Fri., Week 11	In-Class Work on report drawings	
April 2	Mon., Week 12	In-Class consultation on traffic operations parameters	
April 4	Wed., Week 12	Primer on queuing	
April 6	Fri., Week 12	In-Class Work on report drawings	
April 9	Mon., Week 13	Level 2 report content checks	

Date	Day/Week	Topic	Important Dates
April 11	Wed., Week 13	Level 2 report consistency checks	
April 13	Fri., Week 13	Final Design Presentation	Assignment 4 due
April 16	Mon., Week 14		
April 18	Wed., Week 14	Case Studies/Ethics	<i>Assignment 5 given out</i>
April 20	Fri., Week 14		
April 23	Mon., Week 15	Introduction to intersection accident models	
April 25	Wed., Week 15	Example intersection accident models	
April 27	Fri., Week 15	In-Class Work on intersection accident models	
April 30	Mon., Week 16	Introduction to segment accident models	
May 2	Wed., Week 16	Example segment accident models	
May 4	Fri., Week 16	In-Class Work on Segment Models	Assignment 5 due finals week

Grading: Assignment 1 – 5%, Assignment 2 – 20%, Assignment 3 – 15%, Assignment 4 – 40%, Assignment 5/Finals – 20%

Case studies are potential bonus assignments.