
Civil and Environmental Engineering (CEE) 679

SPECIAL TOPICS IN TRANSPORTATION SAFETY ENGINEERING

2003

Class Information: Lecture: 12:05, MWF
Lab: Various F
3 Credits
Prerequisites: CEE 370, CEE 574, Instructor's Consent

Instructor: Dr. David A. Noyce

Office Hours: 8:00 to 9:30 MW
By Appointment
By E-mail

Class Web Site: TBA

Catalog Description

Advanced topics in transportation safety including both motorized and non-motorized modes. The course is divided into three modules. Topics in the first module include safety management systems, human factors, data needs and limitations, identification of hazardous locations, diagnosis of problems, and development of countermeasures. The second module explores the road safety audit process and the methodologies of conducting an audit. The third module includes topics in motor vehicle accident reconstruction and cause analysis.

Course Objectives and Outcomes

The primary objective of this course is to introduce graduate students to topics in traffic safety engineering. Over 42,000 people are killed each year on United States roadways. The goal of transportation safety engineering research is to reduce this number substantially. State-of-the-art computer applications and current research findings will be presented throughout the course.

Text

Ogden, K.W. **Safer Roads: A Guide to Road Safety Engineering**. Avebury Technical, 1996, ISBN 0 291 39829 4. (Provided)

Resource Materials

1. *Highway Capacity Manual (HCM)*. Transportation Research Board (TRB), Washington D.C., 2000.
2. *Manual on Uniform Traffic Control Devices*. FHWA, U.S. Department of Transportation, Washington, D.C., 1988. Web site: <http://mutcd.fhwa.dot.gov/>.
3. Robertson, H.D., J.E. Hummer, and D.C. Nelson. *Manual of Traffic Engineering Studies*. Institute of Transportation Engineers (ITE), Washington, D.C., 1994.
4. Pline, J. *Traffic Engineering Handbook*. Fifth Edition, Institute of Transportation Engineers, Washington, D.C., 1999.
5. *Highway Design Manual*. Massachusetts Highway Department, Metric Edition, 1997.
6. Kell, J., and I. Fullerton. *Manual of Traffic Signal Design*. Second Edition, Institute of Transportation Engineers, Washington, D.C., 1991.
7. Garber, Nicholas, J. and Lester A. Hoel. *Traffic and Highway Engineering*. PWS Publishing, New York, 1999.
8. Banks, James H. *Introduction to Transportation Engineering*. Second Edition, McGraw-Hill, New York, NY, 2001.
9. *The Traffic Safety Toolbox - A Primer on Traffic Safety*. Institute of Transportation Engineers, Washington, D.C., 1998.
10. Limpert, Rudolf. *Motor Vehicle Accident Reconstruction and Cause Analysis*. 5th Edition, Lexas Publishing, Charlottesville, VA, 1999.
11. Baker, J.S. and L.B. Fricke. *The Traffic Accident Investigation Manual*. Northwestern University Traffic Institute, Evanston, IL, 1986.
12. Fricke, L.B. *Traffic Accident Reconstruction, Volume 2*. Northwestern University Traffic Institute, Evanston, IL, 1990.
13. Computer software manuals, Transportation Research Records, and Research Reports assigned by the instructor.

Class Attendance Policy

Students are expected to attend each class and lab and **arrive on time**. Each student is responsible for the material covered and for all assignments made in class whether or not he or she attends the class. ***Attendance will be considered in assigning final grades in borderline cases.***

Homework/Lab Reports/Project Due Date Policy

All class assignments are due on the day and time assigned. **Late assignments will NOT be accepted for grade.**

Handouts/Software

The handouts and software used in this course are copyrighted. Handouts shall not be copied unless the instructor expressly grants permission. Under no circumstances shall software be copied or used outside of class requirements or for personal activities.

Statement on Plagiarism

The student will be required to use published and unpublished literature in preparing class assignments and laboratory reports. Literature includes books, reports, papers, articles, speeches/oral presentations, interviews, and Internet Web Sites. **Plagiarism in any form will not be tolerated and will result in a grade of zero.** Plagiarism includes, but is not limited to, the following:

Using the thoughts or words of others and representing them as your own. This includes the copying of text from other sources without attribution. Direct quotation of other source material may be used if it is highlighted by quotation marks and/or italic font, and the source is acknowledged. Plagiarism also includes the description of concepts or ideas which you have taken from other sources, not copied word for word, but for which you do not attribute the source.

Copying of lab reports or papers prepared by other students, regardless of the source.

Submitting a paper, and representing it as your own work, which was prepared by another individual or organization.

Downloading text and figures from an Internet Web Site which you do not attribute the source.

The student will be instructed on methods for proper referencing of cited literature using Transportation Research Board (TRB) format (see TRB Web Site).

Evaluation

Final grades for the course will be based on the overall course average using the following guide:

<u>Percent</u>	<u>Accomplishment Level</u>	<u>Letter Grade</u>
90 - 100	Superior	A
88 - 89	Excellent	AB
80 - 87	Proficient	B
78 - 79	Good	BC
70 - 77	Acceptable	C
68 - 69	Fair	CD
60 - 67	Poor	D
Below 60	Unacceptable	F

University Academic Honesty Policy and Guidelines will be followed.

Outcome Measures and Assessment:(Grading)

Your grade for this course will be based on the following: (TOTAL POINTS = 1000)

2 - One Hour Exams 300 points
(feedback on the comprehension and application of traffic engineering principles).

Homework (~6)/Quizzes 300 points
(feedback on comprehension of lectures and reading assignments; state-of-the-art analysis; communication)

Project/Oral Presentation 300 points
(measure ability to apply technical material to the solution of a real-life problem in a group setting; communication including a detailed written report and oral presentation)

Lecture 100 points
(understand elements of the profession and current topics in transportation safety)

Week	Topic	Objectives	Assignment
1	Introduction to Course	1. Introduce professor and students 2. Understand the Syllabus 3. Introduce transportation safety	Review NHTSA web site; 2000 Traffic Safety Facts (www.nhtsa.org). Select 1 item to present to the class
2	Safety Plans	1. Understand what safety facts are available 2. List and describe AASHTO's Strategic Highway Safety Plan	---
	Human Factors	1. Define Human Factors 2. List the objectives of traffic signals 3. Explain how drivers and traffic signals interact 4. Explain color vision and deficiencies 5. Describe how human factors affects transportation safety	Assignment 1 - Written response to questions on handout
3	Road Safety Management Systems	1. Describe the understanding associated with a good safety management system 2. Explain the multi-causal dynamic systems approach to safety 3. Present and explain the crash v. accident debate 4. Explain 'regression to the mean' and its significance to safety management	---
		1. List five road safety improvement strategies 2. Critique the elements of a road safety plan	
4	Road Safety Management	1. Understand and explain the Haden Matrix 2. Discuss the crash variables presented in the video	
	Roundtable Discussion	1. Apply road safety management principles to critique earned media 2. Compare and contrast European safety plans/issues/statistics to the U.S.	Assignment 2
5	Non-motorized Safety	Guest Speaker –	
	Safety Data Needs and Limitations	1. List the data needs for safety analysis 2. List, describe and critique the major elements of crash reporting forms 3. Explain the data limitation in crash reporting	
6	Hazardous Road Locations	1. Describe methods for identifying hazardous road locations 2. Draw and interpret a collision diagram 3. Use a collision diagram to diagnose a traffic/crash problem	Review Chapters 1 through 7 in Ogden Review Intersection Safety Handout
	Selecting Crash Countermeasures	1. Discuss and present the NHTSA Economics of Crash 2. Describe the process for selecting countermeasures 3. Describe the criteria for selecting countermeasures 4. Critique the countermeasure selection process	Assignment 3
7		1. Describe the statistical process used in countermeasure data analysis	

	Statistical Interpretation and Analysis of Crash Data	1. List and describe typical analyses used in safety data 2. Identify issues in traffic safety data analysis	Read papers and handout material
8		1. Analyze and critique safety literature 2. Evaluate safety data using appropriate techniques	
		1. Apply statistical techniques learned in class discussions	
9	Road Safety Audits	1. Describe the road safety audit process	Assignment 4
		EXAM 1	
10	Road Safety Audits	1. List and describe the key elements of a road safety audit	
	Guest Speaker	1. Describe the FHWA safety program 2. Discuss the key elements of the Roadside Design Guide	Student Lecture
11	Guest Speaker	1. Discuss the safety elements if the International Scan Tour	
	Road Safety Audits	----	Student Lecture
12	Road Safety Audit – Field Analysis	1. Conduct a Road Safety Audit	Assignment 5
			Student Lecture
13	Crash Reconstruction	1. Review Crash Video 2. Describe the basic information that can be obtained from the roadway surface	
		1. Understand basic physics related to crash reconstruction 2. Calculate speed for various skid, friction, drag, and acceleration scenarios	Student Lecture
14		1. Describe the variables involved in jump and flip crashes 2. Describe the variables involved in pedestrian crashes	Assignment 6
			Student Lecture
15	Final Projects	Project Presentations	
		Project Presentations - EXAM 2 – (Take Home)	