

**CIVIL ENGINEERING 592
TRAFFIC CONTROL
SPRING 2003**

Instructor Information

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Office Hours: MW 3:30-4:20 pm or by appointment

Meeting Times: MW 2:00-3:15 pm

Final Examination Time: Tuesday, May 13, 3:00 to 5:00 pm

Catalog Description: 3 cr. U/G. Control of transportation systems with emphasis on traffic engineering principles. Data collection, capacity analysis, traffic improvements, signalization, signs and markings, channelization, intersection, speeds and safety considerations. Prereq: sr st

Course Objectives:

Broad Objectives

- Students will learn the fundamentals of traffic flow.
- Students will learn most forms of traffic control and how to measure the performance and capacity of a traffic system.
- Students will understand the full process of designing a traffic system.

Learning Outcomes

- Students learn the principles of continuous and interrupted traffic flow, using both deterministic and stochastic methods.
- Students understand the complete operational analysis procedure for signalized intersection capacity in the Highway Capacity Manual.
- Students understand the basics of performing operational analysis of two-way stop controlled intersections from the Highway Capacity Manual.
- Students can perform standard statistical analysis of traffic data, including univariate statistics, t-test, F-test and Chi-square test.
- Students can determine appropriate sample sizes for speed studies.
- Students understand the application of signal and sign warrants in the Manual on Uniform Traffic Control devices.
- Students can optimize a corridor for progressive signalization, both graphically and by computer.
- Students are able to apply their theoretical knowledge to a real traffic problem.

Readings

Highway Capacity Manual, NCHRP Report 209, 2000.

Selected Chapters from: William R. McShane, Roger P. Roess, and Elena S. Prassas, *Traffic Engineering*, Second Edition, Prentice Hall, 1998.

Traffic Flow Theory, Matthew J. Huber, Chapter 15, *Transportation and Traffic Engineering Handbook*, 1976.

Spot Speed Studies, *Traffic Engineering*, Louis Pignataro, 1973.

Selected Sections from: *Manual on Uniform Traffic Control Devices*, FHWA, 2000.

Selected Chapters from: *Fundamentals of Traffic Engineering*, Institute of Transportation Studies, UC Berkeley, Wolfgang Homburger, et al., 1996.

Outline

1. INTRODUCTION

Overview of Traffic Engineering
Properties of U.S. Traffic
Term Project Instructions, Initial Tasks
Readings: Homburger, Ch. 1, 2, 3.

2. PRACTICAL ASPECTS OF TRAFFIC FLOW THEORY

Flow, Speed and Density
Cumulative Flow Diagrams, Interrupted Flow
Basic Probabilistic Relationships
Pedestrian and Minor Street Delay
Signalized Intersection Delay
Assignments A and B
Readings: Traffic Flow Theory.

3. HIGHWAY AND INTERSECTION CAPACITY

Overview, Straight Road Segments
Freeway Capacity Issues
Signalized Intersection Capacity -- Complete Analysis
Highway Capacity Software
Assignment C
Readings: Highway Capacity Manual, Chapters 3, 9.

Midterm Examination

4. TRAFFIC CONTROL DEVICES

Manual on Uniform Traffic Control Devices
Signs and Pavement Markings
Signal Types, Warrants, and Timing
Turn Movements/Prohibitions
Assignment D
Readings: MUTCD, selected sections

5. SIGNAL SYSTEMS

Signal Coordination
PASSER-II
Simulation
Assignment E
Reading: McShane, Chapters 22, Software Documentation.

6. SPOT SPEED STUDIES AND STATISTICS

Methods of Speed Data Collection
Summary Statistics, Frequency Distributions
Sample Size, Confidence Intervals
Test for Goodness of Fit
Volume Studies
Assignment F
Readings: Spot Speed Studies.

7. OTHER HIGHWAY CAPACITY ISSUES

Unsignalized Intersections
Two-Lane Rural Highways
Readings: Highway Capacity Manual, Chapters 8 and 10.

8. TRAFFIC SYSTEM DESIGN AND OPERATION

Site Impact Assessment
ITE Trip Generation
Street Operations
Street Design
Freeway Operations
Readings: McShane, Chapters 21 (572-578) and 24.

9. ITE Small Cities Workshop

10. Project Presentations and Conclusion

Final Presentations, Wrap-up
Review for Final Examination

Assignments and Grades

The various components of the course will be weighted as follows:

Midterm Examination	20%
Final Examination	30%
Term Project	40%
Participation/Presentation	5%
Homework	<u>5%</u>
	100%

For reasons of numerical simplicity, grades will be assigned according to the following scale:

A	90.0 to 100.0
B	80.0 to 89.9

C	70.0 to 79.9
D	60.0 to 69.9
F	below 60.00

Homework will be concentrated near the beginning of the semester to illustrate concepts of traffic flow theory, highway capacity, and statistical applications. Problem sets will be distributed in class approximately two weeks before they are due.

Each student will participate in a semester-long, group term project. The term project will consist of a complete analysis and redesign of a traffic control system. Preliminary reports will be due periodically during the semester and a final report will be due during the last week of classes.

Report due dates are:

1. Project Description and Existing Geometry (February 12)
2. Existing Traffic Characteristics (March 5)
3. Design Alternatives (March 26)
4. Capacity and Coordination Analysis (April 16)
5. Final Report and Presentation, including Impact Evaluation and Recommended Design (May 7)

Attendance at the ITE Small Cities Workshop is required. Students unable to attend should consult with the instructor about a makeup assignment.

Graduate Differentiation

Graduate students will be graded for exhibiting leadership on the class project and will be asked to complete all extra credit homework problems for normal credit. If possible graduate students will be assigned to smaller project teams, so as to increase their level of participation.

E-Mail and Web Page

Certain information for this class will only be available on the course web page. The address of this web page is www.uwm.edu/~horowitz/trafficcontrol. All students must have a valid UWM e-mail address. The e-mail reflector for this class is ce592@uwm.edu.

Office Visit

Each student is required to visit the instructor in his office during office hours (or another mutually agreeable time) to discuss progress. The office visit should occur during the first six weeks of class.

Administrative Policies

Disabilities. If you need special accommodations in order to meet any of the requirements of this course, please contact your instructor as soon as possible.

Religious Observances. Students will be allowed to complete examinations or other requirements that are missed because of a religious observance. You must give your

instructor advanced notice of any missed requirements that would be caused by a religious observance.

Comments on Course. Your comments about and criticisms of the course are welcome by the instructor at any time.

Other Administrative Policies. Other policies pertaining to academic misconduct, complaints, grade appeals, sexual harassment, and financial obligation may be found at http://www.uwm.edu/Dept/Acad_Aff/policy/ and Appendix C of the Schedule of Classes.