
Spring 2008

CE 3201 Introduction to Transportation Engineering

Preliminaries

Classes: Lecture: M and W 11:15am – 12:05pm CivE 210
Recitation/Lab: M or W or F 2:30pm – 3:20pm CivE 221

Instructor: Dr. Henry Liu henryliu@umn.edu
Office: CivE 136 Phone: 625-6347
Office Hours: M and W 12:05pm – 1:05pm or by appointment

TA: Adam Danczyk danc0010@umn.edu (Recitation/Lab)
Saif Jabari jabar005@umn.edu (Homework Grading)

TA Office Hours: Adam: by appointment
Saif: Tuesday 2 – 4pm
TA Office Hour Location: Rm 175 in CE Building

Class website: <http://www.ce.umn.edu/~liu/ce3201/>

The course syllabus, lecture notes, homework problems and solutions, recitation and labs will be posted on the class website.

Course Description

Introduction to analysis and design of fundamental transportation system components, including individual vehicle motion, basic elements of geometric design, vehicle flow and elementary traffic flow relations, capacity analysis, and traffic forecasting.

Course Objective

The objectives of this course are to introduce students the major elements of transportation engineering and to develop basic skills in applying the fundamentals of transportation engineering and traffic analysis. By the end of this course, students should be able to start applying these skills to model, plan, and design transportation systems.

Required Textbook

Mannering, Fred L., Walter P. Kilareski, and Scott S. Washburn (2004). *Principles of Highway Engineering and Traffic Analysis*. 3rd Edition. John Wiley & Sons, Inc.

Prerequisites and Requirements

If you are concerned about your background and timely preparation for this course, please speak to the instructor. The specific background topics that will be applied in this class comprise college mathematics and physics including calculus, linear algebra, and mechanics. If any of these topics is unfamiliar (or rusty) to you, review your class textbooks. Familiarity with computer spreadsheets and the use of common computer applications (a word processor, a browser) is assumed.

Homework:

Homework problems will be assigned, and after the due date solutions will be posted on the class website. No homework will be accepted for credit after the solutions are posted.

Recitation/Lab:

For the most part, the recitation sections will be used to practice and develop using the ideas developed in class and in the text and the lab sections will be used to provide experience with computer applications to understand the types of problems which will be encountered in the real world. A cooperative, group-centered format will be employed, where student teams complete and turn in an assigned exercise.

Grading

- (1) 3 Midterm exams plus 1 Final exam (75% total)
- (2) Homework (15% total)
- (3) Recitation/lab (10% total)

The exam grade will be computed from best 3 exam scores *i.e.* best 3 exams count for 20% each, worst exam counts for 0%.

If you are unable to submit a homework assignment or take an exam due to an absence, you will be granted a waiver of the late homework policy and be given the opportunity to make up for the missed exam or quiz only under special circumstances. These include 1) illness or personal injury and 2) university-related extracurricular activities. A written statement from a responsible party (e.g. physician or coach) is required to be granted these special considerations.

Grading Ranges: As 90%+
Bs 80%+
Cs 70% +
Ds 60% +
F.... Below 60%

Academic Integrity

Students are reminded: "The Institute of Technology expects the highest standards of honesty and integrity in the academic performance of its students. Any act of scholastic dishonesty is regarded as a serious offense, which may result in expulsion. The Institute of Technology defines scholastic dishonesty as submission of false records of academic achievement; cheating on assignments or examinations; plagiarizing; altering, or misusing an academic record; taking, acquiring, or using test materials without faculty permission; acting alone or in cooperation with another to obtain dishonestly grades, honors, awards, or professional endorsement. Aiding and abetting an act of scholastic dishonesty is also considered a serious offense."

Tentative Course Outline

Weeks 1 – 5

Introduction

Course outline

Highway engineering and traffic analysis

Text Chapter

1

Principles of Highway Design

Road vehicle performance

2

 Tractive Effort and Resistance

2.1-2.7

 Principle of Braking

2.9

Geometric design of highways

3.1 – 3.2

 Vertical alignment

3.3

 Horizontal alignment

3.4

Weeks 6 – 12

Traffic Analysis and Engineering

Elements of traffic analysis

5.1 – 5.2

 Traffic stream models

5.3 – 5.4

 Queuing theory

5.5

 Highway bottleneck analysis

5.6

Freeway Level of Service Analysis

6.1 – 6.3

 Basic freeway segments

6.4

 Multilane rural and suburban highways

6.5 – 6.6

 Design traffic volume

6.7

Signalized Intersection Analysis

7.1 – 7.4

 Optimal traffic signal timing

7.5

 Traffic signal timing in practice

7.6

Weeks 13 – 15

Traffic Forecasting

Principles of traffic forecasting

8.1 – 8.3

 Trip generation

8.4

 Mode and destination choice

8.5

 Highway route choice

8.6

 Traffic forecasting in practice

8.7