CEE 320 Syllabus

Class Information

Class:	CEE 320 Transportation Engineering I
Days:	Monday, Wednesday, Friday
Time:	2:30 p.m. – 3:20 p.m.
Location:	220 More Hall
Website:	http://courses.washington.edu/cee320ag

Description: Study of vehicular transportation fundamentals including traffic concepts, performance evaluation and management, geometric design, pavement design, and transportation planning.

Instructor: Anne Goodchild

Office:	121E More Hall
Office hours:	Monday and Wednesday, 3:30 - 4:30
Phone:	206.543.3747
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TA: Kelly Pitera

Office:	119 More Hall
Office hours:	Tuesday and Friday, 11:30 am – 12:30 pm
e-mail:	kpitera@u.washington.edu

Textbook: *Principles of Highway Engineering and Traffic Analysis*, 4th edition
Fred L. Mannering (Purdue University)
Scott Washburn (University of Florida)
Walter P. Kilareski (Pennsylvania State University)

The textbook can be purchased at the UW Bookstore.

Instructor:
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CEE 320 Course Concepts

This document describes what I expect from you, the student; what you should expect from me; the basic homework format; team concepts; examination philosophy; and grading procedures.

Expectations

Expectations of the Student

- **Conduct yourself as a responsible member of the academic community**. This basically means honesty, integrity, respecting the rights of others, etc. All of this is outlined in 478-120 WAC as described at: http://www.washington.edu/students/handbook/conduct.html#020.
- **Adhere to deadlines**. Turn in homework assignments on time: the schedule is set to give you adequate time to complete them and the instructor adequate time to grade and return them.
- **Respect other students' time**. Everyone is paying for their education in one way or another. Class time and time spent working on assignments should be productive and meaningful; respect this by contributing you fair share on team assignments and minimizing class disruptions (e.g., talking in the background, sleeping in class, etc.)
- **Respect the instructor's time**. The instructor has put forth substantial effort to make this class as productive and insightful as possible. Respect this effort by paying attention and putting forth appropriate effort on the homework and exams.

Expectations of the Instructor

- **Clear communication**. I should clearly communicate what is expected of you and how you will be evaluated. If you are at any time unclear on this, let me know.
- **Availability**. I will make myself available to you for discussion and consultation.
- **Timeliness**. I will keep my posted office hours and be accountable for getting your homework assignments and exam graded and returned in a timely manner.
- **Fairness and Reasonableness.** Assignments and exams will be fair and reasonable. It is my intention to achieve a fair workload that allows you time to play as well.
- **Respect your time**. As you are putting forth substantial effort and paying good money for this course and others, I will make our class time productive and insightful.

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Assignments

All assignments are due at the beginning of class on the day it is listed as due. *I do not accept late homework.*

Graded Assignments

There are six homework assignments that will be assessed for a grade. Three of these are individual assignments, and three are group projects. The first assignment is fairly prescribed, and may be more typical for engineering courses. For example, you will be asked to use a set of equations and determine a numerical answer. As we progress through the quarter you will find the assignments require more decision making, and the write-ups will require more descriptive text. This is meant to help you practice what you will need to do when you work professionally; not only identify the answer, but describe your process for obtaining the answer, substantiate your assumptions and clearly communicate the results.

Practice problems

For each segment of material covered in the course (e.g. geometric design, queuing theory), you will be provided with a set of questions found in the text that you can use to practice the technical skills you are expected to gain in the course. You do not need to turn these in, and they will not be graded. However, we will provide the solutions to these problems so that you can check your answers, and becoming proficient at answering them will prepare you well for the midterm and final exams.

Homework Grading

We will grade each assignment and endeavor to return them in a timely manner. Answers will be posted on the course website after class on the day the assignment is due. In the case of homework #2 and homework #6 we recommend you copy your answers prior to turning it in so that you can evaluate your work prior to the exam. Answers will be available immediately, but your graded assignment will not be returned until 2 class sessions after it is submitted.

Teams

The three projects are designed to be completed by teams of three students. The TA and Professor will assign teams by the end of the second class session. After completion of the first and second group assignments, you will be asked to complete an evaluation of each team member. These will be anonymous and submitted electronically. These reviews are intended to be used to improve the performance of your team over the course of the quarter. The team project will be evaluated, and each member of the team will receive the same grade.

Examinations

Exams will be closed-book. You will be allowed to bring in one 8.5 x 11 page of notes (both sides can be used). Many questions will be similar to the text book problems, although there may be some that require a little extra thinking beyond the basic concepts.

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Final Grade Determination

Your final grade will be determined by a two-step process. First, I will combine your homework and exam grades using the following weights to determine a raw score:

- Homework: 35% (21% total for the group projects, 12% total for the individual assignments, 1% for each of the group feedback surveys)
- Midterms: 35% total
- Final: 30%

From here I may adjust your score up based on the class performance overall. Your score will not be adjusted down. This adjustment is necessary to calibrate my teaching and grading. If the class turns out to be a bit difficult and raw scores are a bit low overall, I will adjust grades up accordingly.

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CEE 320 Course Learning Objectives

This document lists the course's major subject areas and the knowledge, comprehension, application, analysis, synthesis and evaluation skills that they are designed to impart.

Geometric Design

Geometric design is a broad topic including most all physical roadway elements. This topic covers the fundamentals of vertical and horizontal roadway alignment including curve design and stopping sight distance. Upon completion of this topic, the student will be able to:

- Describe the general principles that govern highway geometric design.
- Create acceptable (by professional standards and codes) roadway alignments given typical design criteria.
- Explain/evaluate the various tradeoffs associated with roadway geometric design.

Intelligent Transportation Systems (ITS)

This topic will introduce the major areas and issues within ITS. Upon completion of this topic, the student will be able to:

- Describe ITS and its areas of emphasis: ATMS, ATIS, CVO, APTS and AVCS.
- Describe types of traffic detection devices, their strengths and weaknesses.
- Calculate vehicle speed using single and dual loop detector data.

Level of Service Analysis

Freeways and highways are often described by how well they serve traffic. The most popular measure of this is called "Level of Service" or LOS. One can set freeway services goals in terms of LOS or one can predict the impact of changed or additional physical facilities (e.g., an extra lane, wider shoulders, etc.) on freeway service. Upon completion of this topic, the student will be able to:

- Define "Level of Service" and "Design Traffic Volume".
- Describe the 6 basic levels of service.
- Calculate freeway LOS given typical professional design and analysis situations.

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Pavement Design

Pavements are integral to geometric design and also affect such far-reaching items as vehicle operating cost, driver comfort and roadway drainage. This topic is an introduction to the types of pavements used and the common procedures used in their design. Upon completion of this topic, the student will be able to:

- Describe the general principles that govern contemporary pavement design.
- Design acceptable (by professional standards and codes) flexible and rigid pavements given typical design criteria.

Queuing

Queuing is a common phenomenon in transportation engineering. Understanding basic queuing principles is essential for a transportation engineer to exercise good judgement in design. Upon completion of this topic, the student will be able to:

- Define the different types of queue analysis used in traffic engineering.
- Analyze deterministic and simple probabilistic queues.

Traffic Concepts

Traffic flow fundamentals are the essential first-principles of traffic engineering. This topic covers relationships between flow, speed and density as well as definitions of headway, speed, and spacing. Upon completion of this topic, the student will be able to:

- Explain the fundamental relationships between traffic flow, speed and density.
- Differentiate between space mean speed and time mean (spot) speed.
- Define roadway capacity.
- Estimate delay.

Transportation Planning

Travel demand, mode choice and route choice are essential to transportation planning. They are routinely used to assist in planning and analysis of transportation facilities and modes as well as general land use. This topic introduces some of the basic models used in travel demand, mode choice and route choice analysis. Upon completion of this topic, the student will be able to:

- Describe the general principles and models used in contemporary travel demand, mode choice and route choice analysis and forecasting.
- Explain the limitations and weaknesses of these methods.
- Compute trip generation, mode choice and route choice parameters given typical models for each.
- Forecast the change in trips generation, mode choice and route choice given a change in determining factors.