Instructor:
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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.

Communication

Communication skills are essential for engineers. Calculations, creativity, designs and recommendations are only of value if they can be effectively communicated to fellow engineers, decision makers and the general public. Upon completion of this class, the student will be able to:

- Communicate engineering design in a clear, concise and effective format.

Vehicle Dynamics

Vehicle dynamics and their influencing factors determine many aspects of roadway safety and geometric design. A basic understanding of road vehicle performance provides a solid background for the study of geometric design and traffic. Upon completion of this topic, the student will be able to:

- Explain the general principles that govern road vehicle performance.
- Compute key road vehicle performance measures including resistances, tractive effort, braking distance, acceleration and stopping distance.

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:

- Discuss the environmental and social implications of transportation projects.
- 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.

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.

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.

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".
- Describe the 6 basic levels of service.
- Calculate freeway LOS given typical professional design and analysis situations.
- Use actual WSDOT publications and data to determine LOS on WSDOT highways.

Signalized Intersections & Queuing

Signalized intersections are a common traffic control measure. Their design and management can be quite complex and really requires an entire course to cover in detail. This topic introduces simple signalized intersections and the necessary queuing theory required to analyze them. Upon completion of this topic, the student will be able to:

- Define the typical terms associated with a signalized intersection.
- Compute signalized intersection LOS for simple pre-timed signals.
- Define the different types of queue analysis used in traffic engineering.
- Analyze deterministic and simple probabilistic queues.

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.

Intelligent Transportation Systems (ITS)

Intelligent transportation systems is an emerging field in transportation that has gained a lot of traction over the past 10 years for good reason. 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.