

CE 211 Transportation Engineering

- Course No:** 70351 Lect. 1A/Lab. 3A
- Lecture:** Tuesday and Thursday, 11:00 – 11:50 AM 315 Butler Carlton Hall
Lab: Wednesday, 1:00 – 3:50 PM 315 Butler Carlton Hall
- Instructor:** Ghulam Bham
Office: 135 Butler Carlton Hall
Office Hours: MTuThF 4:00 - 5:00 PM
MWF 11:00 AM - 12:00 AM
OR by appointment
Please do not try to see me an hour before class
- Lab. Assistants:** Rachel St. Juliana (rls522@mst.edu)
Joshua Mooney (jwm433@mst.edu)
219 Butler Carlton Hall
M 1:00 - 3:00 PM
For latest information, please refer to BB
- Email:** ghbham@mst.edu
- Course Website:** on Blackboard as Lect. 1A
- Prerequisites:** Cv Eng 1 with a grade of "C" or better.
- Text:** *Traffic & Highway Engineering*, 3rd Edition, Garber & Hoel, Brooks/Cole, 2002.
ISBN 0-534-38743-8

CATALOG DESCRIPTION

A study of operating characteristics of transportation modes including highways, railways, inland waterways, airways, and pipelines. Consideration of traffic control devices, safety, system capacity, design of routes, planning of urban transportation systems, and economic evaluation of transportation alternatives.

COURSE GRADES

A weighted average grade is calculated using the following distribution:

Examinations (100 points)	40%	Note: 1 test point = 1 lab point 1 test point ≠ 1 quiz point 1 test point ≠ 1 HW point 1 quiz point ≠ 1 HW point
Lab Assignments (100 points)	40%	
Quizzes (10 plus @ 1 pt each)	9%	
Homework (12 plus @ 10 to 20 pts each)	9%	
Riveting Discussion (1 each group)	2%	

A weighted grade of 90 or above is guaranteed an A, 80 or above at least a B, 70 or above at least a C and 60 or above at least a D. However, curving of grades may enable students to get higher letter grades than this list indicates.

CE 211 Transportation Engineering

COURSE OBJECTIVES

1. **Introduction to Transportation Engineering.** Readings will cover some history of transportation in the US, how the transportation community is structured, some key legislative acts, how transportation projects are administered and funded and how facilities are classified.
2. **The Highway Design.** We will cover the steps in the process from determination of the need for a road to the design of that road. We will also cover the basics of designing the features of a highway and the pavement.
3. **Fundamentals of Transportation Operations.** We will cover what variables are used, the relationships among the variables, and how the variables and relationships are used in assessing the performance of various transportation facilities.
4. **Fundamentals of Planning.** We will cover how to forecast how many vehicle trips will be made, based upon the system's operational characteristics and the community's socioeconomics and demographics. You will also be introduced to variables used to make these forecasts.

GOALS

Upon completion of this course, students will be able to:

Design

- Explain how human characteristics influence transportation design and analysis
- Define and calculate safe stopping sight distance
- Define and calculate superelevation
- Perform horizontal and vertical curve calculations
- Perform grade and traverse calculations
- Calculate stopping sight distance given curve geometry
- Estimate earthwork quantities using cross sections
- Create and use mass diagrams
- Explain the difference in structure between flexible and rigid pavements.
- Design layer thickness for flexible pavements

Operations

- Describe the macroscopic and microscopic properties of traffic
- Define traffic volume, speed and density and explain methods for measuring each
- Draw reasonably accurate examples of relationships between speed and density, volume and density, and speed and volume.
- Identify the free-flow speed, the capacity point, and the free-flow and capacity speeds on the above diagrams.
- Determine and define time and space mean speeds, 85th percentile, and other measures related to speed
- Draw and use time space diagrams to analyze performance of different modes of transportation

Planning

- Name the various modes of transportation
- Describe functional classifications of all modes
- Describe current urban planning models
- Forecast future traffic using the four step planning process
- Discuss the broad issues faced by transportation professionals
- Explain the general process by which transportation facilities are built in the US

Communication

- Prepare technical reports
- Present data appropriately

CE 211 – Lab. Project I-Realignment of I-44

SPRING 2008, Assigned: January 16th, Due: March 12th, Instructor: Ghulam Bham, MS&T

The purpose of the CE211 laboratories is to provide you with real-life, hands-on experience dealing with transportation issues. Each of you will be part of a 3-person group and projects assignments will be submitted by as group projects. Throughout the semester, **each member will evaluate the contribution of the other members towards the final group project.** Make sure one of the group members is experienced in use of AutoCAD, you will need it for your design project.

Design Project Learning Objectives

- Relate material covered during lectures to practical problems worked out during lab. projects
- Design horizontal and vertical curves for Interstate highways – for safe driving at a given design speed
- Learn to rectify existing problematic alignment
- Design a typical Interstate highway section (select appropriate features) in cut and fill
- Design an interchange/intersection
- Estimate cost of construction
- Prepare a final report

Design Project Objective

- Redesign the stretch of I-44 between US 63 and Highway E

General Tasks

1. Propose three alternative alignments and choose one as your final proposed design
2. Layout new alignment showing location of centerline, edge of shoulder and edge of right-of-way (ROW) for I-44 and on-Ramps and off-ramps
3. Design and propose horizontal curves and vertical profiles for realigned I-44
4. Design typical cross-sections at approximately every 200 feet
5. Design an Interchange and Intersection at one of the exits
6. Determine cost of the project

Restrictions

- a) Design Interstate highway as a four-lane highway (2 lanes in each direction) with a median for a design speed of 70 mph
- b) Design ramps with single lanes. At intersections you may add lanes

Available

Plot of contour drawing of the area showing centerline of existing roadways
Set of MoDOT drawings and unit costs (will be provided later in the semester)

Posted on Blackboard (BB)

Aerial Photographs of the area; Aerial Photo, Aerial Photo 2
Contour Drawing in AutoCAD with centerline of existing alignment of I-44, other routes, bridges, etc. (plot provided); also available on BB as Drawing 4
Various other drawings from City of Rolla and MoDOT