

CEE 412/ CET 522 Transportation Data Management and Visualization

Course Syllabus | Winter 2020

Time

8:30 – 9:50 AM on Wednesday and Friday

Classroom

Lectures: MOR 220

In-class exercises: MOR 001 (computer lab)

Website

Everything is on UW Canvas

Description

In recent years, traffic sensors have been intensively deployed in major highway systems across the country. These sensors generate tremendous traffic data that are extremely valuable for traffic management, travel demand forecasting, pavement design, and traffic control. How to manage the data efficiently and produce the most useful information out of them have been crucial challenges faced by transportation professionals.

This course introduces important concepts of database design and application. Transportation data management, analytical, and visualization tools are introduced and demonstrated based on traffic sensor data, roadway geometric data, traffic accident data, etc.

Objective

The objective is to introduce modern concepts, algorithms, and tools for transportation data management and analysis. With the instructions, assignments, and projects in this course, students are expected to learn database design theories; analytical methods for transportation safety analyses; and skills on popular software tools for transportation data management and visualization.

Major topics of this course include: (1) database design and management; (2) data management and analysis tools (Excel, Microsoft SQL Server, etc.); (3) basic transportation data analysis methods; and (4) transportation data analysis and visualization tools (R programming language, Shiny, etc.).

Instructor

Zhiyong Cui

Office: More Hall 101

Office hours: 3:30 – 4:30 PM on Mondays

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Teaching Assistant

Sam Ricord

Office: More Hall 101

Office hours: 2:30 - 3:30 PM on Thursdays

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Note: The instructor's and TA's office hours may change. Check the most recent ones on Canvas.

Textbook

None. Required readings will be assigned as needed.

Course Schedule

Week	Day	Date	Topic	Room	Notes	Homework
1	Wed	Jan. 8	Introduction and Course Overview	More 220	Course Survey	
	Fri	Jan. 10	Excel Data Model Practice	More 220		A#1 Out
2	Wed	Jan. 15	No Class (TRB Meeting)	More 220	TRB Week	
	Fri	Jan. 17	Introduction to Databases	More 220		
3	Wed	Jan. 22	E/R Diagram	More 220		A#1 Due, A#2 Out
	Fri	Jan. 24	Relational Data Model	More 220		
4	Wed	Jan. 29	Structured Query Language (SQL) I	More 220		A#2 Due, P#1 Out
	Fri	Jan. 31	SQL Practice	More 001	Exercise	
5	Wed	Feb. 5	Structured Query Language (SQL) II	More 220		
	Fri	Feb. 7	SQL Practice	More 001	Exercise	A#3 Out
6	Wed	Feb. 12	Midterm 1	More 220		
	Fri	Feb. 14	Advanced SQL & Introduction to R	More 220		P#1 Due, P#2 Out
7	Wed	Feb. 19	Transportation Data Analysis	More 220		
	Fri	Feb. 21	R Practice	More 001	Exercise	A#3 Due, A#4 Out
8	Wed	Feb. 26	Data Visualization	More 220		
	Fri	Feb. 28	Data Visualization in R & Shiny	More 220		
9	Wed	Mar. 4	Data Visualization & Shiny Practice	More 001	Exercise	A#4 Due
	Fri	Mar. 6	Guest Lecture - Data Management & Visualization	More 220		
10	Wed	Mar. 11	Midterm 2	More 220		
	Fri	Mar. 13	Shiny Practice	More 001	Exercise	
11	Wed	Mar. 18	Final Project Presentations (8:30-9:50 AM)	More 220		P#2 Due

A# n – assignment number n ; P# m – project number m .

Schedule subject to change. Check the most recent one on Canvas.

We will split our class time between the lecture and lab time. There will be a final project presentation at the end of the quarter. No final exam.

Expectations for Course Work

The work in this course consists of assigned readings, assignments, projects, and exams. All of them are designed to help you achieving the course learning objectives and should be completed as required.

Assigned Reading

Readings will be assigned which correspond to lecture materials (please see the course schedule for details). Though these assigned readings will not be directly evaluated, it will be greatly beneficial to complete reading them on time because they provide important information for you to understand the class contents and participate in class discussions. Also, assigned reading is covered in the tests.

Assignments and Exercises

There are four regular assignments. Each assignment should be completed by each person in the class individually. As always with these types of problems, solution steps should be clearly shown with answers clearly denoted (e.g., box or underline the answer). The solution to each assignment will be posted online after the assignment due date. In class exercises will also be assigned, generally to be completed during the class time. While a grade is not assigned for these exercises, you must complete them during the week they are assigned in order to get credit.

Projects

There are two projects in this course. Each project is designed to aid skill development for a specific software application, and will be completed by a team of students. Each team will consist of two or three members. At the end of the quarter, each team member will fill out a peer evaluation on all team members including himself/herself. In this evaluation, students will be asked to divide up 100 points amongst all team members according to their contributions to the team. An individual's grade for team projects will be a product of the team's overall project grades weighted by the individual's contribution to the team. Therefore, it is possible for an individual to score more than or less than his/her team's project grade.

The final project will be evaluated by everyone in the class during the final project presentation time at the end of quarter. Each team spends about 10 minutes on presenting their work. Students, instructor, and TA grade all teams' work using a standard evaluation form.

A project report should be typed and submitted by each team just like a consulting firm submitting it to a client. It should be written in clear English, contain the relevant answers and descriptions of the work done for the project, be relatively short (4-8 pages), and be backed up by additional pages of relevant equations, assumptions, etc. Electronic files of a project should be submitted through Canvas.

Exams

There are two midterm exams and no final exam. In each of the two exams, students will be allowed up to 2 pages of notes. Everyone should respect each other's space and keep their books and notes within their own space. Exam questions will be from the contents covered in lectures, assigned readings, assignments, or projects.

Course Policy

Class Attendance

You are expected to attend all lectures and computer labs scheduled for this course, though attendance is not required. Note that you are responsible for all of the material covered during class (content, policies, and scheduling), so if you plan to be absent you may want to ask a fellow student to share their notes.

Late Homework Turn-ins

You are required to turn in your homework (including both assignment and project) on time. Late homework is not acceptable except for special cases approved (prior to the due date) by the instructor.

Final Grade Determination

Your final grade will be determined by combining your scores of assignments, projects, and exams using the following weights:

- ✓ Assignments: 30%
- ✓ Midterm Exams: 30%
- ✓ Projects: 40%