

### Instructor

Jason Cao, [cao@umn.edu](mailto:cao@umn.edu)

Please call me by my first name. I am your instructor now but will be your colleague in the near future. Culture may play a role in how to address a person, so I recognize that this may be uncomfortable at first. Feel free to use Professor Cao until you are comfortable using my first name. By the way, my last name is pronounced like “Tsau” but I’m fine with “Cow”.

Lecture: 4:00 – 5:40 pm Tuesday & Thursday HHH 30 (some lectures will be via Zoom.)

Office hours: HHH 295G or Zoom by appointment

The best way to reach me is by email. Start with PA 5290 in the subject so that the email receives a preferential treatment. I may black carbon copy my response to all students.

### Description

Transportation planners interact with engineers on a daily basis. Because of different emphases of professional training, many planners who graduate from urban planning programs have experienced difficulty in communicating with transportation engineers. This course introduces fundamental concepts and principles of transportation engineering in terms of traffic flow and freeway operation, traffic data and volume studies, capacity and level of service, intersection control and signalization, safety and crash analysis, infrastructure and maintenance, storm water management, project evaluation, travel demand forecasting, traffic impact analysis, the ethics of a professional engineer, etc. It will bridge the gaps between the two closely related professions and help you succeed in your career in transportation.

### Class Participation

Research shows that students learn more and remember what they learn much longer when they are active participants in the learning process. Be ready to participate in think-pair-share, group discussions, jigsaw, and other active learning activities. The goal of these activities is to facilitate your **learning through engagement**.

Many students find speaking in front of a group quite stressful, especially as a non-volunteer. The best way to overcome the anxiety of public speaking is to come prepared and to participate regularly. You should participate in classroom discussions. If you tend to be **quiet** during class, you should **push yourself** to raise your hand and join the discussion. If you are a **regular participant**, you should **limit the frequency** of your comments to allow others to participate. Some of you may be more likely to volunteer a comment when there are fewer hands raised or when there is a gap in the discussion. Some of you will have an answer ready almost immediately; some of you will take more time to formulate your thinking and get ready to speak. **I will try to provide an opportunity for everyone to participate.** In calling on students who raise their hands, I will usually call first on students who participate less often. When the only raised hands I see are from frequent participants, I may wait for others to be ready to join the discussion, or call on a non-volunteer.

In class, I will **call upon both non-volunteers and volunteers** each day. If I call on you, I expect you to make a good faith effort to answer the question. If you do not know how to answer a question, you may simply say so and I will either rephrase my question, or invite another student to assist us. And you

don't have to be absolutely certain about an answer to contribute to the discussion. Often the best learning in class will occur from discovering how to think through a question to get to an answer or walking through the steps that led to a wrong answer.

I **strongly encourage you to ask questions**. Framing questions is part of the learning process. Some questions I will answer right away, because it is important to clear up a confusing point that is critical to our topic. Some questions are ones to which I will be unable to give a clear answer immediately, without creating more confusion. I will think about those questions and answer later.

**Tennessee Warning Notice Pursuant to MN Department of Administration's Data Practices:** To make this class more accessible to all enrolled students, we intend to record some lectures. Since your audio/video may be part of those recordings we are informing you. These recordings will be shared with only the students enrolled in the class during this semester, in accordance with FERPA regulations.

### Grading and Requirements

Grades will be based on the following:

Assignment related to Week 1	30%	Feb 3
Presentation of an engineering concept	30%	Feb 17/22
Travel demand forecasting (2-member group work)	30%	Mar 4
Participation	10%	

Students are responsible for all course requirements, including deadlines. All assignments are due at **Midnight** (unless indicated). *For late assignments, the penalty is 20% of the assignment grade per day.* For group assignments, although only one submission is required for a group, all members are responsible for the late assignment. We will follow university policies for penalty waiver. If you wish to dispute the grade of an assignment, you must do so **IN WRITING** within one week after the assignment has been returned. You must include a specific rationale for why your assignment deserves a higher grade. "I think I deserve a better grade" does NOT constitute a rationale.

### Course Policies

Please refer to University of Minnesota and Humphrey School policy statements, which are presented as "U of M Policies" on the home page of the course website.

**Safe Campus COVID-19 Response:** <https://safe-campus.umn.edu/return-campus/covid-19-updates>

The University of Minnesota currently requires all students, staff, and faculty to wear masks when indoors regardless of vaccination status. Students are recommended to sit in the same seat throughout the course to enhance contact tracing should it be necessary. Please do not eat in the classroom and lab; it is fine to drink water occasionally. Please stay at home if you experience symptoms of COVID-19 and consult with your healthcare provider about an appropriate course of action. An absence due to symptoms of COVID-19 is an excused absence, and I will work with you to find the best course of action for missed work and/or class experiences.

Schedule and Readings

Refer to Canvas for updated readings, which will be finalized one week before the lecture.

Roess, Roger P., Elena S. Prassas, and William R. McShane. 2019. *Traffic Engineering*. Fifth Ed. New York: Pearson Education. [RPM] Inclusive Access will be used for the textbook.

<b>Week 1</b>	<b>The week of Jan 18 (Tue)</b>
Tue	Introduction and mode/vehicle/user characteristics RPM Chapters 1-3, 7.1, 7.3
Thur	Data collection and traffic studies RPM Chapters 9-10
<b>Week 2</b>	<b>The week of Jan 25</b>
Tue	Pavement and maintenance (Qing Lu of USF via Zoom) and storm water management (Bell Allison of Minneapolis)
Thur	Winter maintenance (Mike Kennedy of Minneapolis) and traffic flow RPM Chapters 5.1-5.3, 6.1-6.4
<b>Week 3</b>	<b>The week of Feb 1</b>
Tue	Traffic flow (continued) and freeway operation RPM Chapters 28, 29.1, 29.2, 29.5, 30.1
Thur	MUTCD (Hannah Pritchard of MnDOT) and Intersection control and signalization RPM Chapters 4, 15-16
<b>Week 4</b>	<b>The week of Feb 8</b>
Tue	Intersection control and signalization (continued) and urban streets RPM Chapters 17-18, 24
Thur	Safety and crash analysis
<b>Week 5</b>	<b>The week of Feb 15</b>
Tue	At-risk locations and countermeasures, and roundabout safety (Derek Leuer of MnDOT)
Thur	Project evaluation and student presentation Chapter 8 (Evaluation of Cycling Policies and Projects) in Buehler, Ralph, and John Pucher. 2021. <i>Cycling for Sustainable Cities</i> . Cambridge, MA: The MIT Press. Online access through the UMN library.  Wang, Guijing, Caroline A. Macera, Barbara Scudder-Soucie, Tom Schmid, Michael Pratt, and David Buchner. 2005. "A Cost-Benefit Analysis of Physical Activity Using Bike/Pedestrian Trails." <i>Health Promotion Practice</i> 6 (2):174-179.

	Zerbe, R.O. and T. Scott. 2015. A Primer for Understanding Benefit-Cost Analysis. <a href="https://www.aisp.upenn.edu/wp-content/uploads/2015/09/0033_12_SP2_Benefit_Cost_000.pdf">https://www.aisp.upenn.edu/wp-content/uploads/2015/09/0033_12_SP2_Benefit_Cost_000.pdf</a>
<b>Week 6</b>	<b>The week of Feb 22</b>
Tue	Benefit-cost analysis (Francis Loetterle of MnDOT) and student presentation MnDOT. Benefit-Cost Analysis for Transportation Projects. <a href="https://www.dot.state.mn.us/planning/program/benefitcost.html">https://www.dot.state.mn.us/planning/program/benefitcost.html</a>
Thur	The ADAM model for travel demand forecasting (Tao Tao of Humphrey @ HHH85)
<b>Week 7</b>	<b>The week of Mar 1</b>
Tue	Traffic impact analysis (TIA) and professional ethics (Ning Zhang of North Tarrant Express via Zoom) RPM Chapter 14 MnDOT Traffic Impact Study Guidance, <a href="https://www.dot.state.mn.us/accessmanagement/docs/pdf/manualchapters/chapter5.pdf">https://www.dot.state.mn.us/accessmanagement/docs/pdf/manualchapters/chapter5.pdf</a>
Thur	State aid for local transportation – city and county needs (Kim DeLaRosa of MnDOT) and TIA (continued) De Gruyter, Chris, Seyed Mojib Zahraee, and Nirajan Shiwakoti. 2021. "Site characteristics associated with multi-modal trip generation rates at residential developments." <i>Transport Policy</i> 103:127-145. Combs, Tabitha, and Noreen McDonald. 2021. "Driving change: Exploring the adoption of multimodal local traffic impact assessment practices." <i>Journal of Transport and Land Use</i> 14 (1):47-64.

Guest speakers are highlighted in Green.