CEE 598 UTM/UTO – Urban Transportation Models

Fall 2025

Meeting Times

Component	Meeting time	Meeting place
Lecture UTM	Tu & Th, 3:30-4:50 pm central	3310 Newmark & Zoom for any online lectures
Lecture UTO	Videos Available	`https://mediaspace.illinois.edu` & Zoom for any online lectures
Instructor's Office Hours	Monday 3:45-4:45 pm central	1212 Newmark - Prof Kontou's office

Course Information

Instructor: Professor Eleftheria Kontou
Email: kontou@illinois.edu
Course website: canvas.illinois.edu
Office: 1212 Newmark Civil Eng Bldg

Office hours may also be available by appointment. Feel free to contact me personally to set up an online meeting.

Course Communication

All communication of announcements, assignments and other materials will be done through the course website on canvas.illinois.edu. You can also email the instructor; when doing so, please begin your email subject line with **UTM 598**. This helps with class organization and will ensure a prompt reply.

Main Recommended Textbooks

1. Sheffi, Yosef. **Urban Transportation Networks: Equilibrium Analysis with Mathematical Programming Methods**, Prentice-Hall Inc, 1985.; freely available here.
2. Nagurney, Anna. **Sustainable Transportation Networks**, Edward Elgar Publishing, 2000; available here.
3. Nagurney, Anna and Qiang, Qiang. **Fragile Networks**, Wiley, 2009; freely available here.

Other recommended texts include:

- Patriksson, M. The Traffic Assignment Problem: Models and Methods, VSP, Utrecht, Netherlands, 1994.
- Bell, M.G.H. and Iida,Y. Transportation Network Analysis, John Wiley, 1997. E-book available at the UIUC Online Collection (see here).
- Hensher, D. A. and Button, K. J. Handbook of Transport Modeling, Pergamon, 2000.

- Hearn, D.W. and Ramana, M.V. Solving Congestion Toll Pricing Models. In Equilibrium and Advanced Transportation Modeling (P. Marcotte and S. Nguyen ed.), Kluwer Academic Publishers, 109-124. 1998.

Other recommended reading assignments will be given during each lecture.

Course Learning Outcomes

Upon completion of the course and all of its topics, students should have the abilities and tools to:

- employ quantitative models for urban transportation planning and, in particular, traffic assignment,
- understand how to interpret the results of these quantitative models and foster critical thinking regarding their potential and their limitations,
- use mathematical modeling for a variety of transportation system applications and code mathematical programs in Python,
- model and understand externality relationships in an urban transportation system, accounting for congestion, environmental emissions, and vulnerabilities of transportation networks.

Projects

Two projects will be given. Students are expected to conduct in depth analysis and deliver professional reports along with documented code. At the end of the semester, students will be expected to present the findings of their second project in a presentation and be evaluated by their peers.

Problem Sets

Problem sets will be announced and submitted online through the course website. Six problem sets will be available testing the concepts taught in class. The points allocation is expected to be as follows.

Problem Set #	Total Points Allocation
1	8%
2	24%
3	22%
4	18%
5	10%
6	18%
Total	100%

Note that copying and plagiarizing violates the Student Code and is not allowed under any circumstances. The University of Illinois at Urbana-Champaign Student Code should also be considered as a part of this syllabus. Students should pay particular attention to Article 1, Part 4: Academic Integrity. Read the Code at the following URL. **If you use outside sources for a problem set (textbook, scientific or other publication, website, data etc.) you should acknowledge it by citing the source.** Late problem sets submission will not be accepted unless the instructor has been informed in advance and the student has received permission. Formatting

instructions are as follows: strive for professionalism. Typewritten answers (Word, LaTeX, markdown) are the most appropriate. Neatness and organization count: if I cannot read or interpret your solution, then points will be deducted. Students are expected to show their work done for solving the problem, not just the answer. Submit your code, including comments, markdown, etc. Number each page of the submitted problem set.

Attendance

Students will be responsible for all the material taught in the classroom. All classes will be recorded and provided online through mediaspace. During lectures, office hours, or emails, you are encouraged to **ask questions and offer discussion**.

Grading Policy

A: $[93, 100]$, A-: $[90, 93)$, B+: $[87, 90)$, B: $[83, 87)$, B-: $[80, 83)$, C+: $[77, 80)$, C: $[73, 77)$, C-: $[70, 73)$, D+: $[67, 70)$, D: $[63, 67)$, D-: $[60, 63)$, F: $[0, 60)$.

The grading will be determined by the following weighting:

Problem Sets	35%
Project Report 1	25%
Project Report 2	25%
Final Presentation	15%
Total	**100%**

Academic Integrity

We will follow articles 1-401 through 1-406 of the Student Code (find the articles beginning here). This rule defines infractions of academic integrity, which include but are not limited to cheating, fabrication, and plagiarism. Academic dishonesty will result in a sanction proportionate to the severity of the infraction, with possible sanctions described in 1-404 of the Student Code. You are responsible for following these guidelines. If you have any questions about whether something would be an infraction, consult with the instructor before proceeding.

Request for Special Accommodations

To obtain disability-related adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217.333.4603, email disability@illinois.edu, or go to the DRES website (at http://disability.illinois.edu).

Run > Hide > Fight

Emergencies can happen anywhere and at any time. It is important that we take a minute to prepare for a situation in which our safety or even our lives could depend on our ability to react quickly. When we're faced with almost any kind of emergency – like severe weather or if someone is trying to hurt you – we have three options: Run, hide or fight. Please consult this website for more information on emergency preparedness. I encourage you to review this website and the campus building floor plans website within the first 10 days of class.

Sexual Misconduct Reporting Obligation

The University of Illinois is committed to combating sexual misconduct. Faculty and staff members are required to report any instances of sexual misconduct to the University's Title IX Office. In turn, an individual with the Title IX Office will provide information about rights and options, including accommodations, support services, the campus disciplinary process, and law enforcement options. A list of the designated University employees who, as counselors, confidential advisors, and medical professionals, do not have this reporting responsibility and can maintain confidentiality can be found here: `https://wecare.illinois.edu/resources/students/`.

Religious Observances

It is the policy of the University of Illinois Urbana-Champaign to reasonably accommodate its students' religious beliefs, observances, and practices that conflict with a student's class attendance or participation in a scheduled examination or work requirement, consistent with state and federal law. Students should make requests for accommodation in advance of the conflict to allow time for both consideration of the request and alternate procedures to be prepared. Requests should be directed to the instructor. The Office of the Dean of Students provides an optional resource on its website to assist students in making such requests.

Building a Supportive Learning Environment

The effectiveness of this course is dependent upon each of us! As your instructor I want to create a safe and encouraging learning environment that allows for the open exchange of ideas while also ensuring equitable opportunities and respect for all of us. Everyone is expected to help establish and maintain an environment where students and faculty can contribute without fear of personal ridicule, or intolerant or offensive language. I look forward to instructing you and being a part of your graduate learning journey this semester!

Tentative Lectures Schedule

Lecture	Date	Topic	Reading
1	Aug-26	Introduction & Review	Sheffi: Chapter 1-3
2	Aug-28	Network Equilibrium Analysis	Sheffi: Chapter 1-3
3	Sep-02	Link-Based User Equilibrium Formulation	Sheffi: Chapter 3-4
4	Sep-014	Optimization Algorithms	Sheffi: Chapter 4
5	Sep-09	Solving for User Equilibrium	Sheffi: Chapter 5
6	Sep-11	System Optimum & Marginal Cost Pricing	Sheffi: Chapter 5
7	Sep-16	Congestion Pricing	
8	Sep-18	Public Acceptance & Pareto Improving Tolls	Hearn & Ramana
9	Sep-23	Project 1 & Coding Demonstration	
10	Sep-25	Stochastic User Equilibrium	Sheffi: Chapter 10-12
11	Sep-30	Stochastic User Equilibrium	Sheffi: Chapter 10-12
12	Oct-02	Elastic Demand	Sheffi: Chapter 6
13	Oct-07	Review of Static Network Equilibrium Analysis	
14	Oct-09	Bilevel Programs - Duopoly	
15	Oct-14	Bilevel Programs - Capacity Expansion	
16	Oct-23	Project 2 & Coding Demonstration	
17	Oct-30	Environmental Externalities	Nagurney: Chapter 2
18	Nov-04	Environmental Policy Instruments	Nagurney: Chapter 2
19	Nov-06	Emission Paradoxes in Transportation Networks	Nagurney: Chapter 3
20	Nov-11	Achievable Environmental Quality Standards	Nagurney: Chapter 4
21	Nov-13	Pricing for Sustainable Transport Networks	Nagurney: Chapter 5
22	Nov-18	Permits for Sustainable Transport Networks	Nagurney: Chapter 6
23	Dec-02	Robustness of Networks	Nagurney & Qiang: Chapter 3
24	Dec-04	Project Presentations	
25	Dec-09	Project Presentations	

Updates to the Syllabus

The contents of the syllabus and the policies described are subject to change. If that happens, all the changes will be announced and described on the course website.

Prepared by: Prof. Eleftheria Kontou
Last updated: August 21, 2025