

## CEE 598 UTM/UTO – Urban Transportation Models

Fall 2020

### Meeting Times

Component	Meeting time	Meeting place
Lecture UTM	Tu & Th, 3.30-4.50pm central	1311 Newmark & Zoom/online invited lectures
Lecture UTO	Videos Available	<a href="https://echo360.org/">https://echo360.org/</a> & Zoom/online invited lectures
Instructor Online Office Hours	Wed 8:00am central	Zoom Link

### Course Information

**Instructor:** Professor Eleftheria Kontou

**Email:** kontou@illinois.edu

**Course website:** compass2g.illinois.edu

**Office:** 1212 Newmark Civil Eng Bldg

**Online Office hours:** Wed 8:00am central with Zoom Link

and meeting ID: 969 4949 0894, password: 9u014t

**Prerequisites:** CEE 310 or IE 310 and CEE 417 or UP 430 or consent of instructor

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 compass2g.illinois.edu. You can also email the instructor; when doing so, please begin your email subject line with [CEE 598]. This helps with class organization and will ensure a prompt reply.

### Required 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.

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, and the reading must be completed before the beginning of the next 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 operations,
- 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 or GAMS,
- model and understand externality relationships in an urban transportation system, accounting for emissions, air quality, and energy consumption.

### 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 their findings.

### 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. Note that copying violates the Student Code and is not allowed under any circumstances.

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

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 to do so. Formatting instructions are as follows: strive for professionalism. Only typewritten answers (Word, L<sup>A</sup>T<sub>E</sub>X, markdown) are appropriate. Students are advised to highlight their answers. Neatness and organization counts: 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. Due to COVID19 online attendance is acceptable. All classes will be recorded and provided online through echo360. 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%
<b>Total</b>	<b>100%</b>

### 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. 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](mailto: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.

## COVID-19

Following University policy, all students are required to engage in appropriate behavior to protect the health and safety of the community, including wearing a facial covering properly, maintaining social distance (at least 6 feet from others at all times), disinfecting the immediate seating area, and using hand sanitizer. Students are also required to follow the campus COVID-19 testing protocol. Students who feel ill must not come to class. In addition, students who test positive for COVID-19 or have had an exposure that requires testing and/or quarantine must not attend class. The University will provide information to the instructor, in a manner that complies with privacy laws, about students in these latter categories. These students are judged to have excused absences for the class period and should contact the instructor via email about making up the work. Students who fail to abide by these rules will first be asked to comply; if they refuse, they will be required to leave the classroom immediately. If a student is asked to leave the classroom, the non-compliant student will be judged to have an unexcused absence and reported to the Office for Student Conflict Resolution for disciplinary action. Accumulation of non-compliance complaints against a student may result in dismissal from the University.

## 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: [wecare.illinois.edu/resources/students/#confidential](https://wecare.illinois.edu/resources/students/#confidential). Other information about resources and reporting is available here: [wecare.illinois.edu](https://wecare.illinois.edu).

## Religious Observances

Illinois law requires the University to reasonably accommodate its students' religious beliefs, observances, and practices in regard to admissions, class attendance, and the scheduling of examinations and work requirements. You should examine this syllabus at the beginning of the semester for potential conflicts between course deadlines and any of your religious observances. If a conflict exists, you should notify your instructor of the conflict and follow the procedure at <https://odos.illinois.edu/community-of-care/resources/students/religious-observances/> to request appropriate accommodations. This should be done in the first two weeks of classes.

## Tentative Lectures Schedule

Lecture	Date	Topic	Reading
1	Aug-25	Introduction & Review	Sheffi: Chapter 1-3
2	Aug-27	Network Equilibrium Analysis	Sheffi: Chapter 1-3
3	Sep-01	Link-Based User Equilibrium Formulation	Sheffi: Chapter 3-4
4	Sep-03	Optimization Algorithms	Sheffi: Chapter 4
5	Sep-08	Solving for User Equilibrium	Sheffi: Chapter 5
6	Sep-10	System Optimum & Marginal Cost Pricing	Sheffi: Chapter 5
7	Sep-15	Congestion Pricing	Invited Lecture
8	Sep-17	Public Acceptance & Pareto Improving Tolls	Hearn & Ramana
9	Sep-22	Project 1 & Coding Demonstration	
10	Sep-24	Stochastic User Equilibrium	Sheffi: Chapter 10-12
11	Sep-29	Stochastic User Equilibrium	Sheffi: Chapter 10-12
12	Oct-01	Elastic Demand	Sheffi: Chapter 6
13	Oct-06	Review of Static Network Equilibrium Analysis	
14	Oct-08	Bilevel Programs - Duopoly	
15	Oct-13	Bilevel Programs - Capacity Expansion	Invited Lecture
16	Oct-15	Project 2 & Coding Demonstration	
17	Oct-20	Environmental Externalities & Transportation Networks	Nagurney: Chapter 2
18	Oct-22	Environmental Policy Instruments	Nagurney: Chapter 2
19	Oct-27	Emission Paradoxes in Transportation Networks	Nagurney: Chapter 3
20	Oct-29	Achievable Environmental Quality Standards	Nagurney: Chapter 4
21	Nov-03	Pricing for Sustainable Transport Networks 1	Nagurney: Chapter 5
22	Nov-05	Pricing for Sustainable Transport Networks 2	Nagurney: Chapter 5
23	Nov-10	Permits for Sustainable Transport Networks	Nagurney: Chapter 6
24	Nov-12	Sustainable System-Optimized Networks	Nagurney: Chapter 8
25	Nov-17	Coupled Transportation & Energy Systems	Sioshansi 2012
26	Nov-19	Power Systems & Electric Vehicles Recharging Modeling	Invited Lecture
27	Dec-01	Project Presentations	
28	Dec-03	Project Presentations	
29	Dec-08	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:**  
**Last updated:**

Prof. Eleftheria Kontou  
January 8, 2021