

ENGR 8210 Network Modeling and Optimization

Course Syllabus

Lecture: Tuesday & Thursday, 3:30 pm – 4:45 pm

Instructor: Mahyar Amirgholy
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Office: M-162C

Prerequisite: Calculus and Linear Programming

Textbook

The primary course text will be the following book:

Sheffi, Y. Urban transportation networks. Prentice-Hall, Englewood Cliffs, NJ.

Available Online: <https://web.mit.edu/sheffi>

Additional readings and references will be posted as necessary to D2L Brightspace.

Description and Objectives

[3 credits] The course objectives are for students to understand mathematical network modeling and optimization techniques. Upon completing the course, students should be familiar with the concepts of user equilibrium, system optimum, and heuristic algorithms. Students should be able to develop demand generation, trip distribution, modal split, and traffic assignment models for urban networks. The student will leave the class with mathematical programming skills that have wide applications in the network modeling field.

Course Topics

- Urban networks analysis
- Mathematical programming formulation
- Heuristic optimization algorithms
- User equilibrium
- Demand generation
- Trip distribution
- Modal split and stochastic choice models
- Network assignment
- System optimization and pricing
- Supernetworks

Course Learning Outcomes

1. Formulate optimization problems as mathematical programs
2. Solve mathematical programs using heuristic methods
3. Model user equilibrium in urban networks
4. Develop joint network models
5. Solve network assignment problems
6. Optimize urban networks

Course Requirements and Grades

Course grades will be based on four components:

1. **Homework** [30%] In order to practice concepts from the class, some shorter exercises will be assigned as homework. Homework assignments must be submitted to the D2L website in a single PDF with a file name as "FirstInitial_LastName_HW#.pdf".
2. **Midterm Exam** [30%] The midterm exam evaluates your knowledge in the middle of the semester. The problems will be similar in size and scope to the assigned homework. Unless instructed otherwise, the midterm exam will be closed book.
3. **Term Project** [40%] The topic of your project must be related to network modeling. You will be expected to prepare a report in the format of a journal or conference paper on your term project. The project report must be submitted to the D2L website in a single PDF with a file name as "FirstInitial_LastName_TPR.pdf"

Microsoft Word Template: https://github.com/chiehrosswang/TRB_MSWORD

Course Communication

Course communications will be sent to the class using the D2L website. This site is where notes, readings, assignments, and other announcements will be posted. It is important that if you are registered for the course, you are also on the roster for the D2L site.

Contacting Me

The best way to contact me is by email. Include "CE 8543" in the subject line to ensure your message receives timely attention. In general, homework and project questions are difficult to answer by email, so I may request that you come in for office hours.

Academic Integrity Policy

Homework assignments are designed to be an individual effort, and you are expected to submit only your own work. Semester projects must consist of your original analysis and writings. Ideas from other authors must be properly cited, and plagiarism will not be tolerated. All students are expected to adhere to the Kennesaw State University Codes of Conduct.*

* https://scai.kennesaw.edu/KSU_Codes_of_Conduct_2019-2020.pdf