IE 430 Logistics Systems Planning and Design - Fall 2021

Instructor: Güvenç Şahin
TA: Amin Ahmadi Digehsara
Lectures: Tuesday 15:40 – 18:30 (FENS G032 & online)

Objectives:

The objective of the course is to give the students a solid understanding of the analytical modeling and solution approaches in logistics planning problems and design issues in logistics systems. We will use mathematical programming approaches to model and solve the planning and control problems arising in transportation and distribution logistics, including (but not limited to) single and multiple facility location/allocation problems, logistics networks design for long-haul freight transportation, transportation modes and multi-modal transport, and vehicle routing and scheduling. We will develop and employ both exact and approximate methods to solve optimization problems and implement computerized applications. Proficiency in operations research and capability of using an optimization solver (preferably Gurobi) and coding with a computer programming language (Python or C++) are required.

Textbook:

Introduction to Logistics Systems Management. G. Ghiani, G. Laporte and R. Musmanno. John Wiley & Sons, 2013. (eBook available online)

Additional References:

Introduction to Logistics Systems Planning and Control. G. Ghiani, G. Laporte and R. Musmanno. John Wiley & Sons, 2004. [TS161 .G45 2004]

Facilities Design, 3rd edition. S. Heragu. CRC Press, 2008. [TS177 .H47 2008]

Supply Chain Engineering. M. Goetschalckx. Springer, 2011. [HD38.5 .G586 2011] (eBook available online)

Grading Policy: (final percentages to be determined with students' participation)

~~5-10 % During-class Exercises~~
~~30-~~ 40% Midterm Exam(s): Midterm Exam 30% + Coding Exam 10%
~~15-25~~ 20% Term Project
~~30-~~ 40% Final Exam

- *Exams*: Depending on the schedule of the students, we will arrange one or two midterm exams and one final exam. Exams are in-class exams, given individually (performed closed book and closed notes). A single comprehensive make-up exam will be offered following the final exams period to those who have missed an exam and have a medical report provided/approved by the Health Center. If you miss both exams, one of your grades will be "0" regardless of your excuse. There is no make-up for the make-up exam!
- *Term Project*: A term project will be assigned around mid-semester. The project involves the development and implementation of a methodological/algorithmic approach to solve a logistics planning problem using an optimization solver and/or a programming language. Students are expected to form groups of two or three (depending on the class size). The students may either come up with a project idea of their own and get approval from the instructor, or the instructor will determine a set of possible projects and randomly assign

them to each group. More details about the project options and execution will be announced in the second half of the semester.

- ~~*During-class Exercises*: Students should be prepared for in-class (announced or unannounced) exercises during the lectures. Depending on the rules for physical in-class participation, we may conduct these exercises both online and face-to-face meetings. There is no limit on the number of such exercises to be given during the semester; there is no make-up for missed ones.~~

- ~~*Homework*: The purpose of the homework assignments is to encourage you to study in an organized method and to facilitate your learning process. Regular homework assignments will be given throughout the semester, which usually require mathematical modeling of logistics planning problems and solving them using an optimization package and/or a solver and/or coding/programming an algorithm. The homework may be done in groups of two or three students. They will be collected but not graded.~~

Course Outline (updated on October 26, 2021)

Week 1	Continuous space facility location (FL)	Sections 3.1-3.3.1
Week 2	Single echelon discrete space FL problems	Sections 3.3.2
Week 3	Single echelon discrete space FL problems	Sections 3.3.2
Week 4	*Python-Gurobi Tutorial*	
Week 5	Two echelon discrete space FL	Sections 3.3.3 & 3.3.4
Week 6	Location covering problems (LCP)	Sections 3.3.5 & 3.3.6
Week 7	*Midterm Exam (Tuesday, November 9)*	16:00-17:30
Week 8	Long Haul Freight Transportation	Sections 6.1-6.5
Week 9	*Coding Exam (Tuesday, November 23)*	16:00-17:30
Week 10	Traveling salesman problem (TSP)	Sections 6.8.1
Week 11	Vehicle routing problems (VRP)	Sections 6.8.2-6.8.5
Week 12	Heuristics for VRP	Sections 6.8.2.2 & 6.8.3.1
Week 13	*Algorithm Programming Tutorial*	
Week 14	Heuristics for VRP	Lecture notes

Disclaimer:

The instructor reserves the right, when necessary, to alter the grading policy, change exam dates, and modify the syllabus and course content. Modifications will be announced in class and at the SUCourse website. Students are responsible for the announced changes.

Academic Integrity:

Student in this course are expected to honor the academic integrity principles according to the SU rules and procedures. Non-compliance to academic integrity principles through plagiarism, using or accomplishing another person's work, and/or submitting previously used work will be penalized severely.