SIE 546: Algorithms for Networks and Graphs
Spring 2025

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Course Hours: MW 4:30 – 5:45pm
Office Hour: by appointment

Course Objectives: Many real-life problems can be formulated with a "network" structure, and efficient algorithms have been developed to solve the resultant problems. The objective of the course is to provide knowledge and skills to students so that they are very comfortable addressing such problems, whether they arise in the workplace or in their research.

Catalog Description: Model formulation and solution of problems on graphs and networks. Topics include heuristics and optimization algorithms on shortest paths, min-cost flow, matching, and traveling salesman problems. Pre-requisite SIE 340 or SIE 440 or SIE 540.

Topics (more-or-less in order of presentation):

1. Introduction on applications (Chapter 1 plus notes)
2. Networks: definitions and notation (part of Chapter 2 plus notes)
3. Introduction to algorithms (part of Chapter 3, Appendix A, plus notes)
4. Shortest path problems (parts of Chapters 4 and 5)
5. Network covering problems (notes and parts of Chapter 13)
6. Maximum flows problems (Chapter 6)
7. Minimum cost flows (Chapter 9)
8. Assignment and matching (parts of Chapter 12 and notes)
9. Multicommodity flows and network traffic (parts of Chapter 17 and notes)
10. Other applications (Chapter 19 and notes)

Textbook: R.K. Ahuja, T.L. Magnanti, and J.B. Orlin, *Network Flows: Theory, Algorithms and Applications*, Prentice Hall, 1993.

Grading:		
	Homework	40 %
	Mid-term Exam	30 %
	Project	30 %