540:311 Deterministic Models in Operations Research

Lecture: M W 2-3:20pm, @TIL-226

Overview

This course teaches the fundamentals of mathematical programming, specifically linear deterministic models. It covers the necessary theory of model building, solution algorithms, duality, and sensitivity. In addition to theory, the course teaches practical mathematical programming using Python and practical examples.

Textbooks:
- Bazaraa, M. S., Jarvis, J. J., & Sherali, H. D. (2011). *Linear programming and network flows*. John Wiley & Sons.
- Postek, K., Zocca, A., Gromicho, J. A., & Kantor, J. C. (2025). *Hands-On Mathematical Optimization with Python*. Cambridge University Press.

Instructor

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Teaching Assistant

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Recitation

Friday, 2-3:20pm, LSH-B267, starting February 6

Grading

Coding Assignments:	15%
Midterms (each):	15%
Final Exam:	30%

Homework and Coding Assignments

Suggested homework will be posted most weeks and discussed in the recitation. They will not be graded. There will be two coding assignments / case studies throughout the semester. These will be posted on Canvas alongside their deadline. Late submissions of assignments without prior written approval will receive zero points without exception. The midterms and exam may contain questions related to the labs.

Tentative Course Schedule

Dates	Lecture	Lab
1/21, 1/26	Introduction	
1/28		Intro to Python, Jupyter, PYOMO
2/2, 2/4	Linear Algebra and Convexity	
2/9		Full PYOMO Example
2/11	Midterm 1	
2/16 – 2/25	The Simplex Method	
3/2		Optimization and Machine Learning
3/4	Midterm 2	
3/9, 3/11	More on Simplex	
3/16, 3/18	[Spring Break]	
3/23, 3/25	Optimality Conditions	
3/30		Practical Modeling
4/1 – 4/15	Duality and Sensitivity	Duality
4//15	Midterm 3	
4/20 – 4/22	Decomposition	
4/27 – 5/4	Network flow and transportation	Network flow