Syllabus MATH 510
Linear Programming and Network Flows
Fall 2016 Weber 206 Tuesday, Thursday 9:30-10:45

This course serves as a mathematical introduction to linear optimization theory and applications. The course content includes the following topics:

- Introduction Linear Programming
- The Geometry of Linear Programs
- The Simplex Method
- Applications to l_1 Optimization and Data Fitting.
- Duality Theory
- Sensitivity Analysis
- Applications to Game Theory and Portfolio Selection
- Network Flows
- Interior Point Methods
- Convex Programming
- Integer Programming
- Student Projects (LAB)

Required Text: Introduction to Linear Optimization by D. Bertsimas and J.N. Tsitsiklis (3rd Edition).

Instructor: Michael Kirby, Professor, Department of Mathematics, Weber 211. Office Hours

Examinations: There will be one midterm and a final examination. The final examination *may* be used towards satisfying Part i) the Ph.D. Qualification Exam in Mathematics.

Problem Sets will be every week. Each student has a one week late pass for one assignment. Additional late work will receive half credit.

Grading Policy: The final grade will be calculated using the weighting

- Problem Sets 35%
- Midterm examination 25%
- Final examination 25%
- Final project 15%

Prerequisites: M261. Basic knowledge of linear algebra assumed including notion of a basis, rank, linear independence. Ability to program in a high level language such as Matlab or Python.

Computer Programming: The Matlab optimization toolbox will be available for students in Weber 205. We will also be coding the simplex algorithm and the primal dual interior point methods from scratch to enhance our understanding of these methods.

Final Project: The last two weeks of the course before finals week will be dedicated to a final project. This final project will allow students to explore an application in linear programming in depth. No problem set will be assigned during the final project period. Attendance in the computer lab during the final project is required and is worth one third of the lab grade.

Policy on Collaboration and Group Work: You may collaborate with other students (in our class) on problem sets and are encouraged to do so. However, if you choose to collaborate on assignments it is required that you adhere to these rules

- You are required to write up your solutions independently, i.e., each student hands in his or her own work. Solutions that appear to be copies of each other will receive zero credit.
- You are required to identify the other students with whom you have collaborated.

Discussing assignments and exchanging ideas is recommended. There is no penalty for collaborating as long as you hand in your own work. Your mastery of the material will be evidenced by your own write-up of the problems as well as examination results.

Important Dates:

- Midterm 10/04.
- Thanksgiving recess 11/21-11/25.
- Student LABs due 12/9.
- Final Examination, 12/15, 6:20-8:20pm

This course will adhere to the CSU Academic Integrity Policy as found on the Student' Responsibilities page of the CSU General Catalog and in the Student Conduct Code.

At a minimum, violations will result in a grading penalty in this course and a report to the Office of Conflict Resolution and Student Conduct Services.