

## **OR 641/MATH 689/OR750 Linear Programming**

Fall 2011, Wednesday 4:30-7:10, *Robinson A250*

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Systems Engineering and Operations Research

Nguyen Engineering Building, Room 2100

Office hours: Tuesday 2:30--3:30, Wednesday 2:30--4:00, or by appointment

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### **Text**

Griva, Nash, and Sofer, [\*Linear and Nonlinear Optimization\*](#), SIAM Books, 2008 (2<sup>nd</sup> Edition).

### **Course description**

Linear programming problems arise in a wide variety of applications from areas such as finance, medicine, transportation, and military. These problems may be very large, potentially involving thousands of constraints and millions of variables. This course focuses on the theory and methods for solving large-scale linear programs. Students will gain hands-on experience in solving large-scale linear programs via computational work with the software CPLEX.

We will take an in-depth look at the geometry of linear programming, then discuss the simplex method, duality theory and the dual simplex. We then discuss computational enhancements to the simplex that make it suitable for large sparse problems. These include the revised simplex, basis factorization, bounded-variable linear programs, column generation and Dantzig-Wolfe decomposition. We then discuss computational complexity of finite algorithms, and in particular the simplex method. Finally, we discuss non-simplex methods for LP, including the ellipsoid method and the primal-dual interior-point method. Throughout the course we will explore a number of large scale applications. The course will cover Chapters 1-7, 9, 10, and Appendix A.1-A.6 of the book.

### **Grading**

There will be an in-class midterm examination, and a cumulative final exam. The midterm will make up 25% of the grade and the final exam will make up 35% of the grade. Homeworks will make up 20% of the grade. A computational project will make up the remaining 20% of the grade. In computing the final grade, the lowest homework grade will be dropped. The exams will be open book, open notes.

**Note:** Students in **OR 750** will be given additional doctoral-level assignments

### **Exam Dates**

Midterm: Wednesday October 16

Final exam: Wednesday December 11, 4:30- 7:15.

### **Fundamental rules**

- Make-up exams will *only* be given for extreme situations, and *only* if I am contacted before the exam is given and full arrangements are established. Full adherence to this policy is the responsibility of the student.
- The exam dates above are tentative, and it is the student's responsibility to keep abreast of changes.
- Homework will be assigned each class, and usually collected. All work must be clearly written. Illegible work will not be accepted.
- There will be a penalty of 10% of the total grade for every day homework is late.