

# Math 432/832: Linear Optimization

Fall 2008 Sections 001 — University of Nebraska–Lincoln — Course Policies

INSTRUCTOR: Stephen Hartke

OFFICE: 339 Avery Hall, PHONE: 402-472-7001, EMAIL: shartke2@math.unl.edu

COURSE WEBPAGE: [www.math.unl.edu/~shartke2/teaching/math432](http://www.math.unl.edu/~shartke2/teaching/math432)

OFFICE HOURS: Mon, Wed, Fri 11:40am–12:30pm, or by appointment.

MEETING TIMES: Mon, Wed, Fri 8:30am–9:20am in Avery Hall Room 110

FINAL EXAM: Mon Dec 15 7:30am–9:30am in Avery Hall Room 110

TEXT: *Introduction to Linear Optimization*, by D. Bertsimas and J. N. Tsitsiklis, Athena Scientific, 1997.

## COURSE OVERVIEW:

In this course, we will study mathematical aspects of problems in linear and integral optimization that are relevant in computer science and operation research. The course will follow the textbook, with supplemental material provided by the instructor.

We will begin by describing and analyzing the simplex algorithm for linear programming. We will next discuss the geometric concepts underlying the algorithm and start the main theme of the course: duality. Using this idea we give some modifications of the simplex method and analyze their computational aspects. We introduce the primal-dual algorithm and show what its variations can do for basic problems of combinatorial optimization: the shortest path problem, the max-flow problem, the min-cost flow problem. We will then discuss some applications of the above material to matrix games and combinatorial min-max theorems. After that, we will describe what can be done for integer linear programs (such as the Traveling Salesman Problem or scheduling problems). If time permits, we will mention some ideas of dynamic programming and branch-and-bound.

## COURSE REQUIREMENTS:

Homework will be assigned roughly weekly. The homework provides practice employing techniques learned in class and finding and writing proofs; writing up the solutions is among the most effective ways of keeping up with the material in the course. Discussion with other students is a great way to better understand a problem and to get ideas, but each student must write his or her submission individually. Late homework will not be accepted.

Students registered for Math 832 will have to complete additional assignments based on outside readings.

There will be two in-class tests; they are tentatively scheduled for Fri Oct 10 and Fri Nov 21. The final exam will be cumulative over the entire semester. Makeup tests will only be given in the case of extreme illness or other hardship. The decision to give makeups is at the discretion of the instructor.

The different components contribute to the final grade as follows: homework assignments (lowest two scores dropped): 35%; two tests: 17.5% each; final exam: 30%. For students in Math 832, the distribution will be homework assignments (lowest two scores dropped): 30%; two tests: 15% each; final exam: 25%; additional assignments: 20%.

All students are expected to be aware of and abide by the University's policies on student conduct and academic integrity and honesty.

**RESOURCES:**

Announcements will be made in class and posted on the course webpage. Some announcements may also be sent to the student email address listed on WAM. The course webpage will have handouts and a log of the topics covered each day.

**STUDENTS WITH DISABILITIES:**

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska–Lincoln to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.