

MA/IE/OR 505 - Linear Programming Spring 2006

1 Instructor:

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2 Teaching Assistant:

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3 When and Where:

Tuesdays and Thursdays between 11.45-1.00 pm in Daniels 225.

4 Instructors office hours:

Kartik's office hours are Tuesdays and Thursdays between 10-11 am or by appointment. To set up an appointment, please send me an email.

5 Course webpage:

The course webpage is located at <http://courses.ncsu.edu/ma505/lec/001/>. I will post course material, including handouts, homeworks, class projects, and topics for supplementary reading here. The webpage will be up to date. However, please inform me about missing links, and necessary updates by sending me email.

6 Course prerequisites:

MA 405 is the prerequisite for the course.

7 Course objectives:

This course is a unique blend of the *theory* of linear programming, exciting *applications* of linear programming to real world problems, and *algorithms* and associated state of the art *software* for solving large scale linear programs. The *theoretical* aspect of the course will focus on complexity, geometry, optimality conditions, and duality in linear programming. The *application* aspect of the course will help students in recognizing and developing linear programming models for problems in science and engineering. The *algorithmic* aspect of the course will develop simplex and interior point methodologies and expose students to associated state of the art computer *software* for reliably and efficiently solving large scale linear programs.

8 Course syllabus:

The following topics will be covered in the course:

1. Introduction to linear programming
2. Simplex method
3. Duality in linear programming
4. Revised simplex method
5. Sensitivity analysis
6. Selected applications of linear programming
7. Advanced topics in the computer solution of large scale linear programs
8. Complexity of linear programming
9. Interior point methods

A detailed listing of course topics can be found in the class schedule on the course webpage.

9 Computational resources:

We will use AMPL, CPLEX, and MATLAB as computer software in the course. You will be expected to write small AMPL and MATLAB programs in your class project and homework assignments. Information on AMPL, CPLEX, and MATLAB is available on the course webpage and I will review some of their important features via in-class demos.

10 Homeworks:

Homeworks are assigned every two weeks and posted on the course webpage. Some of the homework assignments will involve AMPL and MATLAB. You are encouraged to discuss your homeworks with other students, but you must work through, write up, and turn in the assignments on your own. You must turn a hard copy of your homework in the *beginning of class* on the due date. Late homeworks will not be accepted without a prior instructor approval. I will post the solutions to the homework assignments on the course webpage.

11 Class project:

You will complete a class project in the latter half of the semester on one or more aspects on the course and type a 3-4 page report in LATEX presenting the research. The LATEX template files that you will use for your report are available on the course webpage. Early in the semester, I will designate teams of 3 individuals. You will work together and submit your research report as a team. I will assign tentative research projects and post them on the course webpage before the start of spring break. You are also welcome to choose your own research topics.

12 Exams:

There is a midterm and a comprehensive final exam. You can find more information on the tests on the course schedule on the class webpage. All tests are open book and class notes. As you expect, each exam has to be your own work. You will not miss an exam without a certified medical excuse or prior instructor approval. If you cannot make it to an exam, please let me know well in advance!

13 Grading:

Please make it a point to pick up your corrected homework assignments, project, and exams. The responsibility of grading the homeworks resides with Sahar (our TA). If you believe an error has been made in grading the homeworks, bring it to the attention of Sahar during her office hours. I am responsible for your class project and the exams and will notify you by email once I am done with the grading. If you detect mistakes in the grading notify me immediately. Project and exam scores will not be changed one week after they have been returned!

14 Calculation of course grade:

A weighted average will be calculated as follows:

1. Homeworks: 30 %
2. Midterm: 20 %
3. Class Project: 20 %
4. Final exam: 30 %

Homeworks are given the same weight. The grade scale is the following: 90-100 A-,A,A+; 80-89 B-,B,B+; 70-79 C-,C,C+; 60-69 D-,D,D+; below 60 F.

15 Textbooks:

1. V. CHVÁTAL, *Linear Programming*, W.H. Freeman and Company, New York, 1983.
This will serve as the required textbook for the course.
2. S.J. WRIGHT, *Primal-Dual Interior-Point Methods*, SIAM, Philadelphia, 1997.
This will serve as the required reference for interior point methods.

The textbooks can be purchased from the campus bookstore and are available on reserve in the D.H. Hill library.

16 Academic Integrity:

Please review the guidelines posted at
<http://www.ncsu.edu/provost/academic-regulations/integrity/reg.htm>.

17 Disability services for students:

”Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State’s policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.1)”.