

Course Outline

Course Description and Objectives

The course introduces the major topics in optimization and their application in solving problems in engineering. The emphasis is on understanding the methods, and on being able to recognize when a problem encountered in the course of thesis research or on the job can be solved by these techniques. Practice in problem formulation is gained through the assignments, which are stated as small cases.

There is no computer programming in the course. Students will use existing computer programs to carry out calculations to solve problems. “Programming” as in “mathematical programming” or “linear programming” is an old use of the word programming to mean planning.

Hours per Week (lectures/lab/PA): 3 lecture hours per week.

Marking Scheme:	assignments	10%	(4 assignments)
	midterm	25%	
	final exam	65%	

Professor

J.W. Chinneck

tel: 520-5733

Office hours: to be announced.

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email: chinneck@sce.carleton.ca

Regulations

Final Exam: *The final exam is for evaluation purposes only and will not be returned to the student.* The final examination will be scheduled by Examination Services. The date will not be known until later in the term. Do not make travel plans until the exam has been scheduled.

Plagiarism (copying and handing in for credit someone else's work) is a serious instructional offense that will not be tolerated. Please refer to the section on instructional offenses in the Graduate Calendar for additional information.

Students with Disabilities: Students with disabilities requiring academic accommodations in this course must register with the Paul Menton Centre for Students with Disabilities for a formal evaluation of disability-related needs. Registered PMC students are required to contact the Centre, 613-520-6608, every term to ensure that you receive your Letter of Accommodation, no later than two weeks before the first assignment is due or the first in-class test/midterm requiring accommodations. If you require accommodation for your formally scheduled exam(s) in this course, please submit your request for accommodation to PMC by *November 11, 2011*.

Health and Safety Information: Here is the link to the health and safety manual: www.sce.carleton.ca/courses/health-and-safety.pdf

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Resources

Textbook: Wayne L. Winston and M. Venkataramanan, *Introduction to Mathematical Programming, 4th edition*, Thomson, Brooks/Cole. This edition has a diskette in the back. Earlier editions of the book are also useful. The textbook is recommended, rather than required. Partial course notes are available online at <http://www.sce.carleton.ca/faculty/chinneck/po.html>.

Course Web Page: A course web page is maintained at <http://www.sce.carleton.ca/courses/sysc-5004/>.

Software Tools: You will need suitable software to carry out some of the homework assignments. The textbook includes a diskette that has the LINDO system, or the same software is available for free download via the WWW. For web pointers to LINDO and other useful software and resources see <http://www.sce.carleton.ca/faculty/chinneck/StudentOR.html>

Getting help: Get help early if you are having difficulty. Here are ways to get help:

- Ask questions in class. It's best to clear things up right at the start.
- Ask the professor during office hours. Email to set up an appointment if the office hours won't work for you.
- Email is not a suitable medium for technical questions. Questions submitted this way will be answered at the beginning of the next class.

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Schedule

See the online notes and animations for the lectures at
<http://www.sce.carleton.ca/faculty/chinneck/po.html>

Week of:	Topics:	Assigns:
Sept 5	<i>First class Sept. 8.</i> Introduction to the course	
Sept 12	Linear programming intro and the simplex method	
Sept 19	Linear programming for nonstandard models	Assign 1
Sept 26	Sensitivity analysis. Linear programming in practice.	
Oct 3	Networks: shortest route, min spanning tree, max flow/min cut	Assign 2
Oct 10	Network flow programming. PERT and time-cost tradeoffs.	
Oct 17	PERT and resource leveling. Integer Programming: branch and bound.	
Oct 24	<i>Midterm Oct. 25.</i> Integer programming: binary and mixed-integer programming.	Midterm
Oct 31	Genetic algorithms and heuristic methods. Dynamic programming	Assign 3
Nov 7	Dynamic programming. Introduction to nonlinear programming. Gradient methods.	
Nov 14	Nonlinear programming: pattern searches and barrier methods.	Assign 4
Nov 21	Nonlinear programming: method of Lagrange, KKT conditions, GRG methods, convexity and concavity.	
Nov 28	Nonlinear programming: special cases. Separable programming, Franke-Wolfe method, geometric programming, global optimization.	