

## SYLLABUS FOR ISYE 6669

Summer 2009

**Instructor:** Faiz A. Al-Khayyal

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*In all email correspondence, please include ISyE 6669SH in the Subject Line*

**Course Web Site:** <https://t-square.gatech.edu>

All assignments and handouts will be posted to this web site. Unless otherwise instructed, all solutions to assignments are to be uploaded to this web site.

**Required Textbook:** OPTIMIZATION IN OPERATIONS RESEARCH, by Ronald L. Rardin, Prentice Hall, ISBN 0-02-398415-5, New Jersey, 1998 (Reprinted with Corrections April 2000)

**Recommended Textbook:** LINEAR PROGRAMMING WITH MATLAB, by Michael C. Ferris, Olvi L. Mangasarian, and Stephen J. Wright, Society for Industrial and Applied Mathematics (SIAM), ISBN 978-0-898716-43-6, Philadelphia, 2007.

### OUTLINE OF COURSE

**Deterministic Optimization Models** (Chapter 2)

**Improving Search** (Chapter 3)

**Linear Programming Models** (Chapter 4)

**Simplex Method for Linear Programming** (Class Notes)

**Interior Point Methods for Linear Programming** (Class Notes)

**Duality and Sensitivity in Linear Programming** (Chapter 7 and Class Notes)

**Multiobjective Optimization and Goal Programming** (Chapter 8)

**Network Flow Models** (Lecture Notes)

**Discrete Optimization Models** (Chapter 11)

**Discrete Optimization Methods** (Chapter 12)

**Unconstrained Nonlinear Programming** (Chapter 12 and Class Notes)

**Constrained Nonlinear Programming** (Chapter 14 and Class Notes)

#### **Grading :**

Homework: 20%

Exam I: 25%

Exam II: 35%

Final Exam or Project : 20%

#### **Homework:**

Homework will be assigned every week or two, about seven in total, and the lowest homework grade will be dropped. Homework is meant to be a learning tool. Start all assignments as early as possible. Attempt each exercise on your own. If you are having difficulty, find help as soon as possible. Because the emphasis is on learning you may consult with your

classmates, but *an individual write-up in your words must be submitted*. The best strategy is to attempt each exercise on your own, and then get together with a study group to compare your approaches. In general, late homework submissions will not be accepted without advanced notice of extenuating circumstances outside your control. Under no circumstances will an assignment be accepted after the solution key has been released. If you need more time, make arrangements with me in advance of the due date. *In summary*, late homework will not be accepted without prior arrangement. You are allowed (and encouraged) to work together with other students on homework, as long as you write up and turn in your solutions in your own words. If you received help with an answer, be sure that you understand what you turn in because test questions can come from the homework. You are also encouraged to ask me questions, although you should try to think about the problems before asking. *In other words*, *do not expect to be told how to solve a problem if you cannot show what you have attempted and where you got stuck*. I strongly encourage you to work on extra problems from the book on your own, because I sometimes take exam questions from unassigned exercises in the book.

### **Exams :**

All exams will be closed book. In general, no make-up exams will be given without an excuse that complies with Institute grading policy. Treat each scheduled exam as if it is your final exam.

### **Project:**

The course may include a team project in lieu of a final exam. Due at the end of the semester, the project will require you to formulate, analyze and implement an optimization model from either a research or a real-life application that is of interest to your team. The effort includes developing necessary data processing routines, solving the model, and validating your solution. Projects are intended for groups of up to five students. Groups larger than five are allowed with the Instructor's permission, but my expectations will go up with group size. In general, a larger group will be expected to complete a more extensive study. A project report suitable for submission to a client and presentation to the class will be the final deliverable. Further details are provided in a separate hand-out after the beginning of the semester.

### **Academic Honor Code:**

All course participants are expected and required to abide by the letter and the spirit of the Georgia Tech Honor Code; please visit [www.honor.gatech.edu](http://www.honor.gatech.edu) . If there is any way in which I can help you in complying with the honor code, please do not hesitate to ask.

### **Who Should Take This Course?**

This course is designed as an introductory course for linear, nonlinear and discrete optimization problems. You will learn how to model these problems as deterministic mathematical programs, understand the theory of how to solve them, and gain experience with modeling languages and computer packages that implement many of the solution algorithms. Every science and engineering student that encounters optimization problems in their discipline will learn valuable tools that can be applied to their field of study.

### **Course Prerequisites:**

Undergraduate courses in Linear Algebra and Differential Calculus of Many Variables.