# MATH 323
# Introduction to Operations Research - Deterministic models

Fall 2006

**Course meeting times**

MWF 11–11:50am

**Office hours**

Monday and Wednesday from 2-3:30pm.

## Description

Operations Research (OR) is a wide field which, loosely, seeks to investigate how mathematical techniques can be used to aid in solving "real-life" problems. This course provides an introduction to some of the fundamental techniques used in OR under the assumption of "certainty." Topics discussed will include linear and integer programming, as well as combinatorial optimization problems. We will also discuss applications employing these techniques.

**Required background**

Familiarity with linear algebra is required (MATH 211 or equivalent).

**Course text**

Introduction to Operations Research, 8th ed., by Hillier and Lieberman.

**Homework**

Homework will be given on, roughly, a weekly basis. In general, the homework will entail a reading assignment and a corresponding problem set and/or programming assignment.

**Please note:** You are encouraged to discuss homework assignments with each other, and allowed to consult references (both electronic and in hard copy), but no copying is allowed. You are REQUIRED to cite any and all sources, including your classmates and myself, in your homework. Please list all sources used at the end of each homework assignment.

*NO LATE HOMEWORK WILL BE ACCEPTED.*

If you have any questions about the homework (or any other class) policy, please feel free to ask me.

**Exams**

There will be one midterm exam, tentatively scheduled on 10/18, and one final exam, scheduled on Dec. 14 from 8:30 - 11:30 AM.

As the date for the midterm approaches, we will discuss when the best day is. College policy dictates both when the final exam is scheduled and what should be done if there is any conflict. I advise all students to review the final exam policies and resolve any possible conflicts as soon as possible. In particular, note that the last day of classes is the last possible date the policy allows for any resolution.

**Grades**

Your grade will be calculated based on the following:

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|---|---|
| Homework Average | 25% |
| Class participation and attendance | 10% |
| Midterm | 25% |
| Final | 40% |

**Tentative course outline**

1. Brief overview of Operations Research (Ch. 1-2)
   (a) The OR approach
   (b) Some case studies
2. Linear programming (Ch.3 - 6)
   (a) Formulation
   (b) The simplex method
   (c) Duality
   (d) Sensitivity
   (e) Other algorithms for linear programming
3. Network problems (Ch. 8 - 9)
   (a) Assignment and transportation
   (b) Shortest path
   (c) Minimum spanning tree
   (d) Maximum flow
   (e) Minimum cost flow
   (f) Network simplex
4. Integer programming (Ch. 11)
   (a) Formulation
   (b) Solving
   (c) Hard versus easy integer programs
5. Dynamic programming (Ch. 10.1-10.3)