

## Overview of Math 340 (Linear Programming)

Instructor: Prof. Joel Friedman  
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Class: MWF: 2-2:50pm  
IK Barber Learning Centre, Room 182

<http://www.math.ubc.ca/~jf/courses/340> is the location of all handouts for this course, including homework solutions, sample exams and solutions, etc.

This is a course in linear programming. We begin the course by discussing matrix games, such as forms of poker, to motivate linear programming; we shall see that bluffing is needed in a simple type of poker game. Then we develop the theory of linear programming, using the textbook *Linear Programming*, by Vanderbei, 4th Edition; for matrix games we also refer to *Two-Person Zero-Sum Games*, by Washburn. Both textbooks are available online for free to anyone with a UBC CWL. At the end of the course we revisit matrix games, applying the general theory of linear programming to these games. The topics to be covered are tentatively:

- Topic 1: Matrix games and Poker (read the handout Matrix Games and Poker; we will also refer to parts of *Two-Person Zero-Sum Games*). [Roughly 2 weeks.]
- Topic 2: The simplex method (Chapters 1–4 of Vanderbei’s text). [Roughly 2–3 weeks.]
- Topic 3: Duality theory and complementary slackness for linear programs; the dual simplex method (Vanderbei 5.1–5.5 and 5.8). This is the highlight of the technical part of course. [Roughly 2 weeks.]

**Midterm:** Wednesday, October 22, covering material up to and including October 8.

- Topic 4: The Dual Simplex Method (Vanderbei 5.6–5.7) Simplex in Matrix Notation (Vanderbei Ch. 6); the Revised Simplex Method (Vanderbei 8.1–8.4). [Roughly 2 weeks.]
- Topic 5: Sensitivity and Parametric Analyses (Chapter 7). [Roughly 1–2 weeks.]
- Topic 6: More game theory and poker (back to Topic 1, add Chapter 11 of Vanderbei). Possibly other applications. [As time permits.]

**Classes End:** Friday, November 28.

**Homework:** Homework will be assigned either by week or by topic. Homework solutions are posted within days of when the homework is due; the exact time/day will vary.

Late homework will never be graded after the solutions are posted. Three of the lowest homework grades will be dropped to calculate the average homework grade.

Late homework will be graded only if resources permit, without penalizing those who hand homework in on time; specifically:

0. the grader is hired for a fixed number of hours per week;
1. the grader will first grade all homework handed in on time;

2. if the grader has time left over that week, the grader may grade a small amount of late homework (handed in before the solutions were posted) from the previous week.

In practice, if one or two people hand in late homework, there is a good chance it will be graded, but if too many people hand in late homework, it will not be graded. In particular, late homework is always in danger of not being graded.

**Midterm and Final:** I will give you some old Math 340 exams and some other sample exam problems. We will work through some of these questions in class. These questions represent **part (but not all)** of what you might expect on our midterm and final (since material coverage differs greatly from section to section in Math 340).

I will give only one midterm and only one final during the semester; there are no “make-ups” or alternates. Please make sure you do not make travel plans, work plans, etc. without regard for the midterm and final dates; also, do not make such plans assuming that the preliminary exam schedule will not change.

Calculators, notes, and books are not allowed on the midterm and final. In class we will make sheets of common notes to be distributed with the exams.

**Course Grade:** Your grade for the course will be

$$(.55)f + (.35)\max(f, m) + (.10)\max(f, m, h),$$

where  $f, m, h$  are, respectively, your final exam grade, your midterm grade, and your homework grade. You may work with your fellow students on the homework problems, provided that (1) you list the names of the students with whom you have worked, and (2) you write up your own homework and understand what you have written.

**Office Hours:** Office hours are by appointment as long as this is feasible (it’s best to e-mail me when you are available if you’d like to meet). When I cannot accomodate all the requests I will revert to limited office hours at posted times (for example, this is almost always true a few days before an exam).