Term 1, 2018/2019: Sept, 2018 -- Dec, 2018

Math 340:101 Introduction to Linear Programming

Instructor: [Young-Heon Kim](#)   **Email:** yhkim "at" math "dot" ubc "dot" ca
Phone 604-822-6324 **Fax**   604-822-6074   **Office**   MATH 216

Class: MonWedFri   14:00 -15:00 at Buchanan [A104](#).
Office hours : tba at my office MATH 216.
First class: Wednesday, Sept 05, 2018   **Last class:** Friday, Nov. 30, 2018

The address of this page:

https://canvas.ubc.ca/courses/5979/assignments/syllabus

About the Course

- This course would be more properly called Linear Optimization, optimizing a linear objective function subject to linear constraints. The word `programming' is not used in the sense of computer programming. The word `programming' refers to the program of activities given by a solution. There will be no computer programming in this course although for certain assignments you will be asked to use LINDO, a fairly user friendly software package for Linear Programming.

Main Text: *Linear Programming by Vaˇsek Chvaˊtal* . The textbook is short of examples and is rather dense for novices but it has made the excellent choice of the dictionary format. Additional examples will be given in the lectures or in the supplementary material to be provided throughout the course.
- Nearly any book on linear programming will cover the main topics in this course, but the *notation* used for the simplex method may be quite different (and take some effort to translate to the notation we'll use).

* Another good reference is [Linear Programming by Robert Vanderbei](#) (electronic copy available to download through the UBC library!).

Course Outline (Subject to change)

- Simplex Method (chapters 1-4, 7 (first section)). 3 - 4 weeks.
- Duality Theory (chapters 5,9). 2 -3 weeks.
- Revised Simplex Method (chapters 7, 8). 1 - 2 weeks.
- Sensitivity Analysis (chapter 10). 1- 2 weeks.
- Optional topics as time permits: Matrix games (chapter 15), Geometry (chapter 17), etc.   1-2 weeks.

How to succeed in this course:

- It is very important to learn mathematics by "doing". For example, it is not enough to read a worked out example from a book or lecture notes. It is not enough to understand each step in the solution. You have to struggle to work out examples or problems by yourself, without looking at the solutions. This way, you have to build up mathematical intuition on the subject.

Grading

Your grade for the course will be computed roughly as follows:
Quizzes and Assignments: 15%+15% = 30%
Midterm: 15%
Final Exam: 55%

Important Notes:

- **All marks are subject to scaling.**
- IT IS ESPECIALLY IMPORTANT that students know that IF THEY DO NOT FULFILL THE COURSE REQUIREMENTS DURING THE TERM (including not writing the midterm test(s) even if you agree to transfer the weight to the final) AND THEN MISS THE FINAL EXAMINATION, THEY MAY BE DEEMED INELIGIBLE FOR A DEFERRED FINAL.
- **Very useful advices on how to solve problems are in [Polya](#).**

Exams:

- **Midterm**: **Oct 19 (Friday) in class. 50 min.**
- **Final Exam: TBA.**

Quizzes/Assignments

There will be a total of five quizzes and five assignments throughout the term**:**

- **Sept. 14 (Friday): Quiz 1**
- **Sept 21 (Friday): Quiz 2**
- **Sept 28 (Friday): HW 1 due**
- **Oct 5 (Friday): Quiz 3**
- **Oct 12 (Friday): HW 2 due**
- **Oct 19 (Friday): Midterm**
- **Oct 26 (Friday): Quiz 4 due**
- **Nov 2 (Friday): HW 3 due**
- **Nov 9 (Friday): Quiz 5**
- **Nov 16 (Friday): HW 4 due**
- **Nov 23 (Friday): HW 5 due.**

At the end of the semester, among the 5 quizzes and 5 HW assignments, your **lowest quiz grade** and **lowest homework grade** will be dropped. This policy is intended to cover situations where you may miss a quiz or assignment for whatever reason, without you needing to come to me to ask for a concession.

Rules for tests (quizzes/midterm/final):

- **No calculators or other notes will be allowed!**
- There are **no make-up** tests but if you miss a test for a legitimate reason (e.g. illness), allowances can be made. **To claim legitimate emergency: Instructor must be notified within 48 hrs of missed test. Doctor's notes or other relevant official documents must be present.**

- Students will be required to bring Photo ID to all tests and exams.

Homework Assignments Policy: Careful work on the assignments is the best way to prepare for the midterms and the final exam.

- There will be 5 assignments. Students may work together on assignments but must write up their solutions **independently**. Copying is forbidden. Any 2 (or more) assignments with some virtually identical answers deemed the result of copying will be given 0 total credit. The students are reminded of the plagiarism policies of UBC.
- We will be using an online system for collecting the HWs. More details will be provided later.
- Late homework is **not** accepted.
- Unreadable homework will get a zero mark.
- Work must be shown.
- Missed homework will count as a zero mark.
- The number of each homework problem should be clearly printed.
- It is probable that only a subset of those problems turned in would be graded, and you will not be informed (in advance) which ones these are. For example, if your homework does not contain any of the problems to be graded (which will be known only after the due date), you will get zero mark. So, it would be better for you to do all the problems to be handed in.
- For the selected problems, only some important steps and the final answer will be checked.

How to ask for change of marking:

- To ask change of the marking of your HW, you have to follow a certain procedure. Namely, if you have any complaint on the marking, you first study the solution provided very carefully, and then give me a **written note** to explain in detail what was wrong in the marking. I will handle only such written notes. Such a note should be handed in as soon as possible.

Computing

- You can download and install a trial version of LINDO from their website. We recommend "Classic LINDO" at the bottom.
- UBC has computer labs located in the Leonard S. Klinck building (room 310). More info to be announced regarding the lab access.

Vanderbei has an online pivoting tool that lets you choose entering and exiting variables and performs the pivot automatically. This is a good way to get an idea of how the simplex method will work on larger problems without having to do all of the algebra by hand!