MATH 340

Introduction to Linear Programming

Section 201 TTh 9:30-11 LSK 200
Section 202 MWF 12-1 Buchanan A201

2018W T2

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Office Hours: 2-2:45 MWF + 12:30-2 TueTh at LSK 300

Text & Computer Software:

- *Linear Programming* by Vašek Chvátal. The textbook is short of examples and is rather dense for novices but it has made the excellent choice of the dictionary format. I will be posting a significant amount of material on the web to supplement the text. The 'extra' chapters beyond the basics (Chapter 11 on) make good reading. It is a superb reference although not always the perfect text.
- Another good reference is *Linear Programming* by Robert Vanderbei (electronic copy available to download through the UBC library!).
- On some problems you will be asked to use computer software to solve linear programming problems. I recommend the Classic LINDO application for Microsoft Windows. You can obtain a free evaluation copy from that link to install on your own computer, or use the computer lab in LSK 310. You either should choose a time with no labs or, you can work quietly at the back of the lab even if a lab is scheduled (assuming there are some empty computers). Your ID is the first 8 characters in lower case of your name as recorded first name, middle name (if you have one), final name. The password is set to capital S followed by the first 7 numbers of your student ID. You can change your password. Access the Windows system and click on LINDO.
- You don't need to use LINDO, specially if you have prior programming experience. Other options include:

1. Glpk.js and online-optimizer. These are websites, you don't need to install anything on your own computer! The second also does sensitivity analysis (for the constraints).
2. The MixedLinearIntegerProgram class in SageMath. Sage can be used without installing any software at SageMathCell. If you chose the GLPK solver, it can also do sensitivity analysis.
3. The scipy.optimize.linprog function from SciPy.

- A nice simplex method applet to check your answers can be found here or here.

Outline: Simplex Method (chapters 1-4 + 8: 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.

Grading: The grade will be computed as **55% final; 15% midterm; 15% quizzes and 15% assignments**. A student must finish a significant amount of term work in order to pass. 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.

Quizzes: Emphasis on computational problems. There will be 5 quizzes. Your lowest quiz score will be dropped. Practice questions will be given in advance.

Assignments: There will be 5 assignments. They will have an emphasis on theory. Your lowest assignment score will be dropped. 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 the University. Late homework is not accepted.

Midterm: in class. 50 min.

Final: Section 201: Thursday, Feb 14, 2019 Section 202: Friday, Feb 15, 2019

Missed Work: From time to time students may be unable to finish assignments or attend midterms or the final exam. In the case of the Final Exam, the students should contact the Faculty of Science office and the missed final will be handled in a formal way. In the case of assignments, please contact me **before** class time on the due date, and given your reasons for the missed work. Assuming the reasons are legitimate (Doctor's notes or other relevant official documents must be present), I will note that you will be missing the assignment. A missed midterm/quiz can be handled in a similar way, if you contact me **within 48 hrs of missed test**. In such circumstances, the weights of the missed parts will be transferred to the final exam. Again, a student must finish a significant amount of term work in order to pass.