Course Information for Math 808

Instructor:	Tamon Stephen
Meeting Time:	W 3:30–5:20 and F 2:30-4:20 in SUR 5060
Office:	2886 Podium 2
Office Phone:	778–782–7429
E-mail:	tamon@sfu.ca
Web page:	`http://www.sfu.ca/~tstephen/Teaching/1261_Math808/`
Office Hours:	By appointment.
Grading:	20% Homework, 20% Presentation, 20% Midterm, 40% Final.

1. Syllabus. In this course, we begin by reviewing the simplex method, including examples of cycling and the Klee-Minty cube, sensitivity analysis and techniques for handling large scale problems such as decompositions and column generation. We then proceed to the ellipsoid method and why it is a fundamental technique in establishing polynomial-time algorithms for linear programming and other combinatorial optimization problems, even though it is not effective in practice. Finally, we discuss interior point methods for linear programming, including affine scaling and logarithmic barriers. Time permitting, we can cover some additional topics of interest, for instance semidefinite programming.

2. Projects. Near the end of the term, students will each give a presentation on a research paper from the recent mathematical literature. The presentation should describe the results in the paper, as well as their context, and should be at a level where it will be understandable to the undergraduates in the class. There may be an option to give these presentations at the SFU Operations Research Seminar series rather than in class. The papers will be chosen in consultation with the instructor.

The presentation will normally be done using slides projected from a computer and the slides will also be submitted as part of the project.

3. Homework. There will be five homework assignments during the term. Late homework will not be accepted.

4. Academic Integrity. Please review the SFU Academic Integrity information page. In particular, note that there is now a section on the use of generative AI. For this course, the expectation is that you should **not** use generative AI to solve the problems.

If it appears that this is happening, for instance due to answers on different papers coinciding, then penalties will be applied, including zero grades for assignments.

You are encouraged to discuss problems with your classmates, but you must write up your own solutions in your own words.. Please credit all sources of assistance. Note the SFU Library has a Tutorial on Plagiarism that discusses what should be cited and how.

5. Exams. Books, notes and calculators cannot be used on these tests. Students **must** plan to take the tests at their scheduled times.

The tentative dates and times for the tests are:

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Midterm: Wednesday, March 4th, 3:30-5:20 PM  (in class)
Final: April, to be announced.
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6. Illness? Please stay home. Absences will be handled as fairly as possible on a case-by-case basis.

7. Environment. As your instructor, I strive to create a learning environment that supports a diversity of thoughts, experiences and identities. I value your participation in the course. Please let me know if there is any way that I can better support your learning needs. As a student, I expect you to review and adhere to the SFU Student Conduct Policy.

The Department of Mathematics Equity, Diversity, and Inclusion Advisory Group works towards ensuring that the department is a safe, respectful, and inclusive working and learning environment. We encourage you to reach out to the EDI Advisory Group with any equity, diversity, and inclusion concerns and/or ideas.

Resources: `https://www.sfu.ca/edi/support/students.html`.

Math EDI Advisory Group: `https://www.sfu.ca/math/department/edi.html`.

8. Religious Accommodations. Students requesting religious accommodation must tell the instructor by the end of the first week of term.

9. Textbook(s). There are a number of good books on this topic. We'll roughly follow *Introduction to Linear Optimization* by Bertsimas and Tsitsiklis, which is a good source for this material at this level, but fairly old at this point and is not available on-line through SFU's library.

A good basic reference is Vanderbei's *Linear Programming: Foundations and Extensions*, which is available on-line through the SFU library. This is sometimes used for the undergraduate Math 308 at SFU.

You may also want to check out Jon Lee's *A First Course in Linear Optimization*, which is available for download here, and is accompanied by code.

The `AMPL` modelling language comes with an on-line manual that is itself a good introduction to modelling with linear programs. We may use its examples and exercises in class, see: `https://ampl.com/resources/books/ampl-book/`.

Additionally, textbooks that cover this material include: Chvatál's *Linear Programming*, Matoušek and Gärtner's *Understanding Linear Programming*, Schrijver's *Theory of Linear and Integer Programming* and *Linear Programming with* `MATLAB` by Ferris, Mangasarian and Wright.

10. Software. Depending on interest and the availability of computational resources, there may be a short introduction to a prominent commercial optimization package.

11. Questions. Questions are encouraged in class and out.

Have a great term!