

COURSE INFORMATION

Course title:	Optimal Decision Making I	Credits:	1.5
Course code:	BAMS 506	Class location:	Zoom
Session, term, period:	2020W1, Period 1	Class times:	Mon/Weds 8 pm – 10 pm
Section(s):	BA1	Pre-requisites:	n/a
Course duration:	Nov 2 – Dec 12, 2020	Co-requisites:	n/a
Division:	Operations and Logistics		
Program:	MBAN		

Course website: <https://canvas.ubc.ca>

INSTRUCTOR INFORMATION

Instructor:	Steven Shechter	Office location:	Zoom
Phone:	604-822-8340	Office hours:	By appointment
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Teaching assistant:	Hossein Piri
Office hours:	TBD
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COURSE DESCRIPTION

Optimization problems arise whenever one seeks to use limited available resources in the best possible way to maximize profits, to minimize costs or, more generally, to find a "best" solution to a complex problem. Optimization applies to many functional fields of management (e.g., logistics and operations management, health care, marketing, accounting and finance), to several disciplines in science (e.g., computer science, mathematics, physics and biology), and to most fields in engineering.

This course will present the basic models and methods in Continuous Optimization, also known as Linear and Nonlinear Programming. Applications to functional areas of business and related fields will be introduced in class and practice problems and solved using computer software.

COURSE FORMAT

The course will consist of mostly synchronous (live) lecture, discussion, and in-class exercises completed using students' own laptops. There may be a small amount of asynchronous (recorded) delivery.

LEARNING OBJECTIVES

- To introduce students to the basic concepts and models of continuous optimization.
- To enable students to develop and use continuous optimization models arising in business applications.

By the end of the course, students will be able to:

- Formulate an optimization model, solve it using appropriate tools, interpret the results, and derive managerial insights relevant to the intended application.
- Understand the principles behind, and properties of, solutions to linear and nonlinear programs.
- Understand the role of convexity in nonlinear optimization.
- Solve optimization problems using Excel Solver and OpenSolver (a free Excel add-in, which can solve larger problems than standard Solver can).

ASSESSMENTS

Summary

<u>Component</u>	<u>Weight</u>
Four Quizzes (drop the worst one)	45%
Final Exam	40%
Class Participation/Professionalism	<u>15%</u>
Total	<u>100%</u>

Details of Assessments

Quizzes:

There will be four quizzes on Canvas, one in each of weeks 2-5 (no quiz in week one). The quizzes will be released Saturday, 9 AM, and to be completed by Sunday, 9 PM. Once you begin the quiz, you will have 60 minutes to complete it. The quizzes will be based on material covered in class through that week (and may include material from previous weeks). The lowest of your four quiz marks will be dropped, with 15% of the course weight given to each of the remaining three (for a total weight of 45% on the three quizzes that are counted).

Final Exam:

There will be a 2.5 hour exam on Canvas in the examination week. More information will be provided after the course begins.

Participation/Professionalism:

There are a number of ways to actively participate in the course. These include: asking and answering questions during lecture by voice and/or chat, sharing thoughts/ideas/news stories/etc. that promote peer-to-peer learning via the Piazza discussion forum, participating in office hours, contributing to practice problems (e.g., by solving them and/or proposing new ones), and others.

The professionalism component includes being on time to class, appearing on video, avoiding distractions (e.g., cell phone usage), and treating others with respect. More aspects of professionalism are covered below in the "Robert H. Lee Graduate School" and "University" policies sections.

LEARNING MATERIALS

Requirements:

- The lectures will be self-contained and no textbook is required for this course. Copies of the slides used in class will be available on the course website. You should supplement them with your own notes taken during the lectures.

Suggested Reading Materials:

- Hillier, Frederick S. and Lieberman, Gerald J. (2014). Introduction to Operations Research, 10th Edition. McGraw Hill.
 - Relevant sections in the 10th edition are indicated in the Course Schedule below (marked with “HL” in the readings column).
 - While this text is not required, I believe that anyone pursuing a career in Operations Research or Prescriptive Analytics would benefit by having this on their bookshelf.

Technology Requirements:

- A computer with Windows installed. If you own an Apple laptop, you are responsible for configuring Windows on your Mac. A free copy of Microsoft Windows 10 Education is available for all eligible active UBC Students here: <https://it.ubc.ca/services/desktop-print-services/software-licensing/windows-10-education>
- Excel Solver, the optimization tool embedded in Excel spreadsheets. For students using a Mac computer, Excel Solver will run better when accessing Excel through the Windows environment. The Mac version has been buggy in the past (and might still be).
- OpenSolver add-in for Excel, available here: <https://opensolver.org/>

COURSE-SPECIFIC POLICIES AND RESOURCES

Prerequisites

- Familiarity with linear algebra and calculus.

Missed or late quizzes

Late submissions will not be accepted and will receive a grade of zero.

Academic Concessions

If extenuating circumstances arise, please contact the RHL Graduate School program office as early as reasonably possible, and submit an [Academic Concession Request & Declaration Form](https://webforms.sauder.ubc.ca/academic-concession-rhlee) <https://webforms.sauder.ubc.ca/academic-concession-rhlee>. If an academic concession is granted during the course, the student will be provided options by RHL, or by the instructor in consultation with RHL, per [UBC's policy on Academic Concession](#).

Code Plagiarism

Code plagiarism falls under the UBC policy for [Academic Misconduct](#). Students must correctly cite any code that has been authored by someone else or by the student themselves for other assignments. Cases of "reuse" may include, but are not limited to:

- the reproduction (copying and pasting) of code with none or minimal reformatting (e.g., changing the name of the variables)
- the translation of an algorithm or a script from a language to another
- the generation of code by automatic code-generations software

An "adequate acknowledgement" requires a detailed identification of the (parts of the) code reused and a full citation of the original source code that has been reused.

Students are responsible for ensuring that any work submitted does not constitute plagiarism. Students who are in any doubt as to what constitutes plagiarism should consult their instructor before handing in any assignments.

POLICIES APPLICABLE TO COURSES IN THE ROBERT H. LEE GRADUATE SCHOOL

Attendance

Excepting extenuating circumstances, students are expected to attend 100% of their scheduled class hours. Absent students limit their own academic potential, and that of their classmates, and cause unnecessary disruption to the learning environment. Students missing more than 20% of the total scheduled class hours for a course (including classes held during the add/drop period) without having received an academic concession will be withdrawn from that course. Withdrawals, depending on timing, could result in a "W" or an "F" standing on the transcript.

Punctuality

Students are expected to arrive for classes and activities on time and fully prepared to engage. Late arrivals may be refused entry at the discretion of the instructor or activity lead. Students arriving later than halfway through a scheduled class will be treated as absent for that class.

Electronic Devices

During online lectures, students are not permitted to use any electronic devices other than the primary one used for attending the online lecture (e.g. laptop or desktop). Only Zoom should be open during the online lecture unless an instructor advises the use of another program/website for an in-class activity. Feedback from students indicates that personal devices are the number one distraction from effective learning and participation in the online learning environment.

Citation Style

Please use the American Psychological Association (APA) reference style to cite your sources.

Details of the above policies and other RHL Policies are available at:

<http://www.calendar.ubc.ca/vancouver/index.cfm?tree=12,199,506,1625>

UNIVERSITY POLICIES AND RESOURCES

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious observances.

UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available on the UBC Senate website at <https://senate.ubc.ca/policies-resources-support-student-success>.

Respect for Equity, Diversity, and Inclusion

The UBC Sauder School of Business strives to promote an intellectual community that is enhanced by diversity along various dimensions including status as a First Nation, Metis, Inuit, or Indigenous person, race, ethnicity, gender identity, sexual orientation, religion, political beliefs, social class, and/or disability. It is critical that students from diverse backgrounds and perspectives be valued in and well-served by their courses. Furthermore, the diversity that students bring to the classroom should be viewed as a resource, benefit, and source of strength for your learning experience. It is expected that all students and members of our community conduct themselves with empathy and respect for others.

Academic Integrity

The academic enterprise is founded on honesty, civility, and integrity. As members of this enterprise, all students are expected to know, understand, and follow the codes of conduct regarding academic integrity. At the most basic level, this means submitting only original work done by you and acknowledging all sources of information or ideas and attributing them to others as required. This also means you should not cheat, copy, or mislead others about what is your work. Violations of academic integrity (i.e., misconduct) lead to the breakdown of the academic enterprise, and therefore serious consequences arise and harsh sanctions are imposed. For example, incidences of plagiarism or cheating may result in a mark of zero on the assignment or exam and more serious consequences may apply if the matter is referred to the President's Advisory Committee on Student Discipline. Careful records are kept in order to monitor and prevent recurrences.

Academic Freedom and Students Studying from Outside Canada

During this pandemic, the shift to online learning has greatly altered teaching and studying at UBC, including changes to health and safety considerations. Keep in mind that some UBC courses might cover topics that are censored or considered illegal by non-Canadian governments. This may include, but is not limited to, human rights, representative government, defamation, obscenity, gender or sexuality, and historical or current geopolitical controversies. If you are a student living abroad, you will be subject to the laws of your local jurisdiction, and your local authorities might limit your access to course material or take punitive action against you. UBC is strongly committed to academic freedom, but has no control over foreign authorities (please visit <http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,33,86,0> for an articulation of the values of the University conveyed in the Senate Statement on Academic Freedom). Thus, we recognize that students will have legitimate reason to exercise caution in studying certain subjects. If you have concerns regarding your personal situation, consider postponing taking a course with manifest risks, until you are back on campus or reach out to your academic advisor to find substitute courses. For further information and support, please visit: <http://academic.ubc.ca/support-resources/freedom-expression>

COPYRIGHT

All materials of this course (course handouts, lecture slides, assessments, course readings, etc.) are the intellectual property of the instructor or licensed to be used in this course by the copyright owner. Redistribution of these materials by any means without permission of the copyright holder(s)

constitutes a breach of copyright and may lead to academic discipline and could be subject to legal action. Any lecture recordings are for the sole use of the instructor and students enrolled in the class. In no case may the lecture recording or part of the recording be used by students for any other purpose, either personal or commercial. Further, audio or video recording of classes are not permitted without the prior consent of the instructor. Students may not share class Zoom links or invite others who are not registered to view sessions.

ACKNOWLEDGEMENT

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xwməθkwəyəm (Musqueam) people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

ONLINE TEACHING TOOL & REQUIREMENTS

This course will be taught using Zoom for synchronous classes and office hours.

For this course, you are required to use a Zoom account during synchronous classes and office hours. If you do not have a Zoom account, you can create one here: <https://zoom.us/signup>. Note: creating a Zoom account requires that you provide a first name, last name, and email address to Zoom. For privacy purposes, you may consent to using your existing email address and your real name. Alternatively, if you prefer, you may sign up using an alternative email address and an anonymized name that does not identify you (i.e. Jane Doe, jane.doe@email.com). If you have trouble creating an account, or accessing a Zoom session, please contact CLCHelp@sauder.ubc.ca. You will be required to provide the email address associated with your Zoom account in a Canvas quiz for identification purposes.

To help replicate the classroom experience, make sessions more dynamic and hold each person accountable, both students and instructors are required to have their cameras on during Zoom sessions. Students who require an accommodation with regard to the "camera on" requirement must contact their instructors in advance of the first class to discuss options. As professional graduate students, students are expected to conduct themselves professionally by joining sessions on time, muting mics when not speaking, refraining from using any other technology when in-session, attending in business casual dress (at a minimum), and participating from a quiet environment. Content from synchronous sessions will be selectively recorded per instructor discretion and made available to students on Canvas for a maximum duration of the course length. This is done to allow students the opportunity to return to lecture content to solidify learnings.

COURSE SCHEDULE

Class #	CLASS TOPICS	ACTIVITIES / READINGS	ASSIGNMENTS / DELIVERABLES
Week 1 (Nov 2, 4)	<ul style="list-style-type: none"> • Introduction to optimization and to linear optimization. • Linear programming (LP) formulations and solution properties. • LP solution methods 	HL Chs.1-3, 4.1	
Week 2 (Nov 9,11)	<ul style="list-style-type: none"> • Sensitivity analysis • Shadow prices and reduced costs • LP duality. 	HL 4.7, 6, 7.1-7.3	Quiz 1
Week 3 (Nov 16, 18)	<ul style="list-style-type: none"> • LP “tricks” • LP under uncertainty • Stochastic programming 	HL 7.6	Quiz 2
Week 4 (Nov 23, 25)	<ul style="list-style-type: none"> • Introduction to nonlinear programming (NLP) • Unconstrained optimization vs. constrained optimization • Convexity 	HL 13.1-13.5	Quiz 3
Week 5 (Nov 30, Dec 2)	<ul style="list-style-type: none"> • NLP solution methods • Introduction to metaheuristics 	HL 13.6-13.8, 13.10	Quiz 4
Week 6 (Dec 7-12)	Final Exam		Final Exam, to be scheduled by the RHL Office