

COURSE INFORMATION

Course title:	Analyzing and Modeling Uncertainty		
Course code:	BAMS 517	Credits:	1.5
Session, term, period:	2020/21 Period 2	Class location:	Online
Section(s):	BA1	Class times:	Tue/Thu 8-10pm
Course duration:	Jan 4 to Feb 12, 2021	Pre-requisites:	n/a
Division:	Operations & Logistics	Co-requisites:	n/a
Program:	MBAN		

INSTRUCTOR INFORMATION

Instructor:	Hao Zhang, PhD		
Phone:	604-827-3728	Office location:	ANGU 472
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COURSE DESCRIPTION

This course provides an introduction to decision making under uncertainty. Topics include Expected Monetary Value, decision trees, the value of information, sequential decision making under uncertainty (i.e., stochastic dynamic programming), expected utility theory (EUT), common violations of EUT, and alternatives to EUT (e.g., Prospect Theory).

COURSE FORMAT

The format of the course is based on synchronous learning and guided self-practice. We will use Zoom to conduct online classes in the scheduled time periods. Class time will be used for a combination of lectures, discussions, and solving exercise problems. Attendance is expected to accomplish the learning objectives below.

LEARNING OBJECTIVES

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

- Explain how and why individuals might make different decisions under uncertainty
- Understand how to use decision trees to compare options
- Understand when, and how much, to pay for better information
- Identify when individuals are risk-averse vs. risk-neutral vs. risk-seeking
- Describe important behavioral considerations that often arise
- Know how to discount future outcomes and make good sequential decisions under uncertainty

ASSESSMENTS

Summary

<u>Component</u>	<u>Weight</u>
In-class Exercise	10%
(Group) Homework Assignments	35%
Final exam	45%
Class participation	<u>10%</u>
Total	<u>100%</u>

Details of Assessments

Homework Assignments:

There will be four group assignments throughout the course. You will be randomly assigned to a three-member team for each assignment. Each team only needs to submit one answer report. Copying other students' answers is prohibited. Reports should be submitted on *Canvas* before the due date.

Assignment deliverables will include Word documents and possibly Excel spreadsheets, Python, or R scripts if necessary. If a problem does require Excel/Python/R, clearly label and document your spreadsheets or code, so that someone else can easily follow what you did and replicate your results.

The Word document will present and discuss your decision analysis modeling assumptions, setups, and solutions. When presenting a decision analysis, make sure all parameters (e.g., decisions, probabilities, outcomes) are clearly defined or labeled.

Final Exam:

Students are responsible for making sure they appear for the exam on time. No latecomers will be allowed. Students who fail to write the exam, without prior instructor's permission, will not be given any "make-up" exam. More information will be provided after the course begins.

In-class Exercises:

There will be a random number of exercises in each class. Some of them will be answered individually and be graded. Answers will be submitted through Canvas Assignments/Quizzes. For this purpose, you may use a laptop or smartphone during the class when instructed to do so.

Class Participation:

We all bring experience and knowledge into the classroom, and all class participants should share this and benefit by it. Effective class participation includes

- Being prepared for class participation
- asking questions about concepts from lectures or readings
- sharing your experience or point of view with the class
- building on points raised by others;
- clarifying issues or
- relating topics discussed to previous class discussions.

In Zoom class meetings, you may speak to the instructor or the class (if appropriate) directly when no one else is speaking. You may use the "raise hand" function to signal your willingness to speak when someone else is speaking. Chat box will not serve as the primary tool to communicate with the instructor. The in-class interactions should be both positive and courteous even when your opinions differ. Class attendance is important. Regular and punctual attendance is a necessary but not a sufficient criterion for high class participation grades.

Positive contributions to class discussion increase your score. Attending class and not speaking has neither a positive nor a negative impact on your participation grade. Failing to attend significant portions of a class session and detrimental participation (including being disrespectful to any class member) decrease your participation score.

LEARNING MATERIALS

Recommended but not required

- Making Hard Decisions: An Introduction to Decision Analysis, 3rd edition by R.T. Clemen and T. Reilly.
 - Relevant sections are indicated in the Course Schedule below (marked with “CR” in the readings column).
- Puterman ML. Markov Decision Processes: Discrete Stochastic Dynamic Programming. John Wiley & Sons; 2014. (marked as “P” in the readings)
- Kahneman D, Tversky A. Prospect Theory: An Analysis of Decision under Risk. *Econometrica*. 1979 May;47(2):263-92. <https://www.jstor.org/stable/1914185> (marked as “KT” in the readings)

COURSE-SPECIFIC POLICIES AND RESOURCES

Missed or late assignments, and regrading of assessments

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

Devices such as laptops, tablets, and cell phones are not permitted to be used in class unless directed by the instructor for in-class activities. Students who do not follow the School's policy in this regard may be required to leave the room for the remainder of the class, so that they do not distract others. Research shows that students' use of laptops in class has negative implications for the learning environment, including reducing their own grades and the grades of those sitting around them.

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

(Subject to change with class consultation)

Class	Date	Topic	Readings or Activities	Assignments due
1	Jan 5	Introduction Data Analysis by Excel Decision Trees	CR: Ch 1-2 Excel Practice	
2	Jan 7	Decision Trees	CR: Ch 3 (pp 73-83), Ch 4 (pp 118-147)	
3	Jan 12	Decision Trees Sensitivity Analysis	CR: Ch 5 (pp 177-212)	HW1
4	Jan 14	Value of Information	CR: Ch 12	
5	Jan 19	Markov Decision Processes (Sequential Decision Making)	P: Ch 1-4	HW2
6	Jan 21	Markov Decision Processes	P: Ch 1-4	
7	Jan 26	Markov Decision Processes	P: Ch 1-4	
8	Jan 28	Risk Attitudes and Utility Theory	CR: Ch 14, Ch 15 (pp 683-691)	HW3
9	Feb 2	Violations of Expected Utility Theory Alternative Decision Analysis Frameworks	CR: Ch 15 (pp 691- 703); KT	
10	Feb 4	Subjective Probability Assessment Course Review	CR: Ch 8	HW4