

### COURSE INFORMATION

Course title:	Business Applications of Machine Learning		
Course code:	BAIT 509	Credits:	1.5
Session, term, period:	2023W2, Period 3	Class location:	HA 337
Section(s):	BA1	Class times:	Mon & Wed 16:00-18:00
Course duration:	Jan 3 – Feb 10	Pre-requisites:	n/a
Division:	n/a	Co-requisites:	n/a
Program:	MBAN		

### INSTRUCTOR INFORMATION

Instructor:	Prof. Samin Aref		
Phone:	n/a	Office location:	n/a
Email:	samin.aref@sauder.ubc.ca	Office hours:	Online only Mondays 12:00-13:00 Register in the queue using this <a href="#">link</a> . Then, join the Zoom waiting room using the meeting ID 89893858460

Teaching assistant:	TBD
Office hours:	TBD
Email:	TBD

### COURSE DESCRIPTION

This course provides an introduction to statistical and machine learning fundamentals and data science methods. It offers a variety of predictive models, with a focus on explainability and inference. A range of applications from different contexts will be discussed with a focus on business applications. Coding will be based on Jupyter Python and will be primarily through Google colab.

### COURSE FORMAT

The course is structured in weeks. The synchronous parts for each week are interactive lectures and labs. The asynchronous parts of each week are practical reading assignments and online quizzes. This is an intensive and high-demand course which requires active engagement and participation.

### LEARNING OBJECTIVES

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

1. Describe patterns and regularities in data as the foundation of analytics.
2. Implement suitable methods for machine learning and predictive tasks.
3. Understand the statistical foundations of machine learning methods.
4. Replace black boxes with explainable and justifiable predictive models.
5. Learn to implement the above principles, methods, and techniques using Python, and its machine learning libraries to a wide range of applications.
6. Learn how to use scientifically sound methods for analyzing data and interpreting the results of statistical analyses.
7. Learn how to plan, execute, and deliver successful machine learning projects.

## ASSESSMENTS

### Summary

<u>Component</u>	<u>Weight</u>
5 reading assignment quizzes	35%
Test(s)	20%
Final project	40%
Active participation	5%
Bonus for Piazza <sup>+</sup>	+2 points
Total	100%

### Details of Assessments

There are five reading assignments followed by quizzes on Canvas, each worth 7%, to be completed by deadlines according to the course schedule. There will be one (or multiple) test(s) during the term according to the course schedule. There is one final project to be completed in groups of 2-3 and submitted through Canvas by a deadline according to the course schedule. 30% of the project mark will be based on peer evaluation. It is each student's responsibility to ensure that all group members contribute to the group project. In case of any group related issues, the instructor is to be contacted by email.

## LEARNING MATERIALS

Textbook: "An Introduction to Statistical Learning", 2<sup>nd</sup> Edition, by Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani, 2021 (freely available via this [link](#))

Computer: A laptop with a minimum of 8 GBs of RAM and 50 GBs of disk space running any operating system with access to Jupyter Notebook (with Python version 3.7 or above) offline (via [Anaconda](#)) and online (via [Google Colab](#)).

## 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.

### Other Course Policies and Resources

Policies on assessment due prior to students joining the course (i.e., during the add/drop period):

To request a transfer of weights from past assignments to the final project, all past reading assignments must be completed within 72 hours from joining the course. If a minimum of 70% is achieved on these late submissions, weights from past assignments can be transferred to the final project for the student at the discretion of the instructor.

Policies on communication method:

The preferred contact method for getting a quick response from the instructor and/or the teaching assistants is the online forum of the course on *Piazza*. Registered students will receive an invitation to join the *Piazza* forum of the course before the first lecture.

For excluding other classmates from a *Piazza* question, you may use "Post to Instructor(s)" and select "instructors" to include the instructor and the TAs as recipients.

Communication via email (prefix subject with BAIT509) is fine if you have a reason for not using *Piazza* for that question. You can email the instructor if you have difficulty with starting to use the online forum of this course (*Piazza*).

All questions related to the course materials and project queries should be posted on Piazza. Please do not share any code/results/figures/solutions related to the project on Piazza. Emailed questions about the project or assignments will not be answered.

+Top 10 students (across all sections of BAIT509 offered in period 3), ranked on the number of endorsed answers on Piazza, will receive 2 bonus points added to their final course grade. A minimum of 3 endorsed answers is required to qualify for the bonus.

Policies on requesting re-grading:

If a student wishes to discuss marking for an assignment or a test, they should first use "Post to Instructor(s)" to send a private Piazza post with all the details pertaining to the request. If the issue remains unresolved, the instructor is to be contacted directly by email.

### *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](#). 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-generation 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.

### *COVID-19 Policies for Attendance & Academic Concessions:*

If a student feels unwell or is required to self-isolate (e.g., while waiting for test results), they should stay home and submit an [Academic Concession Request & Declaration Form](#).

If a student suspects possible COVID-19 infection, they should use the BC Ministry of Health's [self-assessment tool](#), to help determine whether further assessment or testing for COVID-19 is recommended.

### *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.

#### **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 x<sup>w</sup>məθk<sup>w</sup>ə'yəm (Musqueam) people, who for millennia have passed on their culture, history, and traditions from one generation to the next on this site.

**COURSE SCHEDULE**

(Subject to change; all sessions are 16:00-18:00; all deadlines are at 21:00)

Class	Date	Topics / Deadline
1	04-Jan	Statistical Learning and Linear Regression (chapters 2-3)
2	06-Jan	Lab 1 (chapters 2-3)
3	09-Jan	Classification and Performance Measures (chapter 4)
	10-Jan	<i>Deadline for reading assignment 1</i>
4	11-Jan	Lab 2 (chapter 4)
5	16-Jan	Resampling and Cross-validation (chapter 5)
	17-Jan	<i>Deadline for reading assignment 2</i>
6	18-Jan	Tree-based Methods (chapter 8)
		<i>Tentative time for a test</i>
7	23-Jan	Lab 3 (chapter 8)
	24-Jan	<i>Deadline for reading assignment 3</i>
8	25-Jan	Support Vector Machines (chapter 9)
		<i>Tentative time for a test</i>
9	30-Jan	Lab 4 (chapter 9)
	31-Jan	<i>Deadline for reading assignment 4</i>
10	01-Feb	Unsupervised Learning (chapter 12) – if time permits
	3-Feb	<i>Deadline for reading assignment 5</i>
Exam week	TBD	<i>Deadline for the project</i>