

COURSE INFORMATION

Course title:	Business Applications of Machine Learning		
Course code:	BAIT 509	Credits:	1.5
Session, term, period:	2022W2, Period 3	Class location:	HA 337
Section(s):	BA1	Class times:	Mon & Wed 16:00-18:00
Course duration:	Jan 4 - Feb 12	Pre-requisites:	n/a
Division:	n/a	Co-requisites:	n/a
Program:	MBAN		

INSTRUCTOR INFORMATION

Instructor:	Joel Ostblom		
Phone:	n/a	Office location:	ICCS 185
Email:	joel.ostblom@ubc.ca	Office hours:	Thursdays 14:00-15:00 via Zoom (https://ubc.zoom.us/j/62088610264?pwd=ZTdZM3FsbWczVC9US01zQW1ubWRWdz09)
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COURSE DESCRIPTION

Introduction to machine learning concepts, such as model training, model testing, generalization error and overfitting. Exposure to a variety of machine learning techniques, with deeper exploration of a few chosen techniques. Forming good scientific questions to address business objectives with machine learning. Python will be the primary programming language used.

COURSE FORMAT

Class time will be used for a combination of lectures, discussion, demonstrations and exercises that students will work through individually or in groups.

LEARNING OBJECTIVES

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

1. Describe fundamental machine learning concepts such as: supervised and unsupervised learning, regression and classification, overfitting, training/validation/testing error, parameters and hyperparameters, and the golden rule.
2. Broadly explain how common machine learning algorithms work, including: naïve Bayes, k-nearest neighbors, decision trees, support vector machines, and logistic regression.
3. Identify when and why to apply data pre-processing techniques such as scaling and one-hot encoding.
4. Use Python and the scikit-learn package to develop an end-to-end supervised machine learning pipeline.
5. Apply and interpret machine learning methods to carry out supervised learning projects and to answer business objectives.

ASSESSMENTS

Summary

<u>Component</u>	<u>Weight</u>
Assignments	60%
Group project	25%
Quiz	10%
Class participation	5%
Total	<u>100%</u>

Details of Assessments

During the term, there will be three individual assignments, each worth 20%. Each assignment will focus on a combination of theory and application and will be distributed as a Jupyter Notebook. Each assignment will require the analysis of a data set. The assignments will be distributed on Canvas with a test file which SHOULD NOT be tampered with. This test file will check certain questions and give feedback on if the written code is on the right track. This however does not guarantee full marks. Students will need to submit the assignment in the form of a report and marks will be based on the depth of the analysis and the presentation.

The group assignment will involve the analysis of a more complex data set. The format and submission requirements will be similar to the individual assignment, except that instead of simply answering the specified questions, you will be required to perform a thorough analysis of the case and submit a report summarizing your main findings. Groups will consist of two or three students and will be allocated randomly. All group members will receive the same mark: it is each student's responsibility to ensure that all group members contribute equally to the assignment. In case of any group related issues, please discuss with the instructor.

There will be one 45 min quiz in the middle of the course that should be completed individually. It will be a mix of multiple choice, true or false questions and long answer questions and it will be hosted on Canvas.

LEARNING MATERIALS

Required: [Laptop that meets the requirements listed here](#) (exception: windows 10 home is sufficient for this course)

Additional materials recommended but not required:

- "Data Mining: Practical Machine Learning Tools and Techniques" – Ian Witten, Eibe Frank, Mark Hall, Christopher Pal. Freely available at: <https://www.cs.waikato.ac.nz/~ml/weka/book.html>
- Scikit-learn Python package documentation. Freely available at: <http://scikit-learn.org/stable/documentation.html>

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](#). 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](#).

Other Course Policies and Resources

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.

COVID-19 Policies for Attendance & Academic Concessions:

If a student feels unwell, they should stay home and send a courtesy email to each impacted instructor and cc their program manager. The student should also 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.

If a student is required to self-isolate (e.g., while waiting for test results), they should follow the steps above (stay home, email instructor(s) and program manager, submit an [Academic Concession Request & Declaration Form](#), and follow BC Health Guidance.

Students who are required to quarantine, should get in touch with their Program Manager to discuss the possibility of academic concessions for each impacted course. The Program Manager will work closely with your instructors to explore options for you to make up the missed learning.

COVID-19 Safety in the Classroom:

Masks: Masks are **required** for all indoor classes, as per the BC Public Health Officer orders. For our in-person meetings in this class, it is important that all of us feel as comfortable as possible engaging in class activities while sharing an indoor space. For the purposes of this order, the term “masks” refers to medical and non-medical masks that cover our noses and mouths. Masks are a primary tool to make it harder for COVID-19 to find a new host. You will need to wear a medical or non-medical mask for the duration of our class meetings, for your own protection, and the safety and comfort of everyone else in the class. You may be asked to remove your mask briefly for an ID check for an exam, but otherwise, your mask should cover your nose and mouth. Please do not eat in class. If you need to drink water/coffee/tea/etc, please keep your mask on between sips. Students who need special accommodation are asked to discuss this with the program office.

Seating in class: To reduce the risk of COVID-19 transmission, please sit in a consistent area of the classroom each day. This will minimize your contacts and will still allow for the pedagogical methods planned for this class to help your learning.

Visit the following website for the most recent updates regarding COVID-19 protocol on campus:
<https://students.ubc.ca/campus-life/returning-to-campus>

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^wməθk^wəyəm (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 with class consultation)

Class	Synchronous Or Asynchronous	Date	Topic	Readings or Activities	Assessments due
1	Synchronous	Jan 5, Wed	Introduction to machine learning and Decision Trees	Pre-activities and in-class exercises	
2	Synchronous	Jan 7, Fri	Splitting and cross validation	Pre-activities and in-class exercises	
3	Synchronous	Jan 10, Mon	Baseline, k-Nearest Neighbours	Pre-activities and in-class exercises	
4	Synchronous	Jan 12, Wed	Support vector machines and Feature Preprocessing	Pre-activities and in-class exercises	Assignment 1 due
5	Synchronous	Jan 17, Mon	Preprocessing Categorical Features and Column Transformer	Pre-activities and in-class exercises	
6	Synchronous	Jan 19, Wed	Naive Bayes and Hyperparameter Optimization	Pre-activities and in-class exercises	Quiz
7	Synchronous	Jan 24, Mon	Linear Models	Pre-activities and in-class exercises	Assignment 2 due
8	Synchronous	Jan 26, Wed	Business Objectives/Statistical Questions and Feature Selection	Pre-activities and in-class exercises	
9	Synchronous	Jan 31, Mon	Classification and regression metrics	Pre-activities and in-class exercises	
10	Synchronous	Feb 2, Wed	Topics related to group project	Work on group project	Assignment 3 due
		Feb 7-12	Exam week		Group Project (to be scheduled by the RHL office)