CMPUT 466/566 (Fall 2023) Syllabus

Instructor: Lili Mou
E-mail: LMOU@ualberta.ca
Course webpage: eClass

Course email: uoa.f23.466566@gmail.com

Suggestions for contacting the instructor and TAs

- For course logistics and contents, please use the eClass forum. Your questions will help other students too.
- For emergencies, please send an email to both lmou@ualberta.ca and the above course email (monitored by both TA and the instructor). This ensures you get the most prompt and authentic replies.
- Due to the tons of emails received, non-emergency email will have low priority, and is expected to have a delay of several days to weeks.

Course Format: The course is offered in person only. When the IT infrastructure allows, the lectures will be broadcasted and recorded. However, the instructor cannot guarantee that IT will work well, in which case pre-recorded videos will be released as a replacement. Exams will be based on in-person lectures.

Lecture time and classroom:

T, Th 12:30PM - 1:50PM, Sep 5 - Dec 8

CAB 265

- No course activities during the reading week

Online lecture hall: https://meet.google.com/vqo-vkxv-osy
Dial-in: (US) +1 337-573-0059 PIN: 584 572 100#

In general, remote attendance is strongly discouraged, as we observed that at the end of the term the students who attended in person got on average 10 marks more than the students who attended remotely.

Lab session (in-person only): Monday 5–7:50PM

- 5-6PM: TA's office hours (CCIS 1-160)
- 6-7:50PM: Unattended. TAs will open appointment slots for QA.

Instructor/TA office hours:

With whom	Email	Open door	By appointment
Lili Mou (instructor)	LMOU@ualberta.ca	Tuesday, 3-4PM ATH4-08	as appropriate
Tian Tian	ttian@ualberta.ca	Monday, 5-6PM CCIS1-160	Monday 11AM - 11:30AM https://meet.google.com/nwa-vpnv-mtm
Shuai Liu	shuai14@ualberta.ca		Friday 5 PM - 5:30 PM CSC 3-26 breakout room; online link https://meet.google.com/wkx-tefd-gtm
Cameron Jen	cjen@ualberta.ca		Wednesday 8 PM - 8:30 PM https://meet.google.com/rhn-ytco-aci
Shivam Garg	sgarg2@ualberta.ca		Tuesdays 9:00-9:30AM CSC 3-26 breakout room; online link https://meet.google.com/wyf-wdit-xwy
Amir Hossein Hosseini Akbarnejad	ah8@ualberta.ca		Thursdays, 10:00-10:30 AM https://meet.google.com/hjr-kwgt-ifb
Ehsan Imani	imani@ualberta.ca		Thursdays, 5:30 PM - 6 PM https://meet.google.com/dgv-qiye-mww

- Office hours start from the second week. No office hours on statutory holidays and during the reading week.
- If a student wishes to make an appointment with a TA (10min each slot), they will send an email to the TA before the date.

Students are encouraged to reach out to the instructor if TAs' answer is not satisfactory.

Notes:

The instructor and TAs will not answer assignment answers before the solution is released.

COURSE CONTENT

Course Description:

Machine learning teaches a machine to learn from previous experience and makes a prediction for (possibly new) data. This course covers standard materials of a "Machine Learning" course, such as linear regression, linear classification, as well as non-linear models. In the process, we will have a systematic discussion on issues such as training criteria, inference criteria, bias-variance tradeoff, etc. The goal of the course is to build a solid foundation of machine learning; so there would be intensive math derivations in lectures, assignments, and exams.

Course Prerequisites:

Please fulfill the departmental requirements.
The department asks instructors normally **not** to waive prerequisites.

Course Objectives and Expected Learning Outcomes:

By the end of this course, the student will understand the foundations of machine learning and gain experience in machine learning applications.

Official textbook: Bishop, Pattern Recognition and Machine Learning.

The instructor will provide lecture notes, which may also suffice. If not, please use the above text book. [survey on textbooks]

References: link

Tentative topic list:

Linear regression

- Mean squared error (as heuristics)
- Closed-form solution
- Gradient descent
- Maximum likelihood estimation
- Maximum a posteriori training
- Bias-variance tradeoff
- Train-validation-test framework

Linear classification

- Discriminative model: Logistic regression
- Multi-class softmax
- Maximum a posteriori inference
- Generative model: Naïve Bayes
- Discriminant model: Linear SVM (bonus lecture)

Nonlinear models

- Neural networks
- Kernels methods: Non-linear SVMs (bonus lecture)

Note: The actual lecture pace may vary depending on students' background and interest. Exams will be based on main lectures only. Bonus lectures are not required.

GRADE EVALUATION

Assessment	**466 undergraduate students**	**566 graduate students**
Weekly written assignments	15	10
Two coding assignments	10	10

Mini-project	10 + 5 bonus	15
Mid-term exam (Nov 2, lecture time)	30	30
Final exam (to be announced by registrars)	35	35
Syllabus bonus	5	5
Attendance Bonus	Up to 5	Up to 5

Explanation:

- **Written assignments** will be graded in a (mostly) binary fashion. Students expect to get full marks if they make a serious attempt before the deadline. However, students should be very serious about written assignments for their own sake because they may be much reflected in mid-term and final exams. The overall written assignment mark will be the weighted average by the number of problems.

- **Coding assignments** involve implementations of basic machine learning models, such as linear regression and logistic regression. Students are encouraged to use Python but may use other programming languages as they wish (with access to basic algebra libraries). However, they must implement the algorithm in question, and cannot use API calls to the core algorithms. Details will be posted when the assignment is available. The overall coding assignment marks will be an average of the two assignments.

- **Mini-project:** A student is expected to apply a few machine learning models to a certain task and make experimental comparisons. 10 marks for accomplishing this basic task, and another 5 marks for non-triviality. For undergrads, the 5 non-triviality marks are the bonus. Details are in a separate doc.

  No collaboration is allowed for a basic mini-project (or any assignment). For a non-trivial project, collaboration may be allowed up to 3 students. In this case, the students have to form a group themselves and apply in the notice of intent (NOI) before 12:30PM, Sep 14 (extended to 12:30PM, Sep 19). Each of the team members MUST have substantial and similar previous machine learning background. The team approval will be based on students' previous experience and the intended topic.

- **Mid-term exam** and **final exam** are closed-book. While the instructor will give enough hints and background knowledge, students **cannot** prepare their own cheatsheet. This is because the exam questions will largely overlap with lecture materials. Allowing a cheatsheet doesn't make much sense for such easy exams. No calculator is allowed either, as we do not have calculation questions.

  The mid-term exam is optional. When the letter grade is computed,
  mid-term marks =max{mid-term percentage, final percentage} * 30

  Exams are in-person. In exceptional circumstances, the instructor may approve remote exams (video/audio on, screen-sharing).
  - Reasonable accommodations include: being sick, being in quarantine, attending academic conferences, remote attendance as a non-UofA student
  - Pre-disapproved excuses: feel lazy, want to cheat at home, personal vacation plan, etc.
  - If a student sees a need for remote exams, please discuss with the instructor as soon as possible. **Please do not arrange your travel plan until you are approved by the instructor**.

  [Example exam conduct]

- **Syllabus Bonus:** A student gets 5 bonus marks for reading and agreeing with the syllabus. The bonus can be claimed through an eClass quiz by 12:30PM, Sep 14 (extended to 12:30PM, Sep 19). (Note: Even if a student does not claim the bonus mark, the course will still run strictly according to the

syllabus.) Violating the syllabus may result in the bonus marks being revoked. Such violations include, but are not limited to, requesting marking of late assignments, requesting extra marks/a higher grade without a reasonable ground, violating exam policies (e.g., starting the exam before being instructed, failure to stop writing when the exam ends).

- **Attendance Bonus:** In addition to the syllabus bonus, a student (either undergrad or grad) gets a bonus if, for a mathematical/scientific error in the instructor's derivation during live lectures, the student is the first to point it out in person. This excludes typos, grammatical errors, brevity, and other minor issues at the discretion of the instructor. Lecture notes, videos, assignments, and slides do ***not*** count.

  The bonus marks are calculated based on the following schedule: 2, 1, 1, 0.5, 0.25, 0.125, etc.

  If the instructor grants bonus marks, the student should send a request to the course email to claim the bonus points. The bonus mark request must be sent on the same day when the bonus mark is earned, because the instructor may not remember the details of past lectures.

- **[Important]** All submissions are subject to an oral test, if requested, by the TAs and/or the instructor. We will select a random subset of submissions plus suspicious ones for the oral test. The performance of the oral test will affect the marking of that submission in the following manner:
  - If a student is reasonably acquainted with the submission, the oral test will **not** affect the mark.
  - If the student is unreasonably unaware of/unfamiliar with the submission, the oral test mark will play a role in a multiplicative manner.

  If a student refers to Internet materials or solutions with their friends, the student must still do the assignment by himself/herself alone and acknowledge the source; the student should also be able to defend his/her submission (e.g., explaining and justifying the solution). Otherwise, it is considered plagiarism.

  Any suspected cheating will be reported to the Faculty of Science (FoS).

  Example: If a student gets 100 marks for an assignment but knows nothing about the submission in the oral test, then the mark for the assignment is 0 * 100 = 0. Further, the case will be submitted to the FoS for further investigation. If the student is convicted of cheating/plagiarism, FoS will apply appropriate sanctions.

Late Policy:

Written assignments. Every submission is due in Edmonton time. The student should have finished and submitted the solution by the (first) deadline. The free extension is intended to resolve all issues, including the confusion of time zones, temporary computer/internet/power failure, and any other personal emergencies from the student. Further extensions will not be granted. However, we automatically approve an excused absence (EA) if a student applies before the (first) deadline to the course email. No explanation is needed.

- Once EA is applied, the mark percentage will be overridden by the final exam. In eClass gradebook, we will annotate it with a funny number, e.g., 99999, and manually correct it when calculating the final mark.
- If a student applies for an EA, we will not mark the submission even if the student submits his/her solution later on.
- If a student does not apply EA before the (first) deadline, EA will not be granted. Nor will we accept assignments later than the second deadline. Unwellness, computer/power/Internet failures are all **invalid** EA excuses after the (first) deadline.
- The only exception for EA after the (first) deadline is immobility, such as being in hospital, being detained, isolation/quarantine without computer/internet access, and diagnosed mental diseases. This will be approved at the discretion of the instructor with satisfactory evidence.

Requesting marking of late assignments and applying EA after the (first) deadline are considered as getting undeserved credit, as it is unfair to other students who follow the syllabus. Therefore, late submissions will not be marked but may result in the revocation of syllabus bonus marks.

Coding assignments. Coding assignments will be given enough time and the deadline will be extended as well. However, coding assignments cannot be EA'ed, because the exam does not test coding aspects. Failure to submit the coding assignment solution to eClass means a mark of zero for the coding assignment.

Mid-term exam is optional, because the mid-term will be lifted up to the mark percentage of the final.

Please note that EA'ing everything to the final exam is **unwise**, because FoS will only approve deferred final exams (see below) when a significant amount of coursework is done. A denial of the deferred final means the EA'ed marks are 0.

Deferred Final Examination:

Exams should be taken in-person. In exceptional circumstances, the instructor may grant remote exams, in which case the student must agree with video proctoring, including background check, use of webcam and microphone, and screen-sharing.

A student who cannot write the final examination due to incapacitating illness, severe domestic affliction or other compelling reasons can apply for a deferred final examination. Such an application must be made to the student's Faculty office within two working days of the missed examination and must be supported by appropriate documentation or a Statutory Declaration (https://calendar.ualberta.ca/content.php?catoid=29&navoid=7238#Attendance). Deferred examinations are a privilege and not a right; there is no guarantee that a deferred examination will be granted. Misrepresentation of facts to gain a deferred examination is a serious breach of the Code of Student Behaviour.

The instructor strongly suggests students attending the scheduled final exam if a student has any mobility, because it is possible that the deferred examination is not approved by FoS. If approved, the deferred exam will be scheduled at 7PM on Jan 15, 2024.

Letter grade:

The final letter grade will be given by some cut-off based on numerical marks. Assuming a student does reasonably well in all assignments and the course project, then the letter grades roughly maps to the following criteria:

A+ = The student well understands lecture materials and can generalize well to new problems
A = The student well understands lecture materials and can generalize to certain new problems
A- = The student well understands lecture materials but is unable to generalize to new problems
B+ = The student understands most part of the lecture materials, but a few details are missing
B = The student understands some part of the lecture materials, but several parts are missing
B- = The student understands some part of the lecture materials, but a significant portion is missing
C-level or lower: The student performs worse

Letter grade cutoffs may be different for undergrads and undergrads, because they are two courses.

In the past, the instructor typically sent out 40-50% A or A+. Please disregard eClass course total, as it is not correctly set up. We will calculate course total marks on a spreadsheet strictly following the syllabus.

STUDENT RESPONSIBILITIES

Academic Integrity:

All forms of academic dishonesty are unacceptable at the University. Any suspected offense will be reported to the Faculty of Science. Anyone who is found in violation of the Code of Student Behaviour may receive a sanction. Typical sanctions include conduct probation, a mark reduction or a mark of 0 on an assessment, a grade reduction or a grade of F in a course, a remark on the transcript, and a recommendation for suspension or expulsion.

Appropriate Collaboration:

No collaboration is allowed for assignments (coding and written). Collaboration for projects is subject to the instructor's approval, and such applications must be addressed in notice of intent (NOI) before the NOI deadline.

Exam Conduct:

- Both exams are closed-book, closed-computer. No cheatsheet or calculator is allowed.
- Photo I.D. is required at exams to verify your identity.
- Exams should be done in-person. In extreme circumstances, the instructor may approve remote closed-book exams. However, this is intended for special cases, such as being sick, being in quarantine, and attending academic conferences. Please do not make any travel arrangements before getting approved from the instructor. The following reasons are pre-denied for remote exams: feeling cold in winter, wanting to cheat at home, personal vacation plans, etc. [Example exam conduct of a different course]

Students Eligible for Accessibility-Related Accommodations:

Eligible students have both rights and responsibilities with regard to accessibility-related accommodations. Accommodations are coordinated through the Academic Success Centre. Scheduling exam accommodations in accordance with established deadlines and procedures is essential. Please note adherence to procedures and deadlines is required for U of A to provide accommodations. See Academic Accommodations for further information.

Other Administrative Notes

Students must verify this date on BearTracks when the Final Exam Schedule is posted.

Grades are unofficial until approved by the Department and/or Faculty offering the course.

Learning and Working Environment:
The Faculty of Science is committed to ensuring that all students, faculty and staff are able to work and study in an environment that is safe and free from discrimination and harassment. It does not tolerate behaviour that undermines that environment.

If you are experiencing harassment, discrimination, fraud, theft or any other issue and would like to get confidential advice, please contact any of these campus services:

- Office of Safe Disclosure & Human Rights*: A safe, neutral and confidential space to disclose concerns about how the University of Alberta policies, procedures or ethical standards are being applied. They provide strategic advice and referral on matters such as discrimination, harassment, duty to accommodate and wrong-doings. Disclosures can be made in person or online using the Online Reporting Tool*.
- University of Alberta Protective Services: *Peace officers dedicated to ensuring the safety and security of U of A campuses and community. Staff or students can contact UAPS to make a report if they feel unsafe, threatened, or targeted on campus or by another member of the university community.*
- Office of the Student Ombuds*: A confidential and free service that strives to ensure that university processes related to students operate as fairly as possible. They offer information, advice, and support to students, faculty, and staff as they deal with academic, discipline, interpersonal, and financial issues related to student programs.*
- Office of the Dean of Students*: They can assist students in navigating services to ensure they receive appropriate and timely resources. For students who are unsure of the support they may need, are concerned about how to access services on campus, or feel like they may need interim support while you wait to access a service, the Dean of Students office is here to help.*

Feeling Stressed, Anxious, or Upset?

It's normal for us to have different mental health experiences throughout the year. Know that there are people who want to help. You can reach out to your friends and access a variety of supports available on and off campus at the Need Help Now webpage or by calling the 24-hour Distress Line: 780-482-4357 (HELP).

Land Acknowledgement:

The University of Alberta respectfully acknowledges that we are situated on Treaty 6 territory, traditional lands of First Nations and Métis people.

To learn more about the significance of this land acknowledgement, please read this useful article and associated links to more information.

Disclaimer:

Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by the Registrar and takes precedence over the final examination date reported in this syllabus.