COMPSCI 4451/9548 Course Outline

1. Course Information

Course Information
Foundations of Machine Learning (4441/9548), Fall 2025, the lectures will be held on Mondays 9:30 – 11:30 AM and Wednesdays 9:30 -10:30 AM.

List of Prerequisites
Data Science 3000A/B. In addition, students should have a solid background in linear algebra and statistics.

Unless you have either the prerequisites for this course or written special permission from the Department of Computer Science to enroll in it, you may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on your academic record. This decision may not be appealed.

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Dr. Boyu Wang	bwang@csd.uwo.ca			Wednesday 10:30-11:30am
TA: TBD				

Students must use their Western (@uwo.ca) email addresses when contacting their instructors. [insert other contact policies here]

3. Course Syllabus, Schedule, Delivery Mode

This course provides a rigorous introduction to the fundamental concepts and mathematical foundations of machine learning. The primary goal is to help students develop a deep understanding of key learning paradigms, such as supervised and unsupervised learning, and the mathematical principles that underpin them. Specifically, this course will cover the following topics: Introduction and Motivation, Review of Mathematical Tools for Machine Learning, Linear Regression, Generalization and Overfitting, Regularization, Logistic Regression, Bayes Rule and Generative Models, Support Vector Machines, Kernel Methods, Dimensionality Reduction, Clustering Algorithms, Ensemble Methods, Deep Learning Basics. The programming assignments will be done in Python/Matlab. During this course we will study both algorithmic perspectives of machine learning and their practical applications.

Key Sessional Dates:

Classes begin: September 4, 2025
Fall Reading Week: November 3 – 9, 2025
Classes end: December 9, 2025
Exam period: December 11 – 22, 2025

4. Course Materials

There is no required textbook. However, there are several good machine learning textbooks describing parts of the material that we will cover.

- Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.
- Murphy, "Probabilistic Machine Learning: An Introduction", MIT Press, 2022.
- Prince, "Understanding Deep Learning", MIT Press, 2023.

Individual papers or web resources may be assigned to supplement lecture material.

All course material will be posted to OWL: https://westernu.brightspace.com/

Students are responsible for checking the course OWL site (https://westernu.brightspace.com/) regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL site, they can seek support on the OWL Brightspace Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

5. Methods of Evaluation

Grading Scheme and Assessment Dates

The overall course grade will be calculated as listed below:

Undergrad students:

Assignments (4)	60%

Final Project	40%

Graduate students:

Assignments (4)	40%
Project Presentation	10%
Final Project	50%

Tentative Timetable:
Undergraduate students will write submit the report of their final project. Graduate students will present their final project and submit a report of their final project. **Please note that the timetable is tentative and subject to change. Specific deadlines may be adjusted as the course progresses to accommodate the pace and needs of the class.**

Assignment 1: Release: October 10 Due: October 24
Assignment 2: Release: October 27, Due: November 10
Assignment 3: Release: November 10, Due: November 24
Assignment 4: Release: November 24, Due: December 8

10% of each assessment will be taken off each day for late submissions; after 5 days being late, no points are given anymore. The assignments are worth 60% (40%) of the overall mark for the course. If an assignment has to be cancelled for any reason, the remaining assignment weights will be prorated to add up to 60% (40%).

Final Project:

The project is to be completed in groups of 2-3 graduate students or 3-4 undergrad students. Students who are working for their research on problems that are amenable to machine learning solutions are strongly encouraged to formulate a project related to their work. Students who do not have such problems should contact the course instructor to discuss possible projects.

Undergraduate students will be required to write a project report.
Graduate students will be required to write a project report, and to do a final project presentation (~10 minutes per team). The presentations will be scheduled in the last week of class, during of the class time.

Students are permitted to use ChatGPT or similar software to polish their project reports. However, the use of ChatGPT to generate the entire report is strictly prohibited. Any violation of this policy will result in the report being invalidated, and the grade will be forfeited.

Group Project Contribution Policy
By default, all group members will receive the same grade for the project. If concerns about unequal contribution arise, students should first attempt to resolve the issue within the group and keep records (e.g., emails, chat logs). If the problem persists, members may submit a written complaint with supporting evidence and a contribution score sheet (each member allocating percentages to peers). The instructor will review the materials and make the final decision.
Possible outcomes:

- Minor discrepancies: grade reduction of 5–15%.

- Significant lack of contribution: grade reduced proportionally to peer evaluation.
- No verifiable contribution: grade of 0 and removal from project authorship.

For undergrad students, final project will be due on Dec. 8.
For graduate students, final project report will be due on Dec. 22.

Use of Generative AI Tools
Students are permitted to use AI-assisted tools such as ChatGPT or similar software **to help revise or polish their own written work** (e.g., for grammar correction, clarity improvement, or style refinement). However, **it is strictly prohibited to use such tools to generate entire assignments or projects on your behalf**. All submitted work must reflect your own understanding and original effort. Violations of this policy will be treated as academic misconduct.

General information about missed coursework
Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs,* posted on the Academic Calendar: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person.

The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult Accessible Education.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:
https://registrar.uwo.ca/academics/academic_considerations/
All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request without supporting documentation in this course, which will grant a 48-hour extension. However, the following assessments are excluded from this, and therefore always require formal supporting documentation:

- Presentation/Group Project

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

Essential Learning Requirements

Even when Academic Considerations are granted for missed coursework, the following are deemed essential to earn a passing grade.

Students must obtain at least 50% score of the assignments AND complete the final project to pass the course. For the project report, students are not expecting to be accommodated if they become sick at the due date.

6. Additional Statements

6.1 Religious Accommodation

When conflicts arise with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible, but not later than two weeks prior to the writing of the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays - https://www.edi.uwo.ca

6.2 Academic Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf.

6.3 General Academic Policies

The website for Registrar Services is https://www.registrar.uwo.ca/.

Use of @uwo.ca email: In accordance with policy, https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf, the centrally administered e-mail account provided to students will be considered the individual's official university email address. It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

Requests for Relief (formally known as "appeals")

Policy on Request for Relief from Academic Decision:
https://uwo.ca/univsec//pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf

Procedures on Request for Relief from Academic Decision (Undergraduate):
https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf

Procedures on Request for Relief from Academic Decision (Graduate):
https://uwo.ca/univsec//pdf/academic_policies/appeals/graduate_requests_for_relief_procedure.pdf

6.4 Scholastic Offences

Policy on Scholastic Offences:
https://uwo.ca/univsec//pdf/academic_policies/appeals/scholastic_offences.pdf

Procedures on Scholastic Offences (Undergraduate):
https://uwo.ca/univsec//pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf

Procedures on Scholastic Offences (Graduate):
https://uwo.ca/univsec//pdf/academic_policies/appeals/graduate_scholastic_offence_procedure.pdf

Use of Electronic Devices During Assessments

In courses offered by the Faculty of Science, the possession of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, and wireless earbuds or headphones.

Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at your desk, on your person, or within reach during an assessment will be treated as a *scholastic offence*, even if the device is not in use.

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is your responsibility to review and comply with these expectations.

Use of Generative AI Tools

Unless otherwise stated, the use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is **not permitted** in the completion of any course assessments, including but not limited to: assignments, lab reports, presentations, tests, and final examinations.

Using such tools for content generation, code writing, problem solving, translation, or summarization—when not explicitly allowed—will be treated as a **scholastic offence**.

If the use of generative AI is permitted for a particular assessment, the conditions of use will be specified by the instructor in advance. If no such permission is granted, students must assume that use is prohibited. It is your responsibility to seek clarification before using any AI tools in academic work.

6.5 Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, requests for relief, exam conflicts, and many other academic-related matters: https://www.uwo.ca/sci/counselling/.

Students who are in emotional/mental distress should refer to Mental Health@Western (https://uwo.ca/health/) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. If you have any questions regarding accommodations, you may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

Learning-skills counsellors at Learning Development and Success (https://learning.uwo.ca) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: https://www.uwo.ca/se/digital/.

Additional student-run support services are offered by the USC, https://westernusc.ca/services/.