COURSE OUTLINE		
TERM: Fall 2027	**COURSE NO:** COMP 440	
INSTRUCTOR:	**COURSE TITLE:** Applied Artificial Intelligence: Tools, Systems, and Society	
OFFICE: **LOCAL:** **E-MAIL:** @capilanou.ca	**SECTION NO(S):**	**CREDITS:** 4.0
OFFICE HOURS:		
COURSE WEBSITE:		

Capilano University respectfully acknowledges that our campuses are located on the unceded territories of the səlilwətaɬ (Tsleil-Waututh), Sḵwx̱wú7mesh (Squamish) and xʷməθkʷəy̓əm (Musqueam) Nations.

COURSE FORMAT
Three hours of class time, with an hour and a half of lab time, plus an additional hour and a half delivered through online or other activities for a 15-week semester, which includes two weeks for final exams.

COURSE PREREQUISITES
COMP 330 or 45 credits of 100-level or higher coursework including one of the following: COMP 215(B+), COMP 320, MATH 336, STAT 305, STAT 310.

CALENDAR DESCRIPTION
This course introduces core concepts in modern AI - including prompting, embeddings, generative models, and evaluation frameworks—through a hands-on, systems-based approach. Emphasizing practical application over formal theory, it is designed for undergraduate students, presenting AI concepts at an accessible, systems level without requiring advanced mathematics. Students develop the ability to understand, build, and apply AI tools to real-world problems while critically reflecting on broader societal impacts.

COURSE NOTE
COMP 440 is an approved Science and Technology course for Cap Core requirements.
COMP 440 is an approved Science course.

OPTIONAL TEXTS AND/OR RESOURCES
Zhang, A., Lipton, Z. C., Li, M., & Smola, A. J. (2024). *Dive into deep learning*. Cambridge University Press.

Foster, D. (2022). Generative deep learning: Teaching machines to paint, write, compose, and play (2nd ed.). O'Reilly Media.

COURSE STUDENT LEARNING OUTCOMES

On successful completion of this course, students will be able to do the following:

- Explain foundational AI concepts including neural networks, network architecture, and the ethical implications of AI systems.
- Build and deploy chatbots and language models using modern tools and frameworks.
- Implement semantic search systems using embeddings and vector similarity.
- Work with generative AI models including text generation and image synthesis using diffusion models.
- Design and build multi-modal AI agents that combine multiple AI components.
- Serve and evaluate AI systems by deploying models, running inference efficiently, identifying biases and failure modes, and applying structured evaluation methodologies.
- Apply AI tools to real-world problems while critically reflecting on broader societal impacts.

Students who complete this Science and Technology course will be able to do the following:

- Apply numerical and computational strategies to solve problems.
- Assess the cultural, economic, and political effects of technology.
- Assess the impacts of human activity on natural systems and articulate ways in which environmental sustainability may be achieved.
- Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity of information).
- Demonstrate how a problem, concept, or process can be modelled numerically, graphically, or algorithmically.
- Explain how scientific inquiry is based on investigation of evidence and evolves based on new findings.
- Participate in scientific inquiry and communicate the elements of the process, including making careful and systematic observations, developing and testing a hypothesis, analyzing evidence, and interpreting results.

COURSE CONTENT

The following topics will be covered in the course (not necessarily in the listed order)

# of Weeks (approx.)	Topics
3	Foundations of Modern AI Systems: Neural Networks, Interaction, and Prompting
2	LLM Infrastructure & Transformer Architecture
1	Semantic Representation: Embeddings and Search
2	Diffusion-Based Generative Models

2	Compositional AI Systems: Multi-Modal Systems, Agents, and RAG
1	Evaluation of LLM Systems
1	Training Custom Models
1	Final Project Presentations
2	Final Exam Period (weeks 14 and 15)

EVALUATION PROFILE

Final grades for the course will be computed based on the following schedule:

Assignments (labs, projects)	30%
Quizzes and Term Tests	30%
Final Examination	35%
Performance Evaluation	5%
TOTAL	**100%**

The default Performance Evaluation component in the evaluation profile is pro-rated to the grade earned on the remainder of the profile. In exceptional circumstances, a student's improved performance in the later part of the term may justify an elevated grade. The instructor has sole discretion, in such cases, to alter the performance evaluation to elevate the student's grade to better reflect their performance at the end of term.

Specific dates and details regarding the Evaluation Component will be provided by the instructor.

GRADING PROFILE

A+ = 90-100	B+ = 77-79	C+ = 67-69	D = 50-59
A = 85-89	B = 73-76	C = 63-66	F = 0-49
A- = 80-84	B- = 70-72	C- = 60-62	

Students should refer to the University Calendar for the effect of the above grades on grade point average.

Incomplete Grades

Grades of Incomplete "I" are assigned only in exceptional circumstances when a student requests extra time to complete their coursework. Such agreements are made only at the request of the student, who is responsible to determine from the instructor the outstanding requirements of the course.

Late Assignments

The due dates for all course activities are posted on eLearn. If you anticipate being late with a submission, please consult with your instructor beforehand.

Missed Exams/Quizzes/Labs etc.
Normally, a score of zero will be given for a missed exam, test, quiz, lab, etc. In some exceptional situations, the student will be permitted to write a make-up test, defer the lab to a later date or to replace the score by other marks.

The situations in which a score of zero may be avoided are those for which the student meets all of the following conditions:

1. Circumstances clearly beyond the control of the student caused the exam, test, quiz, lab, etc. to be missed. Such circumstances include serious illness or injury, or death of close family member. They do not include forgetting about the test, lack of preparation for the test, work-related or social obligations.

2. The student has notified the instructor (or the School of STEM office staff, if the instructor is not available) about the missed exam, test, quiz, lab, etc. Such notification must occur in advance, if possible, or at the latest, on the day of the exam, test, quiz, lab, etc.

3. Proof of the circumstances is provided. Proper proof of illness or injury requires a medical certificate from a doctor, who may also be consulted.

4. The student has been fully participating in the course up until the circumstances that prevented the writing of the exam, test, quiz, lab, etc. Fully participating means attending almost all of the classes and turning in almost all assignments in the course.

The options offered to the student who meets the four conditions are decided by the instructor. They will not necessarily meet the convenience of the student.

Accommodations can be made to honour community needs and traditional practices.

Attendance
Students are expected to attend and fully participate in all classes, labs and associated activities. Students should expect to log in to eLearn 3-4 times per week and to spend 8-10 hours per week on course readings, practice tests, weekly learning activities, teamwork and assignments. Students are responsible for all information given during lectures, labs and tutorials, including exam dates and assignment deadlines, even if they were unable to attend for any reason.

English Usage
Students are expected to proofread all written work for any grammatical, spelling and stylistic errors. Instructors may deduct marks for incorrect grammar and spelling in written assignments.

Electronic Devices
Students may use electronic devices during class solely for class-related activities, such as note-taking, coding, and ‘just in time’ research to contribute to class discussions.

On-line Communication
Outside of the classroom, instructors will (if necessary) communicate with students using either their official Capilano University email or eLearn; please check both regularly. Official communication between Capilano University and students is delivered to students' Capilano University email addresses only.

Students are reminded to engage in respectful behavior when participating in online discussions.

UNIVERSITY OPERATIONAL DETAILS

Tools for Success
Many services are available to support student success for Capilano University students. A central navigation point for all services can be found at: https://www.capilanou.ca/student-services/

Capilano University Security: download the CapU Mobile Safety App

Policy Statement (S2009-06)
Capilano University has policies on Academic Appeals (including appeal of final grade), Student Conduct, Academic Integrity, Academic Probation and other educational issues. These and other policies are available on the University website.

Academic Integrity (S2017-05)
Any instance of academic dishonesty or breach of the standards of academic integrity is serious and students will be held accountable for their actions, whether acting alone or in a group. See policy and procedures S2017-05 Academic Integrity for more information:
https://www.capilanou.ca/about-capu/governance/policies/

Violations of academic integrity, including dishonesty in assignments, examinations, or other academic performances, are prohibited and will be handled in accordance with the Student Academic Integrity Procedures.

Academic dishonesty is any act that breaches one or more of the principles of academic integrity. Acts of academic dishonesty may include but are not limited to the following types:

Cheating: Using or providing unauthorized aids, assistance or materials while preparing or completing assessments, or when completing practical work (in clinical, practicum, or lab settings), including but not limited to the following:

- Copying or attempting to copy the work of another during an assessment;
- Communicating work to another student during an examination;
- Using unauthorized aids, notes, or electronic devices or means during an examination;
- Unauthorized possession of an assessment or answer key; and/or,
- Submitting of a substantially similar assessment by two or more students, except in the case where such submission is specifically authorized by the instructor.

Fraud: Creation or use of falsified documents.

Misuse or misrepresentation of sources: Presenting source material in such a way as to distort its original purpose or implication(s); misattributing words, ideas, etc. to someone other than the original source; misrepresenting or manipulating research findings or data; and/or suppressing aspects of findings or data in order to present conclusions in a light other than the research, taken as a whole, would support.

Plagiarism: Presenting or submitting, as one's own work, the research, words, ideas, artistic imagery, arguments, calculations, illustrations, or diagrams of another person or persons without explicit or accurate citation or credit.

Self-Plagiarism: Submitting one's own work for credit in more than one course without the permission of the instructors, or re-submitting work, in whole or in part, for which credit has already been granted without permission of the instructors.

Prohibited Conduct: The following are examples of other conduct specifically prohibited:

- Taking unauthorized possession of the work of another student (for example, intercepting and removing such work from a photocopier or printer, or collecting the graded work of another student from a stack of papers);
- Falsifying one's own and/or other students' attendance in a course;
- Impersonating or allowing the impersonation of an individual;
- Modifying a graded assessment then submitting it for re-grading; or,
- Assisting or attempting to assist another person to commit any breach of academic integrity.

Sexual Violence and Misconduct

All Members of the University Community have the right to work, teach and study in an environment that is free from all forms of sexual violence and misconduct. Policy B401 defines sexual assault as follows:

> Sexual assault is any form of sexual contact that occurs without ongoing and freely given consent, including the threat of sexual contact without consent. Sexual assault can be committed by a stranger, someone known to the survivor or an intimate partner.

Safety and security at the University are a priority and any form of sexual violence and misconduct will not be tolerated or condoned. The University expects all Students and Members of the University Community to abide by all laws and University policies, including B.401 Sexual Violence Policy and B.401.1 Sexual Violence Procedure (found on Policy page https://www.capilanou.ca/about-capu/governance/policies/)

Emergencies: Students are expected to familiarise themselves with the emergency policies where appropriate and the emergency procedures posted on the wall of the classroom.

DEPARTMENT OR PROGRAM OPERATIONAL DETAILS

Computer Access

Students may bring and use their own computing devices, running any modern OS (i.e., Windows, OSX, or Linux). Every effort is made to ensure that required course software can be freely downloaded and installed on student computer. However, it is the responsibility of each student to ensure their computer meets the minimum requirements of required course software, and to perform the installation and configuration of such software themselves.