Department of Mathematics

Applied Mathematics 4999Z Course Outline

Applied Mathematics Project — Fall/Winter 2026–27

DRAFT VERSION 1

1. Course Information

Course: Applied Mathematics 4999Z — Applied Mathematics Project

Academic term: Fall/Winter 2026–27. This is a full-year half-credit course.

Delivery mode: In person. The regular class/seminar meeting time and location will be announced through OWL Brightspace. Each student will also arrange regular meetings with a faculty mentor; these should occur at least once every two weeks while classes are in session.

Prerequisites

Registration in the fourth year of a module offered by the Department of Mathematics and permission of the department.

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this course or written special permission from the Department of Mathematics to enroll in it, they may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on their academic record.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

2. Instructor Information

Course Coordinator	Email	Office	Office Hours
Prof. Greg Reid	reid@uwo.ca		

Students must use their Western (@uwo.ca) email addresses when contacting the Course Coordinator. Please include “AM 4999Z” in the subject line.

Each student must have a faculty mentor/supervisor. It is the student’s responsibility, in consultation with the Course Coordinator, to identify a suitable mentor and obtain agreement in principle to supervision.

3. Course Syllabus, Schedule, Delivery Mode

Calendar description: The student will work on a project under faculty supervision. The project may involve an extension, or more detailed coverage, of material presented in other courses. Credit for the course will involve a written as well as oral presentation.

AM 4999Z is a capstone experience in Applied Mathematics. Students undertake a substantial project with a faculty mentor and develop the habits required for independent mathematical and scientific work: finding and evaluating literature, formulating questions, carrying out mathematical or computational investigations, interpreting results, and communicating their work.

Course Learning Outcomes

- carry out an effective search of the peer-reviewed literature relevant to a project;
- summarize, evaluate, and place relevant literature in context;
- apply new and existing mathematical knowledge to a non-trivial question in the natural sciences, social sciences, computational sciences, or a related area;
- explain the mathematical ideas, assumptions, computations, and limitations underlying their project;
- communicate research effectively in written and oral forms;
- use computational and generative-AI tools critically and responsibly when appropriate;
- reason, calculate, explain, and defend important aspects of their project independently, without technological assistance; and
- participate professionally and constructively in a community engaged in mathematical research.

Independent Human Mathematical Thinking

An important goal of this course is the deliberate cultivation of independent human mathematical thinking. Modern computational and generative-AI tools can be powerful aids to research, but students must also develop the ability to understand and discuss their own work without relying on those tools.

At least once every two weeks while classes are in session, students are expected to meet with their faculty mentor. As part of these meetings, approximately 10–15 minutes should normally be devoted to a human-only discussion of the project, without a laptop, phone, AI system, or prepared notes. Depending on the project, a student may be asked to explain an idea in their own words, sketch a derivation, carry out a representative computation by hand, interpret a result, describe a model or algorithm approximately but meaningfully, or discuss what they think should be tried next.

These discussions are intended to develop understanding rather than reward flawless performance. Research naturally involves uncertainty, false starts, and mistakes. Students should be willing to identify an error, say when they do not know something, and reason about how an idea or computation could be checked or improved.

Key Sessional Dates

	Fall 2026	**Winter 2027**
Classes begin/resume	September 9, 2026	January 4, 2027
Reading Week	October 10–18, 2026	February 13–21, 2027
Classes end	December 9, 2026	April 9, 2027
Exam period	December 11–22, 2026	April 12–30, 2027

Approximate Course Progression

Period	**Main activity**
September	Finalize faculty mentor and project; begin literature search; establish regular mentor meetings.
October	Literature search; literature review, critical evaluation, and project proposal.
November	Peer input on proposals; project development; seminar discussion and mentor meetings.
December	Midyear status report and Winter-term plan.
January–February	Main project work; regular progress discussions with mentor and class.
March	Final oral presentations and discussion.
April	Complete and submit final project essay/report.

4. Course Materials

Materials required for individual projects will vary. Students should consult their faculty mentor before obtaining specialized books, software, datasets, or other resources. If computational resources are needed and access is uncertain, students should contact the Course Coordinator.

There is no required textbook for the course and no course-wide required learning material with a purchase cost. Any project-specific material carrying a cost should be discussed with the faculty mentor before purchase.

All course-wide materials and announcements will be posted to OWL Brightspace. Students are responsible for checking the course site regularly for news, deadlines, and updates.

Technical Requirements

Students require regular access to a computer and the software appropriate to their project. Written course submissions must be prepared using LaTeX unless the Course Coordinator approves an alternative in advance. The Coordinator may request original .tex source files and associated project files where appropriate.

5. Methods of Evaluation

Evaluation in AM 4999Z will be conducted by the Course Coordinator in collaboration with faculty mentors. The following scheme follows the recent structure of the course and is proposed for 2026–27.

Assessment	Weight	Tentative timing
Literature Search	5%	Early October
Literature Review, Critical Evaluation and Proposal	15%	Late October
Peer Input on Proposal	5%	Early November
Midyear Status Report	5%	Early December
Final Oral Presentation	15%	March
Final Essay / Project Report	40%	Early April
Participation and Research Engagement	15%	Throughout
Total	100%	

Exact submission dates will be inserted in the final course outline before it is issued to students.

Assessment Descriptions

Literature Search (5%). Identify approximately 10–20 key references relevant to the project. Describe the search process and briefly indicate why the selected items are relevant. Students should begin a BibTeX database or equivalent scholarly reference collection for use throughout the project.

Literature Review, Critical Evaluation and Proposal (15%). A concise review and proposal, normally about 1000 words, explaining the topic and its significance, the current state of relevant knowledge, the question or gap the student intends to address, and the proposed approach and milestones.

Peer Input on Proposal (5%). Each student will provide constructive input on another student's proposal, including a concise summary, identification of strengths and opportunities for improvement, and concrete suggestions.

Midyear Status Report (5%). A short written report restating the project question or goal, summarizing milestones achieved during the Fall term, identifying difficulties or changes of direction, and setting out a realistic plan for Winter-term completion.

Final Oral Presentation (15%). Students will present their projects during scheduled class meetings in March. The presentation should communicate the problem, mathematical ideas or methods, principal results, limitations, and conclusions to an audience with a strong general mathematical background. Questions and discussion form part of the presentation.

Final Essay / Project Report (40%). The final report is the student's principal written account of the year's work. It should be written for a mathematically sophisticated reader who need not have prior knowledge of the specific application area. Results should be presented clearly and discussed in the context of relevant literature. The report must satisfy University requirements for a Z-designated essay course; further length and formatting guidance will be posted on OWL Brightspace.

Participation and Research Engagement (15%). Participation reflects attendance and constructive engagement in course meetings, research discussions, and regular mentor meetings. The Course Coordinator will assess course-level participation and the faculty mentor will provide input on the student's research engagement. The mentor's assessment will include the student's developing ability to discuss and reason about the project independently during the regular human-only portions of mentor meetings.

Use of Generative AI and Computational Tools

This course takes a positive but critical approach to generative AI. AI and computational tools can be valuable for exploration, brainstorming, organization, coding support, checking, and improving communication. At the same time, the central intellectual work of the project must reflect the student's own understanding, judgment, and mathematical reasoning.

- Students may use generative AI to brainstorm questions or approaches, organize ideas, explore background concepts, and improve grammar or clarity, unless an assessment gives more specific instructions.
- AI assistance must not replace the student's substantive mathematical reasoning, interpretation of results, critical evaluation of literature, or responsibility for the final project.
- Students must verify the accuracy, relevance, and originality of AI-assisted material. Fabricated references, unsupported claims, or incorrect mathematics remain the student's responsibility.

- Materially significant use of generative AI in assessed work must be acknowledged in a brief statement describing the tool and how it was used.
- For oral presentations, AI may assist with brainstorming or slide preparation, but students must understand, explain, and defend the content themselves.
- The human-only portions of faculty-mentor meetings are explicitly AI-free and technology-free.

The Course Coordinator may use generative AI in preparing or revising course materials, including the course outline, and for brainstorming instructional approaches. AI will not be used as the sole evaluator of student work. Academic judgments and grades remain the responsibility of the Course Coordinator and faculty mentors.

Essential Learning Requirements

Because AM 4999Z is a capstone and Z-designated essay course, the following are essential learning requirements:

- satisfactory participation in at least three-quarters of scheduled course meetings, subject to approved accommodations and University policy;
- regular substantive engagement with the faculty mentor, normally including meetings at least once every two weeks while classes are in session;
- completion of the oral presentation requirement, including the ability to respond to questions about the project; and
- a passing grade on the Final Essay / Project Report component.

Where a shortfall in an essential learning requirement results from granted Academic Consideration, the consequences will follow the current Faculty of Science and University policies stated in the official 2026–27 course-outline template.

Information about Missed Coursework and Flexible Completion

AM 4999Z is a research project-based course and has no final examination. Under the Faculty of Science 2026–27 approach, project-based courses without a final exam are exempt from the midterm-to-final reweighting framework. Missed written coursework will therefore be handled through the Faculty's Flexible Completion principles and the specific course rules below.

Take-home written assessments with a stated due date will include the Faculty of Science automatic 48-hour no-late-penalty period. A submission made within that period will not require an Academic Consideration request. Because the assessments in this project course build toward the final report and some involve peer interaction, firm completion dates may be required where later course activity depends on the work; these will be stated with the assessment instructions.

The Final Oral Presentation is an essential course requirement. A student who cannot complete it at the scheduled time because of an extenuating circumstance must follow the Academic Consideration process through the Student Absence Portal; an approved student will be offered an appropriate rescheduled presentation opportunity.

Longer-term circumstances affecting sustained project participation or mentor engagement cannot always be addressed by a short deadline extension and will be considered under the applicable University and Faculty procedures, including Accessible Education where appropriate.

6. Additional Statements

The final issued outline will retain the current Faculty of Science standard statements required by the 2026–27 template concerning religious accommodation, academic accommodation, requests for relief, scholastic offences, use of electronic devices, generative AI, and student support services. Course-specific AI rules in Section 5 take precedence where they expressly permit or restrict a use of AI for a particular component.