

Applied Mathematics 3817A – Mathematical Modelling Course Outline Fall 2026

1. Course Information

Course Information

AM3817A Mathematical Modelling.

List of Prerequisites

Antirequisite(s): Applied Mathematics 3813A/B. Prerequisite(s): Applied Mathematics 2402A/B; Calculus 2303A/B or Mathematics 2500A/B or the former Calculus 2502A/B; plus one of Mathematics 1600A/B, Mathematics 1700A/B.

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this course or written special permission from the Department of Mathematics to enroll in it, they may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on their academic record.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

Instructors	Email	Office	Office Hours
Dr. Jason Bertram (Ass. Prof.)	jason.bertram@uwo.ca		TBA

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

Office hours held in person in MC116 weekly. Time TBA.

3. Course Syllabus, Schedule, Delivery Mode

A broad introduction to building and analyzing mathematical models. Linear compartmental models. Nonlinear ODE models, bifurcations and chaos. Collective behaviour. Probabilistic models and master equations.

In person lectures

Learning outcomes: Identify the key components of a mathematical model. When given a verbal or pictorial description, be able to identify an appropriate approach and construct a mathematical model. Be

able to analyze ODE (linear and nonlinear) and stochastic model predictions and identify successes and limitations. Know how to modify or extend a model to address limitations.

Classes begin: September 9, 2026

National Day for Truth and Reconciliation (Wednesday, September 30, 2026 — no classes)

Fall Reading Week: October 10 – 18, 2026

Classes end: December 9, 2026

Exam period: December 11 – 22, 2026

4. Course Materials

Costs of Textbooks and Other Learning Materials/Activities

Textbook and Other Learning Materials

• **Required textbook:** Barnes and Fulford. Mathematical modelling with case studies : using Maple and MATLAB (3rd edition). Chapman and Hall/CRC. 2014. **The textbook costs:** Digital version available at no cost through the Western Library.

In addition to the textbook, course material will be posted to OWL Brightspace:

<https://westernu.brightspace.com/>

Students are responsible for checking the course OWL Brightspace site 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 Brightspace 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:

Assignments (best 4 out of 5)	20%	
Midterm Test	30%	tentatively: week of October 5-9, exact date TBA
Presentation	5%	
Final Exam	45%	

Tentative List of Topics

Please note: this is the first time this course has been run. The content covered in each week is subject to change.

Week	Class Content	Assessment
1	Intro + start Chapter 2	

2	Chapter 2	Assignment 1 due
3	Chapter 3	
4	Chapter 5	Assignment 2 due
5	Chapter 6	
6	Chapter 7	Midterm. Assignment 3 due
Reading week		
7	Chapter 8	
8	Axiomatic/proof of principle approaches	Assignment 4 due
9	Optimization	
10	Chapter 12	Assignment 5 due
11	Probabilistic models	
12	Probabilistic models	Presentations

Midterm covers all content covered in weeks 1-5. Final is cumulative – covers all content in the course.

Use of Generative AI Tools

The student is free to use AI tools however they like for the assignments or the presentation. **However:** the assignments and presentation are designed to prepare the student for the midterm and final where AI tools will not be available. Hence, it is strongly recommended that AI tools be used sparingly and in a way that enhances understanding rather than doing the thinking for them.

No purely AI-generated content will appear in the course content. Almost all of the course content comes from the required textbook, other modeling textbooks, the primary literature and the instructor's own knowledge. That said, Claude will be used to accelerate some mundane tasks such as writing up solutions and proofreading. Use of AI tools in modeling will also be discussed as part of the course content. All student work will be assessed by the instructor and/or a TA.

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://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/ Academic Consideration is only accepted for the final examination. For all in-term assessments in this course (assignments, the midterm test, and the presentation), Academic Consideration requests are not accepted. Missed work is handled automatically through the reweighting provisions described below. Requests for Academic Consideration for the final examination must be submitted through the Student Absence Portal with supporting documentation.

Midterms and Tests

This course has 1 midterm test(s)/term test(s) and a **cumulative** final exam. There is no makeup test for a missed midterm. If a student misses a midterm, its weight will shift automatically to their final exam grade. If their final exam grade is higher than their midterm grade, their final exam grade will replace the midterm's weight in their overall grade. They do not need to request Academic Consideration for a missed midterm; the reweighing will be done automatically.

The only exception is an early sitting, offered solely for a university-sanctioned schedule conflict (e.g., conflict of two midterms, Varsity competitions) or a religious accommodation that prevents a student from writing the midterm at its scheduled time. If a student requires this accommodation, they must notify their instructor in writing no later than one week before the test. No other circumstance, including illness, qualifies for an early sitting or makeup; these are addressed through the automatic reweighing described above.

Assignments

This course has 5 assignments. Students are expected to complete 4 to receive full credit for this component. If they miss up to 1 of these, they do not need to request Academic Consideration; the missing item(s) will not count against them, and their grade for this component will be calculated from their best 4 submissions.

If a student completes fewer than 4 of the total, the missing items will be reweighted to the final. If their final exam grade is higher than their grade on this component, their final exam grade will replace it. They do not need to request Academic Consideration.

Deadlines: The 48-Hour No-Late-Penalty Period

All take-home assignments with a stated due date include an automatic 48-hour period after the deadline during which students may still submit without a late penalty. For example, if an assignment is due on November 5, they may submit it until November 7 without penalty. After this 48-hour period, no further submissions will be accepted, and students do not need to request Academic Consideration for a missed deadline; their grade for this component will be calculated as described above.

Presentations

If a student misses the project presentation, the presentation will be reweighted to the final. They are encouraged to present, even if incomplete, since a partial mark is always better than a zero. If their final exam grade is higher than their grade on this component, their final exam grade will replace it. They do not need to request Academic Consideration.

Special Examination

Per university policy, Academic Consideration requests with supporting documentation are required for the final examinations scheduled during official examination periods by the Registrar's Office.

If the student has been approved by the Academic Advising Office to write a Special Examination (SPC) and the final exam is their only outstanding course component, an SPC will be assigned to them and scheduled by the instructor per university policy.

If the student misses their SPC exam and is approved for Academic Consideration, they will be withdrawn from the course without academic penalty. If they experienced extenuating circumstances such as prolonged illness, they may appeal to the Associate Dean (Academic), on a case-by-case basis, for the opportunity to write the final exam the next time the course is offered. An outstanding SPC will reduce their course load for the term in which the exam is deferred, as outlined in the [Definitions of Types of Examinations](#) policy.

If the student misses their SPC exam and Academic Consideration is not approved, or was not requested, they will receive a grade of zero on the exam.

6. Additional Statements

6.1 Religious Accommodation

When a recognized religious holiday either requires a student to be absent from the University, or requires or prohibits an activity that makes it impossible for them to complete an academic requirement scheduled that day, they are entitled to accommodation. No student will be penalized for an absence for religious reasons, and an alternative means of satisfying the requirement will be arranged. This accommodation is provided in accordance with the University's policy on Accommodation for Religious Holidays:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

The student should submit their requests through the Student Absence Portal (SAP), identifying the conflict and the specific course component(s) affected (e.g., test, midterm, exam).

Midterms and Tests: If a religious observance conflicts with a midterm test, they must submit their request no later than **one week** before the test. Their instructor will arrange an early sitting of the test. As set out above, no makeup test is offered for any other reason; this early sitting is available specifically for this accommodation.

Final Examinations: If a religious observance conflicts with the final exam, the student must submit their request no later than **two weeks** before the exam. Their instructor will arrange a Special Examination to take place no later than one month after the end of the examination period.

Students are responsible for finding out what was covered in any class they miss due to a religious observance, and for taking the appropriate steps to keep up with the course.

If a suitable arrangement cannot be reached between a student and their instructor, they should consult the Undergraduate Chair of the department offering the course, and if necessary, the Associate Dean (Academic) of the Faculty of Science.

For a list of recognized religious observances, please visit the calendars posted on the Equity, Diversity & Inclusion website - <https://www.edi.uwo.ca> (About Us – Resources – Additional Resources – Calendars).

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

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

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, hidden cameras and wireless earbuds.

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

Effective September 2026, the typical penalty for this offence is a failing grade in the course AND a 12-month prohibition on retaking the course.

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is their 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 the student's responsibility to seek clarification before using any AI tools in academic work.

6.5 Support Services

Academic Advising. 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/advising/>.

Mental Health Support. 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.

Gender-Based and Sexual Violence. Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who has gone through these traumatic events. If a student has experienced GBSV (either recently or in the past), they can 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.

Accessibility for Coursework. A student may contact the course instructor if they require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to them. If they have any questions regarding accommodations, they may also contact Accessible Education at http://academicsupport.uwo.ca/accessible_education/index.html

Learning Development and Success. Learning-skills counsellors at Learning Development and Success (<https://learning.uwo.ca>) are ready to help students improve their learning skills. The facility offers 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.

Student Councils.

Student-run support services are offered by the University Students' Council (<https://westernusc.ca>) and the Science Students' Council (<https://www.westernssc.ca>).