Department of Mathematics

Applied Mathematics 3811A Course Outline

Complex Variables with Applications — Fall 2026

Version 1 — September 2026

1. Course Information

Item	Details
Course	Applied Mathematics 3811A (AM 3811A), Complex Variables with Applications
Term	Fall 2026 (September–December)
Section / Class Number	001 / 9342
Lectures	
Location	
Delivery Mode	
First Lecture	Wednesday, September 9, 2026

Prerequisite(s): Calculus 2303A/B or Mathematics 2500A/B or the former Calculus 2503A/B.

Antirequisite: Mathematics 3124A/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this course or written special permission from the Department of Mathematics to enroll in it, they may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on their academic record.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

Instructor	Email	Office	Office Hours / Help
Dr. Greg Reid	reid@uwo.ca		

Students must use their Western (@uwo.ca) email addresses when contacting the instructor. Please include "AM3811" in the subject line of all emails.

Microsoft Teams may also be used for course-related communication when appropriate.

3. Course Syllabus, Schedule, Delivery Mode

Course Description

Functions of a complex variable, analytic functions, integration in the complex plane, Taylor and Laurent series, analytic continuation, Cauchy's theorem, residue theory, Laplace transforms, conformal mapping and applications.

This is a first course in Complex Analysis. Complex analysis extends many of the familiar ideas of real calculus to complex numbers and is an essential prerequisite for much of mathematics, engineering, and other scientific disciplines. It is also a beautiful subject: calculations that begin concretely lead to results of striking elegance and power. Our aim is to develop the central theory while reaching important applications, especially methods for Laplace and Fourier transforms.

The course moves quickly and covers most of the selected chapters, but the major results are developed and proved. Students should use lectures, the textbook, and material posted on OWL Brightspace together. Some material and methods will be presented differently from the textbook when this provides a clearer or more efficient path. Selected supplementary ideas and examples are influenced by materials from Terence Tao's teaching of complex analysis and by other sources identified during the course.

Learning Outcomes

By the end of the course, students should be able to:

- work confidently with complex numbers and elementary complex functions;
- compute complex derivatives and determine analyticity;
- evaluate complex contour integrals and apply Cauchy's theorem and Cauchy integral formulas;
- compute Taylor and Laurent series and determine their regions of convergence;
- locate and classify isolated singularities;

- compute residues and apply the residue theorem to complex and real integrals;
- construct and analyze basic complex and conformal mappings;
- apply complex-variable methods to Laplace and Fourier transforms and inversion problems;
- state, explain, and prove basic results from the course, and connect computations with the underlying theory.

Course Coverage

Material will be taken primarily from the following chapters of Saff and Snider, in approximately this sequence:

- Complex Numbers (Chapter 1), Analytic Functions (Chapter 2), and Elementary Functions (Chapter 3)
- Introduction to complex and conformal transformations (selected material from Chapters 1–3)
- Complex Integration (Chapter 4)
- Series representations for analytic functions (Chapter 5)
- Residues and applications (Chapter 6)
- Laplace and Fourier transforms (Chapter 8)

Key Sessional Dates

Date	Event
September 9, 2026	Classes begin / first AM 3811A lecture
October 10–18, 2026	Fall Reading Week
December 9, 2026	Classes end
December 11–22, 2026	Fall examination period

Tentative Weekly Schedule

Week / Dates	Topics / Activities	Notes / Assessments
1: Sep 9–11	Introduction; course logistics; Complex Numbers (Ch. 1)	First lecture Wed Sep 9
2: Sep 14–18	Complex Numbers; Analytic Functions (Ch. 2)	Quiz 1 — Fri Sep 18 (tentative)
3: Sep 21–25	Analytic Functions; Elementary Functions (Ch. 3)	Quiz 2 — Fri Sep 25 (tentative)
4: Sep 28–Oct 2	Elementary Functions; complex/conformal transformations	No class Wed Sep 30; Quiz 3 — Fri Oct 2 (tentative)
5: Oct 5–9	Complex Integration (Ch. 4)	Assignment 1 due Wed Oct 7 (tentative)
Reading Week: Oct 10–18	No classes	Fall Reading Week
6: Oct 19–23	Complex Integration; Cauchy's Theorem and Integral Formula; review	Midterm — Fri Oct 23, evening; time/location TBA
7: Oct 26–30	Taylor and Laurent Series (Ch. 5)	Assignment 2 due Fri Oct 30 (tentative)
8: Nov 2–6	Laurent Series; isolated singularities	
9: Nov 9–13	Residues and Residue Theorem (Ch. 6)	
10: Nov 16–20	Applications of residues; Argument Principle	
11: Nov 23–27	Fourier and Laplace Transforms (Ch. 8)	Assignment 3 due Sun Nov 22 (tentative); presentations begin
12: Nov 30–Dec 4	Fourier/Laplace transforms; inversion formulas; applications	Team presentations continue
13: Dec 7–9	Wrap-up, final review, Q&A	Classes end Wed Dec 9
Exam Period: Dec 11–22	Final Examination	3 hours; date/time scheduled by Registrar

The topic schedule and dates marked tentative may be adjusted as the course develops. Any changes will be announced in class and on OWL Brightspace.

4. Course Materials

Required Textbook

Edward B. Saff and Arthur David Snider, Fundamentals of Complex Analysis with Applications to Engineering and Science, 3rd Edition.

The current Western Bookstore listing for AM 3811A should be consulted for the available formats and current prices. The 2025 course listing gave approximate costs of $187 for the printed text and $66 for a 180-day e-text rental; 2026 prices may differ. Students may use a suitable second-hand copy of the same edition.

Course Website and Other Materials

Course announcements, assignments, supplementary notes, and other materials will be posted on OWL Brightspace (https://westernu.brightspace.com/) and, where indicated, Gradescope. Selected supplementary material and examples may also be drawn from other complex-analysis resources identified by the instructor.

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 OWL Brightspace, they can seek support on the OWL Brightspace Help page or contact the Western Technology Services Helpdesk at 519-661-3800 or ext. 83800.

iClicker and Technical Requirements

iClicker will be used to encourage and enhance participation. Students should have a web-enabled device capable of accessing iClicker during lectures. A stable internet connection is required for access to OWL Brightspace, Gradescope, and other online course resources.

5. Methods of Evaluation

Grading Scheme and Assessment Dates

Component	Weight	Details
Assignments & Quizzes	25%	3 assignments + 3 quizzes; best 5 of 6 counted
iClicker participation	5%	Participation-based
Team Presentation	10%	Normally teams of 2; approximately 7 minutes per student
Midterm Test	20%	Friday, October 23, 2026, evening; time/location TBA
Final Examination	40%	3 hours; cumulative; scheduled during the December exam period
Total	100%	

Assignments and quizzes are equally weighted within their 25% component, with the best five of the six items counted. The dates in the weekly schedule are tentative unless explicitly confirmed on OWL Brightspace.

iClicker Participation

iClicker is marked on participation rather than correctness. Typically one poll will be used in a class, with occasional additional questions. To receive participation credit, students must be physically present in class and answer using their own registered account/device. The participation scheme is designed to tolerate occasional missed classes; detailed scoring information will be posted on OWL Brightspace.

Team Presentation

The team presentation will normally involve two students working together on a course-related topic selected jointly with the instructor. The target presentation time is approximately 7 minutes per student. Presentation details, scheduling, and evaluation criteria will be announced in class and on OWL Brightspace.

Midterm and Final Examination

The midterm is planned for Friday, October 23, 2026, in the evening. The exact time and location will be announced when confirmed. The final examination is cumulative and is scheduled by the Registrar during the December examination period.

Use of Generative AI, Computers, and Calculators in Assessments

Unless the instructor explicitly states otherwise for a particular assessment, generative AI tools, calculators, computers, and other electronic computational tools are not permitted on the individual components of the midterm or final examination. Limited use of computational or generative-AI tools may be permitted on selected assignments, presentation work, iClicker questions, or specially designated activities, but only under conditions

stated in advance by the instructor. The aim is to make intelligent use of computational tools while strengthening independent mathematical reasoning and calculation skills.

Instructor disclosure: generative AI tools were used to assist with drafting and editing this course outline. The instructor reviewed the resulting text and is responsible for the final course policies and content.

Information about Missed Coursework

Students must familiarize themselves with the University Policy on Academic Consideration – Undergraduate Students in First Entry Programs:
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. It also does not apply to students experiencing longer-term impacts on their academic responsibilities; those students should consult Accessible Education.

Procedures for Academic Consideration requests are posted at
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.

Midterm Test: Flexible Completion

This course has one midterm test and a cumulative final exam. There is no makeup test for a missed midterm. If a student misses the 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. Students do not need to request Academic Consideration for a missed midterm; the reweighting will be done automatically.

The only exception is an early sitting, offered solely for a university-sanctioned schedule conflict (for example, a conflict of two midterms or Varsity competition) or a religious accommodation that prevents a student from writing the midterm at its scheduled time. Students requiring this accommodation must notify the instructor in writing no later than one week before the test. Other circumstances, including illness, are addressed through the automatic reweighting described above.

Assignments and Quizzes: Flexible Completion

This course has three assignments and three quizzes. The best five of these six assessments count toward the 25% Assignments & Quizzes component. A student who misses one of the six does not need to request Academic Consideration; the missing item will be the item dropped from this component. If a student completes fewer than five of the six, additional missing items will be recorded as zero and included in the calculation of this component. Students are encouraged to submit all work, even if incomplete, since partial credit is preferable to a zero.

All take-home assignments or quizzes with a stated due date include an automatic 48-hour period after the deadline during which students may still submit without a late penalty. After this 48-hour period, no further submissions will be accepted. Students do not need to request Academic Consideration for a missed deadline within this built-in flexibility.

Team Presentation

The team presentation is not designated as an essential learning requirement for the purposes of Academic Consideration. If a student is unable to complete the presentation because of an extenuating circumstance, the instructor will determine an appropriate alternative or reweighting consistent with Faculty of Science policy and the nature of the team activity. Details will be communicated to affected students.

Special Examination

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

If a 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 and scheduled by the instructor per university policy.

If a student misses an SPC exam and is approved for Academic Consideration, they will be withdrawn from the course without academic penalty. In extenuating circumstances, they may request relief from the Associate Dean (Academic) for an opportunity to write the final exam the next time the course is offered. If a student misses the

SPC 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 requires a student to be absent from the University, or requires or prohibits an activity that makes it impossible to complete an academic requirement scheduled that day, students should request religious accommodation as early as possible and in accordance with University policy. For a test or examination, requests must be made within the timelines specified by Western. Students are responsible for finding out what was covered in any class missed due to a religious observance and for taking appropriate steps to keep up with the course. Recognized religious observances are listed through Western's Equity, Diversity & Inclusion resources: 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 appropriate documentation. 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

Registrar Services: https://www.registrar.uwo.ca/. In accordance with Western policy, the centrally administered @uwo.ca email account is the student's official university email address, and students are responsible for attending to messages received there in a timely manner.

Requests for Relief (formerly known as "appeals"): Policy — https://uwo.ca/univsec//pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf ; Undergraduate Procedures — 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 may be brought into the assessment room. Students are responsible for reviewing and complying 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, 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 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 and should seek clarification before using AI tools in academic work.

Use of Software for Assessments / iClicker

iClicker will be used for participation and for gathering information about student understanding. Each student must use only their own account/device. Participation data will be used to calculate the iClicker component of the course grade and to help the instructor gauge class participation and the effectiveness of teaching approaches.

6.5 Support Services

Academic Advising: https://www.uwo.ca/sci/advising/ — information on adding/dropping courses, academic considerations, requests for relief, exam conflicts, and other academic matters.

Mental Health Support: https://uwo.ca/health/ — information about mental-health and wellness supports at Western.

Gender-Based and Sexual Violence support: https://www.uwo.ca/health/student_support/survivor_support/get-help.html ; support@uwo.ca

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

Learning Development and Success: https://learning.uwo.ca — support for learning skills, time management, exam preparation, textbook reading, and related academic skills.

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