
MATH*3260 - Complex Analysis

Winter 2024 Course Outline

Section: 01

Credits: 0.50

Calendar Description

This course extends calculus to cover functions of a complex variable; it introduces complex variable techniques which are very useful for mathematics, the physical sciences and engineering. Topics include complex differentiation, planar mappings, analytic and harmonic functions, contour integration, Taylor and Laurent series, the residue calculus and its application to the computation of trigonometric and improper integrals, conformal mapping and the Dirichlet problem.

Prerequisite(s): MATH*2200

Department(s): Department of Mathematics and Statistics

Lecture Schedule

MonWedFri 9:30am-10:20am in ROZH*105 (1/8 to 4/23)

Instructor Information

Allan Willms

Email: awillms@uoguelph.ca

Office: MACN 512

Winter 2024 Office Hours:

MW 2:00-3:30 or by appointment

Additional Support

TA: Serge Adonsou

Email: sadonsou@uoguelph.ca

Office Hours: TBA

The course web site on CourseLink has additional information and resources.

Textbooks

| Group | Title | Author | ISBN |
|----------|--|-----------------|---------------|
| Required | A FIRST COURSE IN COMPLEX ANALYSIS (Available electronically from library) | Allan R. Willms | 9781636393148 |

Course Level Learning Outcomes

- Exhibit an understanding of the basic theory of complex numbers
- Understand differentiation and contour integration for functions of complex variables
- Be able to prove results about differentiation of complex-valued functions
- Be able to use complex numbers in applications such as Fourier series
- Use complex variables to evaluate certain improper real integrals

Schedule of Topics and Assignments

| Week of | Topic | Activities | Due: |
|---------|--|---|--|
| 1/8 | Basics of Complex Numbers, 1.1-1.4 | | |
| 1/15 | Basics of Complex Numbers, 1.5-1.6 Functions of a Complex Variable, 2.1-2.4 | Assn. 1 | Wed. 17th, in class |
| 1/22 | Functions of a Complex Variable, 2.5 | Assn. 2 | Wed. 24th, in class |
| 1/29 | Differentiation, 3.1-3.4 | Assn. 3 | Wed. 31st, in class |
| 2/5 | Differentiation, 3.5-3.6 | Assn. 4 | Wed. 7th, in class |
| 2/12 | Contour Integration, 4.1-4.2 Cauchy Theory, 5.1 | Assn. 5 | Wed. 14th, in class |
| 2/19 | | Winter Break | |
| 2/21 | | Winter Break | |
| 2/23 | | Winter Break | |
| 2/26 | Cauchy Theory, 5.2 | Assn. 6 Midterm test | Wed. 28th, in class date and time TBA |
| 3/4 | Cauchy Theory, 5.3 Series, 6.1 | Assn. 7 | Wed. 6th, in class |
| 3/11 | Series, 6.2-6.3 | Assn. 8 | Wed. 9th, in class |
| 3/18 | Series, 6.3-6.5 | Assn. 9 | Wed. 20th, in class |
| 3/25 | Residues, 7.1-7.3 | Assn. 10 | Wed. 27th, in class |
| 3/29 | | Holiday - Classes Rescheduled to Monday April 8 | |
| 4/1 | Residues, 7.3 Conformal Mapping, 8.1-8.2 | Assn. 11 | Wed. 3rd, in class |
| 4/8 | Conformal Mapping, 8.2 | Last day of classes: April 8. | |
| 4/15 | | Exam, Friday 19th, 8:30-10:30 | |

Assessment Breakdown

| Description | Weighting (%) | Due Date |
|--------------------------|---------------|--------------------------------|
| Best 9 of 11 Assignments | 25% | Wednesdays |
| Midterm test | 25% or 35% | Week 7, TBA |
| Exam | 50% or 40% | Friday, April 19, 8:30-10:30am |

Final Exam

Date: Apr 19

Time: Fri 8:30am-10:30am

Location: TBA *Please see Web Advisor closer to the date of scheduled final for location.*

To understand rules and regulations regarding Examinations students are encouraged to read Student's Responsibilities (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/examinations/>)

If the student is unable to meet the final exam requirements due to medical, psychological or compassionate circumstances they are encouraged to review Student's Responsibilities in the Academic Consideration, Appeals and Petitions (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/>) section of the Academic Calendar.

Grading Schemes

Your best 9 of the 11 weekly assignments will constitute your assignment mark. In general, if you miss an assignment for any valid reason (illness, etc.) then that will be one of the assignments dropped from the set. Speak to me if you miss more than two assignments for valid reasons.

If you do better in the final exam than on the midterm test, then the exam will be weighted at 50% and the midterm test at 25%, otherwise the exam will be weighted at 40% and the midterm test at 35%.

Last Day to Drop Course

The final day to drop Winter 2024 courses without academic penalty is the last day of classes: April 08

After this date, a mark will be recorded, whether course work is completed or not (a zero is assigned for missed tests/assignments). This mark will show on the student's transcript and will be calculated into their average.

Course Grading Policies

Submission of Assignments

Assignments must be submitted in class on Wednesdays. Late assignments will not be accepted. If possible, assignments will be graded and returned by Friday of the same week. It is the student's responsibility to ensure the marks recorded on the course web page are accurate.

Reassessment

All requests for reassessment of assignments or the midterm test must follow the procedure outlined on the course web page.

Standard Statements for Undergraduate Courses

Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-misconduct/>) is outlined in the Undergraduate Calendar.

Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability. Use of the SAS Exam Centre requires students to make a booking at least 10 days in advance, and no later than the first business day in November, March or July as appropriate for the semester. Similarly, new or changed accommodations for online quizzes, tests and exams must be approved at least a week ahead of time. For students at the Guelph campus, information can be found on the SAS website. (<https://www.uoguelph.ca/sas/>)

Accommodation of Religious Obligations

If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements.

See the Academic calendar for information on regulations and procedures for Academic Accommodations of Religious Obligations (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-accommodation-religious-obligations/>).

Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Drop Date

Students will have until the last day of classes to drop courses without academic penalty. The deadline to drop two-semester courses will be the last day of classes in the second semester. This applies to all undergraduate students except for Doctor of Veterinary Medicine and Associate Diploma in Veterinary Technology (conventional and alternative delivery) students. The regulations and procedures for course registration are available in the Undergraduate Calendar - Dropping Courses (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/dropping-courses/>).

Email Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

Health and Wellbeing

The University of Guelph provides a wide range of health and wellbeing services at the Vaccarino Centre for Student Wellness (<https://wellness.uoguelph.ca/>). If you are concerned about your mental health and not sure where to start, connect with a Student Wellness Navigator (<https://wellness.uoguelph.ca/navigators/>) who can help develop a plan to manage and support your mental health or check out our mental wellbeing resources (<https://wellness.uoguelph.ca/shine-this-year/>). The Student Wellness team are here to help and welcome the opportunity to connect with you.

Illness

Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

Recording of Materials

Presentations that are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The Academic Calendars (<http://www.uoguelph.ca/registrar/calendars/?index>) are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.

When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the Undergraduate Calendar for information on regulations and procedures for Academic Consideration. (<https://calendar.uoguelph.ca/undergraduate-calendar/undergraduate-degree-regulations-procedures/academic-consideration-appeals-petitions/>)