

**MATH 3124A – COMPLEX ANALYSIS I
FALL 2019/2020**

Instructor.

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

Class.

MWF 2:30–3:30pm, MC 107.

Office hours.

TBA

Textbook (required).

J. Bak, D. J. Newman, Complex Analysis, 3rd ed., Springer 2010

Free online access from within the UWO intranet at

<http://dx.doi.org/10.1007/978-1-4419-7288-0>.

The following books may also be helpful. The non-electronic ones will be on course reserve at the Taylor Library.

L. V. Ahlfors, Complex Analysis, 3rd ed., McGraw-Hill 1979

S. Lang, Complex Analysis, 4th ed., Springer 1999

R. Busam, E. Freitag, Complex Analysis, 2nd ed., Springer 2009

<http://dx.doi.org/10.1007/978-3-540-93983-2>

Prerequisites.

Mathematics 2122A/B

Antirequisites.

Applied Mathematics 3811A/B

Unless you have either the requisites for this course or written special permission from your Dean to enrol in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

Course Description.

Complex analysis is the study of differentiable complex-valued functions of a complex variable. While the definition is a straightforward adaptation of the concept of real differentiability, complex-differentiable functions enjoy surprising properties: any complex-differentiable function can in fact be differentiated infinitely often. Moreover, two complex-differentiable functions in the complex plane that agree near one point are identical in the whole plane. In short, there are lots of beautiful theorems with lots of beautiful proofs.

We are going to study the following topics: the Cauchy-Riemann equations, elementary functions, branches of the logarithm and argument, Cauchy's integral theorem and formula, winding number, Liouville's theorem and the fundamental theorem of algebra, the identity theorem, the maximum modulus theorem, Taylor and Laurent expansions, isolated singularities, the residue theorem and applications, the argument principle and applications.

As with any other upper-year course in mathematics, there will be an emphasis on mathematical reasoning and proof-writing, which will be practiced through in-class discussion and homework exercises, for instance. Additionally, I want to focus on the ability to read (and understand!) mathematical texts. To practice this, we will sometimes read parts of the textbook together in class. The goal is to increase the students' ability to learn mathematics on their own, outside of the classroom.

Students are expected to attend all classes and to prepare for them by reviewing the material from previous classes, to do the assigned homework and to read in advance the sections of the textbook that we are going to read together in class.

Students should check OWL (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class, besides in-class announcements. Students are responsible for checking OWL on a regular basis.

Evaluation of Student Performance.

Midterm Examination. One midterm exam (90 or 120min), worth 40% of the final grade. Tentatively scheduled for Thu, Oct 31, 7–9pm, MC 108

In case a student misses the midterm for a valid reason, either a make-up exam will be offered or the weight of the midterm will be transferred at the final exam. This happens at the discretion of the instructor.

Final Examination. The final oral exam (30min) is worth 60% of the final grade. The date will be scheduled in class once the dates of the other (written) final exams are known.

Assignments. There will be homework assignment, at least every two weeks. They may be graded, but the grades only serve as feedback; they will not affect the final grade.

Solving the exercises is strongly recommended as this is the best (and probably the only) way to understand the material. It is also a very good preparation for the exams.

Discussing the solution of assignments may be restricted to students who have made a discernible effort to solve them, for example by handing in their own solutions.

Accommodation and Accessibility. If you are unable to meet a course requirement due to illness or other serious circumstances, you must seek approval for the absence as soon as possible. Approval can be granted either through a self-reporting of absence or via the Dean's Office/Academic Counselling unit of your Home Faculty. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at scibmsac@uwo.ca.

For further information, please consult the university's policy on academic consideration for student absences: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf.

If you miss the Final Exam, please contact your faculty's Academic Counselling Office as soon as you are able to do so. They will assess your eligibility to write the Special Exam (the name given by the university to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (see http://www.registrar.uwo.ca/examinations/exam_schedule.html)

Academic Policies.

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

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

Electronic devices (including cell phones and calculators) are NOT allowed on exams and may be confiscated.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Support Services: Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations.

The policy on Accommodation for Students with Disabilities can be found here: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation%20for%20students%20with%20disabilities.pdf.

The policy on Accommodation for Religious Holidays can be found here: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on 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.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.

Acknowledgment of the Science Student Donation Fund. Mathematics undergrad courses are supported by the Science Student Donation Fund. If you are a BSc or BMSc student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Counselling site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the Chair of the Department or email the Science Students' Council at ssc@uwo.ca.