

Complex Analysis II, Math 9056B/4156B

[course outline version January 15, 2023; may be updated later]

Winter term (January-April 2023); MWF 12:30-1:30; in MC 108

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This is an advanced course in complex analysis. The UWO calendar description is:

Linear-fractional transformations, Schwarz's lemma, Reflection Principle, the Argument principle, the Riemann mapping theorem, Runge's theorem, the Mittag-Leffler and Weierstrass theorems.

Learning outcomes: to assess the theorems or techniques applicable to address problems in advanced complex analysis, to justify the properties of analytic and meromorphic functions.

Course participants need to be comfortable with the topics covered in Complex Analysis I (a standard undergraduate course in complex analysis: UWO Math 3124A/B or an equivalent, covering most of the content of the first 11 chapters of "Complex Analysis" by Bak and Newman).

Prerequisite: Mathematics 3124A/B.

Complex Analysis I was, in a sense, an introduction to analytic functions. They have many properties that differentiable functions (real valued functions of one real variable that are differentiable) do not possess. This kind of phenomena produces valuable techniques that are commonly used in mathematics and its applications.

Content of Complex Analysis II goes beyond the basics. We will have a look at more subtle properties of holomorphic functions. In particular, Runge's theorem (a theorem about approximating a holomorphic function by polynomials or by rational functions) is a fundamental fact that pretty much serves as a door into the vast subject of complex approximation theory.

Marks will be based on homework assignments (60%), and two in class tests (20% each). Graduate students (those enrolled in 9056B) will be given a somewhat harder version of the tests than the undergraduate students (those registered in 4156B).

There are 4 homework assignments (each worth 15%), tentatively due Jan. 25, March 1, March 15, April 5. Tentative dates for the in class tests: Fridays Feb. 10 and March 24.

Most of the course material can be found in

"Complex Analysis" by Theodore W. Gamelin

”Functions of One Complex Variable I” by J. Conway

Owl site:

Students are responsible for checking the course OWL site (<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.

All course material will be posted to OWL: <http://owl.uwo.ca>.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

Office hours: on the owl site.

Math 4156B students: Unless you have either the requisites for this course or written special permission from your Dean to enroll 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.

Accommodated evaluations: late homework will not be accepted. Please submit any time before the deadline. If there is proper documentation for a missed assignment, then the homework component of the grade will be adjusted accordingly. In order to obtain a passing numerical course grade, a student must write a proctored assessment. If a student missed a test and there is proper supporting documentation, then a make up test will be given. There is no pre-scheduled date for make-up tests.

Undergraduate students (those registered in Math 4156B): if you missed an assignment or a test, then submit your documentation to the Academic Counselling Office of your Faculty of Registration. Graduate students (those registered in Math 9056B): contact the course instructor for directions.

Religious Accommodation When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University’s list of recognized religious holidays (updated annually) at <https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>

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](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf)

Medical accommodation: if you are unable to meet a course requirement due to illness or other serious circumstances, you must ensure that you have valid medical or other supporting documentation. The Student Medical Certificate is available at

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

It is the student's responsibility to request accommodation and make alternative arrangements with the instructor.

Support services

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>

Contingency plan for an in-person class pivoting to 100% online learning: In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, affected course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will not change. Any remaining assessments will also be conducted online as determined by the course instructor.

In the event of health lock-down, tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide personal information (including some biometric data) and the session will be recorded. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at: remoteproctoring.uwo.ca.

Academic Policies

The website for Registrarial Services is www.registrar.uwo.ca

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 e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

No electronic devices will be permitted on tests and exams.

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

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