Course outline

MATH 300 **Introduction to Complex variables**, University of British Columbia
2024 Winter Term 1 (September - December 2024)

Description

This is an introductory course to complex analysis, that is, the theory of differentiable functions of one complex variable. We will study functions of a complex variable, Cauchy-Riemann equations, elementary functions, Cauchy's theorem and contour integration, Laurent series, poles and residues.

Prerequisites & Corequisites

Prerequisite (Calculus 3): One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 254

Corequisite (Calculus 4): One of MATH 217, MATH 227, MATH 254, MATH 317

Topics

1. complex numbers (1.1-1.6, 4hr)
2. complex derivatives and analytic functions (2.1-2.5, 6hr)
3. elementary functions (3.1-3.3, 3.5, 6hr)
4. contour integration and Cauchy's theorem (4.1-4.6, 8hr)
5. Taylor series and Laurent series (5.1-5.3, 5.5-5.6, 7hr)
6. poles and residues (6.1-6.3, 4hr)

References

We will follow the book [S] closely, but it is optional in the sense that all assignments will be typed and you can study another book.

- [S] Fundamentals of Complex Analysis with Applications to Engineering and Science, third edition, by E. B. Saff and A. D. Snider. It is a standard textbook at UBC and I taught with it twice before.
- [B] A First Course in Complex Analysis, by Matthias Beck, Gerald Marchesi, Dennis Pixton, and Lucas Sabalka. It is an open textbook available at **https://matthbeck.github.io/complex.html (https://matthbeck.github.io/complex.html)** . A couple other UBC professors used it as the textbook.

Important Dates

- First lecture: Wednesday, Sep. 4
- Last day to withdraw without record: Monday, Sep. 16
- Midterm exam 1: Wednesday, Oct. 2
- Midterm exam 2: Wednesday, Nov. 6
- midterm break: Nov 11-13
- Last lecture: Friday, Dec. 6
- Final exam: TBA, during Dec. 10-21

Grading

Homework 10%
Nine (9) weekly homework due Wednesdays Sep 18, 25, Oct 9, 16, 23, 30, Nov 20, 27 and Dec 4 at 11:59pm on Canvas, with the lowest score dropped;

Two midterm exams, 20% each
Two 50-minute midterm exams on Wednesdays October 2 and November 6, in class. MT2 is non-accumulative;

Final exam 50%
One 150-minute final exam. The final exam is accumulative and covers all topics.

Canvas

Canvas is UBC's mobile-friendly online learning platform. You can log in Canvas with your CWL id. Announcements, assignments, lecture notes, solutions of homework and exams will be all posted in Canvas. You will take photo or scan your assignments and upload them to Canvas.

Piazza

We will have a forum at Piazza (see link on the sidebar, or visit **this Piazza link (https://piazza.com/ubc.ca/winterterm12024/math_v3001012024w1)**). You can ask and answer questions there. It is more efficient than emailing questions to the instructors since many students will have similar questions, the answers from your classmates may be easier to understand, and the process of discussion is also beneficial. Instructor and TA will occasionally check if there are questions unanswered. Following the advice of the math department, the set up is that students can show up as "Anonymous" to classmates, but not to instructors.

Policies on homework and midterms

1. All exams are closed book. No outside sheets/papers/notes/books and electronic devices (including all types of calculators) are allowed, except those approved by the Centre for Accessibility. A formula sheet will be provided with each exam.
2. Homework assignments are due 11:59pm at Canvas on Wednesdays. Solutions will be posted

on Canvas. A selection of the problems will be graded. If you submit homework late, a 25% penalty will be applied for each day late.

3. Permission to shift the weight of your missed midterm exam to the final exam, or to ignore missed assignments, may be granted only in the following circumstances:
   i. prior notice of a valid, documented absence on the scheduled date (e.g. out-of-town varsity athletic commitment with a letter from a coach), or
   ii. notification to the instructor of absence due to a medical condition with a doctor's note.

   Otherwise, a score of 0 will be given for the missed midterms/assignments. However, the **UBC policy on Academic Concession (http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,329,0,0)** allows students to request academic concession without documentations ONCE per course. For such request please fill the **form (https://owncloud.math.ubc.ca/index.php/s/mumsWsljdjR1idJ#pdfviewer)** .
4. The period for final exams is Dec. 10-21, 2024 inclusive. The exact time will be announced by the University in the middle of the term. Students should not make early travel plans that overlap with the scheduled exam period.

Severe Weather Plan

On a lecture day, If there is a severe weather such as big snow that makes it difficult to come to campus, I will send an announcement and move the lecture online by Zoom. The Zoom link will be given in the announcement. If a severe weather happens on the day of a midterm exam, I will send an announcement to postpone the exam to a later lecture time in class.

Statement on UBC's Policies and Resources to Support Student Success

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence. UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom. UBC provides appropriate accommodation for students with disabilities and for religious and cultural observances. UBC values academic honesty and students are expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions. Details of the policies and how to access support are available **here (https://senate.ubc.ca/policies-resources-support-student-success)** .

Instructor

1. Tai-Peng Tsai, Math building room 109, phone 604-822-2591, email ttsai@math.ubc.ca , URL https://personal.math.ubc.ca/~ttsai/
2. office hours: TBA, and by appointments.