Math 301/201 **Applied Analysis** **Jan-Apr 2026**

Instructor: Michael J. Ward, ward@math.ubc.ca. Credits: 3

Office hours: to be arranged

Course webpage: Course materials will be found on Canvas

Piazza: There is a link to Piazza on Canvas. Please use Piazza for questions that arise in your learning and for questions about all issues related to the course. For personal matters please use email to Michael Ward.

Text: An excellent text for the course is J.E. Marsden and M.J. Hoffman, "Basic Complex Analysis," 3rd edition, W.H. Freeman, 1999, but it is out of print. There are used copies for sale online.
An alternate text is E.B. Saff and A.D. Snider, "Fundamentals of Complex Analysis," 3rd edition, Pearson Education Inc., 2003 (reissued in 2018).
Course notes written by me will be on canvas. There is no required textbook, but if you do have Saff and Snider the material is as follows. The last part of the course is not covered in Saff and Snider.

Topics: The main topics are (SS = Saff and Snider):

1. Review of residue theory and complex integration (SS §5.6, §6.1–6.4)
2. Multi-valued functions and integrals involving branch cuts (SS §6.6)
3. Argument principle and Rouché's Theorem (SS §6.7).
4. Laplace equation and conformal mapping, Riemann mapping theorem (SS §7.1, 7.2).
5. Möbius transformations (a.k.a. fractional linear transformations) (SS §7.3, 7.4).
6. Applications of conformal mapping (SS §7.6, 7.7).
7. Laplace and Fourier Transforms
8. Analytic continuation (SS §5.8).
9. Asymptotic evaluation of integrals (including Laplace and Fourier integrals), steepest descent and stationary phase (as time permits).

Evaluation: There will be homework assignments, two tests, and a final exam.

Homework: Roughly weekly assignments will be given and marked for credit. Assignments are due at the time indicated on Canvas and are to be uploaded as file uploads to Canvas. *No late assignments will be accepted.*

Tests: There will be two 50-minute tests held during the regularly scheduled class hours on the following dates:
Friday, February 13, Wednesday, March 25.

Final exam: There will be a final examination during the April examination period.

Final mark: The final mark will be calculated (subject to possible scaling) as follows:
Homework: 20% (lowest HW score is dropped)
Tests: 15% each
Final exam: 50%

Prerequisite: One of MATH 300, MATH 305 and one of MATH 215, MATH 255, MATH 256, MATH 258.
Corequisite: One of MATH 256, MATH 257, MATH 316, MATH 358, MECH 358, PHYS 312.

Course policies: You are encouraged to discuss assignment problems with each other; it is a good way to learn. However, the solutions that you write up should be in your own words. Never copy your solutions from each other. If you find a solution on the internet, a book, or elsewhere, cite your source.

The midterms and final exam are closed book: no calculators, formula sheets, or other aids are permitted.

Missing an assessment without a valid reason results in a mark of zero. Missing an assessment for a valid reason normally results in the weight of that assessment being transferred to the final exam. Examples of valid

reasons include illness and travel to play a scheduled game for a varsity team. Examples of reasons that are not valid include conflicts with personal travel schedules or conflicts with work schedules. Any student who misses an assessment is to present to their instructor the Department of Mathematics self-declaration form for reporting a missed assessment within 72 hours of the assessment date. The form is here: `https://www.math.ubc.ca/undergraduate-academic-concession-form`. This policy conforms with the UBC Vancouver Senate's Academic Concession Policy V-135 and students are advised to read this policy carefully: `http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,329,0,0`.

University policies: 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 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 on the UBC Senate website `https://senate.ubc.ca/policies-resources-support-student-success`.