Math 301/201 **Applied Analysis** **2021W2, Jan-Apr 2022**

Instructor: Dr. G. Slade, `slade@math.ubc.ca`.

Office hours: Via Zoom at the times indicated on Canvas.

Teaching assistant: The TA for the course is Fanze Kong. For concerns about marking please send email to `fzkong@math.ubc.ca`.

Course webpage: Course materials will be found on Canvas `https://canvas.ubc.ca/courses/85185/`.

Lectures on Zoom: During periods determined by the University as unhealthy for in-person classes, including January 10-21, lectures will be given on Zoom (click on the Zoom link in Canvas) at the scheduled hours MWF 11:00-11:50 . You are strongly encouraged to attend Zoom classes at those times, and to take notes as you would do in a blackboard lecture. Online lectures will be recorded and available in Zoom Cloud Recordings on Canvas. When authorised by the University, in-person classes will resume and Zoom will not be used.

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 Dr. Slade.

Text: The primary text is E.B. Saff and A.D. Snider, "Fundamentals of Complex Analysis," 3rd edition, Pearson Education Inc., 2003 (reissued in 2017).
In the latter part of the course we will also refer to M.J. Ablowitz and A.S. Fokas, "Complex Variables Introduction and Applications," 2nd edition, Cambridge, 2003 (can be downloaded from UBC library).

Topics: The main topics are:

1. Integrals involving multi-valued functions (Saff and Snider §6.6).
2. Argument principle and Rouché's Theorem (Saff and Snider §6.7).
3. Laplace equation and conformal mapping, Riemann mapping theorem (Saff and Snider §7.1, 7.2).
4. Möbius transformations (a.k.a. fractional linear transformations) (Saff and Snider §7.3, 7.4).
5. Applications of conformal mapping (Saff and Snider §7.6, 7.7).
6. Asymptotic evaluation of integrals (including Laplace and Fourier integrals), steepest descent and stationary phase (Ablowitz and Fokas §6.1, 6.2, 6.3, 6.4).

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

Homework: Eight assignments will be given and marked for credit. Assignments are to be submitted on Canvas by 10:59 a.m. on the due date. This is a strict deadline: *no late assignments will be accepted.* The assignment schedule is as follows:

Assignment given	Assignment due
January 14	January 21
January 21	January 28
January 28	February 4
February 11	February 18
February 18	March 4
March 4	March 11
March 11	March 18
March 25	April 1

Tests: There will be two 50-minute tests held during the regularly scheduled class hours on the following dates:

Friday, February 11, Friday, 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: 10% (best 7 assignment marks)
Tests: 20% 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. (This is subject to change if in-person tests are not possible.)

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://secure.math.ubc.ca/Ugrad/ugradForm/Student_Declaration_Academic_Concession_MATH.pdf`. 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`.

Updated January 5, 2022.