ACKNOWLEDGEMENT

UBC's Point Grey Campus is located on the traditional, ancestral, and unceded territory of the xʷməθkʷəy̓əm (Musqueam) people.

COURSE INFORMATION

Course Title	Course Code Number	Credit Value
Applied Complex Analysis	MATH 305:201	3

Time and Room: MWF 12-1pm, in SWNG 122

PREREQUISITES

One of MATH 200, MATH 217, MATH 226, MATH 253, MATH 254
and one of MATH 215, MATH 255, MATH 256, MATH 258

COREQUISITES

One of MATH 256, MATH 257, MATH 316, MATH 358, MECH 358, PHYS 312

CONTACTS

Course Instructor(s)	Contact Details	Office Location	Office Hours
Sven Bachmann	By email: sbach@math.ubc.ca	MATH 228	Wed 1-2pm

OTHER INSTRUCTIONAL STAFF

TA: TBA TBA@math.ubc.ca
Office hours: TBA

COURSE STRUCTURE & LEARNING OUTCOMES

The three weekly lectures aim at a non pedantic and enlightening exposition of the central mathematical results of complex analysis, illustrated by few examples. They are complemented by the homework exercises which are an essential part of the learning process. Student questions during the lectures are encouraged.

Students will further benefit from reading the corresponding material in the textbook (see below), which provides a slightly different perspective on the topics and covers many more examples.

Having reviewed basics of complex numbers and the complex plane $\mathbb{C}$, this course concentrates on analytic aspects of functions defined on $\mathbb{C}$ and taking values in $\mathbb{C}$. It will cover differentiation and integration and focus on the fundamental difference between the plane $\mathbb{R}^2$ and the complex plane $\mathbb{C}$. Complex functions are ubiquitous in science and engineering, in particular through the computational power associated with complex integration as well as in understanding the solutions of differential and finite difference equations.

SCHEDULE OF TOPICS

1. Preliminaries
   - Complex numbers
   - Polar form, powers and roots
   - Sets in the complex plane, complex functions and their mapping properties
2. Functions
   - Differentiability and the Cauchy-Riemann equations
   - Holomorphic functions
   - Power series
   - The exponential and logarithm functions
3. Integration
   - Contours and integration along contours
   - Primitives
4. Cauchy's theorem and applications
   - Cauchy's theorem and Cauchy's integral formulas
   - Toy contours and evaluation of integrals
   - Liouville's theorem
   - The fundamental theorem of algebra
5. Meromorphic functions
   - Zeros and poles
   - Laurent series
   - The residue formula
   - Evaluation of integrals
   - The argument principle
6. The Fourier and Laplace transforms (if time permits)

Learning Materials

There will be weekly lecture notes posted on the course's Canvas page. The weekly homework assignments and their solutions will be posted there as well. All important announcements will be communicated through Canvas.

We will not follow any textbook explicitly. The reference textbook is
Fundamentals of Complex Analysis: with Applications to Engineering and Science by E. Saff and A.D. Snider
There are many other excellent elementary texts, such as
Complex Variables by S. D. Fisher
Complex Analysis by E. Stuart and D. Tall

Discussions on Piazza is encouraged, and must be limited to the course material. The course's TA will monitor the discussions, comment and respond whenever needed.

Assessments of Learning

There will be

1. weekly homework assignments due Mondays at noon,
2. two midterm exams, on Wednesday February 12 and Wednesday March 12, lasting 45 minutes,
3. one final exam to be scheduled in the exam period.

Cheating will not be tolerated.

The final grade is computed as such:

Homework: 5%;   Midterms: 20% each;   Final: 55%.

In order to obtain the maximum 5% available for the homework, 8 sheets must be handed in during the term. They will not be marked, but randomly checked: if a submitted sheet does not contain evidence of sufficient work (at least three-quarters of the problems worked out) the student will loose 10% on the final grade.

Missing a midterm: There is no make-up midterm. Missing a midterm for a valid reason normally results in the weight of that midterm being transferred to the final exam, resulting in HW: 5%, M: 20%, F: 75%. 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. A student who misses a test is to submit a self-declaration form for reporting a missed assessment within 24 hours of the midterm time.

After midterm grades are released: Solution of the problems, which include grading keys will be available on the midterm assignment page. Please consult them before contacting us about your grade. If you think there is a marking error, contact the TA with a detailed request specifying which question and associated grading key should be reviewed. Alternatively, you can attend office hours. Requests will be considered within one week after the grade release.

Academic concessions for final exam are handled through your Faculty Advising Office.

On submitted work:

All assertions require an argument unless the problem states otherwise. No matter the operative word ('find', 'solve', 'establish', 'calculate', 'determine',...), you must justify your answer. Written work should be presented carefully, in complete English sentences, and with sufficient detail. A correct sequence of formulas will only receive partial credit, an unstructured cloud of formulas and incoherent text will receive none.

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.

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