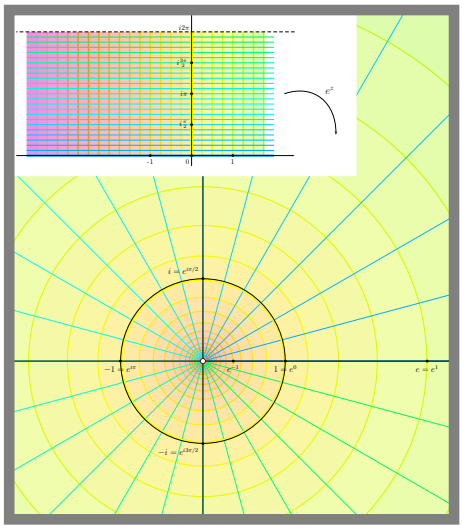

Dalhousie University
Department of Mathematics and Statistics

MATH 4020

Analytic Function Theory

Winter 2019

INSTRUCTOR:
Andrea Fraser, Assoc. Professor afraser@mathstat.dal.ca
Chase Building, Room 206 (by the central stairwell) 494-3062

LECTURES:
Monday, Wednesday, Friday: 10:35 am - 11:25 am Chase Building 319 (Colloquium Room)

COURSE DESCRIPTION:
Topics include: review of analytic complex functions including topological properties of the plane, Mobius mappings, exponential, logarithmic, trigonometric and related functions, integration and the Cauchy theorem. Cauchy's integral formula, residues, harmonic functions, analytic continuation, entire and meromorphic functions, some results of conformal mapping, including the Riemann mapping theorem.

PREREQUISITES: MATH 2002.03 (MATH 3080.03 recommended)
CROSS-LISTING: MATH 5020.03

COURSE OBJECTIVES:
To study the theory and methods for functions of one complex variable. Note that this course subsumes the material of MATH 3080, with the major difference that here the emphasis is on theory and proof, whereas there it was on techniques and computation.

TEXT: No required text. Suggested texts: Lars Ahlfors, *Complex Analysis*; Stein and Shakarchi, *Complex Analysis*; Marsden and Hoffman, *Basic Complex Analysis*.

IMPORTANT DATES:

9 Assignments due each Monday (except the first week, and the weeks of the tests)
3 Tests (in class) on the Mondays of February 4, March 11, April 8

COURSE ASSESSMENT:

Assignments: 25%	Tests: 75%

CONVERSION OF GRADES: Follows the Dalhousie Common Grade Scale.

90	–	100	A+	77	–	79.9	B+	65	–	69.9	C+
85	–	89.9	A	73	–	76.9	B	60	–	64.9	C
80	–	84.9	A-	70	–	72.9	B-	55	–	59.9	C-

50	–	54.9	D
0	–	49.9	F

COURSE POLICIES:

Attendance is expected in this course. Class discussions are an integral part of the learning process, and all students are expected to participate. All course content will be covered in lectures and in handouts distributed in class. All handouts for this course will be available in class, at the start of lecture on the day on which they are first distributed. If you are unable to attend a lecture, it is your responsibility to obtain a copy of the lecture notes or any distributed handouts from a fellow student who was present.

Lecture notes will not be posted or distributed. Taking notes during lectures is an important skill which you are expected to practice in this class. If you find it difficult to keep up, try to improve your note-taking speed. Learn to write using abbreviations, a personal shorthand, or to write while watching the board rather than your page. You might find it helpful to review your notes as soon as possible after class. This is also a good time to tidy up your notes, fill in any things you did not record, memorize new concepts, and try the exercises given in class. Be sure to seek help from your instructor (in class, by email, or by setting up a time to meet) if there are things you don't understand.

Any announcements regarding the course will be made in class, on Brightspace, or by email. You are expected to attend class and to check Brightspace and email regularly. If you miss or are late for a class, it is your responsibility to consult your peers to learn of any announcements. If you do not use your official Dalhousie email address, you should set a forward on it to an address you do use.

Soliciting outside help on assignment questions (for example, at the Learning Centre, from a higher level student, or online) is considered cheating. Use of solutions to tests or assignments from a previous year to which you have somehow gained access, and use of information from websites in solving assignments, are strictly forbidden and considered plagiarism. Any student suspected of violating these rules will be required to pass an oral exam to demonstrate a full understanding of the work submitted. Further action may then be taken following Dalhousie's official plagiarism and cheating policy.

Each assignment must be completed *on the question sheet* and submitted *in class* at the *start* of lecture on the day it is due (or in the event of university closure, on the next class day the university is open). Assignments left at the instructor's office during the lecture will not be accepted. Because assignment solutions will be made available on the same day and assignment questions are frequently discussed in class, no late assignments will be accepted. This includes assignments received on the due date at any time *after* class has started or solutions have been distributed. There will be no make-up assignments under any circumstances.

Tests will be held in class on the dates listed (or in the event of university closure, on the next class or exam day the university is open). Because solutions will be made available on the same day, absence for a test will result in a score of 0 unless a *Student Declaration of Absence* is filed.

STUDENT DECLARATION OF ABSENCE: To self-declare your absence for an assignment, **you must notify your instructor by email before 10:35 am on the day the assignment is due**. You may submit your assignment electronically (scanned and emailed), but it must be received before 10:35 am. If you opt instead not to submit your assignment, the score for that assignment will be dropped from your course assessment.

To self-declare your absence for a test, **you must notify your instructor by email before 10:35 am on the day the test is to be written and you must also include in your email a copy of your official Dalhousie class schedule; failure to do so may result in a score of 0.** A make-up test will then be scheduled for you at the earliest possible date based solely on the constraints of your official Dalhousie class schedule. Be advised that this might be as early as 8:35 am on the day after your self-declared absence.

The *Student Declaration of Absence* form (which can be found in Assignments under Assessment in the MATH 4020 course space on Brightspace) must be completed and submitted via Brightspace no later than three days after the last day of a self-declared absence.

UNIVERSITY POLICIES AND STUDENT RESOURCES: Information on Dalhousie policies and student resources can be found under Syllabus in the Table of Contents of the MATH 4020 course space on Brightspace.

COURSE CONTENT:

Complex numbers. Topology of the complex plane. Complex differentiation. Cauchy-Riemann equations. Series of complex numbers. Series of functions. Power series. Elementary functions. Möbius mappings. Complex integration. Primitives, path independence. Cauchy's theorem. Homotopy of paths. Cauchy's integral formula. Morera's theorem. Cauchy's inequalities, Liouville's theorem, maximum modulus principle, Schwarz' lemma. Laurent series and residue theorem. Meromorphic functions. Argument principle. Harmonic functions. Analytic continuation. Conformal mappings. Riemann mapping theorem.