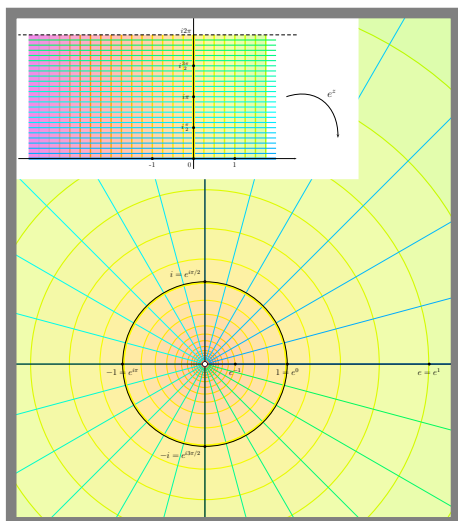




Dalhousie University
Department of Mathematics and Statistics

MATH 4020
Analytic Function Theory
Winter 2018

INSTRUCTOR:

Andrea Fraser, Assoc. Professor
Chase Building, Room 206 (by the central stairwell)

afraser@mathstat.dal.ca
494-3062

LECTURES:

Monday, Wednesday, Friday: 2:35 pm - 3:25 pm 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 reading: Lars Ahlfors, *Complex Analysis*; Stein and Shakarchi, *Complex Analysis*; Marsden and Hoffman, *Basic Complex Analysis*.

IMPORTANT DATES:

Midterm (in class) Monday March 5

Exam (2:30pm -5:30pm) Thursday April 12

COURSE ASSESSMENT:

8 Assignments: 20%

Midterm: 30%

Exam: 50%

CONVERSION OF GRADES: Follows the [Dalhousie Common Grade Scale](#).

90	–	100	A+
85	–	89.9	A
80	–	84.9	A-

77	–	79.9	B+
73	–	76.9	B
70	–	72.9	B-

65	–	69.9	C+
60	–	64.9	C
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. If you miss or are late for a class, it is your responsibility to check with your peers to learn of any announcements. You are expected to check Brightspace and email regularly for any information updates. If you do not use your official Dalhousie email address, you should set a forward on it to an address you do use.

Each assignment must be 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). If you self-declare your absence from class on the day an assignment is due, you may submit your assignment electronically (scanned and emailed), but it must be received before 2:30pm and the correct submission requirements for the *Student Declaration of Absence* form must be met. Because solutions will be handed out immediately after assignments are submitted, late assignments will not be accepted. This includes assignments received on the due date at any time *after* solutions have been distributed. There will be no make-up assignments under any circumstances. Since each assignment is only worth 2.5%, a missed assignment will not seriously affect your final course mark.

All work must be entirely your own. Seeking help on assignment questions from another person (for example, at the Learning Centre 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 using previous years' solutions to tests or assignments, of receiving assistance to assignments online, or of consulting a person or website in order to solve assignment questions, 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.

The midterm and exam will be held in Chase 319 on the dates indicated (or in the event of university closure, on the next class/exam-period day the university is open).

Excepting students who are approved to write in the Student Accessibility Centre at Dalhousie, all students are expected to write the midterm and exam where and when they are scheduled; failure to write a test or exam where and when it is administered will result in a score of 0, regardless of the reason.

For students who self-declare absence from the midterm, the score for the midterm will be dropped and the course assessment will be calculated using 80% final exam, *provided* the correct submission requirements are met for the *Student Declaration of Absence* form.

There will be absolutely NO make-up assignments or make-up midterm under any circumstances – illness, emergency, death, sports, schedule conflicts, travel, or otherwise. There will be absolutely NO exceptions to this rule. By maintaining your registration in this course, you are accepting this rule and agreeing to abide by the terms of this syllabus.

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. The *Student Declaration of Absence* form and its submission requirements can be found in Assignments under Assessment in 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.