MATH 3260 - Complex Analysis

Winter 2017

Department of Mathematics & Statistics
University of Guelph

Calendar Description

This course extends calculus to cover functions of a complex variable; it introduces complex variable techniques which are very useful for mathematics, the physical sciences and engineering. Topics include complex differentiation, planar mappings, analytic and harmonic functions, contour integration, Taylor and Laurent series, the residue calculus and its application to the computation of trigonometric and improper integrals, conformal mapping and the Dirichlet problem.

Course Weight: 0.50
Class Schedule and Location: MWF 9:30-10:20 in CRSC 116

Instructor: A. Willms
Email: AWillms@uoguelph.ca
Office Location: MACN 512
Office Hours: Tues. 13:30-14:30; Wed. & Fri. 13:00-14:00; or by appointment

GTA: Brady Dortmans
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Lecture Content

- Complex numbers, basic operations, polar form, Euler's formula and de Moivre's Theorem, roots and powers, Riemann sphere.
- Elementary functions of complex variables, branch points and branch lines, Riemann surfaces, limits, sequences, continuity.
- Complex differentiation, the Cauchy-Riemann equations, analytic and harmonic functions, derivatives of elementary functions, singularities, differential operators.
- Contour integrals, complex integration, the Cauchy-Goursat Theorem and its consequences.
- Cauchy's integral formulas and their consequences.
- Sequences and series of functions, absolute and uniform convergence, Taylor and Laurent series, classification of singularities, analytic continuation.
- Residue Theorem, evaluation of integrals.
- Possibly some of: Conformal mapping, Riemann's mapping theorem, special mappings, Fourier transforms.

Evaluation

Assessment	date/time	place	weight
Best 9 of 11 Quizzes	Wednesdays starting Jan. 18, 9:30	CRSC 116	30%
Midterm Test	Thur. Mar. 2, 19:00-21:00	MCKN 231	30%
Final Exam	Fri. Apr. 21, 14:30 - 16:30	TBD	40%

Texts

Required:

- *Schaum's Outlines: Complex Variables, 2nd Edition* by Murray R. Spiegel, Seymour Lipschutz, John J. Schiller, and Dennis Spellman. McGraw-Hill 2009.

We will cover nearly all of the material in the first six chapters and possibly touch on a few topics in the last two chapters.

Recommended:

- *Fundamentals of Complex Analysis*, 3rd Edition, E.B. Saff and Arthur D. Snider. Prentice Hall, 2003.
- *Complex Variables and Applications*, 8th ed., James W. Brown and R.V. Churchill, McGraw-Hill, 2009.
- *Visual Complex Analysis*, Tristan Needham, Oxford University Press, 1997.

All of these texts have been placed on reserve in the library.

Grading Policies

There are eleven 15-minute quizzes which will take place in class on Wednesdays starting January 18. Since only the best nine of these quizzes will count toward your final grade, there will normally be no accommodation for missing a quiz.

Quizzes and the midterm will be marked as quickly as possible and returned in class. Marks will be available on courselink. It is the student's responsibility to check that the posted marks are accurate. All requests for reassessment of quizzes or the midterm test **must** follow the procedures outlined on the course web page.

Suggested Homework Problems

I will post a large number of suggested problems from the text book as we cover the topics from each section. I strongly encourage you to both read the relevant sections in the text and attempt the suggested problems in the week they are scheduled. You should do as many of these suggested problems as you need in order to understand the material. If after doing a few similar problems you have mastered one concept, feel free to skip the remaining suggested problems that deal with the same concept. Worked solutions and answers to many problems are available in the text.

As a general guideline, I expect students to spend about six or seven hours per week (in addition to lectures) reading the text book, reviewing lecture notes, doing homework problems, and studying.

University Policies

E-mail Communication

All students are required to check their University of Guelph e-mail account regularly; e-mail is the official route of communication between the University and its students.

Academic Accommodation of Religious Obligations

If you are unable to complete a course requirement due to religious obligations, please let the instructor know within the first two weeks of class. See the academic calendar for more information: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml

Academic Consideration

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor in writing, with your name, id, and e-mail contact. See the academic calendar for information on regulations and procedures for Academic Consideration: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community, faculty, staff, and students to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection. Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor. The Academic Misconduct Policy is detailed in the Undergraduate Calendar: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Accessibility

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability or a short-term disability should contact the Student Accessibilities Services (SAS) as soon as possible. For more information, contact SAS at 519-824-4120 ext. 56208 or email csd@uoguelph.ca or see the website: http://www.uoguelph.ca/csd/

Drop date

The last date to drop one-semester courses, without academic penalty, is the 40th day of classes. See the Undergraduate Calendar Schedule of Dates: https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c03/index.shtml For regulations and procedures for Dropping Courses, see the Academic Calendar: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Recording of Materials

Presentations which are made in relation to course work, including lectures, cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a student, or guest lecturer. When recordings are permitted they are solely for the use of the authorized student and may not be reproduced, or transmitted to others, without the express written consent of the presenter.