

Course Outline Form: Winter 2016

General Information

Course Title: Complex Analysis

Course 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.

Credit Weight: 0.50

Academic Department (or campus): Mathematics & Statistics

Campus: University of Guelph

Semester Offering: Winter 2016

Class Schedule and Location: MWF 9:30–10:20 in MCKN 228

Instructor Information

Instructor Name: Allan Willms

Instructor Email: AWillms@uoguelph.ca

Office location and office hours: MACN 512, MWF 10:30-11:30 or by appointment

GTA Information

GTA Name: Connor Paul-Paddock

GTA Email: cpaulpad@mail.uoguelph.ca

GTA office hours and location: none

Course Content

Specific Learning Outcomes:

To gain an understanding of the complex number system including functions of complex numbers and the calculus of complex functions. To learn how complex analysis has applications in various fields such as partial differential equations.

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.

Course Assignments and Tests:

Assessment	date/time	place	weight
Best 3 of 5 Quizzes	Fridays Jan. 22, Feb. 5, Mar. 4,18, Apr. 1; 9:30 a.m.	MCKN 228	15%
Midterm Test	Wed. Feb. 24, 7-9 p.m.	MCLN 107	40%
Final Exam	Fri. Apr. 22, 14:30 - 16:30 p.m.	TBD	45%

Course Resources

Required Texts:

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

Recommended Texts:

- *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 are available at Library Reserve desk.

Other Resources:

This course is on the web at the University's Courselink page. It contains the information on this page as well as other information that will be updated regularly, including assignments, and posted marks.

Course Policies

Grading Policies

There are five 25-minute quizzes which will take place in class on the dates indicated above. Since only the best three 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, with unclaimed ones going in the MATH 3260 OUT Box on the third floor of MACN. 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.

Course Policy on Group Work: There will be no group work for this course.

Course Policy regarding use of electronic devices and recording of lectures

Electronic recording of classes is expressly forbidden without consent of the instructor. 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 instructor.

Additional Course Information

Homework assignments will be posted on courselink on Monday of each week. You are *not* required to hand in these assignments. However, if you wish to hand in any portion of the assignment, the TA will look at your solutions and provide you with feedback. Assignments should be handed in in class on Monday of the week following their posting. Solutions to the assignments will also be posted on courselink at that time. I strongly encourage you to both read the relevant sections in the text and attempt the assignment problems in the week they are scheduled whether or not you hand any in. If you have any doubt about your solutions, either hand in the problems or check the solutions yourself.

In addition to the assignments, I will post a large number of suggested problems from the text book as we cover the topics from each section. 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 of 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 assignment problems, and studying.

University Policies

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:

<https://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/>

Course Evaluation Information

Please see <http://www.mathstat.uoguelph.ca/files/TeachevaluationformF10.pdf>

Drop date

The last date to drop one-semester courses, without academic penalty, is Friday, March 11, 2016. For regulations and procedures for Dropping Courses, see the Academic Calendar:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>