MATH D34 : COMPLEX VARIABLES II
WINTER 2017

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Welcome to MAT D34! This class is a continuation of MAT C34: we will explore analytic and geometric properties of holomorphic functions of one complex variable.

Syllabus

Review of complex analysis. Holomorphic functions. Power series. The maximum principle. Liouville's theorem. The argument principle. Residues.

Entire functions. Jensen's formula. Functions of finite order. Infinite products. Weierstrass' infinite products. Mittag-Leffler's theorem. Hadamard factorization.

Conformal mapping. Conformal mapping of polygons. The Schwarz-Christoffel formula. The Riemann mapping theorem and its proof.

Elliptic functions. Eisenstein series.

An introduction to Riemann surfaces. Topological foundations on manifolds. Definition of Riemann surface. Holomorphic functions between Riemann surfaces. The Riemann sphere. Covering maps. Hyperbolic geometry. Conformal structures on tori. Uniformization of compact Riemann surfaces. The classification of elementary Riemann surfaces. The little Picard theorem.

Practical information

Class time.

- Tu 12:00-14:00, in AA 206
- Th 13:00-14:00, in IC 320.

Instructor. Giulio Tiozzo, tiozzo@math.toronto.edu.

Office hours. My office is IC 495. Office hours are scheduled on Tuesdays and Thursdays, 3-4 PM. If you can't make it to either, please write me and we can arrange some other time to meet.

Prerequisites. Both MAT C34 (complex variables I) and MAT C27 (topology) are recommended. If you have not taken them, let me know.

Homework. There will be 5 homework assignments, due approximately bi-weekly at the beginning of class. Please staple it. You are welcome to collaborate, but in the end everyone should write their own version to hand in.

Exams. For undergraduate students, there will be a midterm exam (on February, 28^{th}) and a final written exam. Graduate students who need a grade should contact me.

Grades. Homework 35%, midterm 25%, final 40%.

Textbooks. The main recommended texts are: for the first part
E. M. Stein, R. Shakarchi, *Complex analysis*
and for the second part (on Riemann surfaces)
J. Jost, *Compact Riemann surfaces*

Other related texts in complex analysis are
S. Lang, *Complex analysis*
T. Gamelin, *Complex analysis*

For Riemann surfaces, other good texts are
H. M. Farkas, I. Kra, *Riemann surfaces*
G. Springer, *Introduction to Riemann surfaces*

An interesting viewpoint on basic complex analysis is given in
T. Needham, *Visual complex analysis*