Mei-Chi Shaw

Math. 60380 Basic Complex Analysis II

Spring 2024, Tuesday-Thursday 2:00-3:15 pm

Complex analysis is one of the most important subjects in mathematics. The main goal of this course is to introduce both classical and modern methods to complex analysis and Riemann surfaces.

Holomorphic functions are solutions to the homogenous Cauchy-Riemann equation, which is of fundamental importance in complex analysis. Harmonic functions and Dirichlet problems will be discussed using classical methods and L^2 techniques. The emphasis is on the interplay between complex analysis and partial differential equations with applications to function theory on Riemann surfaces.

The following topics will be covered in the course:

1: The inhomogeneous Cauchy-Riemann equation.

2: Harmonic functions and the Dirichlet problem.

3: Riemann surfaces.

4: Uniformization of Riemann surfaces.

5: Function theory on compact Riemann surfaces.

6: Introduction to several complex variables.

Course Grade:

Homework: Homework will be assigned every week. Homework will count for 30% of the grade.

MIdterm (Take-Home) Exam: 40%

Project: 30%: Each student will do an individual course project on a topic of his/her choice. The topic should be submitted a month before the end of the semester and be approved by the instructor. Each student will then submit a formal report and make a presentation in front of the class at the end of the semester.

Office Hours: There will be regular office hours every Tuesday 3:30-4:30 pm or by appointment.

Textbook: We will use the monograph "*Complex Analysis in One Variable and Riemann Surfaces*" coauthored with Dr. Charles Stanton. The monograph is based on lecture notes from complex analysis courses I have taught over the years.

Other References:

1. Ahlfors, L. V.; Complex Analysis, 3rd edition, New York, Mcgraw-Hill, 1979.
2. Donaldson, S.; Riemann Surfaces, Oxford University Press, 2011.
3. Forster, O.; Lectures on Riemann Surfaces. Springer-Verlag, 1993

Prerequisite: Math 60370 Basic Complex Analysis I and some basic knowledge of real analysis.