Mei-Chi Shaw

Math. 60380 Basic Complex Analysis II

Spring 2021, Tuesday-Thursday 2:20-3:35 Online Classes

The main goal of the course is to introduce the modern approaches to complex analysis and Riemann surfaces, with emphasis on the interplay among complex analysis, Riemannian geometry, topology and differential manifolds. We will cover the classical results in complex domains using the inhomogeneous Cauchy Riemann equations. Harmonic functions and the Dirichlet problem by both classical and modern approaches will be discussed systematically. Topics on Riemann surfaces, including function theory on Riemann surfaces and the uniformization theorem will be introduced. We will also give an introduction to several complex variables.

Textbook:

We will continue to use the textbook "*Complex Analysis and Partial Differential Equations*" coauthored with Dr. Charles Stanton. The manuscript is based on lecture notes that I taught over the years. We will cover the following chapters:

Chapter 6: The inhomogeneous Cauchy-Riemann equation.

Chapter 7: Harmonic functions and the Dirichlet problem.

Chapter 8: Riemann surfaces.

Chapter 9: Uniformization of Riemann Surfaces.

Chapter 10: Introduction to several complex variables.

Grades:

Homework: 20%

MIdterm Exam: 50%

Project 30%: Each student will do an individual course project of a topic of your choice. A preliminary report of the topic should be submitted before the end of the semester. Each student will submit a paper on the topic and make a presentation in front of the class at the end of the semester.

Office Hours: There will be regular office hours every Wednesday, 4:00-5:00 pm via zooming or by appointments.

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
4. Krantz, S., Complex Analysis from the Geometric point of view. Cirus Vance.
5. Narasimhan, R. Complex Analysis in one variable, Birkhäser,

Prerequisite: Math 60370 or some basic knowledge of one complex variable.