

Mei-Chi Shaw

Spring 2020, Tuesday-Thursday 2:00-3:15 pm, Hayes-Healy 231

### Math 60380-1 Basic Complex Analysis II

The main topics of the course concentrate on the function theory of Riemann surfaces. We will cover the classical results in Riemann surfaces, including uniformization theorem, Riemann Roch theorem and function theory on compact Riemann surfaces. The emphasis is on the interplay among complex analysis, partial differential equations and function theory on complex manifolds. The method is to use the Cauchy-Riemann equations and the Hodge theorem. This potential theoretic approach will yield the classical results directly and streamline the classical topics. We will also give an introduction to several complex variables.

#### Textbook:

We will continue to use the manuscript coauthored with Dr. Charles Stanton. We will cover the following topics:

Chapter 5: Zeros and poles of functions.

Chapter 6: The inhomogeneous Cauchy-Riemann equation.

Chapter 7: Riemann surfaces.

Chapter 8: Harmonic functions and the Dirichlet Problem.

Chapter 9: The uniformization theorem.

Chapter 10: Function theory on compact Riemann surfaces.

Chapter 11: Introduction to several complex variables.

**HOMEWORK:** Homework will be assigned, collected and graded each week.

**EXAMS and GRADING:** Your course grade will be computed as follows:

**Homework: 40%**

**Midterm Exam: 40%**

**Final Project 20%:** Each student will do an individual course project of a topic. 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 at the end of the semester.

**Office Hours:** There will be regular office hours every Wednesday 1:00-3:00 pm at my office (Hayes-Healy 244) 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

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