Mei-Chi Shaw

Math 80350, Topics in Complex Analysis

Fall 2022, MWF 10:30-11:20 am

Prerequisite: Basic knowledge of one complex variable.

Holomorphic functions in one or several complex variables are defined as functions satisfying the homogeneous Cauchy-Riemann equations. Function theory in several complex variables is fundamentally different from one complex variable. Its development started at the beginning of the twentieth century, from some important observations by Poincaré and Hartogs. The purpose of this course is to study holomorphic function theory in several complex variables.

In this course, we will first study the basic properties of the theory for the Caucchy-Riemann equations and the boundary complex in the complex Euclidean spaces or Stein manifolds. Next we will study the Cauchy-Riemann equations in the geometric setting, i.e., on manifolds with positive curvature using the Bochner's technique. We will make this course as self-contained as possible. The following topics will be covered:

1. An introduction to Several Complex Variables.
2. Hilbert space techniques.
3. The Bochner techniques and function theory on compact complex manifolds.
4 The Cauchy-Riemann equations and the Levi problem, L^2 theory.
5. Tangential Cauchy-Riemann equations.
6. Function theory on Hermitian and Kähler manifolds.

References

1. So-Chin Chen and Mei-Chi Shaw, *Partial Differential Equations in Several Complex Variables*, American Math. Society-International Press, Studies in Advanced Mathematics, Volume 19, Providence, R.I. 2001. ISBN: 978-0-8218-2961-5

2. Steven S. Krantz, *Function Theory of Several Complex Variables, 2nd edition*, Wadswort Belmont, California 1992. ISBNs: 978-0-8218-2724-6