MATH 554: COMPLEX MANIFOLDS I. SYLLABUS

Welcome to MATH 554 Complex Manifolds I. This course will be an introduction to the basic theory of Riemann surfaces. We will cover fundamental theorems such as the Uniformization theorem, the Riemann-Roch Theorem, Serre duality, the Torelli theorem and the Brill-Noether Theorem. If time permits, we will discuss aspects of Moduli and Teichmüller theory. The recommended text books for the class are:

(1) Otto Forster, Lectures on Riemann surfaces
(2) Herschel M Farkas and Irwin Kra, Riemann surfaces
(3) E. Arbarello, M. Cornalba, P. Griffiths and J. Harris, Geometry of Algebraic Curves I

In addition, there are many other excellent texts on Riemann surfaces. I encourage you to explore the following.

(1) Ahlfors and Sario, Riemann surfaces
(2) Gunning, Lectures on Riemann surfaces
(3) Weyl, The concept of a Riemann surface

Venue: Taft 308
Time: MWF 10:00-10:50
Prerequisites: Familiarity with topology, algebra and complex analysis at the level of a first year graduate course.

There will periodically be problem sets. Your grade will be entirely based on these problem sets.

Office hours: MW 9-9:50 in SEO 423
Tentative List of Topics:

Week 1. Introduction to Riemann surfaces and examples
Week 2. Covering spaces, analytic continuation
Week 3. Differential forms
Week 4. Riemann-Roch and Serre duality
Week 5. Applications of Riemann-Roch
Week 6. Canonical embeddings and projective geometry of curves
Week 7. The Jacobian variety and the Torelli Theorem
Week 8. The Uniformization Theorem
Week 9. Special divisors and automorphisms of Riemann surfaces
Week 10. Brill-Noether existence
Week 11. Moduli of curves
Week 12. Specialization and limit linear series
Week 13. Brill-Noether nonexistence