MATH 510
Riemann Surfaces and Algebraic Curves
Fall 2012
SYLLABUS

Last revised 8/28/12 to include office hours

Time and place: MWF 11:00–11:50, 445 AH
Instructor: Sheldon Katz
Office and hours: 301 Altgeld Hall, Mondays 2–2:50, Fridays 10–10:50
Instructor contact information: 265-6258, katz@math.uiuc.edu
Prerequisites: MATH 500 and MATH 542.
Course website: http://www.math.uiuc.edu/~katz/class/f12/

Course Description:
Compact Riemann surfaces appear in mathematics in a wide variety of ways. In topology, compact Riemann surfaces up to homeomorphism are precisely the compact orientable manifolds of dimension 2. In differential geometry, they are 2 dimensional compact orientable Riemannian manifolds up to conformal equivalence. In complex analytic geometry, they are precisely the compact complex manifolds of dimension 1. In algebraic geometry, they are the smooth projective varieties of dimension 1 over the field of complex numbers. They are also in 1–1 correspondence with a purely algebraic object, the set of fields of transcendence degree 1 over the complex numbers. They also come up in physical applications such as potential theory, conformal field theory, and string theory (alas, not covered in the course due to time constraints).

This course serves as an introduction to Riemann Surfaces from both the algebraic and function-theoretic points of view. The emphasis will be geometric. Topics include projective algebraic curves, differential forms, integration, divisors of poles and zeroes, linear systems, the Riemann-Roch
theorem, Serre duality, and applications, and other topics in Chapters 1–8 of the text. The course will also introduce students to algebraic geometry over the complex numbers beginning with the analytic theory, serving as an invitation to algebraic geometry.

Lectures will parallel the topics in the text but the treatment will not always be the same. Students are advised to attend the lectures, read the book, and stay on top of the homework.

**Homework:** will be assigned, collected, and graded roughly weekly. You can discuss problems with each other and with the instructor, but solutions must be written up individually.

**Late homework policy:** Late homework, while discouraged, will be accepted at any time and will be graded. There will be a grade penalty for late homework: 25% for up to one week late, 50% for up to two weeks late, etc. Homework turned in after 5pm on the due date will be considered late.

**Course Description:**

**Grading:** Based on homework assignments