

Math 6150/Complex Manifolds/Fall 2015 Syllabus

Course webpage: www.math.utah.edu/~bertram/6150

Class meets: MWF 11:50-12:40 in WEB L120 (note the room change!)

Instructor: Aaron Bertram Office: JWB 302

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Office Hours: By appointment and afternoons at 3 (tea!)

Texts:

Fulton, *Algebraic Curves* (available online),
Kirwan, *Complex Algebraic Curves*,
Mumford, *Curves and their Jacobians*,
Clemens, *A Scrapbook of Complex Curve Theory*,
Arbarello et al, *Geometry of Algebraic Curves*, Volumes I and II,
Harris and Morrison, *Moduli of Curves*

Assignments: Problem Sets and Class Presentations.

Description: This course is about compact, complex manifolds of dimension one, i.e. complex algebraic curves. We will approach these from the point of view of algebraic geometry, viewing algebraic curves as one-dimension subvarieties of projective space, and studying them via their linear series and moduli. Ironically, from this point of view an algebraic curve need neither be complex nor a manifold, but aside from an investigation into the singularities of plane curves, we will generally stick to the category of smooth, complex curves. Prerequisites for the course are a basic understanding of complex analysis in one variable as well as algebra at an advanced undergraduate level. We will develop additional commutative algebra as needed. The course is intended to serve as an introduction to algebraic geometry, but we will also be proving some important theorems about curves.

ADA Statement: The Americans with Disabilities Act requires that reasonable accommodations be provided for every student with physical, sensory, cognitive, systemic, learning, and psychiatric disabilities. Contact me at the beginning of the semester to discuss whether any such accommodations are necessary.

Topics to be Covered:

- Plane Curves
- Bézout's Theorem (for plane curves)
- Max Noether's Theorem
- Linear Series
- Differentials
- The Riemann-Hurwitz Theorem
- The Riemann-Roch Theorem
- Jacobians
- Abel's Theorem
- The Theta Divisor
- Curves of Low Genus
- Petri's Theorem
- Special Divisors
- Clifford's Theorem
- Brill-Noether Theory
- Moduli
- Hurwitz Schemes
- Tropical Curves (time permitting)