Math 672: Algebraic Geometry

Instructor: Mark Shoemaker
Email: mark.shoemaker@colostate.edu

Material:

Algebraic geometry is the study of spaces, known as algebraic varieties, defined as solutions to polynomial equations. Basic examples of such spaces include a circle, defined by the equation $x^2 + y^2 = 1$, or a cone, defined by the equation $x^2 + y^2 = z^2$. Due to the wide variety of types of solutions one can consider (integer solutions, real solutions, complex solutions, solutions mod p, etc…), algebraic geometry provides a unifying language and set of tools for a vast range of fields from complex geometry to number theory to computer science. Much of the power of the subject comes from the fact that geometric questions can be translated into algebraic terms (and vice versa). In the first semester of this course (672) we will introduce affine and projective algebraic varieties and explore the properties, constructions, and questions that classically arise in the field.

Axioms:

Dr. Federico Ardila, a mathematician at San Francisco State University, developed a set of axioms for mathematics education. I strongly believe in them, and so have copied them here.

- **Axiom 1.** Mathematical potential is distributed equally among different groups, irrespective of geographic, demographic, and economic boundaries.

- **Axiom 2.** Everyone can have joyful, meaningful, and empowering mathematical experiences.

- **Axiom 3.** Mathematics is a powerful, malleable tool that can be shaped and used differently by various communities to serve their needs.

- **Axiom 4.** Every student deserves to be treated with dignity and respect.

Course webpage:
https://sites.google.com/site/markshoemakermath/teaching/math-672-algebraic-geometry

Class schedule: M,W,F 3:00 - 3:50 PM in Eng B 4
Office hours: M, W   2:00 - 3:00 PM in Weber 124

Textbook: An Invitation to Algebraic Geometry by Karen E. Smith, Lauri Kahanpää, Pekka Kekäläinen, and William Traves

How you will be graded:

Homework:	80%
Final Project:	20%

Homework:

       Homework will be posted on the course webpage in the spreadsheet at the bottom. It will be due Mondays of most weeks. You may discuss homework problems with your classmates but I strongly encourage you to work on them (and struggle with them) yourself first. All solutions must be written up individually.

Final Project:

       Your last assignment will be a paper on a particular topic from algebraic geometry that goes beyond the scope of our class. This is an opportunity to explore in more depth a topic you find interesting and to practice writing mathematics. We'll talk more about this later, but be thinking about what you might want to explore. Your final project should be written in LaTeX. If you don't have experience writing in TeX, come talk to me and I can help you get started.

Announcements:

       Course announcements will be made via email.

Concluding Thoughts:

       Please reach out and let me know if you are having issues with the course or otherwise. I want to make this class work for you, but I can't help unless I know what's going on. The best way to contact me is via email or to just stop by my office.