Math 526— Algebraic Geometry

Fall 2014, TuTh 8:30–9:45 AM, 1218 SAS Hall
Instructor: Seth Sullivant, office: SAS Hall 3114, email: smsulli2@ncsu.edu
Office Hours: Tu 10:00-11:00 AM, W 2:00-3:00 PM
Course Website: http://www4.ncsu.edu/~smsulli2/MA526Fall2014/MA526.html
Prerequisites: Math 521 or equivalent
Course Description: Algebraic geometry is the study of solutions to systems of polynomial equations. The algebra/geometry dictionary establishes a bijection between such solution sets and certain ideals in a polynomial ring. Hence, techniques from commutative algebra can be used to analyze these geometric objects. The course will provide an introduction to algebraic geometry. We will emphasize not only the theory, but also practical aspects of how to compute with polynomial ideals using Gröbner bases. We will discuss the following topics: ideals and affine varieties, the Nullstellensatz, irreducible varieties and primary decomposition, morphisms and rational maps, Gröbner bases and elimination theory, projective varieties, Grassmannians, graded modules, Hilbert functions, Bezout’s theorem.

Homework: Homework will be assigned weekly and is due in class on Thursday, unless otherwise indicated. Students must write up their own solutions. Working with other students is allowed, however, you must first attempt all problems on your own before discussing solutions with other students. Limit your group size to at most four students. Each student must write up their own solutions. Please indicate on your homework any sources that you used in preparing solutions (e.g. any groups members you worked with or discussed the problems with, if another student helped with a solution, or you were aided by reading a particular text).

It is acceptable to use other sources besides the course notes and the text to aid your learning. However, using another student’s homework solutions from previous courses, online homework solutions from courses at NCSU or other universities, or copying the solutions out of books are unacceptable sources for preparing your homework, and violate the university’s academic integrity policy.

Students are encouraged to prepare homework solutions in LateX. Homework assignments can be found at the course website as well as information on preparing your homework in LateX.
Policy on Late Homework: Homework is due in class on Thursdays, unless otherwise indicated. Late homework will be accepted up to Friday at 5 PM of the week it was due, either to my mailbox, delivered to me in person, or by email and will received 80% of the points. Any homework turned in after Friday at 5 PM will receive a zero. If you must miss a class on the day a homework is due and you want full credit, it is your responsibility to get the homework to me by the beginning of class on Thursday. This could be delivered to my mailbox, delivered to me in person, turned in by another student, or by email.

Quizzes: There will be two 20-minute quizzes. Each quiz will be worth 5% of your grade. The quizzes will cover basic definitions and theorem statements only. The quizzes will be on September 23 and November 18.
Exams: There will be one in-class midterm exam and a take home final exam. The midterm
will be on October 7. The final exam will be a take-home exam and is due on December 3rd at 5 PM.

**Grades:** Grades will be based on Homework (40%), Quizzes (10%), Midterm (20%), and Final Exam (30%). Grades are based on the following scale: A: (> 85%), B: (70-85 %) C: (60-70%) D-F: (< 60%).

**Attendance:** Participation in class activities, group work, and class discussions will be a key contributor to your understanding of the material. To encourage your participation, I will provide up to one third of a letter grade “bonus” to students that attend regularly and participate actively in group work in class (fyi: one third of a letter grade means B would become B+, B+ would become A-, etc.).

**Adverse Weather:** Announcements regarding scheduled delays or the closing of the University due to adverse weather conditions will be broadcast on local radio and television stations and posted on the University homepage.

**Electronic Devices:** You may use your electronic devices in class as long as it is not distracting to the other students or me. (Warning: I get distracted very easily.) Acceptable: Using a tablet to take notes. Unacceptable: Answering your phone in class, typing on a laptop.

**Academic Integrity Statement:** Students are required to follow the NCSU policy. “Academic dishonesty is the giving, taking, or presenting of information or material by a student that unethically or fraudulently aids oneself or another on any work which is to be considered in the determination of a grade or the completion of academic requirements or the enhancement of that student’s record or academic career.” (NCSU Code of Student Conduct). The Student Affairs website has more information.

**Students with Disabilities:** Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at 1900 Student Health Center, Campus Box 7509, 515-7653. For more information on NC State’s policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01).

**Class Evaluations:** Online class evaluations will be available for students to complete during the last two weeks of class. Students will receive an email message directing them to a website where they can login using their Unity ID and complete evaluations. All evaluations are confidential; instructors will never know how any one student responded to any question, and students will never know the ratings for any particular instructors.