

Math 524 — Scheme Theory — Spring 2022

Instructor Contact Info: Brooke Ullery (bullery@emory.edu, MSC E416). I'll respond to your emails within 24 hours. Office hours are 9-10 AM on Tuesdays on Zoom.

Class meeting times: Mon/Wed 11:30 AM - 12:45 PM January 10 - April 25 on Zoom through January 26, and in MSC N306 thereafter.

Website: <http://www.math.emory.edu/~bullery/math524>. I'll post all of your assignments and lecture notes on the website. Canvas will be used for homework submission.

Prerequisites: A first course in algebraic geometry – roughly the first chapter of Hartshorne. You should also be comfortable with basic point-set topology. Some familiarity with differentiable manifolds would help provide context and motivation for some of the material but is not necessary.

Course Overview: This is a graduate-level scheme theory class. We will mostly be following chapters 2 and 3 of Hartshorne. Topics may include sheaves, schemes, separated and proper morphisms, divisors, projective morphisms, sheaf cohomology, and Serre duality.

Text: The main text we will use is “Algebraic geometry” by Robin Hartshorne. We will also occasionally use Shafarevich’s “Basic algebraic geometry 2.”

Homework: I will assign 4-5 problem sets throughout the semester (due every three weeks or so). I'll give you several problems to work on, and some will be graded. You should submit your solutions on canvas. I encourage you to work on the problems together, but you should turn in your own solutions and list the names of your collaborators.

Final project: At the end of the semester, you will choose a recent algebraic geometry paper or preprint and write a 2-3 page summary (more details on the course website). I encourage you to subscribe to daily mailings from <https://arxiv.org> in algebraic geometry at the beginning of the semester.

Grading: The final course grade will be calculated as follows: 90% homework/participation, 10% final project. The solutions to the homework problems are all readily available online, so it doesn't make much sense for me to assign grades based on them, so if you regularly show up to class and turn in homework, you can expect at least an A- on the homework/participation portion. If you work hard and prove it to me (as evidenced by discussions in class or office hours), you may receive an A.

Masks: Please keep your mask on for the entire length of class. Refrain from eating/drinking in class so that you can keep your mask on the whole time.

ADA and students with disabilities: In compliance with the Americans with Disabilities Act of 1990 (ADA), no otherwise qualified person with a disability be excluded from participation in, be denied the benefits of, or be subject to discrimination under any educational program or activity in the university. Please contact the Office for Disability Services, located in the SAAC building on the Emory's Clairmont campus to coordinate reasonable accommodations for students with documented disabilities.