

## MATH 595: COHOMOLOGY OF SCHEMES, SPRING 2019

**Course Meets:** First half of the semester, TuTh 11am-12:20pm

**Instructor:** Thomas Nevins ([nevins@illinois.edu](mailto:nevins@illinois.edu))

**Prerequisites:** Math 500; Math 510 or Math 511 or some basic knowledge of algebraic varieties.

**Course Web Page:** <http://www.math.uiuc.edu/~nevins/courses/spr19/m595.html>

The course will present an introduction to the cohomology of vector bundles and more general (coherent or quasicoherent) sheaves on algebraic varieties and more general schemes.

Many geometric and topological problems about algebraic varieties (as well as real and complex manifolds and other kinds of topological spaces) can be interpreted in terms of vector bundles or sheaves on those varieties; solutions to the problems then typically involve computing things about the sections of those vector bundles/sheaves, and such computations typically rely on information about cohomology. Thus, vector bundle/sheaf cohomology is an indispensable tool in algebraic geometry and parts of complex geometry, algebraic number theory, homotopy theory, and more.

This is a crash course in sheaf cohomology with an emphasis on Čech cohomology as both a definition and a computational tool. We will develop the theory but also carry out a lot of calculations. The main goal of the course: students should finish the course able to use cohomology to solve geometric problems.

In light of the course goal, the course meetings will involve a mix of lecture and problem-solving sessions.