## PRACTICAL INFORMATION

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MA 251
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## **COURSE DESCRIPTION**

The developments in computer algebra software have, over the last couple of decades, had a profound influence on research in commutative algebra and algebraic geometry. They have made it a routine matter to compute examples in quantities and of complexities that are way beyond the reach of pencil and paper. This course is focused on using the computer algebra software MACAUALY 2 to perform computations of objects and invariants that occur in commutative algebra and algebraic geometry.

**Text:** *Computational Algebraic Geometry* by Hal Schenck, London Mathematical Society Student Texts **58**.

Prerequisites: Math 5327, possibly concurrent.

**Student learning outcomes:** After completion of the course, the students will be familiar with a host of invariants from commutative algebra and algebraic geometry, and they will know how to compute them using the computer algebra system MACAULAY 2. The focus of the class is on computations ranter than proofs. Topics covered include:

- Zariski Topology
- Hilbert's Nullstellensatz
- Projective Space
- Graded free resolutions
- Gröbner bases
- Stanley–Reisner rings
- Sheaves
- Global sections
- Divisors

## LEARNING ASSESSMENT

Graded assessment is done through homework, presentations, and projects. Other assessment techniques will also be used; these include direct questioning, problems to be solved in class, and discussions during office hours. Additionally, problems will be assigned for student self-assessment.