

MATH 249A. ARITHMETIC OF ABELIAN VARIETIES

**Instructor:** Prof. Brian Conrad, [conrad@math.stanford.edu](mailto:conrad@math.stanford.edu)

**Office:** 383CC, Sloan Hall

**Office hours:** MWF, 9–10am, and by appointment.

**Course assistant:** None.

**Prerequisites:** Familiarity with the theory of schemes at the level of 216 A,B,C (e.g., valiative criteria, cohomology of coherent sheaves, representable functors, infinitesimal schemes). Knowledge of algebraic number theory in the later parts of the course.

**Textbooks:** *Abelian varieties* by David Mumford.

**Homework/exams:** There will be no homework or exams.

**Course description:** We will aim to hit the highlights of the theory: complex-analytic case, general algebraic theory over an *arbitrary* field, duality and endomorphism algebras, and special results over interesting fields (finite fields, local fields, global fields). Ideally I would like to prove the Mordell–Weil theorem for an abelian variety over a global field and to discuss some finer results due to Tate over finite fields and Néron over local fields. In view of time constraints, our discussion of the complex-analytic case will likely be more of a survey without much proof, but on the algebraic and arithmetic sides I will aim to give a complete treatment (granting familiarity with some techniques from algebraic geometry).