Rational points on varieties

Remke Kloosterman

Dipartimento di Matematica "Tullio Levi-Civita"
Email: klooster@math.unipd.it

**Timetable:** 16 hrs. First lecture on March 5, 2021, 10:00, (date already fixed, see Calendar) Torre Archimede, Room 1BC/50.

**Course requirements:** Basic knowledge of algebraic geometry (definition of an algebraic variety; morphisms between algebraic varieties; interaction between algebra and geometry; genus of an algebraic curve/Riemann surface) and algebraic number theory (some knowledge on ring of integers of a number field; completion of a number field).

**Examination and grading:** Seminar talk.

**SSD:** MAT/02 and MAT/03

**Aim:** An introduction to the study of rational points on varieties, in particular on curves, abelian varieties and Del Pezzo surfaces.

**Course contents:**

1. Revisiting field theory ($C_r$ fields; Galois theory)
2. Introduction to varieties over arbitrary fields
3. Weil conjectures for algebraic curves over finite fields
4. Properties of morphisms
5. Algebraic groups and group cohomology
6. Selmer groups and Tate-Shafarevich groups and rational points on elliptic curves and abelian varieties.
7. Brauer-Manin obstruction and rational points on Del Pezzo surfaces

**Bibliography:** Bjorn Poonen, Rational points on Varieties, American Mathematical Society, 2017.