Semester: Fall

Instructor: Vadim Vologodsky. Email: vologod@gmail.com. Office hours: Mondays, 12:00-13:00 and Thursdays, 16:00-17:00 in room 328.

The class meets on Wednesdays at 14:00-16:50 in room 306. A weekly seminar/problem session meets also on Wednesdays at 12:00-13:20 in room 427. Teaching assistant: Dmitry Krekov. His -email address is dmkrekov@gmail.com

Course description: The beginnings of number theory can be traced to Diophantine equations: polynomial equations such that only the integer solutions are sought or studied. Surprisingly this is a highly structured part of mathematics: there are general results and conjectures which have many concrete nontrivial corollaries. Number theory uses tools from algebra, analysis, and topology. The course covers some of the most important results obtained by the beginning of the 20th century.

Prerequisites: basic abstract algebra (linear algebra, rings, groups, the Galois theory) and elementary complex analysis.

Curriculum:

- Finite fields
- Integers represented by binary quadratic forms
- Quadratic reciprocity law
- Division rings over number fields
- The ideal class group
- Dirichlet's theorem on units in number fields
- Local fields
- Hasse-Minkowski theorem
- Dirichlet's theorem on primes in arithmetic progressions
- Analytic class number formula

Textbooks:

- J.P. Serre, A course in Arithmetic. Springer (1973)
- Z.I. Borevich and I. R. Shafarevich, Number Theory. Academic Press Inc (1966)
- Algebraic Number Theory, Proceedings of an Instructional Conference Organized by the London Mathematical Society, Edited by Cassels and Frohlich (1967)
- Madhav Nori's lectures on algebraic number theory, available electronically at http://math.uchicago.edu/∼ mitya/number-theory/