Math 129: Topics in Number Theory (Spring 2005)

http://modular.fas.harvard.edu/129-05

Course: TuTh 10-11:30

Office Hours: TuTh 3–4

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1 Textbooks

The main text for this course are the notes that I've written and will be handing out. There are also many other books on algebraic number theory and elliptic curves, and I encourage you to look at some of them. For example, there is a book by Marcus that is popular with students.

2 Course Topics

- [**Algebraic Number Theory**] The foundations of algebraic number theory, including unique factorization, finiteness of the class group, and Dirichlet's unit theorem.
- [**Elliptic Curves**] My goal will be to give a complete proof of finite generatedness of the Mordell-Weil group of elliptic curves over number fields. This theorem mostly reduces to an application of the main results of algebraic number theory from the first part of the course. After we prove the Mordell-Weil theorem, I will talk about the Birch and Swinnerton-Dyer conjecture.
- [**Computation**] How to compute the objects we will encounter in the course, both in theory and practice (i.e., with actual software).

3 Prerequisites

- Math 122 – Groups, rings, fields, etc.
- Ability to follow and create nontrivial mathematical arguments.

4 Grade

Your grade will be determined as follows:

- 25% take-home midterm
- 25% final project
- 50% homework

In particular, note that there will be no in-class exams (subject to university approval). If you get 90% of points you'll get at least an A-, 80% will give you at least a B-, and 70% at least a C-.

5 Homework

There will be one HW assignment per week. It will be assigned on Thursday, and due the next Thursday. Though I will not accept late homework, your lowest homework grade will be dropped.

You are allowed to work together on homework problems!

BUT, write up your solutions individually, and carefully acknowledge the people and other sources that helped you.

6 Office Hours

My office is Science Center 515, and I will be there on **Tuesday and Thursday, 3:00–4:00pm** (except on Feb 10). You can also make an appointment with me if you want to see me outside of my office hours. My office phone number is 617-495-1790.

7 Dining

Faculty members are granted unlimited meals in undergraduate houses when accompanied by a student. So please invite me to dine at your house.