18.781: Number Theory

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This is a basic course in number theory. I hope you are comfortable with the notion of an abelian group, but otherwise I will not assume any algebra as a prerequite. In connection with the last topic listed below, I hope you remember the basic facts about convergence of series. The topics covered in the course will include:

Unique factorization and its failure
Congruences
Quadratic Reciprocity
Continued fractions
Quadratic irrationals
Pell's equation
Quadratic number rings: units, class group
Cyclotomic fields and the Fermat conjecture
L-functions and primes in arithmetic progressions
The class number formula for quadratic fields

The "textbook" is Harold Davenport's *The Higher Arithmetic*. This is a beautifully written classic, but it does not contain everything we will cover in the course. You must keep up with the lectures for this, and do the homework, especially on the last three topics. The books listed below may help as well.

There will be about six problem sets, a midterm, and a final exam. These will count about 60%, 15%, and 25%, of the course grade, respectively.

Books in the Reserve Room of the Science Library:

J. Chahal, *Topics in Number Theory*, QA241.C52
H. Davenport, *Higher Arithmetic*, QA241.D3
H. Davenport, *Multiplicative Number Theory*, QA241.D247
D. Flath, *Introduction to Number Theory*, QA241.F59
I. Niven, H. Zuckerman, and H. Montgomery, *An Introduction to the Theory of Numbers*, QA241.N734
W. Scharlau and H. Opolka, *From Fermat to Minkowski*, QA241.S2813
H. Stark, *An Introduction to Number Theory*, QA241.S795
A. Weil, *Number Theory*, QA241.W3418