Math 539: Analytic Number Theory
Spring Term, 2013

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Course Website	`http://www.math.ubc.ca/~lior/teaching/1314/539_W14/`
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My Website	`http://www.math.ubc.ca/~lior/`
Class	MWF 10:00-11:00, MATX 1102
Office Hours	By appointment.
Textbook	None required; see below for recommendations
(Informal) Prerequisites	Elementary Number Theory, Real Analysis, Complex Analysis

About the course

We will count (that is, estimate the number of) integer and prime number solutions to equations. We will use combinatorial ("elementary") methods, some Fourier analysis, and finally zeta-function (contour integration) techniques. Possible topics include:

- Elementary techniques: Divisor sums; the Chebychev and Mertens estimates.
- Fourier analysis and exponential sums. Smooth counting.
- Dirichlet series and the Mellin transform; countour shifting.
- The Riemann zeta function; analytical continuation; the Prime Number Theorem.
- Dirichlet L-functions and the Prime Number Theorem in Arithmetic Progressions.

The main pre-requisites are Elementary Number Theory and Real and Complex analysis (say at the level of UBC MATH 537, 320, and 508, respectively) . We will use some basic ideas from ring theory and finite abelian groups. We will develop all the Fourier analysis we will use.

Optional Textbooks

Davenport (*"Multiplicative Number Theory"*) covers the material tersely. Montgomery–Vaughn (*"Multiplicative Number Theory I"*) have more details and exercizes. The tome by Iwaniec–Kowalski (*"Analytic Number Theory"*) contains a lot more material, and usually works at a great level of generality.

Evaluation and grading

The final grade will be based on six to eight problem sets. There will be no final exam.