

**MATH 571 ANALYTIC NUMBER
THEORY I FALL 2007, SYLLABUS**

Instructor: Bob Vaughan
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Office Hours: MWF 1:25-2:15 and otherwise by arrangement.
Class: MWF 2:30-3:20 Room 113 Osmond
Schedule #: 869269
Text: (1) H. L. Montgomery & R. C. Vaughan, *Multiplicative Number Theory I. Classical Theory*, Cambridge University Press, xii + 516pp, 2006.
(2) Harold Davenport, *Multiplicative Number Theory*, third edition revised by Hugh Montgomery, Springer-Verlag, 2000.
(3) Gérald Tenenbaum, *Introduction to Analytic and Probabilistic Number Theory*, Cambridge University Press, 1995, ISBN 0521412617.
Homework: Due every Monday (or first lecture thereafter when Monday is a holiday).
Grading: Based on Homework and Attendance.

Topics

There will be a very brief overview of the following topics. Primitive roots. Arithmetical functions and Dirichlet convolution. Chebychev's inequalities for the prime counting function, and Merten's theorem.

The following will be covered in detail

Generating functions, Dirichlet series, power series.

Dirichlet characters, and L-functions. Dirichlet's theorem that there are infinitely many primes in an arithmetic progression. Primitive characters.

The Riemann zeta-function and its properties. Connections with automorphic forms. The prime number theorem. Generalizations and applications.

The prime number theorem for arithmetic progressions and the Siegel-Walfisz theorem.

The large sieve, and Bombieri's theorem on primes in arithmetic progressions. Applications.

If time the Selberg sieve will also be covered.

All Penn State Policies (see <http://www.psu.edu/ufs/policies/47-00.html#49-20> and <http://www.science.psu.edu/academic/Integrity/index.html>) regarding ethics and honorable behavior apply to this course.