

# Math 229: Introduction to Analytic Number Theory

## Spring 2022

### Syllabus

### Prerequisites

This is an graduate course on Analytic Number Theory. Undergraduates are welcome!

We will make heavy use of real and complex analysis, such as from courses 25b and 113, or from course 55b. For example, you will need to know the Poisson summation formula and Cauchy's residue theorem.

On the other hand, we will only need very basic number theory (such as the fundamental theorem of arithmetic and simple facts about quadratic residues). Course 124 covers much more than we will need.

### Tentative list of topics

Fundamental tricks, sieves, Dirichlet series (including the prime number theorem), circle method, Bombieri–Pila

### References

There is no official textbook for this course, but here are some great references:

- *Multiplicative Number Theory I: Classical Theory* by HUGH L. MONTGOMERY and ROBERT C. VAUGHAN
- *Problems in Analytic Number Theory* by M. RAM MURTY

## Grading

There will be weekly homework.

Furthermore, there will be a take-home exam at the end of the term.

The final grade will be 70% based on homework and 30% on the final exam. The two lowest homework scores will be dropped.

You are encouraged to collaborate on homework, but must write the solutions up independently. Remember to always acknowledge collaborators and other sources on homework assignments. Collaboration on the final exam is forbidden. No external sources are allowed on the final exam, except the lecture notes (either those on the course website or those made by the student), problem sets, and solutions to problem sets.