Math GU4007: Algebraic Number Theory
Mondays/Wednesdays, 2:40 - 3:55 in 307 Math

Instructor: Evan Warner

Office hours: Tuesdays 9:00-11:00, Fridays 1:00 - 2:00 in 512 Math

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TA: Kevin Kwan; his office hours are Mondays 4:00-6:00 and Wednesdays 5:00-6:00 in 406 Math

Course description: The first half of the course will cover various topics in multiplicative number theory relating to the Riemann zeta-function and Dirichlet L-functions. In particular we will develop sufficient technology to prove the prime number theorem in arithmetic progressions and related results. The second half of the course can develop in several directions depending on student feedback. We will cover some of the basic theory of modular forms and present some applications thereof, but we can also touch on one or more of the following topics: sieve theory, exponential sums and Weyl equidistribution, the circle method, Bombieri-Vinogradov.
The prerequisite is a course in complex variables or complex analysis (e.g., UN3007 or GU4065). It will be helpful, though not absolutely necessary, to have some previous familiarity with some basic concepts in elementary number theory and algebra, such as modular arithmetic and basic group theory.

Textbooks: No textbook that I am aware of covers exactly the material I would like to cover. Most of it is in Davenport, Multiplicative Number Theory (Springer, GTM 74) and the second part of Serre, A Course in Arithmetic (Springer, GTM 7), so those are the "official" course texts. Both of these books are available for free online on SpringerLink via the Columbia library system. Other introductory textbooks in analytic number theory may also be useful - for any given topic we might cover, there will be good expositions available.

Assignments and exams: Homework will be assigned weekly and will be due at the *beginning* of class each Wednesday, starting the second week. If you are unable to attend class, homework should be handed in via the appropriate box on the fourth floor of the math building. *No late homework will be accepted without prior approval*; however, to take care of the occasional lapse *the lowest homework score for each person will not count towards their final grade.* I recommend you not use this "free pass" too early in the semester! You should attempt every homework problem and are responsible for understanding how to solve them for the purpose of exams. Collaboration and discussion with your classmates is encouraged, but each assignment must be written individually, in your own words. In particular, do not exchange any written work with others and do not use any sources for a given problem that trivialize that problem.
There will be one in-class midterm, on Wednesday, March 11, and a take-home final exam. Makeup exams will be given only under exceptional circumstances and you will need a note from a doctor or dean. Grades will be based 50% on homework, 20% on the midterm, and 30% on the final.

Extra help: If you are unable to make the office hours, feel free to email me to schedule an appointment. Additionally the Columbia Help Room (406 Math) is available without appointment when it is open.

Disability accomodations: If you have an exam acommodation through Disability Services, please let me know at least two weeks in advance so that the paperwork can be completed with enough time in advance to make the necessary arrangements.

Academic dishonesty: As a general policy, the use of electronic devices during exams is not allowed. Anyone found to have cheated on an exam will receive a failing grade for the course and be subject to administrative discipline. Cheating on assignments (e.g., copying written work from somebody else) will also normally trigger administrative disciplinary procedures. Fortunately, the vast majority of students do not cheat in classes like this. Please come to me (or use another resource) if you are struggling with the material instead of resorting to cheating.