**Mathematics**

219 Prospect St  
http://math.yale.edu  
M.S., M.Phil., Ph.D.

**Chair**  
Wilhelm Schlag

**Director of Graduate Studies**  
Van Vu

**Professors**  

**Assistant Professor**  
Junliang Shen

**Fields of Study**

Fields include real analysis, complex analysis, functional analysis, classical and modern harmonic analysis; linear and nonlinear partial differential equations; dynamical systems and ergodic theory; probability; random matrix theory, Kleinian groups, low dimensional topology and geometry; differential geometry; finite and infinite groups; geometric group theory; finite and infinite dimensional Lie algebras, Lie groups, and discrete subgroups; representation theory; automorphic forms, L-functions; Langlands program; algebraic number theory and algebraic geometry; mathematical physics, relativity; numerical analysis; probabilistic combinatorics; additive combinatorics; and spectral graph theory.

**Special Requirements for the Ph.D. Degree**

In order to qualify for the Mathematics Ph.D., all students are required to:

- complete eight term courses at the graduate level, at least two with Honors grades;
- pass qualifying examinations on their general mathematical knowledge;
- submit a dissertation prospectus;
- participate in the instruction of undergraduates;
- be in residence for at least three years; and
- complete a dissertation that clearly advances understanding of the subject it considers.

All students must also complete any other Graduate School of Arts and Sciences degree requirements; see Degree Requirements under Policies and Regulations.

The normal time for completion of the Ph.D. program is five years. Requirement (1) normally includes basic courses in algebra, analysis, and topology. A sequence of
three qualifying examinations (algebra and number theory, real and complex analysis, topology) is offered each term. All qualifying examinations must be passed by the end of the second year. There is no limit to the number of times that students can take the exams, and so they are encouraged to take them as soon as possible.

The dissertation prospectus should be submitted during the third year.

The thesis is expected to be independent work, done under the guidance of an adviser. This adviser should be contacted not long after the student passes the qualifying examinations. A student is admitted to candidacy after completing requirements (1)–(5) and obtaining an adviser.

In addition to all other requirements, students must successfully complete MATH 991, Ethical Conduct of Research, prior to the end of their first year of study. This requirement must be met prior to registering for a second year of study.

**HONORS REQUIREMENT**

Students must meet the Graduate School’s Honors requirement by the end of the fourth term of full-time study.

**TEACHING**

Teaching experience is integral to graduate education at Yale. Therefore, teaching is required of all graduate students, typically one term per year. Generally, first-year students work as coaches for calculus classes, meeting with small discussion sections of undergraduates. Second-year students often work as teaching assistants for a linear algebra class (MATH 222, MATH 225, or MATH 226), real analysis (MATH 255 or MATH 256), or discrete mathematics (MATH 244); duties usually include holding office hours or leading discussion sections.

In the spring of their second year, graduate students attend the Lang Teaching Seminar (MATH 827). In this lunch seminar, experienced faculty help students understand the challenges of teaching and prepare students to lead their own section of calculus in the following year and beyond.

Students who require additional support from the Graduate School after the fifth year of study must teach additional terms, if needed.

**MASTER’S DEGREES**

**M.Phil.** See Degree Requirements under Policies and Regulations.

**M.S.** Students who withdraw from the Ph.D. program may be eligible to receive the M.S. degree if they have met the requirements and have not already received the M.Phil. degree. For the M.S., students must successfully complete six term courses with at least one Honors grade, perform adequately on the general qualifying examination, and be in residence at least one year.