APPLIED MATHEMATICS

Leet Oliver Memorial Hall
http://applied.math.yale.edu
M.S., M.Phil., Ph.D.

Director of Graduate Studies
Anna Gilbert

Professors  Yang Cai (Computer Science), Joseph Chang (Statistics and Data Science), Ronald Coifman (Mathematics; Computer Science), Thierry Emonet (Molecular, Cellular, and Developmental Biology; Physics), Michael Fischer (Computer Science), Anna Gilbert (Mathematics; Statistics and Data Science), Jonathon Howard (Molecular Biophysics and Biochemistry), Yuval Kluger (Pathology), Rajit Manohar (Electrical and Computer Engineering), Owen Miller (Applied Physics), Nicholas Read (Physics; Applied Physics; Mathematics), Vladimir Rokhlin (Computer Science; Mathematics), Charles Smart (Mathematics), Mitchell Smooke (Mechanical Engineering and Materials Science; Applied Physics), Daniel Spielman (Computer Science; Mathematics), Van Vu (Mathematics), John Wettlaufer (Earth and Planetary Sciences; Mathematics; Physics), Huibin Zhou (Statistics and Data Science), Steven Zucker (Computer Science; Biomedical Engineering)

Associate Professors  Sekhar Tatikonda (Statistics and Data Science)

Assistant Professor  Roy Lederman (Statistics and Data Science), Quanquan Liu (Computer Science), Andre Wibisono (Computer Science)

FIELDS OF STUDY

The graduate Program in Applied Mathematics comprises the study and application of mathematics to problems motivated by a wide range of application domains. Areas of concentration include the analysis of data in very high-dimensional spaces, the geometry of information, computational biology, mathematical physics (optical and condensed matter physics), and randomized algorithms. Topics covered by the program include classical and modern applied harmonic analysis, linear and nonlinear partial differential equations, inverse problems, quantum optics, imaging, numerical analysis, scientific computing and applications, discrete algorithms, combinatorics and combinatorial optimization, graph algorithms, geometric algorithms, discrete mathematics and applications, cryptography, statistical theory and applications, probability theory and applications, information theory, econometrics, financial mathematics, statistical computing, and applications of mathematical and computational techniques to fluid mechanics, combustion, and other scientific and engineering problems.

INTEGRATED GRADUATE PROGRAM IN PHYSICAL AND ENGINEERING BIOLOGY (PEB)

Students applying to the Ph.D. program in Applied Mathematics may also apply to be part of the PEB program. See the description under Non-Degree-Granting Programs, Councils, and Research Institutes for course requirements, and http://peb.yale.edu for more information about the benefits of this program and application instructions.
SPECIAL REQUIREMENTS FOR THE PH.D. DEGREE

All students are required to:

1. complete eight term courses (including reading courses) at the graduate level, at least two with Honors grades;
2. pass a qualifying examination on their general applied mathematical knowledge (in four core topics and specialized topics in consultation with the Director of Graduate Studies) by the end of their second year;
3. submit a dissertation prospectus;
4. participate in the instruction of undergraduates for at least two terms;
5. be in residence for at least three years; and
6. complete a dissertation that clearly advances understanding of the subject it considers.

Prior to registering for a second year of study, and in addition to all other academic requirements, students must successfully complete MATH 991, Ethical Conduct of Research, or another approved course on responsible conduct in research. Teaching is considered an integral part of training at Yale University, so all students are expected to complete two terms of teaching. Students who require additional support from the graduate school will be required to teach additional terms, if needed, after they have fulfilled the academic teaching requirement.

Requirement (1) normally includes four core courses in each of (i) the methods of applied analysis, (ii) numerical computation or algorithms, and (iii) discrete mathematics or probability or statistics; these should be taken during the first year. The qualifying examination is normally taken by the end of the fourth term and will test knowledge of the core courses as well as more specialized topics. The thesis is expected to be independent work, done under the guidance of an adviser. An adviser is usually contacted not long after the student passes the qualifying examinations; students are encouraged to find an adviser sooner rather than later. A student is admitted to candidacy after completing requirements (1)–(5) and finding an adviser.

In addition to the above, all first-year students must successfully complete one course on the responsible conduct of research (e.g., MATH 991 or CPSC 991) and AMTH 525, Seminar in Applied Mathematics.

HONORS REQUIREMENT

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

M.D.-PH.D. STUDENTS

With permission of the DGS, M.D.-Ph.D. students may request a reduction in the program’s academic teaching requirement to one term of teaching. Only students who teach are eligible to receive a university stipend contingent on teaching.

MASTER’S DEGREES

M.Phil. The minimum requirements for this degree are that a student shall have completed all requirements for the Applied Mathematics Ph.D. program as described above except the required teaching, the prospectus, and the dissertation. Students will
not generally have satisfied the requirements for the M.Phil. until after two years of study, except where graduate work done before admission to Yale has reduced the student’s graduate course work at Yale. In no case will the degree be awarded after less than one year of residence in the Yale Graduate School of Arts and Sciences. See also Degree Requirements under Policies and Regulations.

**M.S.** Only 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 seven graduate-level term courses, maintain a High Pass average, and meet the Graduate School’s Honors requirement.

More information is available on the program’s website, http://applied.math.yale.edu.