

# Mathematics

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**College of Letters and Science** (<http://ls.berkeley.edu>)

**Department Office: 970 Evans Hall, (510) 642-6550**

**Chair: Arthur E. Ogus, PhD**

**Department Website: Mathematics** (<http://math.berkeley.edu>)

## Majors

The department offers undergraduate major programs in mathematics and applied mathematics leading to the BA degree. These programs provide excellent preparation for advanced degrees in math, physical sciences, economics, and industrial engineering, as well as graduate study in business, education, law, and medicine. They also prepare students for post-baccalaureate positions in business, technology, industry, teaching, government, and finance. The requirements for both majors are summarized below. See the Department of Mathematics website (<http://math.berkeley.edu/programs/undergraduate>) for more information.

Students should contact an undergraduate adviser in 964 or 965 Evans Hall about requirements for admission to the major.

## General Major Requirements

Both major programs require a lower-division base of Mathematics 1A-1B, 53, 54, and 55. Courses Math 16A-16B are not an acceptable alternative to Math 1A-1B. Math 1A-1B must be completed with an average grade of C or better; Math 53, 54, and 55 must be completed with minimum grades of C in each. Eight upper-division courses are required for either major. Specific course requirements follow.

## Major in Mathematics

1. Four core courses 104, 110, 113 and 185
2. Two semi-electives: select one course from each of two of the following three subject areas: I. Computing (128A); II. Geometry (130, 140, 141, 142, 143); III. Logic and foundations (125A, 135, 136)
3. Two upper division math electives. With the approval of the major adviser, students may count two mathematically theoretical courses in computer science, statistics, physics, astronomy, mathematical economics, or other sciences toward requirements for the major in mathematics.

## Major in Mathematics with a Teaching Concentration

The new teaching concentration is designed to increase the number and quality of math teachers. It requires the completion of three new courses, Math 151, 152, and 153, and includes a modification to the typical major course sequence. Please see the Mathematics Department website (<http://math.berkeley.edu>) for more information.

## Major in Applied Mathematics

1. 104, 110, 113, 128A, and 185
2. Three additional upper division courses, approved by a major adviser, which form a coherent cluster in some applied area such as actuarial science, classical mechanics, computer science, economics, fluid mechanics, geophysics, mathematical biology, numerical analysis, operations research, probability theory, quantum

mechanics, statistics, systems theory. Many other clusters are also possible.

## Honors Program

In addition to completing the requirements for the major in mathematics or applied mathematics, students in the honors program must:

1. Earn a GPA of *at least* 3.5 in upper division and graduate courses in the major and *at least* 3.3 in all courses taken at the University
2. Complete either Math 196, in which they will write a senior honors thesis, or pass two graduate mathematics courses with a grade of at least A-
3. Receive the recommendation of the Head Adviser.

Students interested in the honors program should consult with an adviser early in their program, preferably by their junior year.

## The Minor Program

Students in the College of Letters and Science may complete one or more minors of their choice, normally in a field both academically and administratively distinct from their major. The minor program in the Department of Mathematics consists of the following coursework:

## Prerequisites

Mathematics 1A-1B and 53 and 54 (or their equivalents). These courses must be taken for a letter grade and must be passed with *average* grades of C or better.

## Minor Requirements

Mathematics 104, 110, 113, and 185, plus one additional upper division mathematics course. These five courses must each be taken for a letter grade, and a minimum GPA of 2.0 is required for upper division courses applied to the minor program. At least three of the five courses must be completed at Berkeley. One upper division class from your minor may overlap with your major.

For more information about this program, please contact an undergraduate adviser in 964 or 965 Evans Hall.

## Preparation for Graduate Study

Students preparing for the PhD in mathematics are strongly advised to acquire a reading knowledge of one foreign language from among French, German, and Russian. Undergraduate students also often take one or more of the following introductory graduate courses: 202A-202B, 214, 225A-225B, 228A-228B, 250A-250B.

## Graduate Programs

The department offers the MA degree in mathematics and PhD degrees in mathematics and applied mathematics. Detailed information concerning admission, graduate student instructorships and fellowships, and degree requirements is given in the *Graduate Announcement of the Department of Mathematics*, which is available online here (<http://math.berkeley.edu/programs/graduate>) .

**MATH 1A Calculus 4 Units****Department:** Mathematics**Course level:** Undergraduate**Terms course may be offered:** Fall, spring and summer**Grading:** Letter grade.**Hours and format:** 3 hours of lecture and 2 hours of discussion/workshop per week; at the discretion of the instructor, an additional hour of discussion/workshop or computer laboratory per week.**Prerequisites:** Three and one-half years of high school math, including trigonometry and analytic geometry, plus a satisfactory grade in one of the following: CEEB MAT test, an AP test, the UC/CSU math diagnostic test, or 32. Consult the mathematics department for details. Students with AP credit should consider choosing a course more advanced than 1A.

This sequence is intended for majors in engineering and the physical sciences. An introduction to differential and integral calculus of functions of one variable, with applications and an introduction to transcendental functions.

Students will receive no credit for 1A after taking 16B and 2 units after taking 16A.

**MATH 1B Calculus 4 Units****Department:** Mathematics**Course level:** Undergraduate**Terms course may be offered:** Fall, spring and summer**Grading:** Letter grade.**Hours and format:** 3 hours of lecture and 2 hours of discussion/workshop per week; at the discretion of the instructor, an additional hour of discussion/workshop or computer laboratory per week.**Prerequisites:** 1A.

Continuation of 1A. Techniques of integration; applications of integration. Infinite sequences and series. First-order ordinary differential equations. Second-order ordinary differential equations; oscillation and damping; series solutions of ordinary differential equations.

Students will receive 2 units of credit for 1B after taking 16B.

**MATH H1B Honors Calculus 4 Units****Department:** Mathematics**Course level:** Undergraduate**Term course may be offered:** Fall**Grading:** Letter grade.**Hours and format:** 3 hours of lecture and 2 hours of discussion/workshop per week; at the discretion of the instructor, an additional hour of discussion/workshop or computer laboratory per week.**Prerequisites:** 1A.

Honors version of 1B. Continuation of 1A. Techniques of integration; applications of integration. Infinite sequences and series. First-order ordinary differential equations. Second-order ordinary differential equations; oscillation and damping; series solutions of ordinary differential equations.

Students will receive 2 units of credit for H1B after taking 16B.

**MATH 10A Methods of Mathematics: Calculus, Statistics, and Combinatorics 4 Units****Department:** Mathematics**Course level:** Undergraduate**Terms course may be offered:** Fall, spring and summer**Grading:** Letter grade.**Hours and format:** 3 hours of Lecture and 3 hours of Discussion per week for 15 weeks. 5 hours of Lecture and 5 hours of Discussion per week for 8 weeks.**Prerequisites:** Three and one-half years of high school math, including trigonometry and analytic geometry.

This sequence is intended for majors in the life sciences. Introduction to differential and integral calculus of functions of one variable. Representation of data, elementary probability theory, statistical models, and testing.

Students will receive 2 units for 10A after taking 1A.