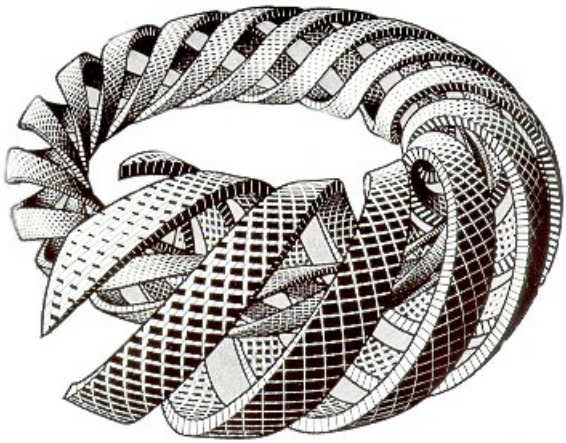
The UCSB Department of Mathematics'

Exhaustive Guide to Our Majors



Information on Requirements & Descriptions, Possible Career Paths, and Choosing the **Right** Major

PLEASE NOTE:

While this pamphlet is a good general guide, it is not a replacement for the General Catalog or academic advising in our office. Artwork by M.C. Escher.

Choosing a Major

Choosing a major can be a daunting task. We encourage our students not to rush the decision, but to take time during the pre-major courses to determine what they love about math. Many of our students decide to choose a track during their junior year just prior to starting their upper-division coursework.

If you aren't sure about whether to commit to math as your major, we suggest taking some time to visit the following website for more information on the vastness of the field:
http://www.ams.org/mathmoments

Opportunities for Academic Distinction

There are many opportunities for academic distinction within our department. The **Mochizuki** and **Wilder Awards** are given out each year to students who have demonstrated academic excellence in the undergraduate mathematics program.

Students may also wish to enter into the **Honors Program in Mathematics.** Students must have completed 120 units of coursework with at least 24 upper-division units in mathematics. The GPA cutoff for the program is an overall GPA of 3.5 and an upper-division GPA of 3.5. To complete the program, students must maintain the 3.5 GPA in all upper division math and statistics courses, and complete either (a) a senior thesis, Math 197A-B; or (b) a two-quarter graduate sequence.

Students may also participate in **reading courses** with individual faculty members - a good option for students who've had their interests piqued by a particular subject.

Bachelor of Science- Mathematics

You will find this major especially suitable if you wish to study the STUFF of mathematics. As opposed to a computational approach that many are exposed to in lower division calculus classes, this degree dives well beyond the shallow waters of formulas and calculators into a world of mathematical theory.

Preparation for the Major

The Mathematics Department uses a pre-major to ensure adequate preparation for this and all other math degrees. You must achieve **at least a 2.5 GPA in the pre-major requirements**, which include a 2-year calculus sequence, a physics course, an introductory programming course and a course in mathematical proofs.

Upper Division Coursework

Students must complete 52 units of upper-division coursework ranging from abstract and linear algebra, to topology and differential geometry and on to real and complex analysis. It is a fairly structured curriculum meant to prepare students for possible graduate work in the quantitative sciences.

Possible Career Paths

While you are by no means required to pursue this major to qualify for graduate studies, it will provide you with excellent preparation for graduate work due to its emphasis on mathematical theory. This program also provides excellent preparation for law school, MBA programs and med school, as students develop extensive skills in critical thinking and logic. Many government organizations recruit mathematicians for work in cryptology and mathematical modeling - the NSA and CIA, in particular.

Bachelor of Science- Mathematical Sciences

If you are interested in applying the math you learn to real world situations, this major may appeal to you. It is a degree for those who enjoy working with numbers and equations; a "down and dirty," hands-on major which focuses on how to solve real-world mathematical quandaries, particularly those with applications to the physical sciences and engineering.

Preparation for the major

Students must achieve at least a **2.5 GPA in the pre-major coursework**, which includes a two-year calculus series and an introductory course in mathematical proofs. One physics and one computer sciences course is also required. Though not factored into the pre-major GPA requirement, the physics and computer science course grades are given heavy consideration due to the nature of the upper division coursework you will undertake.

Upper Division Coursework

Like the BS in Mathematics, students must complete 52 upper-division units. The distinction between this track and the BS in Mathematics is the required coursework in numerical analysis instead of abstract algebra. Students are required to take real analysis, partial or ordinary differential equations, differential geometry and complex analysis. Like the BS in Mathematics, it a fairly structured curriculum meant to prepare students for possible graduate work in the quantitative sciences.

Possible Career Paths

Mathematicians can work in a variety of fields because of their highly developed problem solving skills. With this degree you could go to graduate school for applied math or pursue jobs in systems analysis and engineering. Visit **www.siam.org/careers** for more information.

Bachelor of Science-

Financial Mathematics and Statistics

This major is ideal for you if you are interested in the role that mathematics plays in the financial market. It is a joint major between the Department of Mathematics and the Department of Statistics, so you can utilize both departments' resources as you complete your degree. There is also a degree in Statistics offered by the Department of Statistics, that might be of interest to some students.

Preparation for the Major

Students must take a two-year series in calculus, micro- and macroeconomics, as well as a course in mathematical proofs. Students must also take a computer science course. There is a required **2.5 pre-major GPA.**

Upper Division Coursework

Students must complete 56 units of upper-division coursework. There is a heavy emphasis on math and statistical theory. These are rigorous courses, ranging from partial differential equations to applied stochastic processes. Financial Math majors also have the option of participating in the **Actuarial Club**, and taking coursework to prepare them for actuarial exams.

Possible Career Paths

This is a very focused degree to prepare you for **Masters or Ph.D programs in financial mathematics**. The best paying and most interesting jobs in financial math require an advanced degree. However, companies need support to program models and run simulations. This kind of work requires only a BS. For an employee to be immediately useful to a firm, it is important to have a good background in programming, with **C++ and MatLab** at a minimum.

Bachelor of Arts-
Economics/Mathematics

The Mathematics Department shares this major with the Economics Department. If you are interested in business administration or management science you may enjoy this major, as modern economic theory is heavily emphasized.

Preparation for the Major

Students must achieve a **2.7 GPA in this pre-major**, which requires one course each in micro- and macroeconomics, two years of calculus, an introductory course in mathematical proofs and an introductory course in probability theory.

Upper Division Coursework

This major requires completion of 40 upper-division units, and gives you a sizable amount of leeway in deciding what upper division courses to take. The mathematical coursework includes linear algebra and real analysis, while the economics coursework is quite extensive. Microeconomic and macroeconomic theories are studied in depth, as are econometrics. The large number of elective courses allows you to focus on what interests you while allowing time to try new and exciting classes.

Possible Career Paths

This degree serves as excellent preparation for graduate studies in economics or **MBA programs**. You may also consider this major if you are interested in jobs in actuarial science, communications, computer science, market analysis, operations research, systems analysis, mathematical economics or management.

Bachelor of Arts- Mathematics

This major has two possible emphases, the Liberal Arts and High School Teaching. You may opt for this major, particularly the Liberal Arts track, if you are considering a double major. A degree in math shows employers that you have quantitative skills and that you can think logically to solve problems.

Preparation for the Major

Students must earn at least a **2.5 GPA in the pre-major**, which covers required courses in calculus and an introduction to mathematical proofs. Completion of one physics and one computer sciences course is required, but these courses will not factor into the GPA requirement.

Though this pre-major does not require the full two-year calculus series, the Math Department advises that you take one or both of the last two courses to clear pre-requisites for many upper-division courses.

Upper Division Coursework

Both concentrations of this major require 40 upper-division units.

Concentration I: Liberal Arts- This emphasis provides a liberal education in mathematics. There are very few required courses compared to some of the other majors, which may appeal to you if you want a more personally tailored academic experience.

Concentration II: High School Teaching- This emphasis prepares students to pursue the California single subject teaching credential. It examines the historical context of mathematics, covers a broad range of concepts, and touches upon applications of familiar theorems.

A Minor in Mathematics

Why Minor in Math?

A minor in mathematics is ideal if you want to continue your mathematical education, but prefer to commit to a major in a different subject. A mathematics minor is an excellent complement to any major. It shows evidence of a well-rounded education and will make you more competitive in the job market, especially if your major requires writing skills. There are two possible tracks to obtain a minor in mathematics.

Minor Preparation

Students must complete required courses in our calculus series and an introduction to proofs. We strongly recommend that you pay attention to the prerequisites for upper division courses that interest you, since this may require you to go beyond the required preparation.

Upper Division Coursework

Minor in Mathematics: Students must complete 24 upper-division units in mathematics to complete the minor. This track allows you the freedom to choose from any of our courses, as long as you meet the pre-requisites.

Minor in Mathematics for High School Teaching: Students must complete 24 upper-division units in mathematics or statistics. This course of study has several required upper-division courses to aid in preparation for the California single subject teaching credential.