Mathematics

Bachelor of Arts (BA)

The Department of Mathematics offers an undergraduate major in Mathematics leading to the Bachelor of Arts (BA) degree. The program provides an excellent preparation for advanced degrees in math, physical sciences, economics, and industrial engineering as well as graduate study in business, education, law, and medicine. The program also prepares students for post-baccalaureate positions in business, technology, industry, teaching, government, and finance.

Students majoring in Mathematics may choose to major with a teaching concentration. The teaching concentration is designed to increase the number and quality of math teachers.

Admission to the Major

Students should contact a mathematics undergraduate advisor. Contact information is available on the contact tab or (https://math.berkeley.edu/programs/undergraduate/advising/)here. (https://math.berkeley.edu/programs/undergraduate/advising/)

Honors Program

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

1. Earn a grade point average (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 major advisor.

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

Minor Program

The department offers a minor in Mathematics.

Other Major Offered by the Department of Mathematics

Applied Mathematics (https://guide.berkeley.edu/archive/2024-25/undergraduate/degree-programs/applied-mathematics/) (Major only)

In addition to the University, campus, and college requirements, listed on the College Requirements tab, students must fulfill the below requirements specific to their major program.

General Guidelines

1. All courses taken to fulfill the major requirements below must be taken for graded credit, other than courses listed which are offered on a *Pass/No Pass* basis only. Exceptions will be made for major courses taken in Spring 2020, Fall 2020, Spring 2021, and Summer 2021. Other exceptions to this requirement are noted as applicable.
2. No more than one upper division course may be used to simultaneously fulfill requirements for a student's major and minor programs, with the exception of minors offered outside of the College of Letters & Science.
3. A minimum grade point average (GPA) of 2.0 must be maintained in both upper and lower division courses used to fulfill the major requirements.

For information regarding residence requirements and unit requirements, please see the College Requirements tab.

Major Requirements: Mathematics

Lower Division		
MATH 51/1A	Calculus I (MATH 51 as of Fall 2025)	4
MATH 52/1B	Calculus II (MATH 52 as of Fall 2025)	4
MATH 53	Multivariable Calculus	4
or MATH N53	Multivariable Calculus	
MATH W53	Multivariable Calculus [4]	
MATH 54	Linear Algebra and Differential Equations [1]	4
or MATH N54	Linear Algebra and Differential Equations	
or MATH 56	Linear Algebra	
MATH W54	Linear Algebra and Differential Equations [4]	
MATH 55	Discrete Mathematics [2]	4
or MATH N55	Discrete Mathematics	
Upper Division		
MATH 104	Introduction to Analysis	4
MATH 110	Abstract Linear Algebra	4
MATH 113	Introduction to Abstract Algebra	4
MATH 185	Introduction to Complex Analysis	4
Two semi-electives		
Select one course from two of the following three areas:		
Computing		
MATH 124	Programming for Mathematical Applications [4]	
MATH 128A	Numerical Analysis [4]	
or MATH W1	Numerical Analysis	
MATH 156	Numerical Analysis for Data Science and Statistics [4]	
Geometry		
MATH 130	Groups and Geometries [4]	
MATH 140	Metric Differential Geometry [4]	
MATH 141	Elementary Differential Topology [4]	
MATH 142	Elementary Algebraic Topology [4]	
MATH 143	Elementary Algebraic Geometry [4]	
Logic and Foundations		
MATH 125A	Mathematical Logic [4]	
MATH 135	Introduction to the Theory of Sets [4]	
MATH 136	Incompleteness and Undecidability [4]	
Two electives, select at least two additional upper division or graduate mathematics courses must be taken [3]		

[1] For students double-majoring in Physics, PHYSICS 89 may be substituted, provided that the grade is at least a C.
For students double-majoring in Computer Science or Electrical Engineering and Computer Sciences, EECS 16A plus EECS 16B may be substituted, provided that the grades are at least a C.

[2] For students double-majoring in Computer Science or Electrical Engineering and Computer Sciences, COMPSCI 70 may be substituted, provided that the grade is at least a C.

[3] These two electives must receive the Faculty Advisor's written approval on the Course Approval Form which is then returned to an Undergraduate Advisor in 964 or 965 Evans for the student's file. Courses in other departments may count toward this requirement provided they have substantial mathematical content and are offered for at least 3 units each.

[4] Math 91 (Fall 2022 only) may be taken in lieu of Math 54.

Major Requirements: Mathematics with a Teaching Concentration

Lower division		
STAT 20	Introduction to Probability and Statistics	4
MATH 51/1A	Calculus I (MATH 51 as of Fall 2025)	4
MATH 52/1B	Calculus II (MATH 52 as of Fall 2025)	4
MATH 53	Multivariable Calculus	4
or MATH N53	Multivariable Calculus	
MATH 54	Linear Algebra and Differential Equations [1]	4
or MATH N54	Linear Algebra and Differential Equations	
MATH 55	Discrete Mathematics [2]	4
or MATH N55	Discrete Mathematics	
Upper division		
MATH 104	Introduction to Analysis	4
MATH 110	Abstract Linear Algebra	4
MATH 113	Introduction to Abstract Algebra	4
MATH 151	Mathematics of the Secondary School Curriculum I	4
MATH 152	Mathematics of the Secondary School Curriculum II	4
MATH 160	History of Mathematics	4
Select two of the following:		
MATH 115	Introduction to Number Theory [4]	
MATH 123	Ordinary Differential Equations [4]	
MATH 124	Programming for Mathematical Applications [4]	
MATH 125A	Mathematical Logic [4]	
MATH 128A	Numerical Analysis [4]	
MATH 130	Groups and Geometries [4]	
MATH 135	Introduction to the Theory of Sets [4]	
MATH 136	Incompleteness and Undecidability [4]	
MATH 170	Mathematical Methods for Optimization [4]	
MATH 185	Introduction to Complex Analysis [4]	

[1] For students double-majoring in Physics, PHYSICS 89 may be substituted, provided that the grade is at least a C.
For students double-majoring in Computer Science or Electrical Engineering and Computer Sciences, EECS 16A plus EECS 16B may be substituted, provided that the grades are at least a C.

[2] For students double-majoring in Computer Science or Electrical Engineering and Computer Sciences, COMPSCI 70 may be substituted, provided that the grade is at least a C.

[3] Math 91 (Fall 2022 only) may be taken in lieu of Math 54.

Students who have a strong interest in an area of study outside their major often decide to complete a minor program. These programs have set requirements.

General Guidelines

1. All minors must be declared no later than one semester before a student's Expected Graduation Term (EGT). If the semester before EGT is fall or spring, the deadline is the last day of RRR week. If the semester before EGT is summer, the deadline is the final Friday of Summer Sessions. To declare a minor, contact the department advisor for information on requirements, and the declaration process.
2. All courses taken to fulfill the minor requirements below must be taken for graded credit.
3. A minimum of three of the upper division courses taken to fulfill the minor requirements must be completed at UC Berkeley.
4. A minimum grade point average of 2.0 is required for the lower division minor requirements as well as for the five upper division courses used for the minor.
5. Courses used to fulfill the minor requirements may be applied toward the Seven-Course Breadth requirement, for Letters & Science students.
6. No more than one upper division course may be used to simultaneously fulfill requirements for a student's major and minor programs.
7. All minor requirements must be completed prior to the last day of finals during the semester in which the student plans to graduate.
8. All minor requirements must be completed within the unit ceiling. (For further information regarding the unit ceiling, please see the College Requirements tab.)

For students double-majoring in Physics, PHYSICS 89 may be substituted for MATH 54, provided that the grade is at least a C.

For students double-majoring in Computer Science or Electrical Engineering and Computer Sciences, EECS 16A plus EECS 16B may be substituted for MATH 54, provided that the grades are at least a C.

Requirements

Lower Division		
MATH 51/1A	Calculus I (MATH 51 as of Fall 2025)	4
MATH 52/1B	Calculus II (MATH 52 as of Fall 2025)	4
MATH 53	Multivariable Calculus	4
MATH 54	Linear Algebra and Differential Equations	4
or MATH 56	Linear Algebra	
Upper Division		
MATH 104	Introduction to Analysis	4
MATH 110	Abstract Linear Algebra	4
MATH 113	Introduction to Abstract Algebra	4
MATH 185	Introduction to Complex Analysis	4
One elective: select one additional upper division math course		4

[1] Math 91 (Fall 2022 only) may be taken in lieu of Math 54.

Undergraduate students must fulfill the following requirements in addition to those required by their major program.

For a detailed lists of L&S requirements, please see Overview tab to the right in this guide or visit the L&S Degree Requirements (https://lsadvising.berkeley.edu/degree-requirements/) webpage. For College advising appointments, please visit the L&S Advising (https://lsadvising.berkeley.edu/home/) Pages.

University of California Requirements

Entry Level Writing

All students who will enter the University of California as freshmen must demonstrate their command of the English language by fulfilling the Entry Level Writing requirement. Fulfillment of this requirement is also a prerequisite to enrollment in all reading and composition courses at UC Berkeley and must be taken for a letter grade.

American History and American Institutions

The American History and American Institutions requirements are based on the principle that all U.S. residents who have graduated from an American university should have an understanding of the history and governmental institutions of the United States.

Berkeley Campus Requirement

American Cultures

All undergraduate students at Cal need to take and pass this campus requirement course in order to graduate. The requirement offers an exciting intellectual environment centered on the study of race, ethnicity and culture of the United States. AC courses are plentiful and offer students opportunities to be part of research-led, highly accomplished teaching environments, grappling with the complexity of American Culture.

College of Letters & Science Essential Skills Requirements

Quantitative Reasoning

The Quantitative Reasoning requirement is designed to ensure that students graduate with basic understanding and competency in math, statistics, or computer/data science. The requirement may be satisfied by exam or by taking an approved course taken for a letter grade.

Foreign Language

The Foreign Language requirement may be satisfied by demonstrating proficiency in reading comprehension, writing, and conversation in a foreign language equivalent to the second semester college level, either by passing an exam or by completing approved course work taken for a letter grade.

Reading and Composition

In order to provide a solid foundation in reading, writing, and critical thinking the College of Letters and Science requires two semesters of lower division work in composition in sequence. Students must complete parts A & B reading and composition courses in sequential order by the end of their fourth semester for a letter grade.

College of Letters & Science 7 Course Breadth Requirements

Breadth Requirements

The undergraduate breadth requirements provide Berkeley students with a rich and varied educational experience outside of their major program. As the foundation of a liberal arts education, breadth courses give students a view into the intellectual life of the University while introducing them to a multitude of perspectives and approaches to research and scholarship. Engaging students in new disciplines and with peers from other majors, the breadth experience strengthens interdisciplinary connections and context that prepares Berkeley graduates to understand and solve the complex issues of their day.

Unit Requirements

- 120 total units
- Of the 120 units, 36 must be upper division units
- Of the 36 upper division units, 6 must be taken in courses offered outside your major department

Residence Requirements

For units to be considered in "residence," you must be registered in courses on the Berkeley campus as a student in the College of Letters & Science. Most students automatically fulfill the residence requirement by attending classes at Cal for four years, or two years for transfer students. In general, there is no need to be concerned about this requirement, unless you graduate early, go abroad for a semester or year, or want to take courses at another institution or through UC Extension during your senior year. In these cases, you should make an appointment to meet an L&S College adviser to determine how you can meet the Senior Residence Requirement.

Note: Courses taken through UC Extension do not count toward residence.

Senior Residence Requirement

After you become a senior (with 90 semester units earned toward your B.A. degree), you must complete at least 24 of the remaining 30 units in residence in at least two semesters. To count as residence, a semester must consist of at least 6 passed units. Intercampus Visitor, EAP, and UC Berkeley-Washington Program (UCDC) units are excluded.

You may use a Berkeley Summer Session to satisfy one semester of the Senior Residence requirement, provided that you successfully complete 6 units of course work in the Summer Session and that you have been enrolled previously in the college.

Modified Senior Residence Requirement

Participants in the UC Education Abroad Program (EAP), Berkeley Summer Abroad, or the UC Berkeley Washington Program (UCDC) may meet a Modified Senior Residence requirement by completing 24 (excluding EAP) of their final 60 semester units in residence. At least 12 of these 24 units must be completed after you have completed 90 units.

Upper Division Residence Requirement

You must complete in residence a minimum of 18 units of upper division courses (excluding UCEAP units), 12 of which must satisfy the requirements for your major.

Learning Goals for the Major

Mathematics is the language of science. In Galileo’s words:

> Philosophy is written in this grand book, the universe, which stands continually open to our gaze. But the book cannot be understood unless one first learns to comprehend the language and read the characters in which it is written. It is written in the language of mathematics, and its characters are triangles, circles, and other geometric figures, without which it is impossible to understand a single word of it. Without those, one is wandering in a dark labyrinth.

Mathematics majors learn the internal workings of this language, its central concepts and their interconnections. These involve structures going far beyond the geometric figures to which Galileo refers. Majors also learn to use mathematical concepts to formulate, analyze, and

solve real-world problems. Their training in rigorous thought and creative problem-solving is valuable not just in science, but in all walks of life.

Skills

By the time of graduation, majors should have acquired the following knowledge and skills:

1. Analytical skills
   - An understanding of the basic rules of logic.
   - The ability to distinguish a coherent argument from a fallacious one, both in mathematical reasoning and in everyday life.
   - An understanding of the role of axioms or assumptions.
   - The ability to abstract general principles from examples.
2. Problem-solving and modeling skills (important for all, but especially for majors in Applied Mathematics)
   - The ability to recognize which real-world problems are subject to mathematical reasoning.
   - The ability to make vague ideas precise by representing them in mathematical notation, when appropriate.
   - Techniques for solving problems expressed in mathematical notation.
3. Communication skills
   - The ability to formulate a mathematical statement precisely.
   - The ability to write a coherent proof.
   - The ability to present a mathematical argument verbally.
   - Majors in Mathematics with a Teaching Concentration should acquire familiarity with techniques for explaining K-12 mathematics in an accessible and mathematically correct manner.
4. Reading and research skills
   - Sufficient experience in mathematical language and foundational material to be well-prepared to extend one's mathematical knowledge further through independent reading.
   - Exposure to and successful experience in solving mathematical problems presenting substantial intellectual challenge.

Major maps are experience maps that help undergraduates plan their Berkeley journey based on intended major or field of interest. Featuring student opportunities and resources from your college and department as well as across campus, each map includes curated suggestions for planning your studies, engaging outside the classroom, and pursuing your career goals in a timeline format.

Use the major map below to explore potential paths and design your own unique undergraduate experience:

View the Mathematics Major Map (https://discovery.berkeley.edu/getting-started/major-maps/mathematics/)

The Math Department has a small team of undergraduate advisors (https://math.berkeley.edu/programs/undergraduate/advising/) who specialize in information on requirements, policies, procedures, resources, opportunities, untying bureaucratic knots, developing study plans, attending commencement, and certifying degrees and minors. Students are strongly encouraged to see an undergraduate advisor at least twice a year.

Faculty advisors are also available to students. Faculty advisors approve major electives which are not already pre-approved and listed on our website and can also approve courses from study abroad or other 4 year institutions towards a student's upper-division major requirements. Appropriate questions for the faculty adviser include selection of electives and preparation for graduate level courses in a specific mathematical area to be used for honors in the major. Be sure and let him/her know if you are considering graduate work in or related to mathematics, and if you need to solicit help in how best to prepare.

We also encourage students to take advantage of the expertise of the Math Department's Peer Advisors. They can provide a student perspective on courses, instructors, effective study habits, and enrichment opportunities. They hold office hours, host events, record a podcast, and post interesting information on the Ed Discussion forum.

Information about all of the above Math Department advising resources can be found here (https://math.berkeley.edu/programs/undergraduate/advising/).

Please note that the Math department is in the process of changing the numbering of three courses: Math 32 becomes Math 3; Math 1A becomes Math 51, and Math 1B becomes Math 52. This change is effective as of Fall 2025.

MATH 1 Foundations of Lower Division Mathematics 2 Units

Terms offered: Fall 2025, Summer 2025 3 Week Session, Fall 2024
This course aims to bring students with varying Math backgrounds up-to-speed with the expectations of UC Berkeley's lower division mathematics courses. This course will support comprehension of the fundamental concepts necessary to excel in Math 16A/16B, 1A/1B, 10A/10B, and beyond. You can take this prep course concurrently with or prior to your Calculus classes. The course curriculum covers algebraic operations, laws of exponents and logarithms, inequalities and absolute values, single-variable function properties, polynomials, power and exponential functions, logarithmic functions, trigonometric functions, coordinate geometry in two and three dimensions, complex numbers, and functions of several variables.
Hours & Format

Fall and/or spring: 7.5 weeks - 3 hours of lecture and 0 hours of discussion per week

Summer: 3 weeks - 5 hours of lecture and 5 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Alternative to final exam.

MATH H1B Honors Calculus 4 Units

Terms offered: Fall 2015, Fall 2014, Fall 2013
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.

Rules & Requirements

Prerequisites: 1A

Credit Restrictions: Students will receive no credit for Mathematics H1B after completing Mathematics 1B or N1B.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Summer: 8 weeks - 5 hours of lecture and 5 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH N1A Calculus 4 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
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.

Rules & Requirements

Prerequisites: Three and one-half years of high school math, including trigonometry and analytic geometry. Students with high school exam credits (such as AP credit) should consider choosing a course more advanced than 1A

Credit Restrictions: Students will receive no credit for MATH N1A after completing MATH 1A, MATH 16B or MATH N16B. A deficient grade in MATH N1A may be removed by taking MATH 1A.

Hours & Format

Summer: 8 weeks - 10 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH N1B Calculus 4 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
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.

Rules & Requirements

Prerequisites: 1A or N1A

Credit Restrictions: Students will receive no credit for Math N1B after completing Math 1B, H1B, or Xmath 1B. A deficient grade in N1B may be removed by completing Mathematics 1B or H1B.

Hours & Format

Summer: 8 weeks - 10 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 3 Precalculus 4 Units

Terms offered: Fall 2025
Polynomial and rational functions, exponential and logarithmic functions, trigonometry and trigonometric functions. Complex numbers, fundamental theorem of algebra, mathematical induction, binomial theorem, series, and sequences. Prior to Fall 2025, this course was offered as Math 32.

Rules & Requirements

Prerequisites: Three years of high school mathematics

Credit Restrictions: Students will receive no credit for MATH 32 after completing MATH 16B, MATH 16A, MATH 1B, MATH 1A, MATH N32, MATH N1A, MATH N1B, MATH N16A, or MATH N16B. A deficient grade in MATH 32 may be removed by taking MATH N32, or MATH N32.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Summer: 6 weeks - 5 hours of lecture and 5 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: Mathematics 32

MATH 10A Methods of Mathematics: Calculus, Statistics, and Combinatorics 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
The sequence Math 10A, Math 10B is intended for majors in the life sciences. Introduction to differential and integral calculus of functions of one variable, ordinary differential equations, and matrix algebra and systems of linear equations.

Rules & Requirements

Prerequisites: Three and one-half years of high school math, including trigonometry and analytic geometry. Students who have not had calculus in high school are strongly advised to take the Student Learning Center's Math 98 adjunct course for Math 10A; contact the SLC for more information

Credit Restrictions: Students will receive no credit for Mathematics 10A after completing Mathematics N10A. A deficient grade in Math 10A may be removed by taking Math N10A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 10B Methods of Mathematics: Calculus, Statistics, and Combinatorics 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
The sequence Math 10A, Math 10B is intended for majors in the life sciences. Elementary combinatorics and discrete and continuous probability theory. Representation of data, statistical models and testing. Sequences and applications of linear algebra.

Rules & Requirements

Prerequisites: Continuation of 10A

Credit Restrictions: Students will receive no credit for Mathematics 10B after completing Mathematics N10B. A deficient grade in Math 10B may be removed by taking Math N10B.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH N10A Methods of Mathematics: Calculus, Statistics, and Combinatorics 4 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
The sequence Math 10A, Math 10B is intended for majors in the life sciences. Introduction to differential and integral calculus of functions of one variable, ordinary differential equations, and matrix algebra and systems of linear equations.

Rules & Requirements

Prerequisites: Three and one-half years of high school math, including trigonometry and analytic geometry. Students who have not had calculus in high school are strongly advised to take the Student Learning Center's Math 98 adjunct course for Math 10A; contact the SLC for more information

Credit Restrictions: Students will receive no credit for Math N10A after completing Math 10A. A deficient grade in Math N10A may be removed by completing Math 10A.

Hours & Format

Summer: 8 weeks - 10 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH N10B Methods of Mathematics: Calculus, Statistics, and Combinatorics 4 Units

Terms offered: Summer 2021 8 Week Session, Summer 2020 8 Week Session, Summer 2019 8 Week Session
The sequence Math 10A, Math 10B is intended for majors in the life sciences. Elementary combinatorics and discrete and continuous probability theory. Representation of data, statistical models and testing. Sequences and applications of linear algebra.

Rules & Requirements

Prerequisites: Math 10A or N10A

Credit Restrictions: Students will receive no credit for Math N10B after completing Math 10B. A deficient grade in Math N10B may be removed by completing Math 10B.

Hours & Format

Summer: 8 weeks - 10 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 16A Analytic Geometry and Calculus 3 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Calculus of one variable; derivatives, definite integrals and applications, maxima and minima, and applications of the exponential and logarithmic functions. This course is intended for business and social science majors. (See also the Math 1 sequence.)
Rules & Requirements

Prerequisites: Three years of high school math, including trigonometry. Consult the mathematics department for details

Credit Restrictions: Students will receive no credit for 16A after taking N16A, 1A, or N1A. A deficient grade in Math 16A may be removed by taking Math N16A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 16B Analytic Geometry and Calculus 3 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Continuation of 16A. Application of integration of economics and life sciences. Differential equations. Functions of many variables. Partial derivatives, constrained and unconstrained optimization.
Rules & Requirements

Prerequisites: 16A

Credit Restrictions: Students will receive no credit for MATH 16B after completing MATH N16B, 1B, or N1B. A deficient grade in Math 16B may be removed by taking Math N16B.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH N16A Analytic Geometry and Calculus 3 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
This sequence is intended for majors in the life and social sciences. Calculus of one variable; derivatives, definite integrals and applications, maxima and minima, and applications of the exponential and logarithmic functions.
Rules & Requirements

Prerequisites: Three years of high school math, including trigonometry

Credit Restrictions: Students will receive no credit for 16A after taking N16A, 1A or N1A. A deficient grade in N16A may be removed by completing 16A.

Hours & Format

Summer: 8 weeks - 8 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH N16B Analytic Geometry and Calculus 3 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
Continuation of 16A. Application of integration of economics and life sciences. Differential equations. Functions of many variables. Partial derivatives, constrained and unconstrained optimization.
Rules & Requirements

Prerequisites: Mathematics 16A or N16A

Credit Restrictions: Students will receive no credit for Math N16B after Math 16B, 1B or N1B. A deficient grade in N16B may be removed by completing 16B.

Hours & Format

Summer: 8 weeks - 8 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 24 Freshman Seminars 1 Unit

Terms offered: Fall 2025, Spring 2025, Fall 2024
The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.

Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final Exam To be decided by the instructor when the class is offered.

MATH N32 Precalculus 4 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 8 Week Session
Polynomial and rational functions, exponential and logarithmic functions, trigonometry and trigonometric functions. Complex numbers, fundamental theorem of algebra, mathematical induction, binomial theorem, series, and sequences.

Rules & Requirements

Prerequisites: Three years of high school mathematics

Credit Restrictions: Students will receive no credit for MATH N32 after completing MATH 32, 1A-1B (or N1A-N1B) or 16A-16B (or N16A-16B), or XMATH 32. A deficient grade in MATH 32 or XMATH 32 maybe removed by taking MATH N32.

Hours & Format

Summer: 8 weeks - 10 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 39A Freshman/Sophomore Seminar 2 - 4 Units

Terms offered: Spring 2019, Spring 2018, Spring 2010
Freshman and sophomore seminars offer lower division students the opportunity to explore an intellectual topic with a faculty member and a group of peers in a small-seminar setting. These seminars are offered in all campus departments; topics vary from department to department and from semester to semester.

Rules & Requirements

Prerequisites: Priority given to freshmen and sophomores

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final Exam To be decided by the instructor when the class is offered.

MATH 49 Supplementary Work in Lower Division Mathematics 1 - 3 Units

Terms offered: Spring 2017, Spring 2016, Fall 2015
Students with partial credit in lower division mathematics courses may, with consent of instructor, complete the credit under this heading.

Rules & Requirements

Prerequisites: Some units in a lower division Mathematics class

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

MATH 51 Calculus I 4 Units

Terms offered: Fall 2025
This course is intended for STEM majors. An introduction to differential and integral calculus of functions of one variable, with applications and an introduction to transcendental functions. Prior to Fall 2025, this course was offered as Math 1A.

Rules & Requirements

Prerequisites: Three and one-half years of high school math, including trigonometry and analytic geometry. Students with high school exam credits (such as AP credit) should consider choosing a course more advanced than 51

Credit Restrictions: Students will receive no credit for MATH 51 after completing MATH 16B, MATH N1A, MATH N16B, or XMATH 1A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of discussion per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: Mathematics 1A

MATH 52 Calculus II 4 Units

Terms offered: Fall 2025
Continuation of 51. 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. Prior to Fall 2025, this course was offered as Math 1B.

Rules & Requirements

Prerequisites: Math 51

Credit Restrictions: Students will receive no credit for MATH 1B after completing MATH N1B, MATH H1B, or XMATH 1B.

Hours & Format

Fall and/or spring: 15 weeks - 3-3 hours of lecture and 2-3 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: Mathematics 1B

MATH 53 Multivariable Calculus 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Parametric equations and polar coordinates. Vectors in 2- and 3-dimensional Euclidean spaces. Partial derivatives. Multiple integrals. Vector calculus. Theorems of Green, Gauss, and Stokes.

Rules & Requirements

Prerequisites: Mathematics 52 (Previously offered as 1B or N1B)

Credit Restrictions: Students will receive no credit for Mathematics 53 after completing Mathematics N53 or W53; A deficient grade in 53 may be removed by completing Mathematics N53 or W53.

Hours & Format

Fall and/or spring: 15 weeks - 3-3 hours of lecture and 2-3 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH H53 Honors Multivariable Calculus 4 Units

Terms offered: Fall 2025, Spring 2023, Spring 2022
Honors version of 53. Parametric equations and polar coordinates. Vectors in 2- and 3-dimensional Euclidean spaces. Partial derivatives. Multiple integrals. Vector calculus. Theorems of Green, Gauss, and Stokes.

Rules & Requirements

Prerequisites: 1B

Credit Restrictions: Students will receive no credit for Mathematics H53 after completing Math 53, Math N53, or Math W53.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH N53 Multivariable Calculus 4 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
Parametric equations and polar coordinates. Vectors in 2- and 3-dimensional Euclidean spaces. Partial derivatives. Multiple integrals. Vector calculus. Theorems of Green, Gauss, and Stokes.
Rules & Requirements

Prerequisites: Mathematics 1B or N1B

Credit Restrictions: Students will receive no credit for Mathematics N53 after completing Mathematics 53, H53, or W53; A deficient grade in N53 may be removed by completing Mathematics 53, H53, or W53.

Hours & Format

Summer: 8 weeks - 10 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH W53 Multivariable Calculus 4 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
Parametric equations and polar coordinates. Vectors in 2- and 3-dimensional Euclidean spaces. Partial derivatives. Multiple integrals. Vector calculus. Theorems of Green, Gauss, and Stokes.
Rules & Requirements

Prerequisites: Mathematics 1B or equivalent

Credit Restrictions: Students will receive no credit for Mathematics W53 after completing Mathematics 53 or N53. A deficient grade in Mathematics W53 may be removed by completing Mathematics 53 or N53.

Hours & Format

Summer: 8 weeks - 5 hours of web-based lecture and 5 hours of web-based discussion per week

Online: This is an online course.

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Hutchings

MATH 54 Linear Algebra and Differential Equations 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Basic linear algebra; matrix arithmetic and determinants. Vector spaces; inner product spaces. Eigenvalues and eigenvectors; orthogonality, symmetric matrices. Linear second-order differential equations; first-order systems with constant coefficients. Fourier series.
Rules & Requirements

Prerequisites: Mathematics 52 (previously 1B or N1B), 10B, or N10B

Credit Restrictions: Students will receive no credit for MATH 54 after completing MATH H54, MATH N54, MATH W54, or MATH 56. A deficient grade in MATH 54 may be removed by taking MATH N54, MATH W54, or MATH 56.

Hours & Format

Fall and/or spring: 15 weeks - 3-3 hours of lecture and 2-3 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH H54 Honors Linear Algebra and Differential Equations 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Honors version of 54. Basic linear algebra: matrix arithmetic and determinants. Vectors spaces; inner product spaces. Eigenvalues and eigenvectors; linear transformations. Homogeneous ordinary differential equations; first-order differential equations with constant coefficients. Fourier series and partial differential equations.
Rules & Requirements

Prerequisites: 1B

Credit Restrictions: Students will receive no credit for Math H54 after completion of Math 54 or N54.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH N54 Linear Algebra and Differential Equations 4 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
Basic linear algebra; matrix arithmetic and determinants. Vector spaces; inner product spaces. Eigenvalues and eigenvectors; orthogonality, symmetric matrices. Linear second-order differential equations; first-order systems with constant coefficients. Fourier series.
Rules & Requirements

Prerequisites: 1B, N1B, 10B, or N10B

Credit Restrictions: Students will receive no credit for Math N54 after completing Math 54 or Math H54; A deficient grade in N54 may be removed by completing Mathematics 54 or H54.

Hours & Format

Summer: 8 weeks - 10 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH W54 Linear Algebra and Differential Equations 4 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
Basic linear algebra; matrix arithmetic and determinants. Vector spaces; inner product spaces. Eigenvalues and eigenvectors; orthogonality, symmetric matrices. Linear second-order differential equations; first-order systems with constant coefficients. Fourier series.
Rules & Requirements

Prerequisites: Math 1B, N1B, 10B, or N10B

Credit Restrictions: Students will receive no credit for MATH W54 after completing MATH 54, or MATH N54. A deficient grade in MATH W54 may be removed by taking MATH 54, MATH N54, MATH 54, or MATH N54.

Hours & Format

Summer: 8 weeks - 5.5 hours of web-based lecture and 6 hours of web-based discussion per week

Online: This is an online course.

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructor: Nadler

MATH 55 Discrete Mathematics 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Logic, mathematical induction sets, relations, and functions. Introduction to graphs, elementary number theory, combinatorics, algebraic structures, and discrete probability theory.
Rules & Requirements

Prerequisites: Mathematical maturity appropriate to a sophomore math class. 1A-1B recommended

Credit Restrictions: Students will receive no credit for Math 55 after completion of Math N55 or Computer Science 70. A deficient grade in Math 55 may be removed by completing Math N55.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH N55 Discrete Mathematics 4 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
Logic, mathematical induction sets, relations, and functions. Introduction to graphs, elementary number theory, combinatorics, algebraic structures, and discrete probability theory.
Rules & Requirements

Prerequisites: Mathematical maturity appropriate to a sophomore math class. 1A-1B recommended

Credit Restrictions: Students will receive no credit for 55 after taking N55 or Computer Science 70. A deficient grade in Math N55 may be removed by completing Math 55.

Hours & Format

Summer: 8 weeks - 10 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 56 Linear Algebra 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
This is a first course in Linear Algebra. Core topics include: algebra and geometry of vectors and matrices; systems of linear equations and Gaussian elimination; eigenvalues and eigenvectors; Gram-Schmidt and least squares; symmetric matrices and quadratic forms; singular value decomposition and other factorizations. Time permitting, additional topics may include: Markov chains and Perron-Frobenius, dimensionality reduction, or linear programming. This course differs from Math 54 in that it does not cover Differential Equations, but focuses on Linear Algebra motivated by first applications in Data Science and Statistics.
Rules & Requirements

Prerequisites: Prerequisites are Math 52 (previously known as Math 1B or N1B), 10B, or N10B. [N is the summer version]

Credit Restrictions: Students will receive no credit for MATH 56 after completing MATH 54, MATH N54, or MATH W54. A deficient grade in MATH 56 may be removed by taking MATH 54, MATH N54, or MATH W54.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 74 Transition to Upper Division Mathematics 3 Units

Terms offered: Spring 2025, Spring 2024, Fall 2022
The course will focus on reading and understanding mathematical proofs. It will emphasize precise thinking and the presentation of mathematical results, both orally and in written form. The course is intended for students who are considering majoring in mathematics but wish additional training.
Rules & Requirements

Prerequisites: 53 and 54

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 2 hours of discussion per week

Summer: 8 weeks - 6 hours of lecture and 0-2 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 91 Special Topics in Mathematics 4 Units

Terms offered: Fall 2022, Spring 2016, Fall 2012
Topics to be covered and the method of instruction to be used will be announced at the beginning of each semester that such courses are offered. See department bulletins.
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3-3 hours of lecture and 0-3 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 96 College Algebra 2 Units

Terms offered: Summer 2019 Second 6 Week Session, Summer 2017 8 Week Session, Summer 2015 10 Week Session
Elements of college algebra. Designed for students who do not meet the prerequisites for 32. Offered through the Student Learning Center.
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 4 hours of workshop per week

Summer:
6 weeks - 10 hours of workshop per week
8 weeks - 10 hours of workshop per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 98 Supervised Group Study 1 - 4 Units

Terms offered: Fall 2024, Fall 2023, Fall 2022
Directed Group Study, topics vary with instructor.
Rules & Requirements

Repeat rules: Course may be repeated for credit up to a total of 4 units.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Summer:
3 weeks - 5-20 hours of directed group study per week
6 weeks - 1-10 hours of directed group study per week
8 weeks - 1.5-7.5 hours of directed group study per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

MATH 98BC Berkeley Connect 1 Unit

Terms offered: Fall 2025, Spring 2025, Fall 2024
Berkeley Connect is a mentoring program, offered through various academic departments, that helps students build intellectual community. Over the course of a semester, enrolled students participate in regular small-group discussions facilitated by a graduate student mentor (following a faculty-directed curriculum), meet with their graduate student mentor for one-on-one academic advising, attend lectures and panel discussions featuring department faculty and alumni, and go on field trips to campus resources. Students are not required to be declared majors in order to participate.
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

MATH 99 Supervised Independent Study 1 - 4 Units

Terms offered: Spring 2017, Spring 2016, Fall 2015
Supervised independent study by academically superior, lower division students. 3.3 GPA required and prior consent of instructor who is to supervise the study. A written proposal must be submitted to the department chair for pre-approval.
Rules & Requirements

Prerequisites: Restricted to freshmen and sophomores only. Consent of instructor

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer: 8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

MATH C103 Introduction to Mathematical Economics 4 Units

Terms offered: Spring 2025, Fall 2024, Spring 2024
Selected topics illustrating the application of mathematics to economic theory. This course is intended for upper-division students in Mathematics, Statistics, the Physical Sciences, and Engineering, and for economics majors with adequate mathematical preparation. No economic background is required.
Rules & Requirements

Prerequisites: Math 53 and 54

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Formerly known as: 103

Also listed as: ECON C103

MATH 104 Introduction to Analysis 4 Units

Terms offered: Fall 2025, Summer 2025 8 Week Session, Spring 2025
The real number system. Sequences, limits, and continuous functions in R and R. The concept of a metric space. Uniform convergence, interchange of limit operations. Infinite series. Mean value theorem and applications. The Riemann integral.

Rules & Requirements

Prerequisites: 53 and 54. 55 or an equivalent exposure to proofs

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer: 8 weeks - 8 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH H104 Honors Introduction to Analysis 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
Honors section corresponding to 104. Recommended for students who enjoy mathematics and are good at it. Greater emphasis on theory and challenging problems.

Rules & Requirements

Prerequisites: 53 and 54. 55 or an equivalent exposure to proofs

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 105 Second Course in Analysis 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Differential calculus in Rn: the derivative as a linear map; the chain rule; inverse and implicit function theorems. Lebesgue integration on the line; comparison of Lebesgue and Riemann integrals. Convergence theorems. Fourier series, L2 theory. Fubini's theorem, change of variable.

Rules & Requirements

Prerequisites: 104

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 106 Mathematical Probability Theory 4 Units

Terms offered: Spring 2023
A rigorous development of the basics of modern probability theory based on a self-contained treatment of measure theory. The topics covered include: probability spaces; random variables; expectation; convergence of random variables and expectations; laws of large numbers; zero-one laws; convergence in distribution and the central limit theorem; Markov chains; random walks; the Poisson process; and discrete-parameter martingales.

Rules & Requirements

Prerequisites: Mathematics 104

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 110 Abstract Linear Algebra 4 Units

Terms offered: Fall 2025, Summer 2025 8 Week Session, Spring 2025
Matrices, vector spaces, linear transformations, inner products, determinants. Eigenvectors. QR factorization. Quadratic forms and Rayleigh's principle. Jordan canonical form, applications. Linear functionals.

Rules & Requirements

Prerequisites: 54, or 56, or a course with equivalent linear algebra content. 55, or 74, or an equivalent exposure to proofs is recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 8 hours of lecture and 0 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH H110 Honors Linear Algebra 4 Units

Terms offered: Spring 2025, Fall 2022, Fall 2021
Honors section corresponding to course 110 for exceptional students with strong mathematical inclination and motivation. Emphasis is on rigor, depth, and hard problems.
Rules & Requirements

Prerequisites: 54 or a course with equivalent linear algebra content. 55 or an equivalent exposure to proofs

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 113 Introduction to Abstract Algebra 4 Units

Terms offered: Fall 2025, Summer 2025 8 Week Session, Spring 2025
Sets and relations. The integers, congruences, and the Fundamental Theorem of Arithmetic. Groups and their factor groups. Commutative rings, ideals, and quotient fields. The theory of polynomials: Euclidean algorithm and unique factorizations. The Fundamental Theorem of Algebra. Fields and field extensions.
Rules & Requirements

Prerequisites: 54 or a course with equivalent linear algebra content. 55 or an equivalent exposure to proofs

Hours & Format

Fall and/or spring: 15 weeks - 3-3 hours of lecture and 0-2 hours of discussion per week

Summer: 8 weeks - 8 hours of lecture and 0 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH H113 Honors Introduction to Abstract Algebra 4 Units

Terms offered: Fall 2025, Fall 2024, Spring 2024
Honors section corresponding to 113. Recommended for students who enjoy mathematics and are willing to work hard in order to understand the beauty of mathematics and its hidden patterns and structures. Greater emphasis on theory and challenging problems.
Rules & Requirements

Prerequisites: 54 or a course with equivalent linear algebra content. 55 or an equivalent exposure to proofs

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 114 Second Course in Abstract Algebra 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Further topics on groups, rings, and fields not covered in Math 113. Possible topics include the Sylow Theorems and their applications to group theory; classical groups; abelian groups and modules over a principal ideal domain; algebraic field extensions; splitting fields and Galois theory; construction and classification of finite fields.
Rules & Requirements

Prerequisites: 110 and 113, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 115 Introduction to Number Theory 4 Units

Terms offered: Fall 2025, Summer 2025 8 Week Session, Fall 2024
Divisibility, congruences, numerical functions, theory of primes. Topics selected: Diophantine analysis, continued fractions, partitions, quadratic fields, asymptotic distributions, additive problems.
Rules & Requirements

Prerequisites: Math 55 is recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer: 8 weeks - 8 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 116 Cryptography 4 Units

Terms offered: Spring 2025, Fall 2022, Fall 2021
Construction and analysis of simple cryptosystems, public key cryptography, RSA, signature schemes, key distribution, hash functions, elliptic curves, and applications.

Rules & Requirements

Prerequisites: 55

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 0-2 hours of discussion per week

Summer: 8 weeks - 6 hours of lecture and 0-4 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 118 Fourier Analysis, Wavelets, and Signal Processing 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2022
Introduction to signal processing including Fourier analysis and wavelets. Theory, algorithms, and applications to one-dimensional signals and multidimensional images.

Rules & Requirements

Prerequisites: 53 and 54

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 121A Mathematical Tools for the Physical Sciences 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
Intended for students in the physical sciences who are not planning to take more advanced mathematics courses. Rapid review of series and partial differentiation, complex variables and analytic functions, integral transforms, calculus of variations.

Rules & Requirements

Prerequisites: 53 and 54

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 121B Mathematical Tools for the Physical Sciences 4 Units

Terms offered: Spring 2024, Spring 2022, Spring 2021
Intended for students in the physical sciences who are not planning to take more advanced mathematics courses. Special functions, series solutions of ordinary differential equations, partial differential equations arising in mathematical physics, probability theory.

Rules & Requirements

Prerequisites: 53 and 54

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 123 Ordinary Differential Equations 4 Units

Terms offered: Fall 2023, Fall 2022, Fall 2021
Existence and uniqueness of solutions, linear systems, regular singular points. Other topics selected from analytic systems, autonomous systems, Sturm-Liouville Theory.

Rules & Requirements

Prerequisites: 104

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 124 Programming for Mathematical Applications 4 Units

Terms offered: Fall 2025, Spring 2024, Spring 2023
An introduction to computer programming with a focus on the solution of mathematical and scientific problems. Basic programming concepts such as variables, statements, loops, branches, functions, data types, and object orientation. Mathematical/scientific tools such as arrays, floating point numbers, plotting, symbolic algebra, and various packages. Examples from a wide range of mathematical applications such as evaluation of complex algebraic expressions, number theory, combinatorics, statistical analysis, efficient algorithms, computational geometry, Fourier analysis, and optimization. Mainly based on the Julia programming language, but some examples will demonstrate other languages such as MATLAB, Python, C, and Mathematica.

Rules & Requirements

Prerequisites: Math 53, 54, 55

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 125A Mathematical Logic 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2023
Sentential and quantificational logic. Formal grammar, semantical interpretation, formal deduction, and their interrelation. Applications to formalized mathematical theories. Selected topics from model theory or proof theory.

Rules & Requirements

Prerequisites: Math 104 and 113 or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 126 Introduction to Partial Differential Equations 4 Units

Terms offered: Fall 2025, Summer 2025 8 Week Session, Spring 2025
Waves and diffusion, initial value problems for hyperbolic and parabolic equations, boundary value problems for elliptic equations, Green's functions, maximum principles, a priori bounds, Fourier transform.

Rules & Requirements

Prerequisites: 53 and 54

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Summer: 8 weeks - 6 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 127 Mathematical and Computational Methods in Molecular Biology 4 Units

Terms offered: Fall 2017, Fall 2016, Spring 2016
Introduction to mathematical and computational problems arising in the context of molecular biology. Theory and applications of combinatorics, probability, statistics, geometry, and topology to problems ranging from sequence determination to structure analysis.

Rules & Requirements

Prerequisites: 53, 54, and 55; Statistics 20 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 128A Numerical Analysis 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2024
Programming for numerical calculations, round-off error, approximation and interpolation, numerical quadrature, and solution of ordinary differential equations. Practice on the computer.
Rules & Requirements

Prerequisites: 53 and 54

Credit Restrictions: Students will receive no credit for MATH 128A after completing MATH W128A. A deficient grade in MATH 128A may be removed by taking MATH W128A.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 4 hours of lecture and 4 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 128B Numerical Analysis 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Iterative solution of systems of nonlinear equations, evaluation of eigenvalues and eigenvectors of matrices, applications to simple partial differential equations. Practice on the computer.
Rules & Requirements

Prerequisites: 110 and 128A

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH W128A Numerical Analysis 4 Units

Terms offered: Summer 2025 8 Week Session, Summer 2024 8 Week Session, Summer 2023 8 Week Session
Rules & Requirements

Prerequisites: MATH 53, MATH 54

Credit Restrictions: Students will receive no credit for MATH W128A after completing MATH 128A. A deficient grade in MATH W128A may be removed by taking MATH 128A, or MATH 128A.

Hours & Format

Summer: 8 weeks - 4 hours of web-based lecture and 4 hours of web-based discussion per week

Online: This is an online course.

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required, with common exam group.

Instructor: Persson

MATH 130 Groups and Geometries 4 Units

Terms offered: Spring 2024, Spring 2022, Fall 2020
Isometries of Euclidean space. The Platonic solids and their symmetries. Crystallographic groups. Projective geometry. Hyperbolic geometry.
Rules & Requirements

Prerequisites: 110 and 113

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 135 Introduction to the Theory of Sets 4 Units

Terms offered: Fall 2024, Spring 2024, Fall 2022
Set-theoretical paradoxes and means of avoiding them. Sets, relations, functions, order and well-order. Proof by transfinite induction and definitions by transfinite recursion. Cardinal and ordinal numbers and their arithmetic. Construction of the real numbers. Axiom of choice and its consequences.
Rules & Requirements

Prerequisites: Math 104 and 113 or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 136 Incompleteness and Undecidability 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
Functions computable by algorithm, Turing machines, Church's thesis. Unsolvability of the halting problem, Rice's theorem. Recursively enumerable sets, creative sets, many-one reductions. Self-referential programs. Godel's incompleteness theorems, undecidability of validity, decidable and undecidable theories.
Rules & Requirements

Prerequisites: Math 104 and 113 or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 140 Metric Differential Geometry 4 Units

Terms offered: Fall 2025, Fall 2024, Spring 2024
Frenet formulas, isoperimetric inequality, local theory of surfaces in Euclidean space, first and second fundamental forms. Gaussian and mean curvature, isometries, geodesics, parallelism, the Gauss-Bonnet-Von Dyck Theorem.
Rules & Requirements

Prerequisites: 104

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 141 Elementary Differential Topology 4 Units

Terms offered: Fall 2024, Spring 2024, Fall 2022
Manifolds in n-dimensional Euclidean space and smooth maps, Sard's Theorem, classification of compact one-manifolds, transversality and intersection modulo 2.
Rules & Requirements

Prerequisites: 104 or equivalent and linear algebra

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 142 Elementary Algebraic Topology 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2023
The topology of one and two dimensional spaces: manifolds and triangulation, classification of surfaces, Euler characteristic, fundamental groups, plus further topics at the discretion of the instructor.
Rules & Requirements

Prerequisites: 104 and 113

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 143 Elementary Algebraic Geometry 4 Units

Terms offered: Spring 2025, Fall 2023, Spring 2023
Introduction to basic commutative algebra, algebraic geometry, and computational techniques. Main focus on curves, surfaces and Grassmannian varieties.
Rules & Requirements

Prerequisites: 113

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 151 Mathematics of the Secondary School Curriculum I 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
Theory of rational numbers based on the number line, the Euclidean algorithm and fractions in lowest terms. The concepts of congruence and similarity, equation of a line, functions, and quadratic functions.
Rules & Requirements

Prerequisites: 1A-1B, 53, or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 0-1 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 152 Mathematics of the Secondary School Curriculum II 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Complex numbers and Fundamental Theorem of Algebra, roots and factorizations of polynomials, Euclidean geometry and axiomatic systems, basic trigonometry.
Rules & Requirements

Prerequisites: 151; 54, 113, or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 0-1 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 156 Numerical Analysis for Data Science and Statistics 4 Units

Terms offered: Spring 2025, Fall 2023
Introduction to applied linear algebra, numerical analysis and optimization with applications in data science and statistics.
Topics covered include:
• Floating-point arithmetic, condition number, perturbation theory, backward stability analysis
• Matrix decompositions (LU/QR/Cholesky/SVD), least squares problems, orthogonal matrices
• Eigenvalues, eigenvectors, Rayleigh quotients, generalized eigenvalues
• Principal components, low rank approximation, compressed sensing, matrix completion
• Convexity, Newton's method, Levenberg-Marquardt method, quasi-Newton methods
• Randomized linear algebra, stochastic gradient descent
• Machine learning, neural networks (deep/convolution), adjoint methods, backpropagation
Rules & Requirements

Prerequisites: Math 53 and 54 or 56 or equivalent (e.g., Math 91 from Fall 2022 can replace Math 54)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 160 History of Mathematics 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
History of algebra, geometry, analytic geometry, and calculus from ancient times through the seventeenth century and selected topics from more recent mathematical history.
Rules & Requirements

Prerequisites: 53, 54, and 113

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 170 Mathematical Methods for Optimization 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
Linear programming and a selection of topics from among the following: matrix games, integer programming, semidefinite programming, nonlinear programming, convex analysis and geometry, polyhedral geometry, the calculus of variations, and control theory.
Rules & Requirements

Prerequisites: 53 and 54

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 172 Combinatorics 4 Units

Terms offered: Fall 2025, Spring 2025, Fall 2023
Basic combinatorial principles, graphs, partially ordered sets, generating functions, asymptotic methods, combinatorics of permutations and partitions, designs and codes. Additional topics at the discretion of the instructor.
Rules & Requirements

Prerequisites: 55

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 185 Introduction to Complex Analysis 4 Units

Terms offered: Fall 2025, Summer 2025 8 Week Session, Spring 2025
Analytic functions of a complex variable. Cauchy's integral theorem, power series, Laurent series, singularities of analytic functions, the residue theorem with application to definite integrals. Some additional topics such as conformal mapping.

Rules & Requirements

Prerequisites: 104

Hours & Format

Fall and/or spring: 15 weeks - 3-3 hours of lecture and 0-2 hours of discussion per week

Summer: 8 weeks - 8 hours of lecture and 0 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH H185 Honors Introduction to Complex Analysis 4 Units

Terms offered: Spring 2025, Spring 2024, Spring 2023
Honors section corresponding to Math 185 for exceptional students with strong mathematical inclination and motivation. Emphasis is on rigor, depth, and hard problems.

Rules & Requirements

Prerequisites: 104

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 189 Mathematical Methods in Classical and Quantum Mechanics 4 Units

Terms offered: Fall 2020, Fall 2015, Fall 2014
Topics in mechanics presented from a mathematical viewpoint: e.g., hamiltonian mechanics and symplectic geometry, differential equations for fluids, spectral theory in quantum mechanics, probability theory and statistical mechanics. See department bulletins for specific topics each semester course is offered.

Rules & Requirements

Prerequisites: 104, 110, 2 semesters lower division Physics

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 191 Experimental Courses in Mathematics 1 - 4 Units

Terms offered: Fall 2025, Fall 2024, Fall 2023
The topics to be covered and the method of instruction to be used will be announced at the beginning of each semester that such courses are offered. See departmental bulletins.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of seminar per week

Summer:
6 weeks - 2.5-10 hours of seminar per week
8 weeks - 1.5-7.5 hours of seminar per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 195 Special Topics in Mathematics 4 Units

Terms offered: Spring 2021, Spring 2011, Spring 2004
Lectures on special topics, which will be announced at the beginning of each semester that the course is offered.

Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of lecture per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

MATH 196 Honors Thesis 4 Units

Terms offered: Fall 2023, Fall 2022, Spring 2017
Independent study of an advanced topic leading to an honors thesis.

Rules & Requirements

Prerequisites: Admission to the Honors Program; an overall GPA of 3.3 and a GPA of 3.5 in the major

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

MATH 197 Field Study 1 - 4 Units

Terms offered: Spring 2016, Spring 2015, Spring 2014
For Math/Applied math majors. Supervised experience relevant to specific aspects of their mathematical emphasis of study in off-campus organizations. Regular individual meetings with faculty sponsor and written reports required. Units will be awarded on the basis of three hours/week/unit.

Rules & Requirements

Prerequisites: Upper division standing. Written proposal signed by faculty sponsor and approved by department chair

Credit Restrictions: Enrollment is restricted; see the Course Number Guide in the Bulletin.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3-3 hours of fieldwork per week

Summer: 8 weeks - 3-3 hours of fieldwork per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

MATH 198 Directed Group Study 1 - 4 Units

Terms offered: Fall 2021, Fall 2019, Spring 2017
Topics will vary with instructor.

Rules & Requirements

Prerequisites: Must have completed 60 units and be in good standing

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of directed group study per week

Summer: 8 weeks - 1-4 hours of directed group study per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

MATH 198BC Berkeley Connect 1 Unit

Terms offered: Fall 2025, Spring 2025, Fall 2024
Berkeley Connect is a mentoring program, offered through various academic departments, that helps students build intellectual community. Over the course of a semester, enrolled students participate in regular small-group discussions facilitated by a graduate student mentor (following a faculty-directed curriculum), meet with their graduate student mentor for one-on-one academic advising, attend lectures and panel discussions featuring department faculty and alumni, and go on field trips to campus resources. Students are not required to be declared majors in order to participate.

Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

MATH 199 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017

Rules & Requirements

Prerequisites: The standard college regulations for all 199 courses

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.