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 (http://guide.berkeley.edu/archive/2021-22/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. 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 1A	Calculus	4
or MATH N1A	Calculus	
MATH 1B	Calculus	4
or MATH N1B	Calculus	
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	
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	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	
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.

Major Requirements: Mathematics with a Teaching Concentration

Lower division		
STAT 20	Introduction to Probability and Statistics	4
MATH 1A	Calculus	4
or MATH N1A	Calculus	
MATH 1B	Calculus	4
or MATH N1B	Calculus	
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	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.

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 and are noted officially on the transcript in the memoranda section, but they are not noted on diplomas.

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 1A	Calculus	4
MATH 1B	Calculus	4
MATH 53	Multivariable Calculus	4
MATH 54	Linear Algebra and Differential Equations	4
Upper Division		
MATH 104	Introduction to Analysis	4
MATH 110	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

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

For detailed lists of courses that fulfill college requirements, please review the College of Letters & Sciences (http://guide.berkeley.edu/archive/2021-22/undergraduate/colleges-schools/letters-science/) page in this Guide. For College advising appointments, please visit the L&S Advising (https://lsadvising.berkeley.edu/home/) Pages.

University of California Requirements

Entry Level Writing **(**http://writing.berkeley.edu/node/78/**)**

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.

American History and American Institutions **(**http://guide.berkeley.edu/archive/2021-22/undergraduate/colleges-schools/letters-science/american-history-institutions-requirement/**)**

The American History and Institutions requirements are based on the principle that a US resident graduated from an American university, should have an understanding of the history and governmental institutions of the United States.

Berkeley Campus Requirement

American Cultures **(**http://americancultures.berkeley.edu/students/courses/**)**

All undergraduate students at Cal need to take and pass this 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 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 **(**http://guide.berkeley.edu/archive/2021-22/undergraduate/colleges-schools/letters-science/quantitative-reasoning-requirement/**)**

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

Foreign Language **(**http://guide.berkeley.edu/archive/2021-22/undergraduate/colleges-schools/letters-science/foreign-language-requirement/**)**

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.

Reading and Composition **(**http://guide.berkeley.edu/archive/2021-22/undergraduate/colleges-schools/letters-science/reading-composition-requirement/**)**

In order to provide a solid foundation in reading, writing, and critical thinking the College requires two semesters of lower division work in composition in sequence. Students must complete parts A & B reading and composition courses by the end of their second semester and a second-level course by the end of their fourth semester.

College of Letters & Science 7 Course Breadth Requirements

Breadth Requirements **(**http://guide.berkeley.edu/archive/2021-22/undergraduate/colleges-schools/letters-science/#breadthrequirementstext**)**

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 here for four years. In general, there is no need to be concerned about this requirement, unless you 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 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 BA 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 help undergraduate students discover academic, co-curricular, and discovery opportunities at UC Berkeley based on intended major or field of interest. Developed by the Division of Undergraduate Education in collaboration with academic departments, these experience maps will help you:

- **Explore** your major and gain a better understanding of your field of study
- **Connect** with people and programs that inspire and sustain your creativity, drive, curiosity and success
- **Discover** opportunities for independent inquiry, enterprise, and creative expression
- **Engage** locally and globally to broaden your perspectives and change the world
- **Reflect** on your academic career and prepare for life after Berkeley

Use the major map below as a guide to planning your undergraduate journey and designing your own unique Berkeley experience.

View the Mathematics Major Map PDF. **(**https://vcue.berkeley.edu/sites/default/files/mathematics.pdf**)**

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, and post articles on their blog which can be found here (https://guide.math.berkeley.edu/).

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

Mathematics

Expand all course descriptions [+]Collapse all course descriptions [-]

MATH 1A Calculus 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Calculus: Read More [+]
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 1A after completing MATH N1A, MATH 16B, Math N16B or XMATH 1A. A deficient grade in MATH 1A may be removed by taking MATH N1A.

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.

Calculus: Read Less [-]

MATH 1B Calculus 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Calculus: Read More [+]
Rules & Requirements

Prerequisites: 1A or N1A

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

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.

Calculus: Read Less [-]

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.
Honors Calculus: Read More [+]
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.

Honors Calculus: Read Less [-]

MATH N1A Calculus 4 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 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.
Calculus: Read More [+]
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.

Calculus: Read Less [-]

MATH N1B Calculus 4 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 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.
Calculus: Read More [+]

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.

Calculus: Read Less [-]

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

Terms offered: Fall 2022, Fall 2021, Fall 2020
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.
Methods of Mathematics: Calculus, Statistics, and Combinatorics: Read More [+]

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.

Methods of Mathematics: Calculus, Statistics, and Combinatorics: Read Less [-]

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

Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Methods of Mathematics: Calculus, Statistics, and Combinatorics: Read More [+]

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.

Methods of Mathematics: Calculus, Statistics, and Combinatorics: Read Less [-]

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

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 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.

Methods of Mathematics: Calculus, Statistics, and Combinatorics: Read More [+]

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.

Methods of Mathematics: Calculus, Statistics, and Combinatorics: Read Less [-]

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.

Methods of Mathematics: Calculus, Statistics, and Combinatorics: Read More [+]

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.

Methods of Mathematics: Calculus, Statistics, and Combinatorics: Read Less [-]

MATH 16A Analytic Geometry and Calculus 3 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021

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.)

Analytic Geometry and Calculus: Read More [+]

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.

Analytic Geometry and Calculus: Read Less [-]

MATH 16B Analytic Geometry and Calculus 3 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Continuation of 16A. Application of integration of economics and life sciences. Differential equations. Functions of many variables. Partial derivatives, constrained and unconstrained optimization.
Analytic Geometry and Calculus: Read More [+]
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.

Analytic Geometry and Calculus: Read Less [-]

MATH N16A Analytic Geometry and Calculus 3 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 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.
Analytic Geometry and Calculus: Read More [+]
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.

Analytic Geometry and Calculus: Read Less [-]

MATH N16B Analytic Geometry and Calculus 3 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 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.
Analytic Geometry and Calculus: Read More [+]
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.

Analytic Geometry and Calculus: Read Less [-]

MATH 24 Freshman Seminars 1 Unit

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Freshman Seminars: Read More [+]
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.

Freshman Seminars: Read Less [-]

MATH 32 Precalculus 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Precalculus: Read More [+]

Rules & Requirements

Prerequisites: Three years of high school mathematics

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

Precalculus: Read Less [-]

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.
Precalculus: Read More [+]

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.

Precalculus: Read Less [-]

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.
Freshman/Sophomore Seminar: Read More [+]

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.

Freshman/Sophomore Seminar: Read Less [-]

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.
Supplementary Work in Lower Division Mathematics: Read More [+]

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.

Supplementary Work in Lower Division Mathematics: Read Less [-]

MATH 53 Multivariable Calculus 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Multivariable Calculus: Read More [+]

Rules & Requirements

Prerequisites: Mathematics 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 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.

Multivariable Calculus: Read Less [-]

MATH H53 Honors Multivariable Calculus 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Honors Multivariable Calculus: Read More [+]

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.

Honors Multivariable Calculus: Read Less [-]

MATH N53 Multivariable Calculus 4 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 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.
Multivariable Calculus: Read More [+]

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.

Multivariable Calculus: Read Less [-]

MATH W53 Multivariable Calculus 4 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 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.
Multivariable Calculus: Read More [+]

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

Multivariable Calculus: Read Less [-]

MATH 54 Linear Algebra and Differential Equations 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Linear Algebra and Differential Equations: Read More [+]
Rules & Requirements

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

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

Linear Algebra and Differential Equations: Read Less [-]

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.
Honors Linear Algebra and Differential Equations: Read More [+]
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.

Honors Linear Algebra and Differential Equations: Read Less [-]

MATH N54 Linear Algebra and Differential Equations 4 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 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.
Linear Algebra and Differential Equations: Read More [+]
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.

Linear Algebra and Differential Equations: Read Less [-]

MATH W54 Linear Algebra and Differential Equations 4 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 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.
Linear Algebra and Differential Equations: Read More [+]
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

Linear Algebra and Differential Equations: Read Less [-]

MATH 55 Discrete Mathematics 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Logic, mathematical induction sets, relations, and functions. Introduction to graphs, elementary number theory, combinatorics, algebraic structures, and discrete probability theory.
Discrete Mathematics: Read More [+]

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.

Discrete Mathematics: Read Less [-]

MATH N55 Discrete Mathematics 4 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session, Summer 2020 8 Week Session
Logic, mathematical induction sets, relations, and functions. Introduction to graphs, elementary number theory, combinatorics, algebraic structures, and discrete probability theory.
Discrete Mathematics: Read More [+]

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.

Discrete Mathematics: Read Less [-]

MATH 74 Transition to Upper Division Mathematics 3 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
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.
Transition to Upper Division Mathematics: Read More [+]

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.

Transition to Upper Division Mathematics: Read Less [-]

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.
Special Topics in Mathematics: Read More [+]

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.

Special Topics in Mathematics: Read Less [-]

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.
College Algebra: Read More [+]
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.

College Algebra: Read Less [-]

MATH 98 Supervised Group Study 1 - 4 Units

Terms offered: Fall 2021, Summer 2021 3 Week Session, Spring 2021
Directed Group Study, topics vary with instructor.
Supervised Group Study: Read More [+]
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.

Supervised Group Study: Read Less [-]

MATH 98BC Berkeley Connect 1 Unit

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Berkeley Connect: Read More [+]
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.

Berkeley Connect: Read Less [-]

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.
Supervised Independent Study: Read More [+]
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.

Supervised Independent Study: Read Less [-]

MATH C103 Introduction to Mathematical Economics 4 Units

Terms offered: Fall 2021, Fall 2020, Spring 2020
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.
Introduction to Mathematical Economics: Read More [+]
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

Introduction to Mathematical Economics: Read Less [-]

MATH 104 Introduction to Analysis 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
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.
Introduction to Analysis: Read More [+]
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.

Introduction to Analysis: Read Less [-]

MATH H104 Honors Introduction to Analysis 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Honors section corresponding to 104. Recommended for students who enjoy mathematics and are good at it. Greater emphasis on theory and challenging problems.
Honors Introduction to Analysis: Read More [+]
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.

Honors Introduction to Analysis: Read Less [-]

MATH 105 Second Course in Analysis 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Second Course in Analysis: Read More [+]
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.

Second Course in Analysis: Read Less [-]

MATH 106 Mathematical Probability Theory 4 Units

Terms offered: Not yet offered
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.
Mathematical Probability Theory: Read More [+]
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.

Mathematical Probability Theory: Read Less [-]

MATH 110 Linear Algebra 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
Matrices, vector spaces, linear transformations, inner products, determinants. Eigenvectors. QR factorization. Quadratic forms and Rayleigh's principle. Jordan canonical form, applications. Linear functionals.
Linear Algebra: Read More [+]
Rules & Requirements

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

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 3 hours of discussion per week

Additional Details

Subject/Course Level: Mathematics/Undergraduate

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

Linear Algebra: Read Less [-]

MATH H110 Honors Linear Algebra 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Honors section corresponding to course 110 for exceptional students with strong mathematical inclination and motivation. Emphasis is on rigor, depth, and hard problems.
Honors Linear Algebra: Read More [+]
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.

Honors Linear Algebra: Read Less [-]

MATH 113 Introduction to Abstract Algebra 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
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.
Introduction to Abstract Algebra: Read More [+]
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

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.

Introduction to Abstract Algebra: Read Less [-]

MATH H113 Honors Introduction to Abstract Algebra 4 Units

Terms offered: Fall 2022, Spring 2022, Spring 2021
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.
Honors Introduction to Abstract Algebra: Read More [+]
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.

Honors Introduction to Abstract Algebra: Read Less [-]

MATH 114 Second Course in Abstract Algebra 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Second Course in Abstract Algebra: Read More [+]
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.

Second Course in Abstract Algebra: Read Less [-]

MATH 115 Introduction to Number Theory 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
Divisibility, congruences, numerical functions, theory of primes. Topics selected: Diophantine analysis, continued fractions, partitions, quadratic fields, asymptotic distributions, additive problems.
Introduction to Number Theory: Read More [+]
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.

Introduction to Number Theory: Read Less [-]

MATH 116 Cryptography 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Construction and analysis of simple cryptosystems, public key cryptography, RSA, signature schemes, key distribution, hash functions, elliptic curves, and applications.
Cryptography: Read More [+]
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.

Cryptography: Read Less [-]

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

Terms offered: Fall 2022, Spring 2022, Spring 2020
Introduction to signal processing including Fourier analysis and wavelets. Theory, algorithms, and applications to one-dimensional signals and multidimensional images.
Fourier Analysis, Wavelets, and Signal Processing: Read More [+]
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.

Fourier Analysis, Wavelets, and Signal Processing: Read Less [-]

MATH 121A Mathematical Tools for the Physical Sciences 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
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.
Mathematical Tools for the Physical Sciences: Read More [+]
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.

Mathematical Tools for the Physical Sciences: Read Less [-]

MATH 121B Mathematical Tools for the Physical Sciences 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Mathematical Tools for the Physical Sciences: Read More [+]
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.

Mathematical Tools for the Physical Sciences: Read Less [-]

MATH 123 Ordinary Differential Equations 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Existence and uniqueness of solutions, linear systems, regular singular points. Other topics selected from analytic systems, autonomous systems, Sturm-Liouville Theory.
Ordinary Differential Equations: Read More [+]
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.

Ordinary Differential Equations: Read Less [-]

MATH 124 Programming for Mathematical Applications 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Programming for Mathematical Applications: Read More [+]
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.

Programming for Mathematical Applications: Read Less [-]

MATH 125A Mathematical Logic 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
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.
Mathematical Logic: Read More [+]
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.

Mathematical Logic: Read Less [-]

MATH 126 Introduction to Partial Differential Equations 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
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.
Introduction to Partial Differential Equations: Read More [+]
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.

Introduction to Partial Differential Equations: Read Less [-]

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.
Mathematical and Computational Methods in Molecular Biology: Read More [+]
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.

Mathematical and Computational Methods in Molecular Biology: Read Less [-]

MATH 128A Numerical Analysis 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Programming for numerical calculations, round-off error, approximation and interpolation, numerical quadrature, and solution of ordinary differential equations. Practice on the computer.
Numerical Analysis: Read More [+]
Rules & Requirements

Prerequisites: 53 and 54

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.

Numerical Analysis: Read Less [-]

MATH 128B Numerical Analysis 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Iterative solution of systems of nonlinear equations, evaluation of eigenvalues and eigenvectors of matrices, applications to simple partial differential equations. Practice on the computer.
Numerical Analysis: Read More [+]
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.

Numerical Analysis: Read Less [-]

MATH W128A Numerical Analysis 4 Units

Terms offered: Summer 2022 8 Week Session, Summer 2021 8 Week Session
Numerical Analysis: Read More [+]
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

Numerical Analysis: Read Less [-]

MATH 130 Groups and Geometries 4 Units

Terms offered: Spring 2022, Fall 2020, Spring 2020
Isometries of Euclidean space. The Platonic solids and their symmetries. Crystallographic groups. Projective geometry. Hyperbolic geometry.
Groups and Geometries: Read More [+]
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.

Groups and Geometries: Read Less [-]

MATH 135 Introduction to the Theory of Sets 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
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.
Introduction to the Theory of Sets: Read More [+]
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.

Introduction to the Theory of Sets: Read Less [-]

MATH 136 Incompleteness and Undecidability 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
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.
Incompleteness and Undecidability: Read More [+]
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.

Incompleteness and Undecidability: Read Less [-]

MATH 140 Metric Differential Geometry 4 Units

Terms offered: Fall 2022, Spring 2022, Spring 2021
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.
Metric Differential Geometry: Read More [+]
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.

Metric Differential Geometry: Read Less [-]

MATH 141 Elementary Differential Topology 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
Manifolds in n-dimensional Euclidean space and smooth maps, Sard's Theorem, classification of compact one-manifolds, transversality and intersection modulo 2.
Elementary Differential Topology: Read More [+]
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.

Elementary Differential Topology: Read Less [-]

MATH 142 Elementary Algebraic Topology 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
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.
Elementary Algebraic Topology: Read More [+]
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.

Elementary Algebraic Topology: Read Less [-]

MATH 143 Elementary Algebraic Geometry 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Introduction to basic commutative algebra, algebraic geometry, and computational techniques. Main focus on curves, surfaces and Grassmannian varieties.
Elementary Algebraic Geometry: Read More [+]
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.

Elementary Algebraic Geometry: Read Less [-]

MATH 151 Mathematics of the Secondary School Curriculum I 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
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.
Mathematics of the Secondary School Curriculum I: Read More [+]
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.

Mathematics of the Secondary School Curriculum I: Read Less [-]

MATH 152 Mathematics of the Secondary School Curriculum II 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Complex numbers and Fundamental Theorem of Algebra, roots and factorizations of polynomials, Euclidean geometry and axiomatic systems, basic trigonometry.
Mathematics of the Secondary School Curriculum II: Read More [+]
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.

Mathematics of the Secondary School Curriculum II: Read Less [-]

MATH 160 History of Mathematics 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
History of algebra, geometry, analytic geometry, and calculus from ancient times through the seventeenth century and selected topics from more recent mathematical history.
History of Mathematics: Read More [+]
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.

History of Mathematics: Read Less [-]

MATH 170 Mathematical Methods for Optimization 4 Units

Terms offered: Fall 2021, Fall 2020, Spring 2020
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.
Mathematical Methods for Optimization: Read More [+]
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.

Mathematical Methods for Optimization: Read Less [-]

MATH 172 Combinatorics 4 Units

Terms offered: Fall 2022, Spring 2021, Fall 2019
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.
Combinatorics: Read More [+]
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.

Combinatorics: Read Less [-]

MATH 185 Introduction to Complex Analysis 4 Units

Terms offered: Fall 2022, Summer 2022 8 Week Session, Spring 2022
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.
Introduction to Complex Analysis: Read More [+]
Rules & Requirements

Prerequisites: 104

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.

Introduction to Complex Analysis: Read Less [-]

MATH H185 Honors Introduction to Complex Analysis 4 Units

Terms offered: Spring 2021, Spring 2020, Spring 2019
Honors section corresponding to Math 185 for exceptional students with strong mathematical inclination and motivation. Emphasis is on rigor, depth, and hard problems.
Honors Introduction to Complex Analysis: Read More [+]
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.

Honors Introduction to Complex Analysis: Read Less [-]

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.
Mathematical Methods in Classical and Quantum Mechanics: Read More [+]
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.

Mathematical Methods in Classical and Quantum Mechanics: Read Less [-]

MATH 191 Experimental Courses in Mathematics 1 - 4 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Experimental Courses in Mathematics: Read More [+]
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.

Experimental Courses in Mathematics: Read Less [-]

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.
Special Topics in Mathematics: Read More [+]
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.

Special Topics in Mathematics: Read Less [-]

MATH 196 Honors Thesis 4 Units

Terms offered: Spring 2017, Spring 2016, Spring 2015
Independent study of an advanced topic leading to an honors thesis.
Honors Thesis: Read More [+]
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.

Honors Thesis: Read Less [-]

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.
Field Study: Read More [+]
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.

Field Study: Read Less [-]

MATH 198 Directed Group Study 1 - 4 Units

Terms offered: Fall 2021, Fall 2019, Spring 2017
Topics will vary with instructor.
Directed Group Study: Read More [+]
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.

Directed Group Study: Read Less [-]

MATH 198BC Berkeley Connect 1 Unit

Terms offered: Fall 2022, Spring 2022, Fall 2021
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.
Berkeley Connect: Read More [+]
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.

Berkeley Connect: Read Less [-]

MATH 199 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Supervised Independent Study and Research: Read More [+]
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.

Supervised Independent Study and Research: Read Less [-]