MATHEMATICS

DEPARTMENT OF MATHEMATICS AND STATISTICS
Darwin Hall 114
phone: (707) 664-2368 and (707) 664-3324
email: math@sonoma.edu
www.sonoma.edu/math

DEPARTMENT CHAIR
Brigitte Lahme

ADMINISTRATIVE COORDINATORS
Robbin Elliott Cortez

Faculty

Sam Brannen
Martha Byrne
Ben Ford
Susan Herring
Natalie Hobson
Izabela Kanaana
Brigitte Lahme
Elaine Newman
Jerry Morris
Martha Shott
Sunil Tiwari

Programs Offered

Mathematics

- Bachelor of Arts in Mathematics
- Bachelor of Science in Mathematics
- Minor in Mathematics
- Minor in Math for Teachers
- Preparation For Teaching

Statistics – See the Statistics portion of this Catalog

- Bachelor of Arts in Applied Statistics
- Bachelor of Science in Statistics
- Minor in Applied Statistics
- Minor in Statistics
- Preparation for Actuarial Exams

About Mathematics

Mathematics is a rapidly growing discipline whose concepts and applications play an ever-increasing part in modern life. Mathematics has always been an essential tool in the physical sciences, and has more recently been applied extensively in such diverse areas as medical and biological research, environmental studies, economics, management science, behavioral and social sciences, statistics, and computer science.

Our basic curriculum is designed to give students the mathematical skills necessary for success in business, industry, government, and teaching, as well as to provide a sound background for continuation of study toward advanced degrees in mathematics, computer science, statistics, and related fields.

The B.A. in mathematics provides preparation for teaching, general application of mathematics, and graduate study in mathematics. The bi-disciplinary concentration allows a student to combine mathematics with another discipline.

The B.S. in mathematics has a concentration in applied mathematics. This program prepares students for graduate study in mathematics and for work in a variety of other fields: computer science, work in government and industry, biostatistics, actuarial work, and consultative problem-solving in modern industry.

Degree Requirements	**Units**
General education (50, 8 in major)	42
Major	46-55
Electives	23-26
Total units needed for graduation	**120**

Core Curriculum

MATH 161 Differential and Integral Calculus I (GE B4)	4
MATH 180 Computing for Mathematics and Science	2
MATH 211 Differential and Integral Calculus II	4
MATH 220 Reasoning and Proof (GE A3)	4
MATH 241 Linear Algebra with Applications in Differential Equations	4
MATH 340 Real Analysis I	4
Total units in core curriculum	**22**

B.A. Program (Pure Mathematics)

(See page 200 for a sample four-year program.)

Core Curriculum	*22 Plus*
MATH 261 Multivariable Calculus	4
MATH 306 Number Theory or MATH 308 Geometry	4
MATH 320 Modern Algebra I	4
MATH 322 Linear Algebra	4
Select two of the following:	
MATH 418 Topology	4
MATH 420 Modern Algebra II	4
MATH 440 Real Analysis II	4
MATH 460 Complex Analysis	4
Total units in B.A. program	**46**

B.A. Program (Secondary Teaching)

(See page 201 for sample four-year programs.)

This B.A. program satisfies state requirements for subject matter preparation in mathematics for the Single Subject Teaching Credential.

Core Curriculum	***22 Plus***
MATH 250 Probability and Statistics	2
MATH 306 Number Theory	4
MATH 308 College Geometry	4
MATH 310 History of Mathematics	4
MATH 316 Graph Theory and Combinatorics	
or MATH 416 Graph Theory and Combinatorics	4
MATH 320 Modern Algebra I	4
MATH 470 Mathematical and Statistical Modeling	4
MATH 390 Fieldwork and Seminar:	
Secondary Mathematics Teaching	2
MATH 490 Capstone Seminar:	
Secondary Mathematics Teaching	1
Supporting Courses	
PHYS 114 Introduction to Physics	4
Total units in secondary teaching program	**55**

Note: *Students considering graduate school in mathematics are advised to also take MATH 322 and Math 261.*

B.A. Program (Bi-disciplinary Mathematics)

This B.A. concentration allows a student to combine mathematics with another discipline.

MATH 161 Differential and Integral Calculus I (GE B4)	4
MATH 211 Differential and Integral Calculus II	4
22 additional units selected from the following list, including a minimum of 14 at the upper-division level:	
MATH 165 Elementary Applied Statistics	4
or MATH 250 Probability and Statistics	2
MATH 180 Computing for Mathematics and Science	2
MATH 220 Higher Mathematics: An Introduction	4
or MATH 210 Introduction to Proof	1
or MATH 142 Discrete Structures	3
MATH 222 Elementary Applied Linear Algebra	3
MATH 241 Differential Equations with Linear Algebra	4
MATH 261 Multivariable Calculus	4
MATH 265 Intermediate Applied Statistics with SPSS	4
MATH 306 Number Theory	4
MATH 308 College Geometry	4
MATH 310 History of Mathematics	4
MATH 316 Graph Theory and Combinatorics	4
or MATH 416 Graph Theory and Combinatorics	4
MATH 320 Modern Algebra I	4
MATH 322 Linear Algebra	4
MATH 330 Techniques of Problem Solving	1
MATH 340 Real Analysis I	4
MATH 345 Probability Theory	4
MATH 352 Numerical Analysis	4
MATH 375 M*A*T*H* Colloquium	1
MATH 418 Topology	4
MATH 420 Modern Algebra II	4
MATH 430 Linear Systems Theory	3
MATH 431 Applied Partial Differential Equations	4
MATH 440 Real Analysis II	4
MATH 441 Operations Research	3
MATH 445 Mathematical Statistics and Operations Research	4
MATH 460 Introduction to Complex Variables	4
MATH 470 Mathematical and Statistical Modeling	4
MATH 485 Selected Topics	1-3
MATH 490 Capstone Seminar	1

A minimum of 22 additional units in another program (outside of the Department of Mathematics and Statistics), at least 12 at the upper-division level, chosen in consultation with and approved by the Mathematics and Statistics Department Chair.

Total units in Bi-disciplinary Mathematics program **52**

B.S. Program (Applied Mathematics)

(See page 200 for a sample four-year program.)

This B.S. concentration prepares students for employment in industry and graduate schools in scientific fields.

Core Curriculum	***22 Plus***
MATH 261 Multivariable Calculus	4
MATH 316 Graph Theory and Combinatorics	4
or MATH 416 Graph Theory and Combinatorics	4
or MATH 445 Mathematical Statistics and Operations Research	4
MATH 322 Linear Algebra	4
MATH 345 Probability Theory	4
MATH 352 Numerical Analysis	4
MATH 431 Applied Partial Differential Equations	4
MATH 470 Mathematical and Statistical Modeling	4
Supporting Courses	
PHYS 114 Introduction to Physics	4
Total units in applied mathematics program	**54**

Note: *Students considering graduate school in mathematics are advised to also take Math 320*

Statistics

For the Department's Statistics offerings (majors, minor, and actuarial science preparation), see the Statistics section of this Catalog.

Minor in Mathematics

Twenty units of mathematics are required. These must include MATH 161 (or its equivalent) and at least 6 units of upper-division mathematics courses, not including MATH 300A, MATH 300B, MATH 390, MATH 395, MATH 399, or MATH 490. Approval of the mathematics and statistics department should be obtained by the junior year in order to plan the minor properly.

Minor in Math for Teachers

This program provides the mathematical background to teach effectively at the elementary and middle school levels. Twenty-three units are required. These must include MATH 300A, MATH 103 or 150, MATH 142 or 200 or 220, MATH 160 or 161, MATH 250 or 300B, and two courses chosen from MATH 306, MATH 310, MATH 316, and MATH 470. Students pursuing this minor are also strongly advised to take MATH 390.

Preparation for Teaching

Secondary

The B.A. program for secondary teaching is designed for students planning to teach mathematics in middle, junior high, and high schools. This program is fully accredited by the California Commission on Teacher Credentialing and satisfies the subject matter competency requirement for a Single Subject Teaching Credential. (An alternative route for demonstrating subject matter competence is passing a battery of commercial exams.) Most students complete the B.A. program, then a one-year teaching credential program to earn the Single Subject Credential. Any student interested in teaching mathematics at the secondary level should consult a Mathematics and Statistics Department education advisor as early as possible in their college career. The advisor can provide information about Sonoma State's single subject credential program and can help the student design a plan for taking the required mathematics and education courses to complete both degree and credentialing requirements efficiently. In particular, Math 390 should be taken in the Fall semester of a student's sophomore or junior year.

Elementary

The Department of Mathematics and Statistics also offers coursework for students planning to teach in elementary schools or preschools. The minimal college-level mathematics preparation recommended for elementary teachers is three courses: MATH 150, MATH 300A, and MATH 300B. Particular subject matter preparation programs for elementary teachers may have additional requirements or may offer the option of a mathematics concentration; consult advisors in the program for additional details.

Middle School or Elementary Mathematics Specialist

The California Commission on Teacher Credentialing has approved a Foundational Level Mathematics Credential Waiver program, and the Bi-disciplinary concentration can be used to simultaneously earn a B.A. in Mathematics and satisfy the Foundational Level Mathematics Credential Waiver program. Students interested in this program should contact a Mathematics and Statistics education advisor to design a plan of study.

Students interested in teaching mathematics in middle school, or in specializing in mathematics at the elementary level, should consider the math minor for teachers. This minor also helps students who wish to prepare for the CSET (California Subject Examination for Teachers) exam in mathematics, especially at the Foundational level. The Foundational level credential in mathematics is appropriate for elementary, middle, and early high school teaching.

Grading Policy in the Department of Mathematics and Statistics

Non-majors

All mathematics courses except MATH 103, 104, 105, 111, 131, 141, 150, 160, 161,161X, and 165, 165X are available in the Cr/NC grading mode to non-mathematics majors.

All Students

MATH 131A, 150A, 160W, 161W, 161A, 165A, 175, 210, 211W, 295, 330, 390, 395, and 499 are available only as Cr/NC.

Mathematics and Statistics Majors and Minors

A mathematics and statistics major or minor must take all mathematics courses used to meet major requirements in the traditional grading mode, with the exceptions of courses offered only in the CR/NC modes and any course taken as credit by challenge examination (please see more information on this in the Admissions section of this catalog).

Sample Four-Year Program for Bachelor of Arts in Mathematics- Pure Concentration

FRESHMAN YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 161 (B4) (4)	MATH 211 (4)
Freshman Learning Community (GE) (6)	GE (11)
GE (4)	
MATH 175 (elective) (1)	

SOPHOMORE YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 241 (4)	MATH 261 (4)
PHYS 114 (B1) (4)	MATH 220 (A3) (4)
MATH 180 (2)	GE (3)
GE (5)	Elective (4)

JUNIOR YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH Elective (E.g. MATH 345) (4)	MATH 306 or 308 (4)
MATH 375 (1)	MATH 322 (4)
UD GE (3)	UD GE (3)
Electives (7)	Elective (4)

SENIOR YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 320 (4)	MATH 420 or MATH 440 (4)
MATH 340 (4)	MATH 460 or MATH 418 (4)
UD GE (3)	Electives (7)
Elective (4)	

TOTAL UNITS: 120

Sample Four-Year Program for Bachelor of Science in Mathematics- Applied Concentration

FRESHMAN YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 161 (B4) (4)	MATH 211 (4)
Freshman Learning Community (GE) (6)	GE (11)
GE (4)	
MATH 175 (elective) (1)	

SOPHOMORE YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 241 (4)	MATH 261 (4)
PHYS 114 (B1) (4)	MATH 220 (A3) (4)
MATH 180 (2)	GE (3)
GE (5)	Elective (4)

JUNIOR YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 470 (4)	MATH 316 or 416 (4)
MATH 345 (4)	MATH 322 (4)
UD GE (3)	MATH 375 (1)
Elective (4)	UD GE (3)
	Elective (3)

SENIOR YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 352 (4)	MATH 431 (4)
MATH 340 (4)	MATH 445 (4)
UD GE (3)	Electives (7)
Elective (e.g. Math 320) (4)	

TOTAL UNITS: 120

Sample Four-Year Program for Bachelor of Arts in Mathematics-Secondary Teaching Concentration

FRESHMAN YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 161 (B4) (4)	MATH 211 (4)
Freshman Learning Community (GE) (6)	GE (11)
GE (4)	
MATH 175 (elective) (1)	

SOPHOMORE YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 241 (4)	MATH 250 (2)
PHYS 114 (B1) (4)	MATH 220 (A3) (4)
MATH 180 (2)	GE (3)
MATH 390 (2)	Elective (6)
GE (3)	

JUNIOR YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 310 (4)	MATH 306 (4)
MATH 470 (4)	MATH 316 (4)
MATH 375 (1)	EDUC 417 (D) (3)
UD GE (3)	Elective (4)
Elective (3)	

SENIOR YEAR: 30 Units

Fall Semester (15 Units)	*Spring Semester (15 Units)*
MATH 320 (4)	MATH 308 (4)
MATH 340 (4)	MATH 490 (1)
EDSS 418 (E) (3)	Elective (10)
Elective (4)	

TOTAL UNITS: 120