MATHEMATICS (BS)

Offered at: San Luis Obispo Campus

The undergraduate program for math majors contains a central core of courses. These courses give a solid basis for advanced work that is tailored to fit the needs and objectives of each individual student. Advanced coursework is chosen in close consultation with faculty advisors.

Program Learning Objectives

1. Understand the nature of mathematical proof and be able to write clear and concise proofs.
2. Develop the ability to read, understand, and use basic definitions in linear and abstract algebra and real analysis, and be able to prove simple consequences of these definitions.
3. Be able to use standard mathematical techniques to solve elementary problems.
4. Be able to communicate effectively in oral and written form.
5. Be able to write simple computer programs to perform mathematical computations.
6. Gain experience exploring open-ended problems, learn to make conjectures, and gather evidence to support or refute these conjectures.
7. Develop the ability to read and to learn mathematics independently.
8. Learn about applications of mathematics in other fields and gain experience in mathematical modeling.
9. Foster global citizenship by developing critical thinking skills.

Degree Requirements and Curriculum

In addition to the program requirements listed on this page, students must also satisfy requirements outlined in more detail in the Minimum Requirements for Graduation (https://catalog.calpoly.edu/academic-standards-policies/general-requirements-bachelors-degree/#generaleducationtext) section of this catalog, including:

- 40 units of upper-division courses
- 2.0 GPA
- Graduation Writing Requirement (GWR)
- U.S. Cultural Pluralism (USCP)

Note: No Major, Support or Concentration courses may be selected as credit/no credit. In addition, no more than 12 units of cooperative or internship courses can count towards your degree requirements

Code	Title	Units
REQUIRED COURSES		
MATH 1151	Linear Algebra	3
MATH 1261	Calculus I (2) [1]	4
MATH 1262	Calculus II	2-4
or MATH 1263	Bridge Calculus II	
MATH 2001	Mathematics Orientation	1
MATH 2031	Transition to Advanced Mathematics	3
MATH 2263	Calculus III	3
MATH 2343	Differential Equations	3
Select from the following: (Upper-Division 2/5) [1]		3
MATH 3051	Combinatorics I	
MATH 3111	Number Theory	
MATH 3301	Complex Analysis	
MATH 3152	Advanced Linear Algebra	4
MATH 4201	Abstract Algebra I	4
MATH 4264	Real Analysis I	4
MATH 4202	Abstract Algebra II	3-4
or MATH 4265	Real Analysis II	
Select from the following:		3
MATH 4461 & MATH 4462	Senior Project I and Senior Project II	
MATH 4463	Senior Project Seminar	
MATH 4464	Senior Project Applied Seminar	

CSC 1001 & 1001L	Fundamentals of Computer Science and Fundamentals of Computer Science Laboratory	4
PHYS 1141	General Physics I (5A & 5C) [1]	4
STAT 1510	Statistics I	3
Select from the following:		3-4
CSC 2001 & 2001L	Data Structures and Data Structures Laboratory	
CSC 2600	Computing with Data	
MATH 3681	Mathematical Programming	
PHYS 4202	Computational Physics	
STAT 2610	Introduction to Probability and Simulation	
Select one of the following Tracks: [2, 3, 4, 5]		21-23
General Mathematics Track		
Select 7 courses from List A		
Applied Mathematics Track		
Select 4 courses from List A and 3 courses from List B		
Teaching Mathematics Track		
Select 3 courses from List A and 4 courses from List C		
List A - General Mathematics Electives		
MATH 3011	History of Mathematics	
MATH 3051	Combinatorics I	
MATH 3055	Graph Theory	
MATH 3111	Number Theory	
MATH 3301	Complex Analysis	
MATH 3351	Differential Equations and Boundary Value Problems	
MATH 3511	Euclidean Geometry	
MATH 3622	Mathematics of Data Science	
MATH 3651	Introduction to Numerical Analysis	
MATH 3681	Mathematical Programming	
MATH 4052	Combinatorics II	
MATH 4202	Abstract Algebra II	
MATH 4265	Real Analysis II	
MATH 4342	Nonlinear Dynamical Systems	
MATH 4352	Partial Differential Equations	
MATH 4461 & MATH 4462	Senior Project I and Senior Project II	
MATH 4512	Non-Euclidean Geometry	
MATH 4531	Differential Geometry	
MATH 4541	Introduction to Topology	
MATH 4652	Numerical Differential Equations	
MATH 4653	Numerical Optimization	
MATH 4911	Game Theory	
MATH 4981	Advanced Topics in Mathematics	
MATH 4982	Advanced Topics in Applied Mathematics	
CSC 3449	Algorithms and Complexity	
CSC 3665	Introduction to Database Management Systems	
ECON 3030	Intermediate Microeconomics	
ECON 4010	Mathematical Economics	
ECON 4012	Probability Models for Economic Decisions	
ENGR 2211	Introduction to Mechanics	
ME 3302	Thermodynamics	
PHYS 1143	General Physics II	
PHYS 3301	Statistical Mechanics	

PHYS 3305	Classical Mechanics I	
PHYS 3306	Classical Mechanics II	
PHYS 3314	Ocean Dynamics	
PHYS 3323	Optics	
STAT 3520	Statistics II	
STAT 3530	Applied Linear Models	
STAT 4610	Probability Theory	
STAT 4620	Statistical Theory	
STAT 4750	Bayesian Reasoning and Methods	
STAT 4770	Survival Analysis Methods	
STAT 4790	Applied Multivariate Statistics	
List B - Applied Mathematics Electives		
Select from the following:		
MATH 3055	Graph Theory	
MATH 4342	Nonlinear Dynamical Systems	
MATH 4352	Partial Differential Equations	
MATH 4652	Numerical Differential Equations	
MATH 4653	Numerical Optimization	
MATH 4911	Game Theory	
List C - Teaching Mathematics Electives		
Select from the following:		
MATH 3511	Euclidean Geometry	
MATH 3971	Technology in Mathematics Education	
MATH 4512	Non-Euclidean Geometry	
MATH 4972	Advanced Mathematics for Teaching	
GENERAL EDUCATION (GE)		
(See GE program requirements below)		33
FREE ELECTIVES		
Free Electives [6]		6-11
Total Units		**120**

1 Required in Major or Support; also satisfies General Education (GE) requirement.
2 A maximum of 14 units may be at the 1000-2000-3000 level.
3 A maximum of 4 units may be at the 1000-2000 level.
4 A maximum of 8 units may be from non-MATH prefix courses.
5 Courses can only be used once for major degree credit.
6 If a General Education (GE) course is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.

General Education (GE) Requirements

- 43 units required, 10 of which are specified in Major and/or Support.
- If any of the remaining 33 Units is used to satisfy a Major or Support requirement, additional units of Free Electives may be needed to complete the total units required for the degree.
- See the complete GE course listing (https://catalog.calpoly.edu/academic-standards-policies/general-requirements-bachelors-degree/#generaleducationtext).
- A grade of C- or better is required in one course in each of the following GE Areas: 1A (English Composition), 1B (Critical Thinking), 1C (Oral Communication), and 2 (Mathematics and Quantitative Reasoning).

Lower-Division General Education

Area 1	**English Communication and Critical Thinking**	
1A	Written Communication	3
1B	Critical Thinking	3
1C	Oral Communication	3
Area 2	**Mathematics and Quantitative Reasoning**	

2	Mathematics and Quantitative Reasoning (3 units in Major) [1]	0
Area 3	**Arts and Humanities**	
3A	Arts	3
3B	Humanities: Literature, Philosophy, Languages other than English	3
Area 4	**Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)**	
4A	American Institutions (Title 5, Section 40404 Requirement)	3
4B	Social and Behavioral Sciences	3
Area 5	**Physical and Life Sciences**	
5A	Physical Sciences (3 units in Support) [1]	0
5B	Life Sciences	3
5C	Laboratory (may be embedded in a 5A or 5B course) (1 units in Support) [1]	0
Area 6	**Ethnic Studies**	
6	Ethnic Studies	3
Upper-Division General Education		
Upper-Division 2/5	Mathematics and Quantitative Reasoning or Physical and Life Sciences (3 units in Major) [1]	0
Upper-Division 3	Arts and Humanities	3
Upper-Division 4	Social and Behavioral Sciences (Area 4 courses must come from at least two different course prefixes.)	3
Total Units		**33**

[1] Required in Major or Support; also satisfies General Education (GE) requirement.

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