

BS in Mathematics

58-60 units

The BS in Mathematics (<https://www.apu.edu/clas/programs/math-major/>) at Azusa Pacific University provides students with a strong foundation in the mathematics of continuous change (calculus and analysis), of pattern and symmetry (linear and abstract algebra), of space (geometry and topology), of chance (probability), and of data (statistics). The major focuses on depth of conceptual understanding, rigorous mathematical proof, and problem-solving strategies. While this major does treat applications of mathematics and includes courses in physics and computer science, the emphasis is on theory. Students who prefer a focus on applications are encouraged to choose the applied mathematics major.

A student who majors in mathematics has the option of obtaining a Bachelor of Arts (BA) or a Bachelor of Science (BS) degree. Both degrees have the same mathematics requirements, but the BS degree requires a minor in physics (<http://catalog.apu.edu/academics/college-arts-humanities-theology-sciences/school-humanities-sciences/math-physics-statistics/physics-minor/>), chemistry (<http://catalog.apu.edu/academics/college-arts-humanities-theology-sciences/school-humanities-sciences/biology-chemistry/chemistry-minor/>), or computer science (<http://catalog.apu.edu/academics/college-arts-humanities-theology-sciences/school-humanities-sciences/math-physics-statistics/computer-science-minor/>) (see these subject areas for requirements and course descriptions).

Career Opportunities

The BS in Mathematics degree program prepares graduates to be quantitative experts in a variety of fields: secondary or university teaching, mathematical research (for business, government, or the academy), cryptography, finance and economics, statistics and data analysis, or operations research and management consulting. Mathematics is also an excellent major for quantitatively minded students who want to go into business (see the finance minor (<http://catalog.apu.edu/academics/school-business-management/lp-timothy-leung-school-accounting/finance-minor/>)), medicine (see the premedical program (<http://catalog.apu.edu/academics/college-arts-humanities-theology-sciences/school-humanities-sciences/preprofessional-programs/>)) or law (see the prelaw minor (<http://catalog.apu.edu/academics/college-arts-humanities-theology-sciences/school-humanities-sciences/history-political-science/prelaw-minor/>)). Math majors have some of the highest rates of acceptance to graduate schools in all three of these fields.

APU mathematics graduates have advanced to prestigious graduate schools, have accepted choice offers to teach at various secondary schools, have been selected for Teach for America and Math for America, and have moved into attractive industry positions.

Students preparing for a career in actuarial science, industrial mathematics, mathematical physics, or computer science are encouraged to consider the applied mathematics major.

There is a strong demand for mathematics teachers. Students desiring a junior or senior high school teaching credential should note the requirements of the single-subject waiver program for mathematics. Completion of the Secondary Math Education Track (see below) waives the CSET exam requirement for entrance into a credentialing program.

Requirements

| Code | Title | Units |
|-------------------------|---|-----------|
| Required Courses | | |
| MATH 165 | Calculus I | 3 |
| MATH 166 | Calculus II | 3 |
| MATH 167 | Sequences and Series ^F | 1 |
| MATH 250 | Data Analysis ^F | 3 |
| MATH 268 | Multivariable Calculus | 3 |
| MATH 270 | Ordinary Differential Equations ^S | 4 |
| MATH 280 | Discrete Mathematics and Proof ^F | 3 |
| MATH 290 | Linear Algebra ^S | 3 |
| MATH 400 | Abstract Algebra ^{ES} | 3 |
| MATH 450 | Real Analysis ^{EF} | 3 |
| MATH 480 | Mathematical Reading, Writing, and Presentation ^{F, 1} | 3 |
| MATH 496 | Mathematics Senior Seminar ^{S, 2} | 3 |
| CS 120 | Introduction to Computer Science I ³ | 4 |
| PHYC 165 & PHYC 145 | Physics for Science and Engineering: Mechanics and Physics Laboratory I ^{4,F} | 5 |
| Total Units | | 44 |

In addition to the required courses above, complete one of the tracks below. You must also complete a minor in physics, chemistry, computer science, or statistics.

| Code | Title | Units |
|---|--|-----------|
| General Mathematics Track | | |
| Complete at least 14 units from the courses below. You must complete MATH 361 and at least one of MATH 460 and MATH 470. You cannot count both PHYC 166 and CS 125. | | 14 |
| MATH 269 | Vector Calculus ^{OF} | |
| MATH 340 | Geometry ^S | |
| MATH 361 | Introduction to Modeling with Probability | |
| MATH 390 | Number Theory ^{OF} | |
| MATH 460 | Topology ^{OS} | |
| MATH 470 | Complex Analysis ^{ES} | |
| MATH 495 | Advanced Topics in Mathematics | |
| CS 125 | Introduction to Computer Science II | |
| PHYC 166 & PHYC 146 | Physics for Science and Engineering: Electricity and Magnetism and Physics Laboratory II ^S | |
| Total Units | | 14 |

| Code | Title | Units |
|---|--|-----------|
| Secondary Math Education Track | | |
| Complete all 16 units below. This track meets the requirements of the CTC-approved Single Subject Waiver program. | | |
| MATH 130 | Introduction to Statistics ⁵ | 3 |
| MATH 301 | Mathematics for Secondary Teachers ^{OF} | 3 |
| MATH 340 | Geometry ^S | 3 |
| MATH 390 | Number Theory ^{OF} | 3 |
| EDLS 202 | Introduction to Teaching as a Profession (7-12) ⁶ | 4 |
| Total Units | | 16 |

¹ Meets the General Education Writing 3 requirement.

² Meets the General Education Integrative and Applied Learning requirement.

³ Meets the General Education Oral Communication requirement if taken with CS 290 and CS 480, or ENGR 240 and ENGR 480.

⁴ Meets the General Education Natural Sciences requirement. Students must complete both PHYC 165 and PHYC 145 to fulfill the GE Natural Sciences requirement.

⁵ Meets the General Education Quantitative Literacy requirement.

⁶ Meets the General Education Civic Knowledge and Engagement requirement.

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|-----|---------------------------------------|
| F | Offered in Fall only |
| S | Offered in Spring only |
| F/S | Offered in both Fall and Spring terms |
| EF | Offered in Fall in even years |
| ES | Offered in Spring in even years |
| OF | Offered in Fall in odd years |
| OS | Offered in Spring in odd years |

Program Learning Outcomes

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Students who successfully complete this program shall be able to:

1. Master fundamental mathematical methods and problem solving strategies.
2. Employ logical reasoning and standard proof techniques to construct rigorous mathematical arguments.
3. Communicate mathematical ideas in speech and writing, combining precise language and notation with insightful explanation.
4. Use mathematical models to analyze cross-disciplinary problems.

5. Employ appropriate technology and computational techniques.
6. Articulate how Christian perspectives and the study of mathematics and its applications mutually inform and enhance each other.