

Mathematics

A degree in mathematics is an excellent means of preparation for post-college years, whether a student intends to work in business or industry, teach, or pursue graduate studies. At Cal Lutheran we provide a broad and challenging program designed to develop fundamental skills and to prepare students for lifelong learning. The program features small classes with an emphasis on faculty-student interaction, classroom technology to facilitate learning, computer labs for student exploration and discovery, and a focus on interdisciplinary applications. Faculty mentors assist students in reaching their academic and career goals. Students are challenged to explore the many facets of mathematics and its applications through creative and critical thinking. Departmental space is set aside as a study and resource area for majors. Free tutoring for lower division courses is provided in the Math Lab.

The faculty encourage students to apply their mathematical knowledge by participating in internships, carrying out independent projects, and tutoring in the Math Lab. Students synthesize and extend their mathematical experiences in the senior capstone course. Other opportunities include participating in paid summer research programs across the nation, spending a semester studying mathematics abroad, preparing for and competing in national mathematics-related contests, and preparing posters and presentations for seminars and regional or national conferences.

Employers in the public and private sectors seek generalists with critical thinking skills who are capable of adapting to a wide variety of situations. Graduates in mathematics are prepared in this manner and can work in many career fields. These include computer science, engineering, actuarial science, education, business, finance and the natural sciences. Along with finding excellent employment opportunities, Cal Lutheran math majors have also been accepted for graduate studies at top universities throughout the United States.

Students who wish to register for a mathematics course must meet the necessary prerequisites, as stated in the Schedule of Classes and the Undergraduate Catalog. Students unsure of whether they meet the prerequisites should contact a mathematics faculty member. Courses numbered 400 and above are best taken after or concurrently with a 300-level course.

All Cal Lutheran students are required to meet the Mathematical Reasoning Proficiency under Core 21. Students who meet the proficiency requirement may still need to meet specific mathematics requirements for their majors

Major Requirements

Only mathematics courses numbered 200 or above earn credit toward a major in mathematics.

Bachelor of Science in Mathematics

45 credits minimum, 25 credits upper division.

MATH 241	Discrete Mathematics	4
MATH 251	Calculus I (preferred)	4
or MATH 245	Applied Calculus	
MATH 252	Calculus II	4
MATH 261	Calculus III	4
MATH 320	Elementary Mathematical Analysis	4
or MATH 382	Number Theory	
MATH 420	Real Analysis	4
or MATH 425	Abstract Algebra	
One 4-credit elective (upper or lower division)		4
Four 4-credit upper division mathematics classes (one class may be 3-credits instead)		15-16
MATH 475	Capstone	2
Total Hours		45-46

Required Supporting Courses

PHYS 211/211L	Mechanics and Thermodynamics-Calculus and Mechanics and Thermodynamics-Calculus Lab	5
PHYS 212/212L	Electricity, Magnetism, and Optics - Calculus and Electricity, Magnetism, and Optics - Calculus Lab	5
Computer Programming course at the 200-level or above (choice must be approved by Math Advisor)		
CSC 210	Introduction to Computer Programming	4
or CSC 205	Programming for Scientists	
Total Hours		14

Recommended Supporting Courses

MATH 474	Capstone Preparation (strongly recommended)	2
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CHEM 151/151L	General Chemistry and General Chemistry Lab	5
CHEM 152/152L	General Chemistry II and General Chemistry II Lab	5
Total Hours		12

Bachelor of Arts in Mathematics

41 credits minimum, 21 credits upper division.

MATH 241	Discrete Mathematics	4
MATH 251	Calculus I (preferred)	4
or MATH 245	Applied Calculus	
MATH 252	Calculus II	4
MATH 261	Calculus III	4
Take at least two of the following three courses		8
MATH 320	Elementary Mathematical Analysis	
MATH 381	Geometry	
MATH 382	Number Theory	
One 4-credit math elective (upper or lower division)		4
Three additional 4- credit upper division mathematics classes (one of which may be only 3-credits)		11-12
MATH 475	Capstone	2
Total Hours		41-42

Required Supporting Courses

One mathematical perspectives course (can be a Math upper division elective, must be approved by Math advisor)	3-4
Complete one of the following two course sequence options	9-10

Physics Option

PHYS 211/211L	Mechanics and Thermodynamics-Calculus and Mechanics and Thermodynamics-Calculus Lab
PHYS 212/212L	Electricity, Magnetism, and Optics - Calculus and Electricity, Magnetism, and Optics - Calculus Lab

Economics Option

ECON 203	General Economics	
One of the following 400-level Economics classes		
ECON 406	Intermediate Macro-Economics	
ECON 411	Intermediate Micro-Economics	
or ECON 450	Econometrics	
Total Hours		12-14

Recommended Supporting Courses

MATH 474	Capstone Preparation (Strongly Recommended)	2
A course in Computer Programming at the 200-level or above		3-4
CSC 210	Introduction to Computer Programming	
or CSC 205	Programming for Scientists	
CHEM 151/151L	General Chemistry and General Chemistry Lab	5
CHEM 152/152L	General Chemistry II and General Chemistry II Lab	5
Total Hours		15-16

Minor in Mathematics

20 credits minimum, 8 credits upper division.

Only mathematics courses numbered 200 or above earn credit toward a minor in mathematics. Either MATH 245 or MATH 251 (preferred) may be counted toward the minor, but not both.

MATH 251	Calculus I	4
or MATH 245	Applied Calculus	
MATH 252	Calculus II	4

Two 4-credit upper division mathematics classes	8
Select one of the following:	4
MATH 241 Discrete Mathematics	
MATH 261 Calculus III	
MATH 265 Differential Equations	
4-credit upper division mathematics class	
Total Hours	20

Requirements for the Mathematics Single Subject Program

Students considering a career as a teacher of mathematics in a California high school or middle school should consider completing the CLU Mathematics Single Subject Program which is an approved subject matter program for the California Commission on Teacher Credentialing. Completion of this program allows a student to enroll directly in a teaching credential program upon graduation. Program requirements most closely match the B.S. in Mathematics degree, include an entrance interview after completing Calculus II, and a portfolio defense at the end. Students interested in entering the program should discuss program requirements with the director of the Mathematics Single Subject Program.

Honors in Mathematics

Nomination Process

Students interested in completing Departmental Honors must be nominated by a Math faculty member prior to their final year. This normally will occur three semesters before graduation, but might occur two semesters before. In order to be eligible for nomination a student must satisfy all three of the following requirements:

1. A Math GPA of at least 3.5 with no semester grade below a B in any upper division Math course,
2. An overall GPA of 3.0,
3. 2 upper division Math courses either *completed* or *in progress*.

Selection Process

Once nominated, a student takes MATH 474 Capstone Prep and develops a proposal for an Honors Project. The project proposal must follow the guidelines for Capstone in Mathematics projects but must be for a year-long project that holds the promise of completing publishable results. After the oral and written project proposals have been reviewed, the Math faculty will determine if a student's project is worthy of being selected as an Honors project. Moreover, by the time the candidate is selected he/she must also have *completed* at least 2 Upper Division Math courses with a grade of B or higher in both, and have at least 1 additional upper division Math course *completed* or *in progress*.

Completion of Departmental Honors

To complete Departmental Honors students must successfully pass all of the following courses:

- MATH 474 - Capstone Prep --2 credits (taken spring of Junior year)
- MATH 475 – Capstone--2 credits (taken fall of Senior year)
- MATH 497 - Honors Research--3 credits (taken Spring of Senior year)

This is equivalent to one year of mentored research experience, plus one semester of research preparation in the Capstone Prep course. The final project will be presented in three venues: a written thesis, an oral presentation, and a poster presentation. The advisor in conjunction with Math faculty will review the project at the end of the Capstone course to determine if the student may proceed with the Honors Research course. At the end of the Honors Research course they will again confer to determine if the project meets the standards of an honors project.