

Physics

The physics curriculum at California Lutheran University addresses the question of how and why things work, from the forces which govern subatomic particles to the large-scale phenomena which shape our universe as a whole. The fundamental nature of physics accounts for its relevance not only in engineering and technology but also in the life and earth sciences. The various introductory courses offered by the Physics Department are thus tailored to meet the different needs of physics majors, students in other sciences and liberal arts students, in particular future teachers. The physics faculty members use a blend of interactive lectures, illustrative demonstrations and hands-on laboratory exercises to enhance students' comprehension of the material.

Cal Lutheran offers both the bachelor of science and bachelor of arts in physics, as well as a physics minor. The B.S. program is well suited for students interested in graduate studies in physics or engineering or in careers in industry. The B.A. is a more liberal physics degree, where students can explore the relationship of physics with another field of interest.

Beginning physics students gain a strong background in classical physics, modern physics and applied mathematics. Upper division courses focus on both theoretical topics and experimental techniques. These small upper division classes, together with close supervision by the faculty, provide a uniquely personalized learning experience for the students.

Physics facilities include a teaching laboratory with networked workstations, an optics laboratory with a full-size optical bench and a variety of lasers, an atomic force microscope and a scanning electronic microscope. In addition a bioengineering laboratory contains experimental resources for biomaterials research. Physics also owns an eight-node linux cluster for use in parallel numerical simulations.

Physics students are encouraged to become actively involved in undergraduate research. Cal Lutheran students have worked on projects in fluid dynamics, biomedical engineering, laser medicine, nuclear radiation and digital communication. Current research interests of the physics faculty include fluid dynamics, complex systems, bioengineering and electronics. Senior physics majors participate in original research work that culminates in a research paper. Physics majors often participate in summer undergraduate research programs as well as internships with local industries. Physics graduates easily find employment and those who opt to continue studies in graduate school are accepted into programs at universities throughout the nation.

Bachelor of Science in Physics

36 credits minimum, 27 credits upper division.

PHYS 211/211L	Mechanics and Thermodynamics-Calculus and Mechanics and Thermodynamics-Calculus Lab (recommended)	5
or PHYS 201/201L	Mechanics and Thermodynamics-Algebra	
PHYS 212/212L	Electricity, Magnetism, and Optics - Calculus and Electricity, Magnetism, and Optics - Calculus Lab	5
PHYS 303/303L	Radiation and Nuclear Physics and Modern Physics Lab	4
At least four physics courses numbered 410 and above		16
At least one upper division physics course with a lab component beyond 303		4
PHYS 400	Senior Research Seminar	4
Total Hours		38

Only physics courses numbered 200 and above can count toward the physics credit requirements.

Required Supporting Courses

MATH 251	Calculus I	4
MATH 252	Calculus II	4
MATH 261	Calculus III	4
MATH 265	Differential Equations	4
Total Hours		16

Recommended

CHEM 151/151L	General Chemistry and General Chemistry Lab	5
CHEM 152/152L	General Chemistry II and General Chemistry II Lab	5
CSC 210	Introduction to Computer Programming	4
MATH 343	Linear Algebra	4
MATH 420	Real Analysis	4

MATH 450	Complex Variables	4
Total Hours		26

Bachelor of Arts in Physics

40 credits minimum (28 credits physics, 12 credits concentration), 20 credits upper division physics.

PHYS 211/211L	Mechanics and Thermodynamics-Calculus and Mechanics and Thermodynamics-Calculus Lab (recommended)	5
or PHYS 201/201L	Mechanics and Thermodynamics-Algebra	
PHYS 212/212L	Electricity, Magnetism, and Optics - Calculus and Electricity, Magnetism, and Optics - Calculus Lab (recommended)	5
or PHYS 202/202L	Electricity, Magnetism, and Optics - Algebra	
PHYS 303/303L	Radiation and Nuclear Physics and Modern Physics Lab	4
At least two physics courses numbered 410 and above		8
At least one upper division physics course with a lab component beyond 303		4
PHYS 400	Senior Research Seminar	4
12 Credit Concentration (at least 8 credits of upper division) *		12
Total Hours		42

*The concentration is a minimum of 12 credits in a single field outside of math or physics. It is expected that the presentation for the capstone will incorporate both physics and the field of concentration. Only physics courses numbered 200 and above can count toward the physics credit requirements.

Required Supporting Courses

MATH 251	Calculus I	4
MATH 252	Calculus II	4
MATH 261	Calculus III	4
MATH 265	Differential Equations	4
Total Hours		16

Recommended

CSC 210	Introduction to Computer Programming	4
MATH 343	Linear Algebra	4
MATH 420	Real Analysis	4
MATH 450	Complex Variables	4
Total Hours		16

Minor in Physics

18 credits minimum, 10 credits upper division

PHYS 211/211L	Mechanics and Thermodynamics-Calculus and Mechanics and Thermodynamics-Calculus Lab (recommended)	5
or PHYS 201/201L	Mechanics and Thermodynamics-Algebra	
PHYS 212/212L	Electricity, Magnetism, and Optics - Calculus and Electricity, Magnetism, and Optics - Calculus Lab (recommended)	5
or PHYS 202/202L	Electricity, Magnetism, and Optics - Algebra	
10 Upper Division Physics Credits		10
Total Hours		20

Teaching Credential

Candidates for a California Secondary Teaching Credential should contact the School of Education Office for a complete list of course requirements for a Single Subject Waiver in Science.