

PHYSICS, BACHELOR OF SCIENCE

College of Letters & Science

From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of physics is the study of what makes the universe work. Knowledge gained using atomic-scale microscopes and high-energy particle accelerators and nuclear reactors teaches us not only what holds the atomic nucleus together but also how proteins function and why stars shine.

The Program

The Department of Physics & Astronomy offers a Bachelor of Arts in Physics and two Bachelor of Science degree programs: in Physics (which also offers an emphasis in Astrophysics), and in Applied Physics. The A.B. degree provides broad coverage of classical and modern physics while permitting a broader liberal arts education than is possible with the other two programs. The B.S. degree in either Physics or Applied Physics should be followed by the student who plans to enter physics as a profession, and also provides excellent training for a wide variety of technical career options. The B.S. in Applied Physics provides the student with a solid introduction to a particular applied physics specialty. For the student who plans to enter the job market upon completing a B.S. degree, the applied physics orientation would be an asset. Either B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.

Career Alternatives

Careers in physics and applied physics include research and development, either in universities, government laboratories, or industry; teaching in high schools, junior colleges, and universities; management and administration in industrial laboratories and in government agencies; and in production and sales in industry. A major in physics also provides a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, computer science, and materials science.

Program Variance

Similar courses from other departments may be substituted for courses in the depth subject matter requirements by obtaining prior written permission from the Undergraduate Curriculum Committee Chairperson.

Astronomy

In addition to the introductory Astronomy courses listed, upper division and graduate courses in Astronomy, Astrophysics and Cosmology are listed under Physics.

Graduate Study

The Department of Physics & Astronomy offers programs of study and research leading to M.S. and Ph.D. degrees. Further information regarding requirements for these three degrees, graduate research, teaching assistantships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, One Shields Avenue, University of California, Davis, CA 95616

The major requirements below are in addition to meeting University Degree Requirements (<https://catalog.ucdavis.edu/undergraduate->

education/university-degree-requirements/) & College Degree Requirements (<https://catalog.ucdavis.edu/undergraduate-education/college-degree-requirements/>); unless otherwise noted. The minimum number of units required for the Physics Bachelor of Science is 101.

Physics

Code	Title	Units
Preparatory Subject Matter		
<i>Physics</i>		
Choose a series:		19-25
PHY 009A & PHY 009B & PHY 009C & PHY 009D	Classical Physics and Classical Physics and Classical Physics and Modern Physics	
PHY 009HA & PHY 009HB & PHY 009HC & PHY 009HD & PHY 009HE	Honors Physics and Honors Physics and Honors Physics and Honors Physics and Honors Physics	
PHY 040	Introduction to Computational Physics	3
PHY 080	Experimental Techniques	4
<i>Mathematics</i>		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
MAT 022B	Differential Equations	3
Preparatory Subject Matter Subtotal		48-54
Depth Subject Matter		
<i>Physics</i>		
PHY 104A	Introduction to Mathematical Methods in Physics	4
PHY 105A	Classical Mechanics	4
PHY 105B	Analytical Mechanics	4
PHY 110A	Electricity & Magnetism	4
PHY 110B	Electricity & Magnetism	4
PHY 110C	Electricity & Magnetism	4
PHY 112	Thermodynamics & Statistical Mechanics	4
PHY 115A	Foundation of Quantum Mechanics	4
PHY 115B	Applications of Quantum Mechanics	4
PHY 102	Computational Laboratory in Physics (1 unit)	1-4
or PHY 104B	Computational Methods of Mathematical Physics	
<i>Laboratory Requirement</i>		
Choose PHY 122A or 122B or 116 series:		4-12
PHY 122A	Advanced Laboratory in Condensed Matter Physics	
<i>OR</i>		
PHY 122B	Advanced Laboratory in Particle Physics	
<i>OR</i>		
PHY 116A & PHY 116B & PHY 116C	Electronic Instrumentation and Electronic Instrumentation and Introduction to Computer-Based Experiments in Physics	

Concentration Courses		
Choose two courses from one specialty and one course from a different specialty:	12	MAT 022B Differential Equations 3
General Relativity/Astrophysical Applications		Preparatory Subject Matter Subtotal 48-54
PHY 154 Astrophysical Applications of Physics		Depth Subject Matter
PHY 155 General Relativity		Physics
Condensed Matter		PHY 104A Introduction to Mathematical Methods in Physics 4
PHY 140A Introduction to Solid State Physics		PHY 105A Classical Mechanics 4
PHY 140B Introduction to Solid State Physics		PHY 108 Optics 3
Nuclear/Particle Physics		PHY 108L Optics Laboratory 1
PHY 129A Introduction to Nuclear Physics		PHY 110A Electricity & Magnetism 4
PHY 130A Elementary Particle Physics		PHY 110B Electricity & Magnetism 4
PHY 130B Elementary Particle Physics		PHY 112 Thermodynamics & Statistical Mechanics 4
Additional Upper Division Physics Courses		PHY 115A Foundation of Quantum Mechanics 4
Additional upper division Physics courses ¹ , for a total of 15 upper-division Physics courses of 3 or more units each. With prior departmental approval, one course from mathematics, engineering, or natural science may be used to meet this requirement. May include only one from:	0-12	PHY 115B Applications of Quantum Mechanics 4
PHY 194HA Special Study for Honors Students & PHY 194HB Special Study for Honors Students		PHY 102 Computational Laboratory in Physics 1-4 or PHY 104B Computational Methods of Mathematical Physics
PHY 195 Senior Thesis		PHY 151 Stellar Structure & Evolution 4
PHY 198 Directed Group Study (Must be taken for at least 3 units to count as an elective.)		PHY 152 Galactic Structure & the Interstellar Medium 4
PHY 199 Special Study for Advanced Undergraduates (Must be taken for at least 3 units to count as an elective.)		PHY 153 Extragalactic Astrophysics 4
Depth Subject Matter Subtotal	53-76	PHY 156 Introduction to Cosmology 4
Total Units	101-130	Laboratory Requirement

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Excluding PHY 160

Astrophysics Emphasis

Code	Title	Units
Preparatory Subject Matter		
<i>Physics</i>		
Choose a series: 19-25		
PHY 009A Classical Physics & PHY 009B and Classical Physics & PHY 009C and Classical Physics & PHY 009D and Modern Physics		
PHY 009HA Honors Physics & PHY 009HB and Honors Physics & PHY 009HC and Honors Physics & PHY 009HD and Honors Physics & PHY 009HE and Honors Physics		
PHY 040	Introduction to Computational Physics	3
PHY 080	Experimental Techniques	4
<i>Mathematics</i>		
MAT 021A	Calculus	4
MAT 021B	Calculus	4
MAT 021C	Calculus	4
MAT 021D	Vector Analysis	4
MAT 022A	Linear Algebra	3
Depth Subject Matter Subtotal		59-68
<i>Recommended</i>		

AST 025	Introduction to Modern Astronomy & Astrophysics
Total Units	107-122

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Course(s) discontinued; see your advisor for course options.