

2022-2023 General Catalog

Please note the following:

- Complete galley instructions are [here](#).
- Track Changes are locked on, so editing is the same as always; type your changes right into this file.
- **Programs.** The Office of the University Registrar (OUR) reviewed and updated (as needed) program sub-total units & total units to represent the courses listed. Please review all sub-total units & total units and contact me if the changes made by OUR need revision.
- **Courses** displaying **discontinued** or **non-existent** should be removed. If the program then requires an update, follow your college's program update/approval policies & procedures. Approvals from your college for updates should be copied to me in order to support any changes.
- *Course lists are not included in galleys*; they are data-base driven, so whatever is approved in ICMS appears in the catalog. You can review your [course lists](#) at any time and make any changes through [ICMS](#).
- Each major (A.B or B.S) needs a separate description section. They can be the same, but now is the time to customize them; the same holds true for minors and any other degree types (M.A., Ph.D., etc.).
- When adding a course in the Requirements sections, *there's no need to enter the course title*; the ICMS system will do that when I enter the course.
- Campus-wide, "adviser" is "advisor."

Let me know if you need help.

Randall Larson-Maynard; Senior Editor

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Applied Physics: Bachelor of Science

(College of Letters & Science)

Rena Zieve, Ph.D., Chairperson of the Department

Michael Mulhearn, Ph.D., Vice Chairperson of the Department (Administration & Undergraduate Matters)

Rajiv Singh, Ph.D., Vice Chairperson of the Department (Graduate Matters)

Department Office. 174 Physics Building; 530-752-1500; <http://www.physics.ucdavis.edu>

Faculty. <http://physics.ucdavis.edu/people/faculty>

The Major Program

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 a 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.

Graduate Study. The [Department of Physics](#) & Astronomy offers programs of study and research leading to the M.S. and Ph.D. degrees. Further information regarding requirements for these 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.

Applied Physics—Atmospheric Physics Concentration

Units: ~~110-115~~ ~~105-~~

~~115~~

Preparatory Subject Matter		Units: 59-
		6245-51
<i>Physics; choose a series:</i>		19-20 5
PHY 009A		5
PHY 009B		5
PHY 009C		5
PHY 009D		4
PHY 009HA		5
PHY 009HB		5
PHY 009HC		5
PHY 009HD		5
PHY 009HE		5
<i>Mathematics</i>		22- 24
MAT 021A		4
MAT 021B		4
MAT 021C		4
MAT 021D		4
<i>Choose one:</i>		3-4
MAT 022A		3
MAT 027A		4
MAT 067		4
<i>Choose one:</i>		3-4
MAT 022B		3
MAT 027B		4
<i>Physics</i>		114
PHY 040		34
PHY 045		4
PHY 080		4
<i>Additional Preparatory Courses</i>		7
GEL 050		3
Atm 060		4
Depth Subject Matter		Units: 51-
		5360-64
<i>Physics</i>		2533-36
PHY 104A		4
PHY 105A		4
PHY 110A		4
PHY 110B		4
PHY 112		4
PHY 115A		4
PHY 116A		4
PHY 116B		4
<i>Choose one:</i>		1-4

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PHY 110L 2		1
PHY 112L 04B		14
PHY 115L		<u>1</u>
Laboratory Requirement; choose two one:		8 4
PHY 117 6C		4
PHY 118		<u>4</u>
PHY 122A or PHY 122B		4
PHY 122B		<u>4</u>
Concentration Courses		12 20
PHY 105 C		4
ATM 120		4
ATM 121A		4
ATM 121B		4
GEL 150A		<u>4</u>
Same as ESP 150A.		
Additional Electives; choose two one:		6-8 3-4
PHY 105 4B		4
PHY 105 4C		4
GEL 116N		3
Same as ESP 116N.		
GEL 150A		<u>4</u>
GEL 150B		<u>3</u>
ATM 124		<u>3</u>
ATM 128		4
ATM 158 MAT 118A		4
MAT 118B		<u>4</u>
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.		

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Applied Physics—Chemical Physics Concentration

Units: ~~110-113~~108-114

Preparatory Subject Matter		Units: 67- 70 60-66
Physics; choose a series:		19-20 5
PHY 009A		5
PHY 009B		5
PHY 009C		5
PHY 009D		4
PHY 009HA		5
PHY 009HB		5
PHY 009HC		5
PHY 009HD		5
PHY 009HE		<u>5</u>
Mathematics		22- 24
MAT 021A		4
MAT 021B		4
MAT 021C		4
MAT 021D		4
Choose one:		<u>3-4</u>
MAT 022A		3

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<u>MAT 027A</u>		<u>4</u>
<u>MAT 067</u>		<u>4</u>
<u>Choose one:</u>		<u>3-4</u>
MAT 022B		3
<u>MAT 027B</u>		<u>4</u>
Physics		<u>114</u>
PHY 040		<u>34</u>
<u>PHY 045</u>		<u>4</u>
<u>PHY 080</u>		<u>4</u>
Chemistry		15
CHE 002A		5
CHE 002B		5
CHE 002C		5
Depth Subject Matter		Units: <u>4843</u>
Physics		<u>1822</u>
<u>PHY 102</u>		<u>4</u>
PHY 104A		4
PHY 105A		4
PHY 110A		4
PHY 110B		4
<u>Choose two:</u>		<u>2</u>
<u>PHY 110L</u>		<u>1</u>
<u>PHY 112L</u>		<u>1</u>
<u>PHY 115L</u>		<u>1</u>
Chemistry		<u>3</u>
<u>CHE 124A</u>		<u>3</u>
<u>PHY 112</u>		4
<u>PHY 115A</u>		4
<u>PHY 116A</u>		4
<u>PHY 116B</u>		4
<u>Choose one of the following 2 groups of 4 courses:</u>		<u>16</u>
<u>PHY 115A</u>		<u>4</u>
<u>PHY 115B</u>		<u>4</u>
<u>PHY 112</u>		<u>4</u>
<u>PHY 140A</u>		<u>4</u>
Or		<u>16</u>
<u>CHE 110A</u>		<u>4</u>
<u>CHE 110B</u>		<u>4</u>
<u>CHE 110C</u>		<u>4</u>
<u>CHE 128A</u>		<u>4</u>
Laboratory Requirement; choose <u>6 or more units</u> one:		<u>64</u>
PHY 117 <u>6C</u>		4
<u>PHY 118</u>		<u>4</u>
PHY 122A <u>or</u> PHY 122B		4
<u>CHE 105</u>		<u>4</u>
<u>CHE 115</u>		<u>4</u>
<u>CHE 124L</u>		<u>2</u>
<u>CHE 129A</u>		<u>2</u>
<u>CHE 129B</u>		<u>2</u>
<u>CHE 129C</u>		<u>2</u>

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PHY 122B		4
<i>Concentration Courses</i>		11
PHY 115B		4
PHY 140A		4
CHE 124A		3
<i>Program Variance</i>		
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.		

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Applied Physics—Computational Physics Concentration

Units: ~~109-115~~110-113

Preparatory Subject Matter		Units: 60- 63 49-55
<i>Physics; choose a series:</i>		26-27 19-25
<i>Choose a series:</i>		19-20
PHY 009A		5
PHY 009B		5
PHY 009C		5
PHY 009D		4
PHY 009HA		5
PHY 009HB		5
PHY 009HC		5
PHY 009HD		5
PHY 009HE		5
PHY 040		3
PHY 080		4
<i>Mathematics</i>		22-24
MAT 021A		4
MAT 021B		4
MAT 021C		4
MAT 021D		4
<i>Choose one:</i>		3-4
MAT 022A		3
MAT 027A		4
MAT 067		4
<i>Choose one:</i>		3-4
MAT 022B		3
MAT 027B		4
<i>Computer Science Engineering</i>		8 12
ECS 036A		4
ECS 036B		4
ECS 036C		4
Depth Subject Matter		Units: 50 60
<i>Physics</i>		26-27
PHY 104A		4
PHY 105A		4
PHY 110A		4
PHY 110B		4
PHY 112		4
PHY 115A		4

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PHY 009HD		5
PHY 009HE		5
PHY 040		3 4
PHY 045		4
PHY 080		4
Mathematics		22-24
MAT 021A		4
MAT 021B		4
MAT 021C		4
MAT 021D		4
<u>Choose one:</u>		3 4
MAT 022A		3
MAT 027A		4
MAT 067		4
<u>Choose one:</u>		3 4
MAT 022B		3
MAT 027B		4
Engineering		4
ENG 017		4
Depth Subject Matter		Units: 5458
Physics		2425
PHY 102		1
PHY 104A		4
PHY 105A		4
PHY 110A		4
PHY 110B		4
PHY 112		4
PHY 115A		4
Laboratory Requirement; choose one:		4
PHY 122A		4
PHY 122B		4
Concentration Courses		1013
PHY 110C		4
PHY 140A		4
EEC 100		5
<u>Choose one:</u>		1
PHY 110L		1
PHY 112L		1
PHY 115L		1
Additional Concentration Electives; choose four:		16
EEC 110A		4
EEC 110B		4
EEC 140A		4
EEC 140B		4
EEC 150A		4
EEC 150B		4
Program Variance		

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Applied Physics—Geophysics Concentration Units: ~~401-409~~110-116

Preparatory Subject Matter		Units: 61-6445 54
<i>Physics</i>		30-3123-29
<i>Choose a series:</i>		19-205
PHY 009A		5
PHY 009B		5
PHY 009C		5
PHY 009D		4
PHY 009HA		5
PHY 009HB		5
PHY 009HC		5
PHY 009HD		5
PHY 009HE		5
PHY 040		34
PHY 045		4
PHY 080		4
<i>Mathematics</i>		22-24
MAT 021A		4
MAT 021B		4
MAT 021C		4
MAT 021D		4
<i>Choose one:</i>		3-4
MAT 022A		3
MAT 027A		4
MAT 067		4
<i>Choose one:</i>		3-4
MAT 022B		3
MAT 027B		4
<i>Additional Preparatory Courses</i>		9
GEL 050		3
GEL 050L		2
ATM 060		4
Depth Subject Matter		Units: 49-5256-58 56-58
<i>Physics</i>		2632
PHY 104A		4
PHY 105A		4
PHY 110A		4
PHY 110B		4
PHY 112		4
PHY 115A		4
<i>Choose two:</i>		2
PHY 110L		1
PHY 112L		1

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PHY 115L		<u>1</u>
PHY 116A		<u>4</u>
PHY 116B		<u>4</u>
Laboratory Requirement; choose two <u>one</u> :		8 <u>4</u>
PHY 117 <u>6C</u>		<u>4</u>
PHY 118		<u>4</u>
PHY 122A <u>or</u> PHY 122B		<u>4</u>
PHY 122B		<u>4</u>
Concentration Courses		10
<u>Choose five:</u>		
PHY 105B		<u>4</u>
PHY 105C		<u>4</u>
ATM 120		<u>4</u>
ATM 121A		<u>4</u>
ATM 121B		<u>4</u>
GEL 116N		<u>3</u>
GEL 146		<u>3</u>
GEL 150A		<u>4</u>
GEL 150B		<u>3</u>
<u>Include at least two:</u>		
GEL 161		<u>3</u>
GEL 162		<u>3</u>
GEL 163		<u>3</u>
PHY 104B		<u>4</u>
GEL 161		<u>3</u>
GEL 162		<u>3</u>
Additional Electives; choose three :		10 <u>12</u>
<u>Choose one:</u>		<u>4</u>
PHY 105B		<u>4</u>
PHY 116C		<u>4</u>
PHY 151		<u>4</u>
<u>Choose one:</u>		<u>3</u>
GEL 146		<u>3</u>
GEL 163		<u>3</u>
<u>Choose one:</u>		<u>4</u>
ATM 120		<u>4</u>
ATM 121A		<u>4</u>
ATM 121B		<u>4</u>
Program Variance		
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Applied Physics—Materials Science Concentration

Units: 102-111

Preparatory Subject Matter		Units: 56-59 <u>45</u>
Physics		26-27 <u>23-29</u>
Choose a series:		19 <u>20</u> <u>5</u>
PHY 009A		5

PHY 009B		5
PHY 009C		5
PHY 009D		4
PHY 009HA		5
PHY 009HB		5
PHY 009HC		5
PHY 009HD		5
PHY 009HE		5
PHY 040		<u>34</u>
PHY 045		4
PHY 080		4
Mathematics		<u>22-24</u>
MAT 021A		4
MAT 021B		4
MAT 021C		4
MAT 021D		4
<u>Choose one:</u>		<u>3-4</u>
MAT 022A		3
MAT 027A		4
MAT 067		4
<u>Choose one:</u>		<u>3-4</u>
MAT 022B		3
MAT 027B		4
Engineering		4
ENG 045		4
Depth Subject Matter	Units: 54-58	7-69
Physics		<u>23-36</u>
PHY 104A		4
PHY 105A		4
PHY 110A		4
PHY 110B		4
PHY 112		4
PHY 115A		4
PHY 116A		4
PHY 116B		4
<u>Choose one:</u>		<u>1-4</u>
PHY 102		4
PHY 104B		4
Laboratory Requirement; choose <u>two</u> one:		<u>7-84</u>
PHY 117 6 <u>6</u>		4
PHY 118		4
PHY 122A <u>or</u> PHY 122B		4
<u>May include at most one of the following:</u>		
EMS 162L		3
EMS 170L		3
EMS 172L		3
EMS 174		3
PHY 122B		4
Concentration Courses		<u>23-26</u>

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PHY 115B		4
PHY 140A		4
PHY 140B		4
<u>PHY 110L</u>		<u>1</u>
<u>PHY 112L</u>		<u>1</u>
<u>PHY 115L</u>		<u>1</u>
<u>Choose two:</u>		<u>8-11</u>
<u>EMS 162</u>		<u>4</u>
<u>EMS 160 and EMS 164</u>		<u>7</u>
<u>EMS 170</u>		<u>4</u>
<u>EMS 172</u>		<u>4</u>
EMS 174		4
EMS 180		4
<i>Program Variance</i>		
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Applied Physics—Physical Oceanography Concentration

Units: ~~110-115~~~~105-111~~

Preparatory Subject Matter		Units: 63-66 45 <u>54</u>
<i>Physics</i>		30-31 23-29
<i>Choose a series:</i>		19- 20 <u>5</u>
PHY 009A		5
PHY 009B		5
PHY 009C		5
PHY 009D		4
PHY 009HA		5
PHY 009HB		5
PHY 009HC		5
PHY 009HD		5
PHY 009HE		5
PHY 040		3 <u>4</u>
<u>PHY 045</u>		<u>4</u>
<u>PHY 080</u>		<u>4</u>
<i>Mathematics</i>		22 <u>24</u>
MAT 021A		4
MAT 021B		4
MAT 021C		4
MAT 021D		4
<u>Choose one:</u>		<u>3-4</u>
MAT 022A		3
<u>MAT 027A</u>		<u>4</u>
<u>MAT 067</u>		<u>4</u>
<u>Choose one:</u>		<u>3-4</u>
MAT 022B		3
<u>MAT 027B</u>		<u>4</u>
<i>Additional Preparatory Courses:</i>		<u>11</u>
<u>CHE 002A</u>		<u>5</u>
<u>GEL 050</u>		<u>3</u>
<u>GEL 055</u>		<u>3</u>

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Depth Subject Matter		Units: 47-49 60
<i>Physics</i>		29 26
PHY 102		1
PHY 104A		4
PHY 105A		4
PHY 110A		4
PHY 110B		4
PHY 112		4
PHY 115A		4
<i>Choose two:</i>		<u>2</u>
PHY 110L		1
PHY 112L		1
PHY 115L		1
PHY 116A		4
PHY 116B		4
<i>Laboratory Requirement; choose <u>two</u> or <u>one</u>:</i>		<u>8</u> 4
PHY 117 <u>6</u> C		4
PHY 118		4
PHY 122A <u>or</u> PHY 112B		4
PHY 122B		4
<i>Concentration Courses</i>		13-15 23
GEL 116N		3
GEL 150A		4
<i>Choose two:</i>		<u>6-8</u>
PHY 105B		4
PHY 105C		4
ATM 115		3
ATM 116		3
ATM 120		4
GEL 150B		3
PHY 105C		4
ATM 120		4
ATM 121A		4
ATM 121B		4
GEL 116N		3
Same as ESP 116N.		
GEL 150A		4
Same as ESP 150A.		
<i>Additional Electives; choose one:</i>		4
PHY 104B		4
Substitutions: Physics 102 is waived for students who take Physics 104B.		
PHY 112		4
PHY 116C		4
<i>Choose one:</i>		4
MAT 118A		4
MAT 118B		4
<i>Program Variance</i>		
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.		

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