

PHYSICS, BACHELOR OF SCIENCE

Requirements

Total Course Requirements for the Bachelor's Degree

See the "Requirements for the Bachelor's Degree (<https://catalog.csudh.edu/general-information/baccalaureate-degrees-undergraduate-studies/>)" in the University Catalog for complete details on general degree requirements. A minimum of 40 units, including those required for the major, must be upper division.

Elective Requirements

Completion of elective courses (beyond the requirements listed below) to reach a total of a minimum of 120 units.

General Education Requirements (49 units)

See the "General Education (<https://catalog.csudh.edu/general-education/>)" requirements in the University Catalog or the Class Schedule for the most current information on General Education requirements and course offerings.

Graduation Writing Assessment Requirement

See the "Graduation Writing Assessment Requirement (<https://catalog.csudh.edu/general-information/baccalaureate-degrees-undergraduate-studies/gwar-certifying-courses/>)" in the University Catalog.

Minor Requirements

Single field major, no minor required.

Major Requirements (75-80 units)

Students must select one of the options listed. The following courses, or their approved transfer equivalents, are required of all candidates for this degree.

Each student must select one of the options listed.

Electrical Engineering Option (77 units)

The Electrical Engineering Option provides a broad understanding of physical principles and a solid preparation for advanced study in electrical engineering as well as theoretical and experimental physics including problem-solving. This option should be undertaken by those planning on pursuing continued studies towards an advanced degree in electrical engineering or other fields within engineering, physics, or related fields as well as careers as a technical staff member in a government or industrial lab. By virtue of an agreement with the CSU Fullerton College of Electrical Engineering and Computer Science, this option satisfies all of the course requirements for admission to an MS program in electrical engineering at CSU Fullerton.

Code	Title	Hours
Lower Division Requirements		
CHE 110	General Chemistry I	5
MAT 191	Calculus I	5
MAT 193	Calculus II	5
MAT 211	Calculus III	5
PHY 130	General Physics I	5
PHY 132	General Physics II	5

PHY 134	General Physics III	4
CSC 121	Introduction to Computer Science and Programming I	4

Upper Division Requirements

Required Courses:

PHY 306	Math Methods In Physics	3
PHY 310	Theoretical Mechanics I	3
PHY 320	Physical Optics	3
PHY 333	Analog Electronics	3
PHY 341	Advanced Laboratory	2
PHY 346	Thermal Physics	3
PHY 350	Electromagnetic Theory I	3
PHY 460	Quantum Mechanics I	3

Required Electives:

EE 309	1	3
EE 310	1	3
EE 323	1	4
PHY 335	Digital Electronics	3
Select one of the following:		3

PHY 494	Independent Study	
PHY 498	Directed Research	
EE 498	1	

Total Hours 77

¹ Taken in the Electrical Engineering department at CSU Fullerton.

Note: This option requires taking 11-13 units of electrical engineering courses at CSU Fullerton during regular or summer sessions through concurrent enrollment while a student at CSUDH. Advising for the Electrical Engineering option will be provided by CSUDH as well as CSU Fullerton.

General Physics Option (78-79 units)

The General Physics Option provides a broad understanding of physical principles and a solid preparation in both theoretical and experimental problem-solving in physics. This option should be chosen by students planning a technical career in industry or government laboratories, or planning to continue study toward an advanced degree in physics, engineering or a related field. PHY 306 Math Methods In Physics should be taken as early as possible in preparation for the upper division courses in Physics.

Code	Title	Hours
Lower Division Requirements		
CHE 110	General Chemistry I	5
MAT 191	Calculus I	5
MAT 193	Calculus II	5
MAT 211	Calculus III	5
PHY 130	General Physics I	5
PHY 132	General Physics II	5
PHY 134	General Physics III	4
CSC 111	Introduction to Computers and Basic Programming	3-4
or CSC 121	Introduction to Computer Science and Programming I	
Upper Division Requirements		

Required Courses:

PHY 306	Math Methods In Physics	3
PHY 310	Theoretical Mechanics I	3
PHY 320	Physical Optics	3
PHY 333	Analog Electronics	3
PHY 341	Advanced Laboratory	2
PHY 346	Thermal Physics	3
PHY 350	Electromagnetic Theory I	3
PHY 460	Quantum Mechanics I	3

Electives:

Select 12 upper division units from Physics	12
Select six upper division units from Chemistry, Computer Science, Mathematics, and Physics.	6

Total Hours **78-79**

Physical Science Option (75-76 units)

The Physical Science Option provides a broad understanding of the physical sciences, in particular, physics, chemistry, geology and mathematics. This option is designed for students interested in teaching physical science in secondary school or pursuing a general science field such as science journalism.

Code	Title	Hours
Lower Division Requirements		
CHE 110	General Chemistry I	5
CHE 112	General Chemistry II	5
EAR 100	Physical Geology	3
EAR 101	Physical Geology Laboratory	1
EAR 200	Earth History & Evolution	3
EAR 201	Earth History Lab	1
MAT 191	Calculus I	5
MAT 193	Calculus II	5
MAT 211	Calculus III	5
PHY 130	General Physics I	5
PHY 132	General Physics II	5
PHY 134	General Physics III	4
Select one course from the following:		3-4
CSC 101	Intro.to Computer Education	
CSC 111	Introduction to Computers and Basic Programming	
CSC 121	Introduction to Computer Science and Programming I	
Upper Division Requirements		
PHY 320	Physical Optics	3
PHY 333	Analog Electronics	3
PHY 341	Advanced Laboratory	2
PHY 346	Thermal Physics	3
Select 14 additional units from CHE, CSC, EAR and/or PHY ¹		14
Total Hours		75-76

¹ Consult with a physics advisor to choose classes consistent with the requirements for the subject matter preparation program in physical science.

Program Learning Outcomes

- Demonstrate understanding of classical mechanics
- Demonstrate understanding of classical electromagnetism
- Demonstrate understanding of basic quantum mechanics
- Demonstrate understanding of thermal physics
- Demonstrate understanding of classical optics
- Demonstrate understanding of analog electronics
- Demonstrate understanding of modern physics experiments

General Physics Option Roadmaps**4-Year Roadmap**

Course	Title	Hours
First Year		
Fall		
GE Area A2 Composition I		3
PHY 130	General Physics I	5
MAT 191	Calculus I	5
HIS 101	History Of United States	3
Hours		16
Spring		
GE Area A2 Composition II		3
PHY 132	General Physics II	5
MAT 193	Calculus II	5
CSC 111 or CSC 121	Introduction to Computers and Basic Programming or Introduction to Computer Science and Programming I	3
Hours		16
Second Year		
Fall		
PHY 134	General Physics III	4
GE Area A3 Logic/Critical Thinking		3
PHY 333	Analog Electronics	3
MAT 211	Calculus III	5
GE Area C1 Arts Courses		3
Hours		18
Spring		
CHE 110	General Chemistry I	5
PHY 320	Physical Optics	3
POL 101	American Institutions	3
GE Area A1 Oral Communication		3
Upper Division PHY Elective		3
Hours		17
Third Year		
Fall		
PHY 306	Math Methods In Physics	3
PHY 310	Theoretical Mechanics I	3
PHY 346	Thermal Physics	3
PHY 460	Quantum Mechanics I	3
GE Area C2 Letters Course		3
Hours		15
Spring		
PHY 341	Advanced Laboratory	2
GE Area B2 Life Science		3
GE Area E Lifelong Learning and Self-Development		3
GE Area F Ethnic Studies		3
Upper Division PHY Elective		3
Upper Division PHY Elective		3
Hours		17

Fourth Year

Fall		
PHY 350	Electromagnetic Theory I	3
Additional GE in Area C1 or C2		3
GE Area D1 Perspectives on Individuals, Groups, and Society		3
GE Area D2 Global and Historical Perspectives		3
GWAR satisfying course		3
Upper Division PHY Elective		3
Hours		18
Spring		
GE Area B5 Integrative Studies in Natural Sciences		3
GE Area D3 Integrative Studies in the Social Sciences		3
GE Area C3 Integrative Studies in the Humanities		3
Additional UD Elective from CHE, CSC, MAT or PHY		3
Additional UD Elective from CHE, CSC, MAT or PHY		3
Hours		15
Total Hours		132

2-Year Roadmap

Course	Title	Hours
First Year		
Fall		
PHY 306	Math Methods In Physics	3
PHY 310	Theoretical Mechanics I	3
PHY 333	Analog Electronics	3
GWAR satisfying course		3
Additional UD Elective from CHE, CSC, MAT or PHY		3
Hours		15
Spring		
PHY 341	Advanced Laboratory	2
PHY 346	Thermal Physics	3
PHY 320	Physical Optics	3
Upper Division Physics Elective		3
Additional UD Elective from CHE, CSC, MAT or PHY		3
Elective to meet 120 units		1-3
Hours		15-17
Second Year		
Fall		
PHY 350	Electromagnetic Theory I	3
PHY 460	Quantum Mechanics I	3
GE Area B5 Integrative Studies in Natural Sciences		3
Upper Division Physics Elective		
Upper Division Physics Elective		3
Elective to meet 120 units		3
Hours		15
Spring		
GE Area C3 Integrative Studies in the Humanities		3
GE Area D3 Integrative Studies in the Social Sciences		3
Upper Division Physics Elective		3
Elective to meet 120 units		3
Elective to meet 120 units		3
Hours		15
Total Hours		60-62

Electrical Engineering Option Roadmaps

4-Year Roadmap

Course	Title	Hours
First Year		
Fall		
GE Area A2 Composition I		3

PHY 130	General Physics I	5
MAT 191	Calculus I	5
GE Area E Lifelong Learning and Self-Development		3
Hours		16
Spring		
GE Area A2 Composition II		3
PHY 132	General Physics II	5
MAT 193	Calculus II	5
CSC 121	Introduction to Computer Science and Programming I	4
Hours		17
Second Year		
Fall		
PHY 134	General Physics III	4
GE Area B2 Life Science		3
GE Area A3 Logic/Critical Thinking		3
PHY 333	Analog Electronics	3
MAT 211	Calculus III	5
Hours		18
Spring		
CHE 110	General Chemistry I	5
PHY 335	Digital Electronics	3
GE Area A1 Oral Communication		3
POL 101	American Institutions	3
HIS 101	History Of United States	3
Hours		17
Third Year		
Fall		
PHY 306	Math Methods In Physics	3
PHY 310	Theoretical Mechanics I	3
PHY 346	Thermal Physics	3
PHY 350	Electromagnetic Theory I	3
GE Area F Ethnic Studies		3
Hours		15
Spring		
PHY 341	Advanced Laboratory	2
PHY 320	Physical Optics	3
GE Area C1 Arts Courses		3
GE Area D1 Perspectives on Individuals, Groups, and Society		3
GE Area D2 Global and Historical Perspectives		3
GWAR satisfying course		3
Hours		17
Fourth Year		
Fall		
PHY 460	Quantum Mechanics I	3
EE 309 (required electrical engineering elective)		3
GE Area C2 Letters Course		3
GE Area B5 Integrative Studies in Natural Sciences		3
GE Area D3 Integrative Studies in the Social Sciences		3
Hours		15
Spring		
EE 310 (required electrical engineering elective)		3
EE 323 (required electrical engineering elective)		3
GE Area C3 Integrative Studies in the Humanities		3
Ind. Study / Dir. Research (PHY 494, PHY 498, or EE 498)		2
Additional GE in Area C1 or C2		3
Hours		14
Total Hours		129

2- Year Roadmap

Course	Title	Hours
First Year		
Fall		
PHY 306	Math Methods In Physics	3
PHY 310	Theoretical Mechanics I	3
PHY 346	Thermal Physics	3
PHY 350	Electromagnetic Theory I	3
Elective to meet 120 units		3
Hours		15
Spring		
PHY 341	Advanced Laboratory	2
PHY 320	Physical Optics	3
PHY 333	Analog Electronics	3
PHY 335	Digital Electronics	3
GWAR satisfying course		3
Elective to meet 120 units		3
Hours		17
Second Year		
Fall		
PHY 460	Quantum Mechanics I	3
EE 309 (required electrical engineering elective)		3
GE Area B5 Integrative Studies in Natural Sciences		3
GE Area D3 Integrative Studies in the Social Sciences		3
Elective to meet 120 units		3
Hours		15
Spring		
EE 310 (required electrical engineering elective)		3
EE 323 (required electrical engineering elective)		3
GE Area C3 Integrative Studies in the Humanities		3
Ind. Study / Dir. Research (PHY 494 or PHY 498 or EE 498)		1-3
Elective to meet 120 units		3
Hours		13-15
Total Hours		60-62

Physical Science Option Roadmaps

4- Year Roadmap

Course	Title	Hours
First Year		
Fall		
GE Area A2 Composition I		3
PHY 130	General Physics I	5
MAT 191	Calculus I	5
HIS 101	History Of United States	3
Hours		16
Spring		
GE Area A2 Composition II		3
PHY 132	General Physics II	5
MAT 193	Calculus II	5
POL 101	American Institutions	3
Hours		16
Second Year		
Fall		
PHY 134	General Physics III	4
GE Area A3 Logic/Critical Thinking		3
MAT 211	Calculus III	5
EAR 100	Physical Geology	3
EAR 101	Physical Geology Laboratory	1
Hours		16

Spring

EAR 200	Earth History & Evolution	3
EAR 201	Earth History Lab	1
GE Area A1 Oral Communication		3
CHE 110	General Chemistry I	5
GE Area E Lifelong Learning and Self-Development		3
Hours		15

Third Year

Fall

CHE 112	General Chemistry II	5
PHY 333	Analog Electronics	3
PHY 346	Thermal Physics	3
GE Area F Ethnic Studies		3
GE Area C or D		3
Hours		17

Spring

PHY 320	Physical Optics	3
PHY 341	Advanced Laboratory	2
Upper Division Major Elective from CHE, CSC, EAR and/or PHY		3
GE Area B2 Life Science		3
GE Area C or D		3
GE Area C or D		3
Hours		17

Fourth Year

Fall

CSC 101 or CSC 111 or CSC 121	Intro.to Computer Education or Introduction to Computers and Basic Programming or Introduction to Computer Science and Programming I	3-4
GE Area C or D		3
Additional GE in Area C1 or C2		3
Upper Division Major Elective from CHE, CSC, EAR and/or PHY		3
Upper Division Major Elective from CHE, CSC, EAR and/or PHY		3
GWAR satisfying course		3
Hours		18-19

Spring

GE Area B5 Integrative Studies in Natural Sciences		3
GE Area D3 Integrative Studies in the Social Sciences		3
GE Area C3 Integrative Studies in the Humanities		3
Upper Division Major Elective from CHE, CSC, EAR and/or PHY		3
Upper Division Major Elective from CHE, CSC, EAR and/or PHY		3
Hours		15
Total Hours		130-131

2-Year Roadmap (transfer students)

Course	Title	Hours
First Year		
Fall		
CHE 112	General Chemistry II	5
PHY 333	Analog Electronics	3
PHY 346	Thermal Physics	3
GWAR satisfying course		3
Hours		14
Spring		
PHY 320	Physical Optics	3
PHY 341	Advanced Laboratory	2
Upper Division Major Elective from CHE, CSC, EAR and/or PHY		3
GE Area C3 Integrative Studies in the Humanities		3
Elective to meet 120 units		3
Elective to meet 120 units		2-3
Hours		16-17

Second Year**Fall**

CSC 101 or CSC 111 or CSC 121	Intro.to Computer Education or Introduction to Computers and Basic Programming or Introduction to Computer Science and Programming I	3-4
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Upper Division Major Elective from CHE, CSC, EAR and/or PHY	3
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Upper Division Major Elective from CHE, CSC, EAR and/or PHY	3
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GE Area D3 Integrative Studies in the Social Sciences	3
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Elective to meet 120 units	3
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Hours	15-16
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Spring

Upper Division Major Elective from CHE, CSC, EAR and/or PHY	3
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Upper Division Major Elective from CHE, CSC, EAR and/or PHY	3
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GE Area B5 Integrative Studies in Natural Sciences	3
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Elective to meet 120 units	3
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Elective to meet 120 units	3
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Hours	15
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Total Hours	60-62
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