BS IN PHYSICS (APPLIED PHYSICS)

Units required for Major: 74-82, includes units of study in chosen concentration (see below)
Total units required for BS: 120

Program Description

Physics is the most fundamental science and underlies our understanding of nearly all areas of science and technology. In a broad sense, physics is concerned with the study of energy, space, and matter, and with the interactions between matter and the laws that govern these interactions. More specifically, physicists study mechanics, heat, light, electric and magnetic fields, gravitation, relativity, atomic and nuclear physics, and condensed matter physics.

The BS degrees are recommended for students seeking a career in the technology sector or planning to pursue a graduate degree.

Program Requirements

Code	Title	Units
Required Lower Division Core Courses (27 Units)		
MATH 30	Calculus I [1]	4
MATH 31	Calculus II [1]	4
MATH 32	Calculus III	4
MATH 45	Differential Equations for Science and Engineering	3
PHYS 11A	General Physics: Mechanics [1]	4
PHYS 11B	General Physics: Heat, Light, Sound, Modern Physics	4
PHYS 11C	General Physics: Electricity and Magnetism	4
Required Upper Division Core Courses (17 Units)		
PHYS 105	Mathematical Methods in Physics	3
PHYS 106	Introduction to Modern Physics	3
PHYS 110	Classical Mechanics	3
PHYS 124	Thermodynamics and Statistical Mechanics	3
PHYS 135	Electricity And Magnetism	3
PHYS 175	Advanced Physics Laboratory	2
Physics Colloquium Attendance		
Fulfill a minimum attendance requirement. [2]		
Concentration (30-38 Units)		
Select from the following concentrations:		30 - 38
General Physics		
Applied Physics		
Biophysics		
Total Units		**74-82**

[1] Course also satisfies General Education (GE)/Graduation Requirement.
[2] Majors must fulfill a minimum attendance requirement at Department Colloquia. Students should consult with the Department for details.

Concentration in Applied Physics (31-32)

Code	Title	Units
CHEM 1E	General Chemistry for Engineering	4
ENGR 45	Engineering Materials	3
CSC 25	Introduction to C Programming	3
PHYS 115	Electronics and Instrumentation	4
PHYS 150	Quantum Mechanics	3
PHYS 162	Scientific Computing: Basic Methods	3
Select one of the following (2 units minimum):		2 - 3
PHYS 116	Advanced Electronics and Instrumentation	
PHYS 163	Scientific Computing: Modeling, Simulation, and Visualization	
PHYS 191	Senior Project [3]	
Elective Courses (9 Units)		
Select 9 units of upper-division coursework in Physics or Engineering courses chosen in consultation with an advisor. [4]		9
Total Units		**31-32**

[3] Students choosing Senior Project can take 1 unit of PHYS 191 in two consecutive semesters, or 2 units in one semester.
[4] See list below for a list of Department approved electives.

Elective List

Code	Title	Units
PHYS 116	Advanced Electronics and Instrumentation [5]	3
PHYS 130	Acoustics	3
PHYS 136	Electrodynamics of Waves, Radiation,and Materials	3
PHYS 142	Applied Solid State Physics	3
PHYS 145	Optics	3
PHYS 151	Advanced Modern Physics	3
PHYS 156	Classical and Statistical Mechanics	3
PHYS 163	Scientific Computing: Modeling, Simulation, and Visualization [5]	3
PHYS 172	Biological Physics	3
PHYS 195	Teaching Internship	1 - 2
PHYS 199	Special Problems	1 - 3
EEE 130	Electromechanical Conversion	3
EEE 135	Renewable Electrical Energy Sources and Grid Integration	3
ENGR 112	Mechanics Of Materials	3
ENGR 132	Fluid Mechanics	3
ENGR 181	Electronic Materials	3
ME 121	Solar Thermal and Energy Storage Systems	2
ME 122	Geothermal and Bioenergy Systems	2
ME 123	Wind, Hydro and Ocean Energy	3
ME 154	Alternative Energy Systems	3
MATH 104	Vector Analysis	3
MATH 105B	Advanced Mathematics for Science and Engineering II	4

NSM 195A	STEM Pedagogical Practices	1
NSM 195B	Field Experience in Secondary STEM Classrooms	1

[5] If not used to satisfy other requirement of the degree (Example: PHYS 116, PHYS 163, or PHYS 191 are required for the BS in Physics (Applied Physics) concentration. If two of the three are taken, one will count as an elective).

General Education Requirements [6]

Code	Title	Units
Area A: Basic Subjects (9 Units)		
A1 - Oral Communication		3
A2 - Written Communication		3
A3 - Critical Thinking		3
Area B: Physical Universe and Its Life Forms (6 Units)		
B1 - Physical Science [7]		0
B2 - Life Forms		3
B3 - Lab (Note: Lab experience to be taken with one of the following: B1, B2 or B5) [7]		0
B4 - Math Concepts [7]		0
B5 - Additional Course (Any B to reach 12 units) - Take upper-division course to complete Area & upper division requirements.		3
Area C: Arts and Humanities (12 Units)		
C1 - Arts		3
C2 - Humanities		3
C1/C2 - Area C Course		3
C1/C2 - Area C Course - Take upper-division course to complete Area & upper division requirements.		3
Area D: The Individual and Society (9 Units)		
Area D Course		3
Area D Course		3
Area D Course - Take upper-division course to complete Area & upper division requirements.		3
Area E: Understanding Personal Development (3 Units)		
Area E Course		3
Area F: Ethnic Studies (3 Units)		
Area F Course		3
Total Units		**42**

[6] To help you complete your degree in a timely manner and not take more units than absolutely necessary, there are ways to use single courses to meet more than one requirement (overlap). For further information, please visit the General Education page (https://catalog.csus.edu/colleges/academic-affairs/general-education/).
Note: There is no way to list all possible overlaps so please consult with a professional advisor. The Academic Advising Center can be visited online (http://www.csus.edu/acad/), by phone (916) 278-1000, or email (advising@csus.edu).

[7] Required in Major; also satisfies GE.

Graduation Requirements [6]

Code	Title	Units
Graduation Requirements (required by CSU) (9 Units)		
American Institutions: U.S. History		3
American Institutions: U.S. Constitution & CA Government		3
Writing Intensive (WI)		3
Graduation Requirements (required by Sacramento State) (6 Units)		
English Composition II		3
Race and Ethnicity in American Society (RE)		3
Foreign Language Proficiency Requirement [8]		0

[6] To help you complete your degree in a timely manner and not take more units than absolutely necessary, there are ways to use single courses to meet more than one requirement (overlap). For further information, please visit the General Education page (https://catalog.csus.edu/colleges/academic-affairs/general-education/).
Note: There is no way to list all possible overlaps so please consult with a professional advisor. The Academic Advising Center can be visited online (http://www.csus.edu/acad/), by phone (916) 278-1000, or email (advising@csus.edu).

[8] If not satisfied before entering Sacramento State, it may be satisfied in General Education Area C2 (Humanities). "C- or better required." The alternative methods for satisfying the Foreign Language Proficiency Requirement are described here: https://www.csus.edu/college/arts-letters/world-languages-literatures/foreign-language-requirement.html (https://www.csus.edu/college/arts-letters/world-languages-literatures/foreign-language-requirement.html)
Note: Students with a declared major of BS in Physics are exempt from the Foreign Language Graduation Requirement.

The following roadmaps are sample planning resources. Please consult your academic advisor and Academic Catalog for graduation requirements as you develop your individualized academic plan.

Physics (Applied Physics), BS: 4-Year Roadmap

Course	Title	Units
Year 1		
First Semester		
MATH 30	Calculus I	4
GE Area 1C - Oral Communication [2]		3
GE Area 3A - Arts [2]		3
GE Area 5B - Biological Science [2]		3
Elective of Choice		3
	Units	**16**
Second Semester		
MATH 31	Calculus II	4
PHYS 11A	General Physics: Mechanics	4
GE Area 1A - English Composition [2]		3
GE Area 3B - Humanities [2]		3
	Units	**14**
Year 2		
First Semester		
MATH 32	Calculus III	4
MATH 45	Differential Equations for Science and Engineering	3
PHYS 11C	General Physics: Electricity and Magnetism	4
GE Area 1B - Critical Thinking [2]		3
	Units	**14**
Second Semester		
ENGL 20	College Composition II	3
PHYS 11B	General Physics: Heat, Light, Sound, Modern Physics	4
GE Area 4 - Social & Behavioral Sciences [2]		3
GE Area 6 - Ethnic Studies [2]		3

GR American Institutions (US History) [2]		3
	Units	**16**
Year 3		
First Semester		
CHEM 1E	General Chemistry for Engineering	4
CSC 25	Introduction to C Programming	3
PHYS 105	Mathematical Methods in Physics	3
PHYS 106	Introduction to Modern Physics	3
PHYS 115	Electronics and Instrumentation	4
	Units	**17**
Second Semester		
ENGR 45	Engineering Materials	3
PHYS 110	Classical Mechanics	3
PHYS 124	Thermodynamics and Statistical Mechanics	3
PHYS 135	Electricity And Magnetism	3
Upper Division GE Area 3 - Arts or Humanities + Writing Intensive [2]		3
	Units	**15**
Year 4		
First Semester		
PHYS 150	Quantum Mechanics	3
PHYS 162	Scientific Computing: Basic Methods	3
Physics Elective [3]		3
Upper Division GE Area 5 or 2 - Science or Mathematical Concepts/Quantitative Reasoning [2]		3
GR American Institutions (GOVT) [2]		3
	Units	**15**
Second Semester		
PHYS 116 or PHYS 163 or PHYS 191	Advanced Electronics and Instrumentation [3] or Scientific Computing: Modeling, Simulation, and Visualization or Senior Project	1 - 3
PHYS 175	Advanced Physics Laboratory	2
Physics Elective [3]		3
Physics Elective [3]		3
Upper Division GE Area 4 - Social & Behavioral Sciences [2]		3
Elective of Choice		3
	Units	**15-17**
	Total Units	**122-124**

Physics (Applied Physics), BS: 2-Year Roadmap

Course	Title	Units
Year 1		
First Semester		
CHEM 1E	General Chemistry for Engineering	4
PHYS 105	Mathematical Methods in Physics	3
PHYS 106	Introduction to Modern Physics	3
PHYS 115	Electronics and Instrumentation	4
GR American Institutions (GOVT) [2]		3
	Units	**17**
Second Semester		
ENGR 45	Engineering Materials	3
PHYS 110	Classical Mechanics	3
PHYS 124	Thermodynamics and Statistical Mechanics	3
PHYS 135	Electricity And Magnetism	3
Upper Division GE Area 3 - Arts or Humanities + Writing Intensive [2]		3
	Units	**15**
Year 2		
First Semester		
PHYS 150	Quantum Mechanics	3
PHYS 162	Scientific Computing: Basic Methods	3
Physics Elective [3]		3
Upper Division GE Area 5 or 2 - Science or Mathematical Concepts/Quantitative Reasoning [2]		3
GR American Institutions (US History) [2]		3
	Units	**15**
Second Semester		
PHYS 116 or PHYS 163 or PHYS 191	Advanced Electronics and Instrumentation [3] or Scientific Computing: Modeling, Simulation, and Visualization or Senior Project	1 - 3
PHYS 175	Advanced Physics Laboratory	2
Physics Elective [3]		3
Physics Elective [3]		3
Upper Division GE Area 4 - Social & Behavioral Sciences [2]		3
Elective of Choice		3
	Units	**15-17**
	Total Units	**62-64**

1. Any course not completed in the first semester should be taken in the second or a later semester.
2. Please see General Education/Graduation Requirement **course options (https://www.csus.edu/academic-affairs/curriculum-%20workflow/_internal/_documents/program-road-maps/als_2yr/art_transfer-%20roadmap-2024-25.pdf)**.
3. Please see an academic advisor for elective options.

Career Options: Astronomers, Atmospheric and Space Scientists, Nuclear Technicians, Nuclear Monitoring Technicians, Nanotechnology Engineering Technologists and Technicians, Mechatronics Engineers, Robotics Engineers, Data Scientists, Computer Programmers, Software Developers, Physics Teachers, Physicists, Postsecondary, Biochemists and Biophysicists