BS IN PHYSICS (APPLIED PHYSICS)

In Workflow

1. PHYS Committee Chair (mikkel.jensen@csus.edu)
2. PHYS Chair (physicschair@csus.edu)
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Approval Path

1. 2025-11-14T23:30:19Z
   Mikkel Jensen (mikkel.jensen): Approved for PHYS Committee Chair
2. 2025-11-17T17:28:10Z
   Michael Ray (ray): Approved for PHYS Chair
3. 2025-11-19T23:36:09Z
   Mikkel Jensen (mikkel.jensen): Approved for NSM College Committee Chair
4. 2025-11-24T17:28:32Z
   Chris Taylor (ctaylor): Approved for NSM Dean

History

1. May 3, 2018 by clmig-jwehrheim
2. Aug 9, 2018 by 212408496
3. Oct 2, 2018 by 212408496
4. Apr 28, 2020 by 220267334
5. Apr 20, 2021 by 220267334
6. Mar 7, 2024 by Mikkel Jensen (mikkel.jensen)
7. Jul 1, 2024 by Katie Dickson (katiedickson)

Date Submitted: 2025-11-12T22:01:32Z

Viewing: BS in Physics (Applied Physics)

Last approved: Mon, 01 Jul 2024 21:05:00 GMT

Last edit: 2025-12-09T18:52:17Z

Changes proposed by: Mikkel Jensen (218650862)

Academic Group: (College)

Natural Sciences & Mathematics

Academic Organization: (Department)

Physics and Astronomy

Catalog Year Effective:

2026-2027 Catalog

Individual(s) primarily responsible for drafting the proposed degree major program:

Name (First Last)	Email	Phone 999-999-9999
Mikkel Herholdt Jensen	mikkel.jensen@csus.edu	9162787687

Type of Program:
Major

Program Change Type:
Substantive

Delivery Format:
Fully Face to Face

Title of the Program:
BS in Physics (Applied Physics)

Designation: (degree terminology)
Bachelor of Science

Briefly describe the program proposal (new or change) and provide a justification:
This program change is being filed to reflect the following course changes in the department:
1. The course PHYS 106 has been approved as a GE upper division subject area 5: Science (formerly GE area B5).
2. The course PHYS 105 is being changed from a 3-unit course to a 4-unit course.
3. The course PHYS 175 is being changed from a 2-unit course to a 3-unit course and is being proposed as a writing intensive.

In addition, we are removing CSC 25 as a required course, as this course hasn't been offered regularly and we have had to do course substitutions and waivers for the course, and we evaluate that it no longer meets the desired learning outcomes for the students. The department has instead agreed to replace the course with a list of course options which focus on skill-based outcomes relevant to applied physics which offer more flexibility to the degree.

We are also updating the list of eligible electives to reflect new courses being offered in the department.

University Learning Goals

Undergraduate Learning Goals:
Competence in the disciplines
Knowledge of human cultures and the physical and natural world
Intellectual and practical skills
Personal and social responsibility
Integrative learning

Program Learning Outcomes

Program Learning Outcomes

Learning Outcome
Apply scientific reasoning to solve advanced physics problems and design, carry out and analyze hands-on and numerical experiments.
Communicate physics concepts and particularly their own scientific results in written documents (e.g., senior project reports and research papers).
Explain physics concepts and particularly their own scientific results through a variety of media, including oral (e.g., presentations, seminars) and visual communication (e.g., graphs, figures, posters).
Apply scientific reasoning to solve advanced physics problems and/or to design, carry out, and analyze experiments.
Locate, retrieve, read, draw conclusions, and critically evaluate physics and other related scientific research literature.
Use physics concepts and mathematics to develop models that describe theoretical and/or experimental results or predict physics phenomena.
Act with professional integrity and employ scientific ethics in their professional interactions.
Integrate knowledge of physics concepts, mathematics, and related disciplines when performing their own scientific work.

Learning Outcomes Display

Course Code	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8
MATH 30								
MATH 31								
MATH 32								
MATH 45								
PHYS 11A								
PHYS 11B								
PHYS 11C								
PHYS 105								
PHYS 106								
PHYS 110								
PHYS 124								
PHYS 135								
PHYS 175								
CHEM 1E								
ENGR 45								
PHYS 115								
PHYS 150								
PHYS 162								
ME 37								
ME 76								
ENGR 6								
MATH 64								
STAT 50								
GEOG 3								
CE 4								
CE 9								
CE 9L								
GEOL 10								
PHSC 75								
PHYS 116								
PHYS 163								
PHYS 191								
PHYS 116								
PHYS 130								
PHYS 136								

PHYS 142								
PHYS 145								
PHYS 151								
PHYS 152								
PHYS 156								
PHYS 163								
PHYS 172								
PHYS 195								
PHYS 199								
EEE 130								
EEE 135								
ENGR 112								
ENGR 132								
ENGR 181								
ME 121								
ME 122								
ME 123								
ME 154								
MATH 104								
MATH 105B								
NSM 195A								
NSM 195B								

Will this program be required as part of a teaching credential program, a single subject, or multiple subject waiver program (e.g., Liberal Studies, Biology) or other school personnel preparation program (e.g., School of Nursing)?
No

Please attach a Comprehensive Program Assessment Plan
BS Physics AssessmentPlan.docx

Please attach a Curriculum Map Matrix
BS Physics CurriculumMapMatrix.docx

Please attach a five-year budget projection
BudgetStatement.docx

Do these changes impact the degree roadmap?
Yes

Please attach the updated roadmap:
BS Physics (Applied Physics) roadmap.xlsx

Briefly describe the change:
The roadmap has been updated to implement the changes outlined in the program proposal justification.

Catalog Description:
Units required for Major: 70-84, 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.

As defined by policy http://www.csus.edu/umanual/acadaff/fsm00010.htm, a change in units constitutes a substantive change to the program. If your changes constitute a substantive change, please refer back to the "Program Change Type" field above to ensure that "Substantive" is selected.

Program Requirements: (If new courses are being created as part of a new program, it will be useful to propose courses first.)

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
PHYS 115	Electronics and Instrumentation	4
PHYS 150	Quantum Mechanics	3
PHYS 162	Scientific Computing: Basic Methods	3
Lower-division major elective: Select one of the following:		2 - 4
ME 37	Manufacturing Processes	
ME 76	Programming and Problem Solving in Engineering	
ENGR 6	Engineering Graphics and CADD (Computer Aided Drafting and Design)	
MATH 64	Mathematical Programming	
STAT 50	Introduction to Probability and Statistics	

GEOG 3	Introduction to Maps and Geographic Technologies	
CE 4	Engineering Graphics and CAD	
CE 9 & 9L	Plane and Topographic Surveying Plane and Topographic Surveying Laboratory	
GEOL 10	Physical Geology	
PHSC 75	Introduction to Machine Shop Practices	
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		**30-33**

[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 152	Nuclear and Particle 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 1: English Communication (9 Units)		
1A - English Composition		3
1B - Critical Thinking		3
1C - Oral Communication		3
Area 2: Mathematical Concepts and Quantitative Reasoning (3 Units)		
Area 2 Course - Lower Division		3
Area 3: The Arts and Humanities (6 Units)		

3A - Arts	3
3B - Humanities	3
Area 4: Social and Behavioral Sciences (6 Units)	
Area 4 Course -Lower Division	3
Area 4 Course - Lower Division	3
Area 5: Physical and Biological Sciences (7 Units)	
5A - Physical Science	3
5B - Biological Science	3
5C - Laboratory	1
Area 6: Ethnic Studies (3 Units)	
Area 6 Course	3
Upper Division Courses: (9 Units)	
Area 3 Course - Upper Division	3
Area 4 Course - Upper Division	3
Area 2 OR Area 5 Course - Upper Division	3
Total Units	**43**

[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) (6 Units)		
American Institutions: U.S. History		3
American Institutions: U.S. Constitution & CA Government		3
Writing Intensive (WI) [7]		0
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).

[7] Required in Major; also satisfies GE.

[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.

Fiscal Impact to Change an Existing Program

Indicate programmatic or fiscal impact which this change will have on other academic units' programs, and describe the consultation that has occurred with affected units:

We do not anticipate any fiscal impact on other departments. We have consulted with the departments whose courses we are including as major elective options.

Provide a fiscal analysis of the proposed changes:

The proposed changes will not include any additional resources, except for the additional 1 unit being added to PHYS 105 and PHYS175. These additional units will be taught by existing faculty as part of their assigned teaching load.

How will the above changes be accommodated within the department/College existing fiscal resources?

The additional 2 WTU will be taught by existing faculty as part of the standard assigned teaching loads.

Will the proposed changes require additional resources?

No

What additional space, equipment, operating expenses, library, computer, or media resources, clerical/technical support, or other resources will be needed?

None.

Estimate the cost and indicate how these resource needs will be accommodated:

2 additional WTU to be taught by existing faculty in the department.

Please attach any additional files not requested above:

BS in Physics (Applied Physics) - ENGR ME consultation.pdf
BS in Physics (Applied Physics) - MATH STAT consultation.pdf
BS in Physics (Applied Physics) - GEOL consultation.pdf
BS in Physics (Applied Physics) - CE consultation.pdf

Key: 220