

Adapted from,
Department of Physics and Astronomy, College of Natural and Social Sciences,
California State University, Los Angeles, California, USA.

Bachelor of Science Degree in Physics

The Bachelor of Science degree, which requires a total of 187 units, may be used as preparation for graduate work or as a qualifying degree for professional employment. Selection of electives in astronomy provides substantial background for students planning graduate study in that field.

Programs in physics are built on a foundation of high school studies in mathematics and physical sciences. For completion of a Bachelor of Science degree program in 12 quarters, high school preparation is recommended in physics, chemistry, geometry, trigonometry, and algebra (two years).

In planning their university programs, students who wish to prepare for graduate study in physics are advised to include 12 units of French, German, or Russian, a portion of which will earn general education credit. Student participation in research is strongly encouraged.

The total number of units required for the Bachelor of Science degree in Physics is 187-196 units, of which 115-122 units are in the major depending on the option selected. Consult with an advisor for the specific number of units required in all areas of the degree including GE and free electives.

General Program

Requirements for the Major (115 units)

The major consists of 115 units in physics and related fields, of which 50 are in lower division and 65 in upper division courses. Students must earn a grade of C or higher in all courses used to meet major requirements.

Lower Division Required Courses (50 units)

PHYS [211-214](#) General Physics (5, 5, 5, 4)

CHEM [101-103](#) General Chemistry (5, 5, 5)

MATH [206-209](#) Calculus I-IV (4,4,4,4)

Upper Division Required Courses (46 units)

PHYS [306](#) Modern Physics (4)

PHYS [312](#) Basic Electronics (4)

PHYS [320](#) Physics Computing (3)

PHYS [410AB](#) Mathematical Methods of Physics (4, 4)

PHYS [425A](#) Introduction to Theoretical Physics (4)

PHYS [426AB](#) Electricity and Magnetism (3, 3)

PHYS [427](#) Thermodynamics (4)

PHYS [432A](#) Introductory Quantum Mechanics (3)

PHYS [470-471](#) Advanced Physics Laboratory I, II (3, 3)

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CHEM [360](#) Writing for Chemists (4)

Upper Division Electives (19 units)

Selected with adviser approval

Option in Biophysics

The Bachelor of Science degree in Physics, Biophysics option, may be used as preparation for graduate work in biophysics or as a degree for professional employment.

Requirements for the Major (122 units)

The major with this option consists of 122 units in physics, biology, and related fields, of which 65 are in lower division and 57 in upper division courses. Students must earn a grade of C or higher in all courses used to meet major and option requirements.

Lower Division Required Courses (65 units)

PHYS [211-214](#) General Physics (5, 5, 5, 4)

BIOL 100A, [100B](#) Introductory Biology I, II (5, 5)

CHEM [101-103](#) General Chemistry I-III (5,5,5)

MATH [206-209](#) Calculus I-IV (4,4,4,4)

MICR [300](#) General Microbiology (5)

Upper Division Required Courses (51 units)

PHYS [306](#) Modern Physics (4)

PHYS [312](#) Basic Electronics (4)

PHYS [410AB](#) Mathematical Methods of Physics (4,4)

PHYS [432A](#) Introductory Quantum Mechanics (3)

PHYS [443AB](#) Biophysics (3, 2)

CHEM [301ABC](#) Organic Chemistry (3, 3, 3)

CHEM [401](#) Physical Chemistry I (4)

CHEM [402](#) or [403](#) Physical Chemistry II or III (4)

CHEM [431AB](#) Biochemistry (3, 3)

CHEM [360](#) Writing for Chemists (4)

Electives (6 units)

Select courses in physics or chemistry, with adviser approval.

Minor in Physics

A Physics minor, available for students majoring in other fields, requires 59 units in physics and mathematics, of which 40 are in lower division and 19 in upper division courses. Students majoring in

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fields that require the same courses as those required for the Physics minor need take only those courses in the minor that are not incorporated into their major.

Requirements for the Minor (59 units)

Lower Division Required Courses (39 units)

PHYS [211–214](#) General Physics (5, 5, 5, 4)

MATH [206–209](#) Calculus I–IV (4, 4, 4, 4)

MATH [215](#) Differential Equations (4)

Upper Division Required Course (4 units)

[PHYS 306](#) Modern Physics (4)

Upper Division Electives (16 units)

Select physics courses with adviser approval.

The Credential Program

The Department of Physics and Astronomy participates in the interdisciplinary Bachelor of Science degree in Natural Science which is approved by the California Commission on Teacher Credentialing for the Single Subject credential in Science. The program is described earlier in this chapter. In addition, the department offers the supplementary authorization in physics, described below, for holders of a Single Subject teaching credential in another field. Interested students should contact advisers in both the department and the Charter College of Education. Refer to the undergraduate **Charter College of Education** section of the *Academic Programs: College-based and University-wide* chapter for regulations governing all credential programs.

Supplementary Authorization for Single Subject Teaching Credential (32 units)

Holders of a Single Subject teaching credential issued by the state of California may supplement that credential with an authorization in physics for teaching physics at any grade level through grade 12 or in classes organized primarily for adults by completing the following program with a grade of C or higher in each course. The course work must include one year sequence of courses in at least two of the subject areas. At least one of the courses must include a laboratory component. For other requirements governing issuance of this authorization, consult the Charter College of Education.

Complete or demonstrate proficiency in the following (32 units):

[PHYS 211–214](#) General Physics (5, 5, 5, 4)

[PHYS 306](#) Modern Physics (4)

[MATH 206, 207](#) Calculus I-II (4,4)

[ASTR 152](#) Principles of Astronomy - Laboratory (1)

In addition to the above courses, an astronomy course—such as [ASTR 151](#) is strongly recommended.