

Physics

PHYSICS – PHYS

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 Physical Sciences and Engineering Division
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Possible career opportunities

Career opportunities available for physicists include: research in industry, universities, and national laboratories. Many teach in high schools, colleges, and universities. Others can be found in hospitals, the military, oil fields, power plants, in the astronaut corps, in museums, in patent law firms, and in management positions in business and government. A background in physics can help a technical writer or a computer programmer. Most career options require more than two years of college study.

Program-level student learning outcomes

Program learning outcomes are subject to change. The most current list of program learning outcomes for each program is published on the DVC website at www.dvc.edu/slo.

Associate in science in physics for transfer

Students completing the program will be able to...

- A. solve problems in mechanics, including mechanical waves and fluids, using calculus.
- B. solve problems in thermodynamics using calculus.
- C. solve problems in electromagnetism using calculus.
- D. solve problems in optics using calculus.
- E. solve problems in special relativity using calculus.
- F. solve problems in quantum physics, including its applications, using calculus and differential equations.

The associate in science in physics for transfer is intended for students who plan to complete a bachelor’s degree in a similar major at a CSU campus. Students completing this degree are guaranteed admission to the CSU system, but not to a particular campus or major.

In order to earn the degree, students must:

- Complete 60 CSU-transferable units.
- Complete the California State University-General Education pattern (CSU GE); or the Intersegmental General Education Transfer Curriculum (IGETC) pattern, including the Area 1C requirement for Oral Communication.
- Complete a minimum of 18 units in the major.
- Attain a minimum grade point average (GPA) of 2.0.
- Earn a grade of “C” or higher in all courses required for the major.

Students transferring to a CSU campus that accepts the degree will be required to complete no more than 60 units after transfer to earn a bachelor’s degree. This degree may not be the best option for students intending to transfer to a particular CSU campus or to a university or college that is not part of the CSU system, or those students who do not intend to transfer.

Some courses in the major satisfy both major and CSU GE/IGETC general education requirements; however, the units are only counted once toward the 60 unit requirement for an associate degree. Some variations in requirements may exist at certain four-year institutions; therefore, students who intend to transfer are advised to refer to the catalog of the prospective transfer institution and consult a counselor.

| <i>major requirements:</i> | <i>units</i> |
|---|--------------|
| MATH-192 Analytic Geometry and Calculus I | 5 |
| MATH-193 Analytic Geometry and Calculus II | 5 |
| MATH-292 Analytic Geometry and Calculus III | 5 |
| PHYS-130 Physics for Scientists and Engineers A: Mechanics and Wave Motion..... | 4 |
| PHYS-230 Physics for Scientists and Engineers B: Heat and Electro-Magnetism..... | 4 |
| PHYS-231 Physics for Scientists and Engineers C: Optics and Modern Physics..... | 4 |
| total minimum required units | 27 |

PHYS-110 Elementary Physics

- 3 units LR
- 54 hours lecture per term
 - Prerequisite: MATH-120 or MATH-120SP or equivalent
 - Recommended: Concurrent enrollment in PHYS-111 and eligibility for ENGL-122 or equivalents
 - Note: Students specifically interested in focusing on modern physics should take PHYS-113.

This course provides an overview of physics. Forces, motion, heat, electricity and magnetism, optics and modern physics will be discussed. This course emphasizes topics in classical physics. CSU, UC (credit limits may apply to UC - see counselor)

PHYS-111 Physics Laboratory

- 1 unit LR
- 54 hours laboratory per term
 - Prerequisite: PHYS-110 or equivalent (may be taken concurrently)
 - Recommended: Eligibility for ENGL-122 or equivalent

This laboratory course will include measurement and analysis of mechanical, thermal, electrical and optical phenomena. CSU, UC (credit limits may apply to UC - see counselor)

Physics

PHYS-113 Elementary Modern Physics: From Atoms to the Big Bang

3 units SC

- 54 hours lecture per term

• Prerequisite: MATH-120 or equivalent This course is an introduction to the ideas of modern physics. Topics will include the relativity of space and time, Einstein's theory of gravity, the Big Bang Theory of the origin of the universe, the birth and death of stars, black holes, photons, atoms, quantum uncertainty, the nucleus, radioactivity, and nuclear energy. The emphasis will be on concepts, not mathematical problem solving. CSU, UC

PHYS-120 General College Physics I

4 units LR

- 54 hours lecture/72 hours laboratory per term
- Prerequisite: MATH-121 or equivalent
- Recommended: Eligibility for ENGL-122 or equivalent

This course is the first-term college physics for life science majors and others. It includes a lecture and laboratory study of mechanics, heat and sound. C-ID PHYS 105, CSU, UC (credit limits may apply to UC - see counselor)

PHYS-121 General College Physics II

4 units LR

- 54 hours lecture/72 hours laboratory per term
- Prerequisite: PHYS-120 or equivalent

This is a second term college physics course for life science majors and others. Within lecture and laboratory, the study of electricity, magnetism, light and modern physics will be covered. C-ID PHYS 110, CSU, UC (credit limits may apply to UC - see counselor)

PHYS-124 Calculus Supplement for Physics 120

.5 unit LR

- 9 hours lecture per term
- Prerequisite: PHYS-120 (may be taken concurrently) and MATH-182 or MATH-192 (may be taken concurrently) or equivalents
- Recommended: Eligibility for ENGL-122 or equivalent
- Note: The calculus component may be required for certain transfer majors

This course adds calculus to the mathematical techniques used in PHYS-120 - General College Physics I. CSU, UC (credit limits may apply to UC - see counselor)

PHYS-125 Calculus Supplement for Physics 121

.5 unit LR

- 9 hours lecture per term
- Prerequisite: PHYS-121; and MATH-183 or MATH-193 (all may be taken concurrently) or equivalents
- Recommended: Eligibility for ENGL-122 or equivalent
- Note: The calculus component may be required for certain transfer majors

This course adds calculus to the mathematical techniques used in PHYS-121 - General College Physics II. CSU, UC (credit limits may apply to UC - see counselor)

PHYS-129 Introductory Physics for Engineers

4 units LR

- 54 hours lecture/72 hours laboratory per term
- Co-requisite: MATH-192 or equivalent (may be taken previously)
- Recommended: Eligibility for ENGL-122 or equivalent
- Note: For those students who have not recently completed a full year of high school physics, the physics department strongly recommends completion of PHYS-129 before enrolling in PHYS-130

This course is designed for engineering, physics and chemistry majors. The student will be introduced to basic vocabulary and techniques of studying physics. It presents a study of vectors, motion, forces, momentum, energy and rotating systems. One or more additional topics such as geometric optics, electricity, the atomic nature of matter or the study of fluids will be presented. CSU, UC (credit limits may apply to UC - see counselor)

PHYS-130 Physics for Engineers and Scientists A: Mechanics and Wave Motion

4 units LR

- 54 hours lecture/72 hours laboratory per term
- Prerequisite: PHYS-129 or High School Physics or equivalent
- Co-requisite: MATH-193 (may be taken previously) or equivalent
- Recommended: Eligibility for ENGL-122 or equivalents
- Note: For those students who have not recently completed a full year of high school physics completion of PHYS-129 is strongly recommended.

This course is designed for engineering and physical science majors (such as physics, chemistry, and geology). It presents a lecture and laboratory study of classical mechanics: vectors, particle kinematics, Newton's laws, equilibrium of rigid bodies, work and energy, gravitation, fluids, momentum, rotational kinematics and dynamics, and oscillations and waves in elastic media. C-ID PHYS 205, CSU, UC (credit limits may apply to UC - see counselor)

PHYS-150 Topics in Physics

.3-4 units SC

- Variable hours

A supplemental course in physics to provide a study of current concepts and problems in physics. Specific topics will be announced in the schedule of classes. CSU

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**PHYS-230 Physics for Engineers and Scientists B:
Heat and Electro-Magnetism**

4 units LR

- 54 hours lecture/72 hours laboratory per term
- Prerequisite: PHYS-130 or equivalent; MATH-292 (may be taken concurrently) or equivalent
- Recommended: Eligibility for ENGL-122 or equivalent

This course is a continuation of PHYS-130 and presents the study of thermodynamics, electricity, and magnetism. Topics include temperature, heat the first and second laws of thermodynamics, kinetic theory of gases, electric field and electric potential of charges, capacitance, magnetic field of moving charges, current, voltage, resistance, induced electric and magnetic fields, Maxwell's equations and plane electromagnetic waves. C-ID PHYS 210, CSU, UC (credit limits may apply to UC - see counselor)

**PHYS-231 Physics for Engineers and Scientists C:
Optics and Modern Physics**

4 units LR

- 54 hours lecture/72 hours laboratory per term
- Prerequisite: PHYS-230 or equivalent; MATH-294 (may be taken concurrently) or equivalent
- Recommended: Eligibility for ENGL-122 or equivalent

This course is a continuation of PHYS-130 and PHYS-230 and presents the study of optics and modern physics. Topics include geometric and wave optics, special relativity, quantum physics, atomic and molecular physics, condensed matter physics, and nuclear physics. C-ID PHYS 215, CSU, UC (credit limits may apply to UC - see counselor)

PHYS-299 Student Instructional Assistant

.5-3 units SC

- Variable hours
- Note: Applications must be approved through the Instruction Office. Students must be supervised by a DVC instructor.

Students work as instructional assistants, lab assistants and research assistants in this department. The instructional assistants function as group discussion leaders, meet and assist students with problems and projects, or help instructors by setting up laboratory or demonstration apparatus. Students may not assist in course sections in which they are currently enrolled. CSU