## Definition

Physical sciences are those disciplines of the natural sciences other than the biological sciences. They generally involve nonliving materials and the principles of fundamental nature which have been sought since man appeared on earth. The laws of physics, for instance, are the very fundamental relationships which have existed since the universe was born. Some are complex, some are not. Some are simple yet others elude the best minds and grandest equipment yet devised by man. These laws, we are confident, guide in a very fundamental way, the human and animal world that we see around us. In a sense then, the physical sciences are the study of these same fundamental laws of nature as applied in very complex ways to living organisms.

## Staff

*Please dial (661) 722-6300, then the 4 digit extension.*

| | |
|---|---|
| Division: | |
| Christos Valiotis, Dean | x.6415 |
| Wendy Cios, Administrative Assistant | x.6415 |
| Suzanne Olson, Clerical Assistant III | x.6415 |
| Dr. Alexandra Schroer, Department Chair | x.6922 |
| David Bermea, Lab Technician | x.6274 |
| Jon Paul Bautista, Lab Technician | x.6705 |
| Christos Valiotis, STEM Director | x.6024 |
| Jamie Jones, STEM Coordinator | x.6992 |
| Denilson Freitas, STEM Lab Technician | x.6704 |
| Faculty: | |
| Dr. Jason Bowen | x.6963 |
| Dr. Chrysanthos Kyriakides | x.6415 |
| Dr. Mark McGovern | x.6006 |
| Dr. Alexandra Schroer, Department Chair | x.6922 |
| Paul Stahmann | x.6731 |
| Adjunct Faculty: | V.M. |
| William Rogers | 2401 |
| Bruce Schulte | 6850 |
| Dr. Kenneth Underwood | 2726 |

## Program Description

Physical sciences offered include: astronomy, physical science, and physics. The courses, for the most part, are designed to meet the general education and major transfer requirements for the physical sciences.

Students must receive a minimum grade of "C" or better in all required core courses and the specific courses listed as program electives in order to qualify for the degree or certificate.

## Distinctive Features

Traditional teaching may be supplemented with computer and Internet-based instruction. Laboratory activities provide "hands-on" experimentation and discovery into the natural, physical and chemical characteristics of the earth and our universe. Engineering and life science applications may be presented and computer-based data acquisition and analysis may assist in some lab instruction.

## Career Options

| | |
|---|---|
| Astronomer | Medical Physics |
| Astrophysicist | Physicist |
| Geophysicist | Teacher |

(Careers may require education beyond the two-year college level.)

## Program Learning Outcomes

**Associate in Science in Physics for Transfer**

1. Students will demonstrate an understanding of the fundamental principles and concepts of physics that include mechanics, electromagnetism, thermodynamics, modern physics, and quantum mechanics.
2. Students will competently apply this knowledge and analyze physical systems by constructing mathematical models in which they identify the essential aspects of a problem, formulate a strategy for solution, make appropriate approximations, evaluate the correctness of their solution, and communicate their work clearly.
3. Students will use basic computational techniques for modeling physical systems including those that don't have analytical answers.
4. Students will explore physical systems by setting up experiments, collecting and analyzing data, identifying sources of uncertainty, and interpreting their results in terms of the fundamental principles and concepts of physics.
5. Students will communicate physics concepts, processes, and results effectively, both verbally and in writing.

## Associate Degree

**Associate in Science in Physics for Transfer**

The Associate in Science in Physics for Transfer (AS-T in Physics) degree offers students a fundamental knowledge of Physics and its relation to science, technology, and engineering. Students will enhance their problem solving and critical thinking skills by applying mathematical models to real world problems or utilizing mathematical objects and theorems to evaluate the validity of a statement or to prove mathematical statements.

The Associate in Science in Physics for Transfer (AS-T in Physics) degree meets the requirements of SB 1440 for Associate Degrees for Transfer (ADT). These degrees are intended to make it easier for students to transfer to California State University campuses, but do not exclude admittance to other colleges or universities.

To earn an Associate in Science in Physics for Transfer (AS-T in Physics) degree a student must complete the following:

(1) Completion of 60 semester units or 90 quarter units that are eligible for transfer to the California State University, including both of the following:
(A) *The Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education – Breadth Requirements.
(B) A minimum of 18 semester units or 27 quarter units in a major or area of emphasis, as determined by the community college district.

(2) Obtainment of a minimum grade point average of 2.0.

ADTs also require that students must earn a "C" or better in all courses required for the major or area of emphasis.

| **Required Courses** | **units** |
|---|---|
| PHYS 110, General Physics | |
| PHYS 120, General Physics | 4 |
| PHYS 211, General Physics | 5 |
| MATH 150, Calculus and Analytic Geometry | 5 |
| MATH 160, Calculus and Analytic Geometry | 4 |
| MATH 250, Calculus and Analytic Geometry | 4 |

Courses required for the major may also satisfy general education requirements. Consult with a counselor for additional information.

Except in cases of prerequisite requirement, it is not required that courses be taken in exactly this sequence; they are recommended in this order to facilitate success.

**Recommended Plan of Study**

| **First Semester** | **units** |
|---|---|
| MATH 150, Calculus and Analytic Geometry (IGETC 2 § CSU B4) | 5 |
| GE requirement area IGETC 1a § CSU A2 (ENGL 101) | 3 |
| GE requirement area IGETC 4 § CSU D (recommended GEOG 105) | 3 |
| *CSU only* GE requirement area E (recommended NF 100) | [3] |
| ***or*** | |
| *UC only* GE requirement LOTE, Language Other than English (*if needed) | [5] |
| | **Total 14-16** |
| **Second Semester** | |
| MATH 160, Calculus and Analytic Geometry | 4 |
| PHYS 110, General Physics (IGETC 5A/5C § CSU B1/B3) | 4 |
| GE requirement area IGETC 1b § CSU A3 (recommended ENGL 103) | 3 |
| GE requirement area IGETC 3A § CSU C1 (recommended ART 100) | 3 |
| *UC only* GE requirement LOTE, Language Other than English (recommended SPAN 102* if needed) | [5] |
| | **Total 14** |
| **Third Semester** | |
| MATH 250, Calculus and Analytic Geometry | 4 |
| PHYS 120, General Physics | 4 |
| GE requirement area IGETC 1c § CSU A1 (recommended COMM 101 *CSU only*) | 3 |
| GE requirement area IGETC 4 § CSU D (recommended POLS 101) | 3 |
| GE requirement area IGETC 3H § CSU C2 (recommended PHIL 105) | 3 |
| | **Total 17** |
| **Fourth Semester** | |
| PHYS 211, General Physics | 5 |
| GE requirement area IGETC 5B § CSU B2 (recommended BIO 101& BIO 101L) | 3 |
| GE requirement area IGETC 4 § CSU F | 3 |
| GE requirement area IGETC 3 A/H § CSU C1/C2 (recommended HIST 107) | 3 |
| | **Total 15** |
| | **Degree Total 60** |

## Transfer

Students planning to continue studies at a four-year college or university after AVC should visit the Transfer Resource Center and consult with a counselor as soon as possible. Additional information on official transfer articulation agreements from AVC to many CSU/UC campuses can be found at www.assist.org

## Prerequisite Completion

All prerequisite courses must be completed with a satisfactory grade in order to enroll in the next course. According to Title 5, Section 55200(d), a satisfactory grade is a grade of "A," "B," "C" or "P". Classes in which the Pass/No Pass option is available are indicated with an asterisk **(*)** before the course title. See "Pass/No Pass Option" in the catalog for full explanation.

## Physical Science Course

### PSCI 101 *PHYSICAL SCIENCE

*4 units*
*6 hours weekly [3 lecture, 3 lab]*
***Advisory:*** *Completion of ENGL 101 and MATH 102 or placement by multiple measures.*
Designed to meet lower division physical science requirements for the non-science major. Introduces basic concepts in physics and chemistry (motion, energy, atoms and chemical reactions) emphasizing concepts with a minimum of math. Especially recommended for students interested in teaching, library science, and humanities. (CSU, UC, AVC)

### PSCI 302 *INTRODUCTION TO QUANTATIVE ATMOSPHERIC DYANMICS AND THERMODYNAMICS

*3 units*
*3 hours weekly*
***Limitation on Enrollment:*** *Must be selected as part of the AFMT BS Degree cohort to take this course.*
***Prerequisite:*** *Completion of MATH 135 and PHYS 101.*
This course is designed to provide a non-calculus, quantitative understanding of the evolution of 3-dimensional atmospheric phenomena. The course subject material quantifies the atmospheric thermodynamic and pressure driven processes to explore the vertical and horizontal movement of heat and momentum. Atmospheric thermodynamic processes will be quantified by understanding the thermodynamic relationships and quantified using atmospheric thermodynamic diagrams such as the Skew-T diagram. Vertical profile data will be obtained from web-based sources. This understanding is applied to extra-tropical cyclones and anticyclones, frontal systems and associated meso-scale phenomena, sea and land breezes and atmospheric boundary layer development. Insight into these phenomena is gained through the application of the material presented in both lectures and assigned readings coupled with discussions on the several homework assignments. (AVC)

## Physics Courses

### PHYS 101 INTRODUCTORY PHYSICS
*4 units*
*6 hours weekly [3 lecture, 3 lab]*
***Advisory:*** *Completion of MATH 135 or MATH 140.*
This course is the first part of a two-semester algebra-trig introductory physics course. Topics covered are: kinematics, Newton's laws, statics, linear momentum, linear-rotational analogs, rotational dynamics, energy and its transformation, gravitation, fluids, heat and thermodynamics. (C-ID: PHYS 105) (CSU, UC, AVC)

### PHYS 102 INTRODUCTORY PHYSICS
*4 units*
*6 hours weekly [3 lecture, 3 lab]*
***Prerequisite:*** *Completion of PHYS 101.*
This course is the second part of a two-semester algebra-trig introductory physics course. Topics covered are: mechanical waves, sound, electrostatics, current and DC circuits, magnetism, light and optics and modern physics. (C-ID: PHYS 110) (CSU, UC, AVC)

### PHYS 110 GENERAL PHYSICS
*4 units*
*6 hours weekly [3 lecture, 3 lab]*
***Advisory:*** *Completion of PSCI 101. Eligbility for ENGL 101 or placement by multiple measures.*
***Prerequisite:*** *Completion of or concurrent enrollment in MATH 150.*
This course is the first part of a three-semester calculus-based introductory physics course for scientists and engineers. Topics covered are: kinematics, Newton's laws, statics, linear momentum, linear-rotational analogs, rotational dynamics, energy and its transformation, fluids, gravitation and oscillations. (C-ID: PHYS 205) (CSU, UC, AVC)

### PHYS 120 GENERAL PHYSICS
*4 units*
*6 hours weekly [3 lecture, 3 lab]*
***Advisory:*** *Completion of ENGL 101 or placement by multiple measures.*
***Prerequisite:*** *Completion of PHYS 110, and Completion of or concurrent enrollment in MATH 160.*
This course is the second part of a three-semester calculus based introductory physics course for scientists and engineers. Topics covered are: electrostatics, electric fields and potentials, capacitance, resistance and current, DC circuits, magnetic fields, magnetic induction, Maxwell's Laws and AC circuits. (C-ID: PHYS 210) (CSU, UC, AVC)

### PHYS 211 GENERAL PHYSICS
*5 units*
*7 hours weekly [4 lecture, 3 lab]*
***Advisory:*** *Completion of MATH 220.*
***Prerequisite:*** *Completion of PHYS 110, and Completion of or concurrent enrollment in MATH 160.*
This course covers geometric optics, lenses, mirrors, optical instruments, wave optics/physical optics and laws of thermodynamics. In addition to these areas, the course contains selected topics from modern physics. These include special relativity, quantum mechanics, atomic physics, condensed matter/solid state physics, nuclear physics and particle physics. (C-ID: PHYS 215) (CSU, UC, AVC)