PHYSICS

The study of physics involves trying to understand, at the most fundamental level, our observations of natural phenomena. Inquiries extend from the most minute of subatomic particles, to nuclei, atoms, molecules, solids, liquids, gases and plasmas, stars and galaxies. Physics seeks to explain how, under the influence of some fundamental forces, nature behaves as it does. In a larger sense it tries to address questions about our universe, such as: Where did we come from? What will be our ultimate fate?

The sequence of physics classes fills the lower division requirements for students who plan to major in fields such as physics, engineering or medicine.

Career Opportunities

May require advanced degree. Engineer, Physicist, Teaching at many levels

Faculty

Butros, Michael

Transfer

- California State University, San Bernardino: Physics major
- University of California, Riverside: Physics major

For the most up-to-date information on these programs and others, visit assist.org (http://www.assist.org). Please stop by the Transfer Center in Building 23 or make an appointment with a counselor if you have questions.

Physics, AS

State Control Number: 38197
Program Code: PHYS.AS
Approved for Federal Financial Aid: Yes

The Associate in Science in Physics prepares students for transfer in the fields of Physics, Mathematics, Engineering (all disciplines), Physical and/or Natural Sciences, and Computer Science. It is a good start for students majoring in the above mentioned disciplines.

To earn this degree, complete the major coursework with "C" grades or better and all of the following graduation requirements: 60 minimum degree-applicable units (including a maximum 4 units of activity); 2.0 minimum overall GPA; 12 degree-applicable units through VVC; Information Competency; Global Citizenship; Kinesiology, and the VVC General Education pattern (https://catalog.vvc.edu/degrees-certificates/vvcge/#vvcge). Courses may count in one area only, either in the major or in a general education category. Courses counted in one AA/AS major may not be used in another AA/AS major.

Code	Title	Units
Required Courses		
PHYS 201	Engineering Physics I-Mechanics	4.0
PHYS 202	Engineering Physics II - Fluids, Sound, and Thermodynamics	4.0
PHYS 203	Engineering Physics III Electricity And Magnetism	4.0
PHYS 204	Engineering Physics IV-Optics and Modern Physics	4.0
PHYS 210	Computer Methods for Engineers	4.0
or ELCT 202	Computer Methods for Engineers	
Total Units		**20**

Physics Courses

PHYS 100 Introductory Physics (4.0 Units)
An introduction to physics for students who have not had physics, or who have not had physics recently. Fundamental principles of mechanics, waves, heat, electricity and magnetism, light, atomic and nuclear physics. (UC credit limitation).
Lecture Hours: 54.0; Lab Hours: 54.0
Transfer: Transfers to both UC/CSU

PHYS 138 Cooperative Education Physics (1-8 Units)
This course is designed for students who are cross-training at their current worksite for upward mobility or possible career changes, as well as those looking for entry-level occupational training through work-based learning experiences. Students must have a co-op approved worksite to enroll in this class and establish new learning objectives.
Transfer: Transfers to CSU only

PHYS 150 College Physics I (4.0 Units)
This is the first course in an algebra-based two-semester physics sequence. Topics include motion, forces, Newtons's laws, conservation of energy, conservation of momentum, rotational motion, rotational equilibrium, liquids and solids, heat, thermo-physics, vibration, and waves. C-ID: PHYS 100S.
Prerequisite(s): (MATH 104) and (MATH 105, Minimum grade C)
Lecture Hours: 54.0; Lab Hours: 54.0
Transfer: Transfers to both UC/CSU

PHYS 160 College Physics II (4.0 Units)
The second semester of an algebra-based two-semester physics sequence. Topics include electricity, magnetism, optics, atomic physics and nuclear physics. The laws of physics are investigated and applied to problem solving. C-ID PHYS 100S.
Prerequisite(s): PHYS 150, Minimum grade C
Lecture Hours: 54.0; Lab Hours: 54.0
Transfer: Transfers to CSU only

PHYS 201 Engineering Physics I-Mechanics (4.0 Units)
Course covers a study of vectors, rectilinear motion, motion in a plane, particle dynamics, work and energy, conservation laws, collisions, rotational kinematics and dynamics. (UC credit limitation). C-ID: PHYS 205.
Co-requisite(s): MATH 226 or MATH 226H, Minimum grade C
Lecture Hours: 54.0; Lab Hours: 54.0
Transfer: Transfers to both UC/CSU

PHYS 202 Engineering Physics II - Fluids, Sound, and Thermodynamics (4.0 Units)
Course covers the study of equilibrium of rigid bodies, oscillations, gravitation, fluid statics and dynamics, waves in elastic media, sound and thermodynamics. (UC credit limitation). C-ID: PHYS 200 S.
Prerequisite(s): PHYS 201, Minimum grade C
Co-requisite(s): MATH 227 or MATH 227H
Lecture Hours: 54.0; Lab Hours: 54.0
Transfer: Transfers to both UC/CSU

PHYS 203 Engineering Physics III Electricity And Magnetism (4.0 Units)
Course covers charge and electric force, the electric field, electric potential, capacitors and dielectrics, direct current and resistance, electromotive force and circuits, the magnetic field, inductance, magnetic properties of matter, electromagnetic oscillations, alternating currents, electromagnetic waves, and the Maxwell Equations.(UC credit limitation). C-ID: PHYS 200 S.
Prerequisite(s): PHYS 202, Minimum grade C
Co-requisite(s): MATH 228 or MATH 228H
Lecture Hours: 54.0; Lab Hours: 54.0
Transfer: Transfers to both UC/CSU

PHYS 204 Engineering Physics IV-Optics and Modern Physics (4.0 Units)
The nature and propagation of light, reflection and refraction, interference, diffraction, gratings and spectra, relativity, elements of quantum physics, waves and particles, nuclear physics. (UC credit limitation). C-ID: PHYS 200 S.
Prerequisite(s): PHYS 203, Minimum grade C
Lecture Hours: 54.0; Lab Hours: 54.0
Transfer: Transfers to both UC/CSU

PHYS 210 Computer Methods for Engineers (4.0 Units)
This course is an introduction to methods and techniques for solving engineering problems using numerical-analysis computer-application programs, technical computing and visualization using MATLAB software. The course is structured to allow students to have a thorough hands-on experience with examples and exercises applied to a wide variety of practical engineering problems.
Prerequisite(s): MATH 227 or MATH 227H, Minimum grade C
Lecture Hours: 54.0; Lab Hours: 54.0
Transfer: Transfers to CSU only

PHYS 221 General Physics I (4.0 Units)
Course covers vectors motion in one and two dimensions, particle dynamics, work energy, conservation laws, collisions, rotational motion and dynamics, thermodynamics. (UC credit limitation). C-ID: PHYS 100 S.
Prerequisite(s): MATH 104, Minimum grade C
Co-requisite(s): MATH 226 or MATH 226H
Recommended Preparation: PHYS 100
Lecture Hours: 54.0; Lab Hours: 54.0
Transfer: Transfers to both UC/CSU

PHYS 222 General Physics II (4.0 Units)
Topics include electromagnetic theory, oscillations, waves, geometrical optics, interference and diffraction quantum physics, atomic and nuclear physics. C-ID: PHYS 100 S.
Prerequisite(s): PHYS 221, Minimum grade C
Co-requisite(s): MATH 227 or MATH 227H
Recommended Preparation: PHYS 100
Lecture Hours: 54.0; Lab Hours: 54.0
Transfer: Transfers to both UC/CSU

PHYS 230 Statics (3.0 Units)
This class is concerned with the analysis of forces on physical systems in static equilibrium. Topics covered include: Force and moment vectors, resultants. Principles of statics and free-body diagrams. Applications to simple trusses, frames, and machines. Distributed loads. Internal forces in beams. Properties of areas, second moments. Laws of friction.
Prerequisite(s): (PHYS 201) and (MATH 227 or MATH 227H, Minimum grade C)
Lecture Hours: 54.0
Transfer: Transfers to both UC/CSU

PHYS 240 Material Science and Engineering (3.0 Units)
This course covers major topics related to engineering design, manufacturing, and the properties of materials used in modern component construction. Students will learn to implement design methods required to efficiently use manufacturing methods such as machining, forming, and molding. In addition, case studies of parts and assemblies which incorporate various metals, ceramics, polymers, semiconductors, composites, and superconductors, will be used for comparing product lines which may or may not minimize costs, optimize functionality, and reduce manufacturing time. Atomic and optical properties are key elements which are studied in detail to provide a firm support for student assumptions during analysis.
Prerequisite(s): (CHEM 201) and (PHYS 202, Minimum grade C)
Lecture Hours: 54.0
Transfer: Transfers to both UC/CSU

PHYS 250 Thermodynamics (3.0 Units)
This course covers major topics related to thermodynamic systems. Students will learn to identify the control mass and control volume in thermodynamic problems, calculate properties of pure substances, map and analyze processes on T-V, P-V, and T-S diagrams, apply the first and second laws of thermodynamics to control mass and control volume processes, and use the Carnot thermodynamic cycle to calculate the limits of the thermal efficiency.
Prerequisite(s): (MATH 228) and (PHYS 202, Minimum grade C)
Lecture Hours: 54.0
Transfer: Transfers to both UC/CSU

Program Learning Outcomes

Program Learning Outcomes (PLOs) are statements of the kind of learning a program hopes a student will achieve. The PLOs describe the knowledge, skills, problem-solving, communication and values that apply to all certificates and/or degrees within that program.

Upon completion of this program, students should be able to:

1. Apply theories to solve problems using lower division level knowledge of mechanics, heat, waves, optics, electricity and magnetism, and modern physics.
2. Use common laboratory instruments to make measurements in the areas of mechanics, waves, electricity and magnetism, heat and thermodynamics, and optics.
3. Clearly communicate results of scientific inquiries in both oral and written form.