

# PHYSICAL SCIENCE

School of Physical Sciences and Technologies

**Dean:** Kathleen Schrader, DNSc

**Academic Chair:** vacant

**Faculty:** Walter Christensen, Ernest Freund, Roy McCord, Larry Oldewurtel, Joseph Oliva, PhD, Jennifer Tan, PhD

## Curriculum

The curriculum in physical science includes courses in astronomy and physics. The curriculum is designed to attract and cultivate the student's imagination as to the origin, composition, and mechanics of the solar system; the movement of objects in relation with gravitational, magnetic, and electrical forces; the interaction between matter and energy; the behavior of light; and the physical characteristics of substances.

Courses offered through the curriculum meet general education requirements in natural sciences. They also may be taken as electives toward a major in liberal arts and sciences, or they may be taken to meet the requirements for an Associate in Arts degree with a major in physical science.

## Major

While a baccalaureate degree is recommended preparation for those considering professional careers related to physical science, the completion of the associate degree program will demonstrate commitment to the field and will provide comprehensive preparation for upper-division work.

The purpose of this degree is to provide a solid background in the areas of physical science. By choosing the appropriate courses from the recommended electives list, students should be able to continue their education in chemistry, physics, engineering and many other fields in the physical sciences which require these courses as prerequisites.

## Career Options

Careers for the physical sciences major include the following:

- Aerospace Engineer
- Astronomer
- Astrophysicist
- Defense Planner
- Educator
- Geophysicist
- Laboratory Technician
- Medical Physicist
- National Laboratory Researcher
- Navigation Equipment Specialist
- Nuclear Physicist
- Physicist
- Planetarium Exhibit Planner/Guide
- Research Scientist or Assistant
- Satellite Data Analyst
- Scientific Photographer
- Seismologist
- Telescope Operator
- Test Engineer

## Associate Degree

### Associate in Arts Degree in Physical Science

Students must complete a minimum of 60 units of credit, including the courses in the major ("Major Requirements") and general education requirements (pages 43-49), with an overall GPA of 2.0 or better, and a grade of "A," "B," "C," or "P" in all courses to be counted toward the major. A minimum of 12 units must be completed at Irvine Valley College. See pages 34-35 for further information.

### Transfer Preparation

Courses that fulfill major requirements for an associate degree at Irvine Valley College may not be the same as those required for completing the major at a transfer institution offering a bachelor's degree. Students who plan to transfer to a four-year college or university should schedule an appointment with an IVC counselor to develop a plan of study before beginning their program. It may be helpful to meet with the department faculty at IVC.

### ASSOCIATE IN ARTS DEGREE Major Requirements: Physical Science

| Complete the following courses: |                                   | Units     |
|---------------------------------|-----------------------------------|-----------|
| <b>CHEM 1A</b>                  | General Chemistry I               | 5         |
| <b>CHEM 1B</b>                  | General Chemistry II              | 5         |
| <b>MATH 3A</b>                  | Analytic Geometry and Calculus I  | 5         |
| <b>MATH 3B</b>                  | Analytic Geometry and Calculus II | 5         |
| <b>PHYS 4A</b>                  | General Physics                   | 4         |
| <b>PHYS 4B</b>                  | General Physics                   | 4         |
| <b>TOTAL UNITS:</b>             |                                   | <b>28</b> |

#### Recommended Electives:

CS 30, MATH 4B, MATH 24, MATH 26.

## ASTRONOMY COURSES

### ASTR 20: GENERAL ASTRONOMY

**3 Units**

**3 hours lecture**

**Transfers: CSU, UC**

This introductory course traces the development of astronomy from ancient times to the present. The course examines the solar system, including the moon, sun, and planets; the composition and evolution of stars and galaxies; and theories of the origin of the universe. Field trips may be required to fulfill the objectives of this course. NR

### ASTR 25: OBSERVATIONAL ASTRONOMY

**3 Units**

**2 hours lecture, 3 hours lab**

**Transfers: CSU, UC**

This course is designed primarily to acquaint students with astronomical measurements, instruments and techniques. Students will use telescopes, spectrometers and other instrumentation to observe and study the moon, planets, stars, binary and multiple stars, star clusters, nebulae, and galaxies. Field trips may be required to fulfill the course objectives. NR

## PHYSICS COURSES

### PHYS 2A: INTRODUCTION TO PHYSICS

**4 Units**

**3 hours lecture, 3 hours lab**

**Transfers: CSU, UC credit proviso (see UC course list)**

**Prerequisite: Prior completion of or concurrent enrollment in MATH 124**

This course is intended for students in the sciences and related subjects who are required to complete a physics course based on precalculus mathematics. The major emphasis is on mechanics with selected additions from vibrations and waves, fluids and thermodynamics. Topics include kinematics and dynamics in one and two dimensions; vectors; Newton's laws; conservation of energy and momentum; kinematics and dynamics of rotational motion; Hooke's Law; simple harmonic motions; wave interference and standing waves; gas laws; and the laws of thermodynamics. NR

### PHYS 2B: INTRODUCTION TO PHYSICS

**4 Units**

**3 hours lecture, 3 hours lab**

**Transfers: CSU, UC credit proviso (see UC course list)**

**Prerequisite: PHYS 2A**

This course is a continuation of Physics 2A. The course involves selected topics from electricity and magnetism, light, and atomic and nuclear physics. Areas of study include electrostatics, circuits, magnetism, electromagnetic induction, electromagnetic waves, ray optics, interference and diffraction, special relativity and atomic physics. NR

### PHYS 4A: GENERAL PHYSICS

**4 Units**

**3 hours lecture, 3 hours lab**

**Transfers: CSU, UC credit proviso (see UC course list)**

**Prerequisite: MATH 3A**

This is a calculus-based introduction to classical mechanics. Kinematics in one and two dimensions; forces and equilibrium; Newton's laws; particle dynamics; universal gravitation; conservation laws; work and potential energy; collisions; kinematics and dynamics of rigid bodies and oscillations are studied. NR

### PHYS 4B: GENERAL PHYSICS

**4 Units**

**3 hours lecture, 3 hours lab**

**Transfers: CSU, UC credit proviso (see UC course list)**

**Prerequisite: PHYS 4A**

A calculus-based introduction to classical electromagnetism. Electrostatic forces and fields, Gauss's Law, potential, currents and circuits, magnetic forces and fields, induction, Maxwell's equations and electromagnetic waves are the major topics of study. NR

### PHYS 4C: GENERAL PHYSICS

**4 Units**

**3 hours lecture, 3 hours lab**

**Transfers: CSU, UC credit proviso (see UC course list)**

**Prerequisite: PHYS 4A**

This is a calculus-based introduction to thermodynamics, light, and modern physics. Included are the kinetic theory of gases, laws of thermodynamics, thermal processes, properties of light, optical images, interference and diffraction, electromagnetic waves, relativity, and atomic and nuclear concepts. NR

### PHYS 20: THE IDEAS AND EVENTS OF PHYSICS

**4 Units**

**3 hours lecture, 3 hours lab**

**Transfers: CSU, UC credit proviso (see UC course list)**

This course is intended for students who are not majoring in science and have no previous physics training or mathematical background. It will focus on major discoveries, ideas, and methods in physics. Included are simple motions, the nature of matter and energy, and electrical and nuclear science. This course is designed to prepare students for more advanced physics courses. NR