

Physics

<http://www.pacificu.edu/as/physics>

Students take Physics for a variety of reasons including the desire to major in physics, fulfill the core science requirement, prepare for a health professions career, or prepare for an engineering-related career. Each of these students has a distinct path that they should follow as described below.

A. Students not majoring in science who wish to fulfill their science requirement:

Note: In order to complete the science requirement, a student must complete either two courses from the same prefix with a lab (Physics 202/204, Physics 232/242) or two courses from two different prefixes without labs.

One-semester courses:

The courses below are designed for students interested in physics or astronomy but who are not interested in a full-year course. These courses all require basic high school math skills, such as simple algebra. These courses have no lab component.

Science 170 Astronomy
Science 180 Introduction to Cosmology
Physics 110 Physics of Everyday Phenomena
Physics 160 Energy and the Environment

Year-Long Introductory Sequences in Physics:

Physics 202 and 204 (Introductory Physics). These are the algebra-based physics courses. **Must have taken Math 125 (Pre-Calculus) or the equivalent.** The format of these courses is three lecture periods, and a three-hour lab weekly. These courses include inquiry-based activities such as peer instruction, interactive lecture demonstrations, and tutorials.

Physics 232 and 242 (Workshop Physics). These are the calculus-based physics courses. These courses are taught in an inquiry-based format where students spend three 2-hour periods during the week in the lab. There is very little lecturing as students spend most of their time experimenting and analyzing their data. **Must be taking or have taken Math 226 (Calculus) or the equivalent.**

The same topics are generally covered in both sequences. Workshop Physics (Physics 232/242) covers slightly fewer topics but in greater depth and at a higher mathematical level than Physics 202/204. Neither course sequence assumes a student has taken physics in high school.

B. Physics Majors

The physics program is divided into a core set of courses along with a number of emphases that the students can choose that best match their personal goals. Currently, the emphases we offer are:

Traditional Physics

Meant for students interested in pursuing

- careers in applied physics and engineering
- graduate study in physics, engineering or professional fields

Environmental Science

Meant for students interested in pursuing graduate study in environmental engineering or alternative energy

Physics Core

All physics majors need to take the following core set of physics courses regardless of their chosen emphasis:

Phy 232-242 General (Workshop) Physics I-II

OR

Phy 202-204 Introductory Physics I-II

Phy 322 Modern Physics with Health Applications

Phy 332 Waves and Optics

Phy 380 Classical Mechanics: Dynamics

Phy 460 Electric and Magnetic Fields

Phy 490-492 Physics Capstone (w/ research project)

OR

Phy 480-482 Physics Capstone Seminar

AND an internship

Chem 220-230 General Chemistry I-II

Math 226-228 Calculus I-III

Physics Emphases

In addition to the core physics courses listed above, physics majors need to take the following courses to complete the major:

Traditional Physics Emphasis

Phy 420 Quantum Mechanics

6-8 credits of upper-division electives

Environmental Science Emphasis

Phy 384 Thermodynamics and Statistical Mechanics

Env 200 Intro to Environmental Science

Env 330 Ecosystems and Ecological Design

Env 300-400 level elective

or

Phy 325 Modern Topics in Physics: Environmental Physics

Freshman Year

Freshman year, physics majors should take Physics 232 followed by 242. They should also take Math 226/227. Physics 376 (Statics) or Physics 310 (Relativity) could be taken Winter III.

Sophomore Year

Sophomore year, physics majors should take 322 or 332 in the fall. Physics 376 (Statics) or Physics 310 (Relativity) could be taken if offered Winter III. Spring semester a 300 level course should be taken.

Starting the Physics Major after the Freshman Year

If the student's math background is not sufficient to take Physics 232 fall semester of their freshman year they should be sure to take the appropriate math course into which they are placed. It is possible to complete the physics major in the three remaining years if a student starts physics in the sophomore year. Students can major in physics if they have taken Physics 202/204 instead of 232/242.

C. Students pursuing a career in health professions

Pre-Physical Therapy, Pre-Optometry, Pre-Pharmacy, Pre-Medical and any other pre-health students can take either of the year-long introductory sequences in (A).

D. Students pursuing a career in engineering

Freshman year their courses are identical to physics majors. If they are enrolled in Math 226 or have credit for Calculus I, they should take Physics 232 their freshman year.

They should also take Science 190 (Engineering Passport). This is a one-credit seminar that will give them an introduction into the fields of engineering and the required backgrounds.

We strongly recommend any student considering an engineering career to take this seminar their freshman or sophomore year.