Physics

Bachelor of Science degree with a major in Physics (traditional)

Bachelor of Science degree with a major in Physics — concentration in astronomy

Bachelor of Arts degree with a major in Physics

Minor in Astronomy

Minor in Physics

Department Chair
Joshua Smith, Ph.D.

Department of Physics and Astronomy
Science Complex A 470
707-826-3277
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The Program

Students completing this program will have demonstrated:

- understanding of how physics attempts to describe processes in nature
- competency in abstract reasoning and problem-solving skills
- understanding and use of physical and mathematical models
- knowledge of physics concepts applicable to a range of disciplines
- understanding of how physics relates and applies to studies in other disciplines
- breadth, depth, and rigor expected of a student with an undergraduate degree in physical science
- proficiency and skill in constructing and performing laboratory experiments and in the interpretation of experimental observations
- understanding the theories that support modern physical science.

This program is the prerequisite to many research positions offered by government and industry, and to graduate study. Careers in physics often require advanced degrees beyond the BS. Typical opportunities: aerospace scientist, medical technologist, systems analyst, astronomer, meteorologist, industrial hygienist, electronics engineer, fusion engineer, oceanographer, physical chemist, geophysicist, physicist.

The university's nearby observatory on Fickle Hill has a 16-inch telescope, a 12-inch telescope, and several 8-inch telescopes for student and community use. The department also offers a well-equipped computer electronics laboratory.

Preparation

In high school take English, mathematics, and physics.

REQUIREMENTS FOR THE MAJOR: BACHELOR OF SCIENCE

For a description of degree requirements to be fulfilled in addition to those listed below for the major, please see "The Bachelor's Degree" section of the catalog, pp. 66-80. The Upper Division Area B General Education requirement is met by the coursework within the Bachelor of Science degree for either option in the Physics major.

A minimum grade of C- is required for all courses with the "PHYX" prefix for the BS physics major degree.

Lower Division Core

Core courses required for all majors:

CHEM 109 (5) General Chemistry I
CHEM 110 (5) General Chemistry II
MATH 109 (4) Calculus I
MATH 110 (4) Calculus II
MATH 210 (4) Calculus III
MATH 241 (3) Elements of Linear Algebra
PHYX 109 (4) General Physics I: Mechanics
PHYX 110 (4) General Physics II: Electricity, Heat
PHYX 111 (4) General Physics III: Thermodynamics & Waves

Upper Division Core

Core courses required for all majors:

MATH 311 (2) Vector Calculus
MATH 313 (4) Ordinary Differential Equations
PHYX 320 (3) Modern Physics
PHYX 324 (4) Analytical Mechanics
PHYX 325 (4) Thermal Physics
PHYX 340 (2) Mathematical and Computational Methods
PHYX 441 (3) Electricity & Magnetism I
PHYX 442 (3) Electricity & Magnetism II
PHYX 450 (4) Quantum Physics I
PHYX 485 (.5-1) Physics Seminar

Astronomy Concentration

PHYX 310 (3) Spacetime & Relativity
PHYX 360 (4) Physics of Stars & Planets
PHYX 361 (4) Galaxies and Cosmology

Physics (Traditional)

PHYX 315 (3) Intro to Electronics & Electronic Instrumentation
PHYX 316 (4) Electronic Instrumentation & Control Systems
PHYX 462 (2) Senior Lab

Those students intending to enter graduate school in physics should take more courses in physics and mathematics. For example:

MATH 240 (3) Intro to Mathematical Thought
MATH 314 (3) Partial Differential Equations
MATH 343 (4) Intro to Algebraic Structures
MATH 344 (3) Linear Algebra
MATH 351 (4) Intro to Numerical Analysis
MATH 418 (3) Intro to Complex Analysis
PHYX 495 (1-3) Selected Topics in Physics for Seniors — Undergraduate Research

REQUIREMENTS FOR THE MAJOR: BACHELOR OF ARTS

For a description of degree requirements to be fulfilled in addition to those listed below for the major, please see "The Bachelor's Degree" section of the catalog, pp. 66-80.

A minimum grade of C- is required for all courses with the "PHYX" prefix for the BA physics major degree.

Lower Division

CHEM 109 (5) General Chemistry I
CHEM 110 (5) General Chemistry II
MATH 109 (4) Calculus I
MATH 110 (4) Calculus II
MATH 210 (4) Calculus III
MATH 241 (3) Elements of Linear Algebra
PHYX 111 (4) General Physics III: Thermodynamics & Waves

Plus one of these physics series:

- PHYX 106 (4) College Physics: Mechanics & Heat, **and**
  PHYX 107 (4) College Physics: Electromagnetism & Modern Physics, **and**
  PHYX 399 (1-3) Supplemental Work in Physics

OR

- PHYX 109 (4) General Physics I: Mechanics, **and**
  PHYX 110 (4) General Physics II: Electricity, Heat

Upper Division

MATH 313 (4) Ordinary Differential Equations
PHYX 304 (4) The Cosmos (recommended early in your program)

PHYX 315 (3) Intro to Electronics & Electronic Instrumentation
PHYX 320 (3) Modern Physics
PHYX 324 (4) Analytical Mechanics
PHYX 441 (3) Electricity & Magnetism I
PHYX 442 (3) Electricity & Magnetism II

Plus 12 units from the following physics courses:
PHYX 310 (3) Spacetime & Relativity
PHYX 316 (4) Electronic Instrumentation & Control Systems
PHYX 325 (4) Thermal Physics
PHYX 360 (4) Physics of Stars & Planets
PHYX 420 (4) Optical Systems Design
PHYX 430 (3) Computerized Instrumentation
PHYX 450 (4) Quantum Physics I
PHYX 462 (2) Senior Lab

REQUIREMENTS FOR THE MINORS

Minor in Astronomy

A minimum grade of C- is required for all courses with the "PHYX" prefix for the physics minor degree.

Lower Division

One of these physics series:

- PHYX 109 (4) General Physics I: Mechanics, **and**
  PHYX 110 (4) General Physics II: Electricity, Heat

  OR

- PHYX 106 (4) College Physics: Mechanics & Heat, **and**
  PHYX 107 (4) College Physics: Electromagnetism & Modern Physics, **and**
  PHYX 399 (1-3) Supplemental Work in Physics

Upper Division

One of these two physics courses:
PHYX 310 (3) Spacetime & Relativity
PHYX 320 (3) Modern Physics

One of these two physics courses:
PHYX 324 (4) Analytical Mechanics
PHYX 420 (4) Optical Systems Design

Plus:
PHYX 360 (4) Physics of Stars & Planets
PHYX 361 (4) Galaxies and Cosmology

Minor in Physics

A minimum grade of C- is required for all courses with the "PHYX" prefix for the physics minor degree.

Lower Division

One of these calculus series:

- MATH 105 (3) Calculus for the Biological Sciences & Natural Resources, **and**
  MATH 205 (3) Multivariate Calculus for the Biological Sciences & NR

  OR

- MATH 109 (4) Calculus I (recommended), **and**
  MATH 110 (4) Calculus II

Plus one of these physics series:

- PHYX 106 (4) College Physics: Mechanics & Heat, **and**
  PHYX 107 (4) College Physics: Electromagnetism & Modern Physics, **and**
  PHYX 399 (1-3) Supplemental Work in Physics

  OR

- PHYX 109 (4) General Physics I: Mechanics, **and**
  PHYX 110 (4) General Physics II: Electricity, Heat, **and**
  PHYX 111 (4) General Physics III: Thermodynamics & Waves

Upper Division

Core courses required for all minors:
PHYX 304 (4) The Cosmos (recommended early in your program)
PHYX 315 (3) Intro to Electronics & Electronic Instrumentation
PHYX 320 (3) Modern Physics

Plus one of these physics courses:
PHYX 310 (3) Spacetime & Relativity
PHYX 316 (4) Electronic Instrumentation & Control Systems
PHYX 324 (4) Analytical Mechanics
PHYX 325 (4) Thermal Physics
PHYX 360 (4) Physics of Stars & Planets
PHYX 420 (4) Optical Systems Design
PHYX 441 (3) Electricity & Magnetism I
PHYX 450 (4) Quantum Physics I