

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 Physical Science (see physical science)

Minor in Astronomy

Minor in Physics

Department Chair

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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 (Physics BS)

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. 67-82. 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.

Unit Requirements

Core units: 67

Astronomy/Physics units: 9/11

Total units in the major: 76/78

Total units required for the degree: 120

Special Grade Requirement

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

Core Courses (67 units)

The following core courses are required for all physics majors.

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 109	(4) General Physics A: Mechanics
PHYX 210	(4) General Physics B: Thermodynamics, Waves & Optics
PHYX 211	(4) General Physics C: Electricity & Magnetism

Upper Division

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 484	(0.5) Physics Seminar I
PHYX 485	(0.5) Physics Seminar II

Complete one of the following to fulfill the requirements of the major:

Astronomy Concentration (11 units)

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

Physics – traditional (9 units)

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 MINORS

Minor in Astronomy

Total units required for the minor: 21-32

Special Grade Requirement

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

Lower Division

Complete one of the following series of courses.

MATH 101T	(3) Trigonometry, or
MATH 102	(4) Algebra & Elementary Functions
PHYX 104	(4) Descriptive Astronomy
PHYX 106	(4) College Physics: Mechanics & Heat
PHYX 107	(4) College Physics: Electromagnetism & Modern Physics

OR

MATH 109	(4) Calculus I
MATH 110	(4) Calculus II
MATH 210	(4) Calculus III

- PHYX 109 (4) General Physics A:
Mechanics
- PHYX 210 (4) General Physics B:
Thermodynamics, Waves
& Optics
- PHYX 211 (4) General Physics C:
Electricity & Magnetism

Upper Division

Complete two of the following courses.

- PHYX 303 (3) Life in the Universe
- PHYX 304 (4) Cosmos
- PHYX 310 (3) Spacetime & Relativity
- PHYX 360 (4) Physics of Stars & Planets
- PHYX 361 (4) Galaxies and Cosmology

Minor in Physics

Total units required for the minor: 30

Special Grade Requirement

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

Lower Division

- MATH 109 (4) Calculus I
- MATH 110 (4) Calculus II
- MATH 210 (4) Calculus II
- PHYX 109 (4) General Physics A:
Mechanics
- PHYX 210 (4) General Physics B:
Thermodynamics, Waves
& Optics
- PHYX 211 (4) General Physics C:
Electricity & Magnetism

Upper Division

- PHYX 320 (3) Modern Physics, **or**
- CHEM 362 (3) Physical Chemistry II

Plus 3 additional units of upper division physics courses:

- PHYX 310 (3) Spacetime & Relativity
- PHYX 315 (3) Intro to Electronics &
Electronic Instrumentation
- PHYX 324[†] (4) Analytical Mechanics
- PHYX 325 (4) Thermal Physics
- PHYX 340[†] (2) Mathematical &
Computational Methods
- PHYX 420[†] (4) Optical Systems Design
- PHYX 441[†] (3) Electricity & Magnetism I
- PHYX 450[†] (4) Quantum Physics I
- PHYX 495 (1-3) Selected Topics in
Physics for Seniors —
Undergraduate Research



[†] Course requires one or more prerequisites that are not required elsewhere in the minor. See course description for prerequisites.
