



# Pitt

Kenneth P. Dietrich  
School of Arts and Sciences

## Physics Major and Minor

[www.PhysicsAndAstronomy.Pitt.edu/Undergraduate/Degree-Programs](http://www.PhysicsAndAstronomy.Pitt.edu/Undergraduate/Degree-Programs)

Revised: 05/2019

The University of Pittsburgh's internationally recognized Department of Physics and Astronomy has been an important leader at the frontier of science and, with 500 PhD alumni, has launched many distinguished careers. Now, at the onset of the 21st Century, the department is maintaining its traditions of excellence and innovation while leading the field in breakthroughs that promise an ever-deeper understanding of the universe. From sub-nuclear particles to the unimaginably large, from the birth of the universe to the edge of technology – and at the intersection of quantum and classical physics - our faculty and students explore the fundamental laws of nature. Students may expect to pursue research that influences many fields, including biology, mathematics, medicine, chemistry, engineering, and computer science.

### Required courses for the Physics major

The physics major requires the completion of 47 credits in physics distributed as follows.

**Note:** While not required, the introductory level honors courses, PHYS 0475, PHYS 0476, and PHYS 0520, are appropriate particularly for students seeking degrees in physics.

#### Introductory Physics courses

##### Select one group

- \_\_\_ PHYS 0174 Basic Physics, Science and Engineering 1
- \_\_\_ PHYS 0175 Basic Physics, Science and Engineering 2

- \_\_\_ PHYS 0475 Intro to Physics, Science and Engineering 1
- \_\_\_ PHYS 0476 Intro to Physics, Science and Engineering 2

#### Intermediate and advanced Physics courses

- \_\_\_ PHYS 0477 Introduction to Thermodynamics, Relativity, and Quantum Theory
- \_\_\_ PHYS 1310 Undergraduate Seminar
- \_\_\_ PHYS 1321 Computational Methods in Physics
- \_\_\_ PHYS 1331 Mechanics
- \_\_\_ PHYS 1341 Thermodynamics and Statistical Mechanics
- \_\_\_ PHYS 1351 Intermediate Electricity/Magnetism
- \_\_\_ PHYS 1370 Quantum Mechanics

#### Laboratory courses

##### Choose at least 10 credits

- \_\_\_ PHYS 0219 Basic Lab Physics Science and Engineering (2 cr.) **or** PHYS 0520 Modern Physical Measurements (3 cr.)
- \_\_\_ PHYS 0525 Analog and Digital Electronics (3 cr.)
- \_\_\_ PHYS 1361 Wave Motion and Optics (3 cr.)
- \_\_\_ PHYS 1426 Modern Physics Laboratory (2 cr.)
- \_\_\_ ASTRON 1263 Techniques of Astronomy (3 cr.)

### Science electives; choose at least nine credits from groups A and B

#### Group A

- \_\_\_ BIOSC 0150 Foundations of Biology 1 (3 cr.)
- \_\_\_ BIOSC 0160 Foundations of Biology 3 (3 cr.)
- \_\_\_ BIOENG 1070 Introduction to Cell Biology 1 (3 cr.)
- \_\_\_ BIOENG 1071 Introduction to Cell Biology 2 (3 cr.)
- \_\_\_ CHEM 0110 General Chemistry 1 or CHEM 0710 Honors General Chemistry 1 (4 cr.)
- \_\_\_ CHEM 0120 General Chemistry 2 or CHEM 0720 Honors General Chemistry 2 (4 cr.)
- \_\_\_ CHEM 0310 Organic Chemistry 1 or CHEM 0730 Honors Organic Chemistry 1 (3 cr.)
- \_\_\_ CHEM 0320 Organic Chemistry 2 or CHEM 0740 Honors Organic Chemistry 2 (3 cr.)
- \_\_\_ CS 0401 Intermediate Programming Using Java (3 cr.)
- \_\_\_ CS 0445 Data Structures (3 cr.)
- \_\_\_ ENGR 0240 Nanotechnology and Nano-Engineering (3 cr.)
- \_\_\_ GEOL 0040 Physical Geology (3 cr.)
- \_\_\_ STAT 1151 Introduction to Probability (3 cr.)
- \_\_\_ STAT 1152 Introduction to Mathematical Statistics (3 cr.)

#### Group B; choose at least 3 credits

- \_\_\_ ASTRON 1120 Stellar Structure (3 cr.)
- \_\_\_ ASTRON 1121 Galaxies and Cosmology (3 cr.)
- \_\_\_ CHEM 1410 Physical Chemistry 1 (3 cr.)
- \_\_\_ CHEM 1420 Physical Chemistry 2 (3 cr.)
- \_\_\_ CHEM 1620 Atoms, Molecules and Materials (3 cr.)
- \_\_\_ ECE 1232 Introduction to Lasers & Optical Electronics (3 cr.)
- \_\_\_ ECE 1247 Semiconductor Device Theory (3 cr.)
- \_\_\_ GEOL 1410 Exploration Geophysics (3 cr.)
- \_\_\_ MATH 1470 Partial Differential Equations (3 cr.)
- \_\_\_ MATH 1550 Vector Analysis and Applications (3 cr.)
- \_\_\_ MATH 1560 Complex Variables and Applications (3 cr.)
- \_\_\_ MEMS 1054 Materials Science (3 cr.)
- \_\_\_ PHYS 0481 Applications of Modern Physics (3 cr.)
- \_\_\_ PHYS 1374 Introduction to Solid State Physics (3 cr.)
- \_\_\_ PHYS 1375 Foundations of Nanoscience (3 cr.)
- \_\_\_ PHYS 1376 Introduction to Biological Physics (3 cr.)
- \_\_\_ PHYS 1378 Introduction to Nuclear Particle Physics (3 cr.)

### Prerequisite Mathematics courses

- \_\_\_ MATH 0220 Analytic Geometry and Calculus 1
- \_\_\_ MATH 0230 Analytic Geometry and Calculus 2
- \_\_\_ MATH 0240 Analytic Geometry and Calculus 3
- \_\_\_ MATH 0280, 1180, or 1185 Linear Algebra
- \_\_\_ MATH 0290 or 1270 Differential Equations

### Grade requirements

A minimum GPA of 2.0 in departmental courses is required for graduation.

### Satisfactory/No Credit option

No PHYS courses beyond the introductory level may be taken on an S/NC basis.

### Writing (W) requirement

Students must complete at least one W-course in the major.

### Honors major requirements

Honors in physics is granted if in addition to fulfilling all requirements for the major, the student:

- maintains a GPA of 3.2 or higher in the major;
- maintains a cumulative GPA of 3.0 or higher;
- completes PHYS 1903 Directed Research;
- submits a paper detailing the research within the department; and
- presents the research in a public forum (i.e. at the University's Science Symposium, the undergraduate poster fair hosted by the University Honors College).

### Education concentration

This concentration removes up to 10 credits of Physics courses from the standard Physics major requirements. This concentration requires seven credits of lab courses instead of the standard 10 credits.

### Additional education related courses

- \_\_\_ PSYED 1001 Introduction to Educational Psychology (3 cr.)
- \_\_\_ IL 1580 Foundations of Special Education (3 cr.)

### Additional courses emphasizing the broader impact of science; choose at least 3 credits

- \_\_\_ PHYS 0086 Physics and Public Policy (3 cr.)
- \_\_\_ PHYS 0087 Physics and Society (3 cr.)
- \_\_\_ Any course offered by the Department of History of Philosophy and Science

### Required courses from the Science electives

#### Group A

- \_\_\_ CHEM 0110 General Chemistry 1 or CHEM 0710 Honors General Chemistry 1 (4 cr.)
- \_\_\_ CHEM 0120 General Chemistry 2 or CHEM 0720 Honors General Chemistry 2 (4 cr.)

#### Group B

- \_\_\_ PHYS 0481 Applications of Modern Physics (3 cr.)

### Physics courses removed

- \_\_\_ PHYS 1321 Computational Methods in Physics
- \_\_\_ PHYS 1341 Thermodynamics and Statistical Mechanics
- \_\_\_ PHSY 1370 Quantum Mechanics 1

### Graduate School Preparation concentration

This concentration adds at least six credits of Physics courses to the standard Physics major requirements. This concentration requires seven credits of lab courses instead of the standard 10 credits.

### Additional intermediate and advanced Physics courses

- \_\_\_ PHYS 1371 Quantum Mechanics 2 (3 cr.)
- \_\_\_ PHYS 1372 Electromagnetic Theory (3 cr.)
- \_\_\_ PHYS 1373 Mathematical Methods of Physics (3 cr.)

### Advising

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### Checklist for the Physics minor

#### Select one

- \_\_\_ PHYS 0174
- \_\_\_ PHYS 0475

#### Select one

- \_\_\_ PHYS 0175
- \_\_\_ PHYS 0476

#### Select one

- \_\_\_ PHYS 0219
- \_\_\_ PHYS 0520

#### Select one

- \_\_\_ PHYS 0477
- \_\_\_ PHYS 0479

#### Select one

- \_\_\_ PHYS 0481
- \_\_\_ PHYS 1374
- \_\_\_ PHYS 1375
- \_\_\_ PHYS 1376
- \_\_\_ PHYS 1378

**Note:** Students must apply for any official minor they will complete or have completed at the time they apply for graduation.