

## Astronomy Major

[www.physicsandastronomy.pitt.edu/undergraduate/degree-programs](http://www.physicsandastronomy.pitt.edu/undergraduate/degree-programs)

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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 Astronomy major

The BA in astronomy requires the completion of 39 credits in physics and astronomy and six credits in communication and history and philosophy of science, distributed as follows.

### 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

### Introductory Astronomy course

ASTRON 0113 Introduction to Astronomy

### Intermediate and advanced Physics courses

PHYS 0477 Introduction to Thermodynamics, Relativity, and Quantum Theory  
PHYS 0481 Applications of Modern Physics  
PHYS 1310 Undergraduate Seminar  
PHYS 1331 Mechanics

### Laboratory courses

PHYS 0219 Basic Lab Physics for Science and Engineering (2 cr.) **or** PHYS 0520 Modern Physical Measurements (3 cr.)  
ASTRON 1263 Techniques of Astronomy (3 cr.)

### Intermediate and advanced Astronomy courses; choose at least six credits

ASTRON 1120 Stars: Stellar Structure and Evolution  
ASTRON 1121 Galaxies and Cosmology  
ASTRON 1122 The Solar System and Exoplanets \*

\* GEOL 1701 Geology of the Planets may be substituted

### Science electives; choose at least six credits \*

BIOSC 0150 Foundations of Biology 1  
BIOSC 0160 Foundations of Biology 2  
BIOE 1070 Introduction to Cell Biology 1  
BIOE 1071 Introduction to Cell Biology 2  
CHEM 0110 General Chemistry 1 **or** CHEM 0710 Honors General Chemistry 1  
CHEM 0120 General Chemistry 2 **or** CHEM 0720 Honors General Chemistry 2  
CHEM 0310 Organic Chemistry 1 **or** CHEM 0730 Honors Organic Chemistry 1  
CHEM 0320 Organic Chemistry 2 **or** CHEM 0740 Honors Organic Chemistry 2  
CHEM 1410 Physical Chemistry 1  
CHEM 1420 Physical Chemistry 2  
CS 0401 Intermediate Programming using Java  
CS 0445 Data Structures  
GEOL 0040 Physical Geology  
GEOL 1410 Exploration Geophysics  
GEOL 1701 Geology of the Planets \*\*  
MATH 0280 **or** MATH 1180 **or** MATH 1185 Linear Algebra  
MATH 1470 Partial Differential Equations  
MATH 1550 Vector Analysis and Applications  
MATH 1560 Complex Variables and Applications  
PHYS 1321 Computational Methods in Physics  
PHYS 1341 Thermodynamics and Statistical Mechanics  
PHYS 1351 Intermediate Electricity/Magnetism  
PHYS 1370 Quantum Mechanics 1  
PHYS 1378 Introduction to Nuclear/Particle Physics  
STAT 1151 Introduction to Probability  
STAT 1152 Introduction to Mathematical Statistics

\* Some of these courses have prerequisites

\*\* If this course is taken as a science elective, it cannot be used to satisfy the requirement for nine credits of intermediate and advanced courses.

### 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 0290 **or** MATH 1270 Differential Equations

**Course in the history and philosophy of science or science policy/management; choose at least three credits**

BUSERV 1915 Introduction to Management  
PHYS 0086 Physics and Public Policy  
PHYS 0087 Nuclear Science and Society  
PUBSRV 1315 Managing Projects and Contracts  
Any course in the Department of History and Philosophy of Science (HPS)

**Writing or communication courses; choose at least three credits**

COMMRC 0320 Mass Communication Process  
COMMRC 0520 Public Speaking  
COMMRC 1105 Television and Society  
ENGCOMP 0400 Written Professional Communication  
ENGCOMP 1101 Language of Science & Technology  
ENGCOMP 1400 Grant and Proposal Writing  
ENGWRT 1330 Intermediate Nonfiction  
ENGWRT 1340 Advanced Nonfiction  
ENGWRT 1394 Science Writing  
LING 1000 Introduction to Linguistics

**Grade requirements:** A minimum GPA of 2.0 in departmental courses is required for graduation.

**Satisfactory/No Credit option:** No PHYS or ASTRON 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.

**Related area:** Mathematics satisfies the related area requirement for the Astronomy major.

**Honors major requirements:** Honors in astronomy 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, a cumulative GPA of 3.0 or higher, completes ASTRON 1903 or 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).

**Science Communication concentration**

This concentration replaces the three credit writing or communication course with a three credit writing course and 12 credits of communication courses. Students pursuing this concentration may replace the six credits of science electives with the communication course requirements.

**Required writing course**

ENGCOMP 0400 Written Professional Communication

**Communication courses; choose at least 12 credits**

ENGCOMP 1101 Language of Science & Technology  
ENGCOMP 1400 Grant and Proposal Writing  
COMMRC 0320 Mass Communication Process  
COMMRC 0520 Public Speaking  
COMMRC 1105 Television and Society  
ENGWRT 0610 Introduction to Journalism and Non-fiction  
ENGWRT 1330 Intermediate Nonfiction  
ENGWRT 1340 Advanced Nonfiction  
ENGWRT 1394 Science Writing  
LING 1000 Introduction to Linguistics

**Science Breadth concentration**

This concentration provides broader exposure to other sciences in comparison to the standard Astronomy BA, while going into greater depth in physics and astronomy than a more generic Natural Sciences major. With proper selection of courses, this concentration provides the necessary requirements to apply for admission to medical school while roughly matching the credit requirements of the Astronomy BA.

**Reduced physics requirements**

PHYS 0481 Applications of Modern Physics \*

\* PHYS 0481 may be used for the Physics minor

**Reduced writing requirements**

The three credit writing or communication requirement is waived for students pursuing this concentration.

**Added science requirements; choose two of the three tracks, totaling at least 16 credits**

CHEM 0110 General Chemistry 1 **or** CHEM 0710 Honors General Chemistry 1  
CHEM 0120 General Chemistry 2 **or** CHEM 0720 Honors General Chemistry 2

BIOSC 0050 Foundations of Biology 1 Lab  
BIOSC 0060 Foundations of Biology 2 Lab  
BIOSC 0150 Foundations of Biology 1  
BIOSC 0160 Foundations of Biology 2

**or**

BIOSC 0050 Foundations of Biology 1 Lab  
BIOSC 0060 Foundations of Biology 2 Lab  
BIOE 1070 Introduction to Cell Biology 1  
BIOE 1071 Introduction to Cell Biology 2

GEOL 0040 Physical Geology  
GEOL 0050 Physical Geology  
GEOL 0890 Physical Oceanography

**Added science electives; choose one of the three tracks totaling at least six credits**

CHEM 0310 Organic Chemistry 1 **or** CHEM 0730 Honors Organic Chemistry 1  
CHEM 0320 Organic Chemistry 2 **or** CHEM 0740 Honors Organic Chemistry 2  
CHEM 0330 Organic Chemistry 1 Lab  
CHEM 0340 Organic Chemistry 2 Lab **or** 0750 Honors Organic Chemistry 2 Lab

CS 0401 Intermediate Programming using Java  
CS 0445 Data Structures

Two advanced courses in Biological Sciences (BIOSC), Bioengineering (BIOE), Chemistry (CHEM), Computer Science (CS), or Geology (GEOL).

**Advising:** Russell Clark  
Undergraduate Major Advisor  
OEH 404  
412-624-9204  
[ruc2@pitt.edu](mailto:ruc2@pitt.edu)

Michael Wood-Vasey  
Director of Undergraduate Programs  
308 Allen Hall  
412-624-2751  
[wmwv@pitt.edu](mailto:wmwv@pitt.edu)