

Astrophysics Major

Program Requirements

- **Total units required:** 52-59

Students must complete all course work for the astrophysics major with a grade of at least a C-.

Required Introductory Courses

Majors in astrophysics are required to complete a series of introductory courses.

They may take either:

Code	Title	Units
Physics 191	Physics I	3
Physics 191L	Physics I Laboratory	1
Physics 192	Physics II	3
Physics 192L	Physics II Laboratory	1
Total Units		8

or (recommended for majors):

Code	Title	Units
Physics 193	Focused Physics I	4
Physics 193L	Focused Physics I Laboratory	1
Physics 194	Focused Physics II	4
Physics 194L	Physics II Laboratory	1
Total Units		10

Required Courses

In addition, majors in astrophysics are required to complete the following courses:

Code	Title	Units
Physics 217	Introduction to Quantum Physics	3
Physics 312	Introduction to Astrophysics	3
Physics 322	Physical Measurement Laboratory	3
Physics 411	Mechanics	3
Physics 421	Electricity and Magnetism	3
Total Units		15

One additional laboratory course must be chosen from the following:

Code	Title	Units
Physics 316	Optics and Wave Physics Laboratory	3
Physics 321	Electronics Laboratory	3
Physics 427	Introduction to Computational Physics	3
Physics 435	Nuclear and Radiochemistry Lab	3

Required Advanced Courses

In addition to the above requirements, students who are earning the astrophysics major are required to complete three advanced electives (300 level and above). Students who declare an astrophysics major *and* who complete both Physics 125A Solar System Astronomy and Physics 126A Stars, Galaxies, and Cosmology will be required to complete two advanced electives (300 level and above). They will choose courses from the following list. Students must receive letter grades for these advanced courses.

Code	Title	Units
Physics 446	Galactic Astrophysics	3
Physics 456	Stellar Astrophysics	3
Physics 460	X-ray & Gamma-ray Astrophysics	3
Physics 476	Astrophysics	3
Physics 478	From Black Holes to the Big Bang	3
Physics 3330	Planets and Life in the Universe	3

They must also complete one additional course from the preceding list of five courses or one from the following list of courses:

Code	Title	Units
EEPS 353	Earth Forces	4
EEPS 407	Remote Sensing	3
Physics 422	Electricity and Magnetism II	3
Physics 474	Introduction to Particle Physics	3
Physics 477	Physics of Finite and Infinite Nuclear Systems	3
Physics 547	Intro to Elementary Particle Physics	3
Physics 558	Relativistic Astrophysics	3
MEMS 3410	Fluid Mechanics	3

Required Math Courses

Code	Title	Units
Math 131	Calculus I	3
Math 132	Calculus II	3
Math 217	Differential Equations	3
Math 233	Calculus III	3
Total Units		12

Students who have completed Math 203 Honors Mathematics I and Math 204 Honors Mathematics II will have fulfilled the requirement for Math 131 Calculus I, Math 132 Calculus II, and Math 233 Calculus III.

Science-Breadth Requirement

Majors must select one of the following courses to satisfy the science-breadth requirement:

Code	Title	Units
Chem 105	Principles of General Chemistry I	3
Chem 106	Principles of General Chemistry II	3
Chem 111A	General Chemistry I	3
Chem 112A	General Chemistry II	3
Chem 151	General Chemistry Laboratory I	2
Chem 152	General Chemistry Laboratory II	2
Chem 401	Physical Chemistry I	3
Chem 402	Physical Chemistry II	3
Chem 445	Instrumental Methods: Physical Chemistry	3
CSE 131	Introduction to Computer Science	3
CSE 132	Introduction to Computer Engineering	3
CSE 247	Data Structures and Algorithms	3
EEPS 202	Introduction to Earth, Environmental, and Planetary Science	3

Students who receive Advanced Placement credit or the equivalent of advanced placement credit (indicated with the use of CHEM 103 Advanced Placement Chemistry I and/or CHEM 104 Advanced Placement Chemistry II by the Chemistry department) may use those credits toward the science-breadth requirement.

Additional Information

Senior Honors

Students are encouraged to work toward Latin honors (i.e., cum laude, magna cum laude, and summa cum laude). To qualify, students must meet the academic requirements of the College and successfully complete a suitable project under the supervision of a faculty member in the department. The project, whether experimental or theoretical, should demonstrate the student's capacity for independent work. Honors candidates must apply to the Undergraduate Studies Committee no later than the first day of classes of their senior year. The application should include a description of the proposed project, co-signed by the supervising professor. A written report of the completed work must be submitted to the committee by a March deadline. By enrolling in Physics 499, students may earn up to 6 units of credit for the honors project.

The physics department also offers physics majors the possibility to earn departmental distinctions. These distinctions require the same grade point average cutoffs as Latin honors but are calculated exclusively from the grades in physics courses (i.e., all courses with the prefix L31). Three levels of distinction are offered: 1) highest distinction; 2) high distinction; and 3) distinction. The highest and high distinctions require at least one semester of undergraduate research and a senior thesis describing the results; these distinctions are limited to the top 15% (highest distinction) and the top 15% to 50% (high distinction) of the physics majors in their senior year as ranked by their GPA in the physics courses. Students who meet the GPA cutoff but who do not undertake undergraduate research and a senior thesis may only receive the third level of distinction.

Transfer Credit and Study Abroad

Students may transfer up to 9 credits of advanced course work (300+ level) to satisfy major requirements by taking comparable physics courses at another institution. Prior approval by the department is needed. Online or other distance learning courses are not eligible for transfer credit.

Website: <http://physics.wustl.edu>