

ASTRONOMY (MINOR)

Departmental Guidelines

The astronomy curriculum at Denison University begins by exploring the planets and moons, the origin of the solar system, stellar classification, stellar evolution, galactic astronomy, and cosmology, with a focus on the observational and quantitative nature of the field. Students pursuing the minor in astronomy will also take courses in introductory physics, investigating motion, fluids, heat, electricity, magnetism, waves, optics, and topics in modern physics such as atomic structure and special relativity. Advanced coursework will apply the foundational concepts from the introductory level to develop models for stellar systems, and explore supernovae, general relativity and black holes, the structure of our galaxy, active galactic nuclei, and the evolution of the universe.

A minor in astronomy is available to any Denison student. Those seeking graduate study in astronomy, astrophysics, space physics, or related fields should pursue a physics major with a minor in astronomy. All students interested in the astronomy minor should consult with faculty in the Department of Physics and Astronomy about course requirements as early as possible.

Faculty

Associate Professor Melanie Lott, Chair

Professors Steven D. Doty, N. Daniel Gibson, Daniel C. Homan, Riina Tehver, C. Wesley Walter; Associate Professors Kimberly A. Coplin, Melanie Lott, Steven Olmschen; Visiting Assistant Professor Sandra Doty

Technician/Instrument Maker

Michael Thomas

Academic Administrative Assistant

Cathy Geho

View faculty profiles and contact information (<https://denison.edu/academics/astronomy/contacts/>)

Astronomy Minor

Minimum requirements for a Minor in Astronomy are:

Code	Title
ASTR 100	Introduction to Astronomy
ASTR 125	Physics I: Quarks to Cosmos
or PHYS 125	Physics I: Quarks to Cosmos
PHYS 121	General Physics I
or PHYS 126	Physics II: Mechanics, Fluids, and Heat
PHYS 122	General Physics II
or PHYS 127	Physics III: Electricity, Magnetism, Waves, and Optics
ASTR 300	Astrophysics

Plus an Astronomy Elective at the 200-level or above.

Students who have taken PHYS 121 - General Physics I or PHYS 122 - General Physics II should consult with the Chair about requirements. The experimental course, ASTR 312 - Experimental Physics, may be modified to reflect the student's interest in Astronomy. Early consultation with the Department is imperative. See the Physics Department section of the catalog. Any courses used to satisfy the upper-level elective requirement

for the Physics major (BA or BS) or for the Physics minor may not also be used to satisfy the Astronomy minor.

Courses

ASTR 100 - Introduction to Astronomy (4 Credit Hours)

An introductory course in astronomy, intended for any student who wishes to better understand the nature of the universe. Topics may include the history of astronomy, naked eye observations, the planets and moons, the origin of the solar system, stellar classification, stellar evolution, galactic astronomy, and cosmology. Class and laboratory work will explore the physical and observational background for these topics with an emphasis on the quantitative nature of modern astronomy. Three classroom hours and one two-hour laboratory each week. This course satisfies the quantitative reasoning general education requirement. No previous training in physics is expected; mathematical preparation is assumed to include high school algebra and trigonometry.

ASTR 125 - Physics I: Quarks to Cosmos (4 Credit Hours)

A course that introduces students to topics that are at the current frontiers of physics and astronomy, and helps students develop quantitative reasoning and analytical skills necessary for further study in these fields. Topics typically include special relativity, waves and interference, quantization of light and energy, the hydrogen atom, nuclear structure, radioactivity, and cosmology. This course satisfies the quantitative reasoning requirement. Three lectures and one three-hour laboratory per week.

Prerequisite(s): MATH 130 or MATH 135 or MATH 145 or concurrent.

Crosslisting: PHYS 125.

ASTR 199 - Introductory Topics in Astronomy (1-4 Credit Hours)

A general category used only in the evaluation of transfer credit.

ASTR 299 - Intermediate Topics in Astronomy (1-4 Credit Hours)

A general category used only in the evaluation of transfer credit.

ASTR 300 - Astrophysics (4 Credit Hours)

This course is designed to teach students to build and use physical models to understand a variety of astronomical systems. Students will apply key concepts from modern and classical physics in an astronomical context, including gravity, light, relativity, thermodynamics, nuclear physics, and the interactions of light and matter. They will first develop models for stellar systems, and then explore other astrophysical topics, such as supernovae, general relativity and black holes, the structure of our galaxy, active galactic nuclei, and cosmology.

Prerequisite(s): ASTR 100, ASTR 125 or PHYS 125, PHYS 122 or PHYS 127.

ASTR 312 - Experimental Physics (4 Credit Hours)

An advanced lab course focused on experimental design and techniques, applying statistical principles to analyze and interpret data, and communicating scientific results through writing. May be repeated once for credit as either PHYS 312 or ASTR 312.

Prerequisite(s): PHYS 122 or PHYS 127, PHYS 200 recommended.

Crosslisting: PHYS 312.

ASTR 345 - Special Advanced Topics in Astronomy (4 Credit Hours)

A course exploring a topic in astronomy at the advanced level. The topical focus of each iteration of this course is determined by the instructor. In some cases, the course may be repeated for credit.

Prerequisite(s): ASTR 100, ASTR 125 or PHYS 125, PHYS 122 or PHYS 127.

ASTR 361 - Directed Study (1-4 Credit Hours)

Prerequisite: Consent of chairperson.

ASTR 362 - Directed Study (1-4 Credit Hours)

Prerequisite: Consent of chairperson.

ASTR 363 - Independent Study (1-4 Credit Hours)

ASTR 364 - Independent Study (1-4 Credit Hours)

ASTR 399 - Advanced Topics in Astronomy (1-4 Credit Hours)

A general category used only in the evaluation of transfer credit.

ASTR 451 - Senior Research (4 Credit Hours)

Research under faculty supervision for qualified senior students. Prior consent of the instructor (faculty member advising the research) and the Department Chair required for registration.

ASTR 452 - Senior Research (4 Credit Hours)

Research under faculty supervision for qualified senior students. Prior consent of the instructor (faculty member advising the research) and the Department Chair required for registration.