# Astronomy (PhD)

Graduate instruction and research are conducted in observational astronomy, and theoretical astrophysics including analytical and computational methods. Observational opportunities are available in conventional photometry, polarimetry, and fast photometry of stellar oscillations; spectroscopy and spectrophotometry of planets, stars, nebulae, galaxies, and quasars; galactic and extragalactic research; optical and infrared instrument development; planetary and cometary studies; extrasolar planets; and infrared, millimeter, submillimeter, and radio astronomy. There are also instruction and research opportunities in theoretical astrophysics, including the origin of the elements, cosmology, stellar structure and evolution, star and planet formation, and high-energy astrophysics. There are opportunities for cooperative interdepartmental research with groups in the Department of Physics and the Department of Aerospace Engineering and Engineering Mechanics.

## Graduate Handbook

Graduate handbook information is updated and maintained by each program. Graduate handbooks are available within each program's office and online. Please contact the program with concerns or questions.

## Admission

Prerequisites for graduate work in astronomy are at least 15 to 18 semester hours of upper-division coursework in astronomy and physics, including courses in mechanics, electricity and magnetism, statistical physics, and quantum mechanics. The General GRE and GRE Physics tests are not considered in selecting applicants to the PhD program. A detailed evaluation is made of each new student's physics and astronomy background to identify any deficiencies that should be addressed in order to ensure success in the program.

## Total Hours Required: 30

## Requirements

| Code | Title | Hours |
|---|---|---|
| AST 699W | Dissertation | 6 |
| Hours chosen from: | | 6 |
| Category A (see course list tab) | | |
| Hours chosen from: | | 18 |
| Category B (see course list tab) | | |
| All students must also follow the requirements and policies below: | | |
| Graduate Natural Sciences Requirements | | |
| Graduate University Requirements | | |
| **Total Hours** | | **30** |

## Additional Requirements and Policies

Students must earn a grade of B- or higher in all courses that count towards the degree.

With approval of the student's research supervisor and the graduate advisor, electives may include graduate coursework offered by other related programs; typically, no more than two outside of Astronomy elective course will be allowed.

Students are strongly encouraged to begin research during their first year. Research is done under the supervision of a research supervisor and dissertation committee and normally takes four to five years. In the spring of their second year, students must present their research to date and pass an oral qualifying examination. Students normally apply for PhD candidacy by the end of the fall of the third year. Students must present their research in a colloquium or seminar once per year. Students must serve as a Graduate Teaching Assistant (T.A.) for a minimum of two semesters during their time in the PhD program. All PhD students must complete a dissertation that constitutes a contribution to knowledge in the field. A satisfactory oral examination is required for approval of the dissertation. The dissertation must be approved by the committee and submitted in electronic format to the Office of Graduate and Postdoctoral Studies.

## Category A Courses (Fundamental Astrophysics)

| Code | Title | Hours |
|---|---|---|
| AST 380E | Radiative Processes and Radiative Transfer | 3 |

## Category B Courses (Astronomy Main Subfields, Applied Methods and Specialized Topics)

| Code | Title | Hours |
|---|---|---|
| AST 381C | Gravitational Dynamics | 3 |
| AST 382C | Astrophysical Gas Dynamics | 3 |
| AST 386C | Properties of Galaxies | 3 |
| AST 393F | Survey of the Interstellar Medium | 3 |
| AST 396C | Elements of Cosmology | 3 |
| AST 383C | Stellar Atmospheres | 3 |
| AST 383D | Stellar Structure and Evolution | 3 |
| AST 392J | Astronomical Instrumentation | 3 |
| AST 394P | Planetary Astrophysics | 3 |
| AST 394F | Formation of Galaxies and Large-Scale Structure | 3 |
| AST 382D | Astronomical Data Analysis | 3 |
| AST 392D | Mathematical Methods of Astrophysics | 3 |
| AST 384C | Computational Astrophysics | 3 |
| AST 392G | Observing Techniques in Astronomy | 3 |
| AST 398T | Supervised Teaching in Astronomy | 3 |