Astrophysics

The Department of Astronomy offers a graduate program aimed at the PhD degree in astrophysics. Entering students need not have majored in astronomy, although some background in astronomy is desirable. A strong background in physics, however, is essential.

Research is a major part of the PhD program, and the department offers opportunities in a wide variety of fields, including theoretical and observational astrophysics; infrared, optical, and radio astronomy; galactic structure and dynamics of stellar systems; high-energy astrophysics and cosmology; and star and planet formation.

The department has established six years as the normative time to degree. Normative time is the elapsed calendar time in years that under normal circumstances will be needed to complete all requirements for the PhD, assuming a student who enters without deficiencies, who is engaged in full-time uninterrupted study, and who is making desirable progress toward the degree.

Admission to the University

Minimum Requirements for Admission

The following minimum requirements apply to all graduate programs and will be verified by the Graduate Division:

1. A bachelor's degree or recognized equivalent from an accredited institution;
2. A grade point average of B or better (3.0);
3. If the applicant has completed a basic degree from a country or political entity (e.g., Quebec) where English is not the official language, adequate proficiency in English to do graduate work, as evidenced by a TOEFL score of at least 90 on the iBT test, 570 on the paper-and-pencil test, or an IELTS Band score of at least 7 on a 9-point scale (note that individual programs may set higher levels for any of these); and
4. Sufficient undergraduate training to do graduate work in the given field.

Applicants Who Already Hold a Graduate Degree

The Graduate Council views academic degrees not as vocational training certificates, but as evidence of broad training in research methods, independent study, and articulation of learning. Therefore, applicants who already have academic graduate degrees should be able to pursue new subject matter at an advanced level without the need to enroll in a related or similar graduate program.

Programs may consider students for an additional academic master's or professional master's degree only if the additional degree is in a distinctly different field.

Applicants admitted to a doctoral program that requires a master's degree to be earned at Berkeley as a prerequisite (even though the applicant already has a master's degree from another institution in the same or a closely allied field of study) will be permitted to undertake the second master's degree, despite the overlap in field.

The Graduate Division will admit students for a second doctoral degree only if they meet the following guidelines:

1. Applicants with doctoral degrees may be admitted for an additional doctoral degree only if that degree program is in a general area of knowledge distinctly different from the field in which they earned their original degree. For example, a physics PhD could be admitted to a doctoral degree program in music or history; however, a student with a doctoral degree in mathematics would not be permitted to add a PhD in statistics.
2. Applicants who hold the PhD degree may be admitted to a professional doctorate or professional master's degree program if there is no duplication of training involved.

Applicants may apply only to one single degree program or one concurrent degree program per admission cycle.

Required Documents for Applications

1. **Transcripts:** Applicants may upload *unofficial* transcripts with your application for the departmental initial review. Unofficial transcripts must contain specific information including the name of the applicant, name of the school, all courses, grades, units, & degree conferral (if applicable).
2. **Letters of recommendation:** Applicants may request online letters of recommendation through the online application system. Hard copies of recommendation letters must be sent directly to the program, by the recommender, not the Graduate Admissions.
3. **Evidence of English language proficiency:** All applicants who have completed a basic degree from a country or political entity in which the official language is not English are required to submit official evidence of English language proficiency. This applies to institutions from Bangladesh, Burma, Nepal, India, Pakistan, Latin America, the Middle East, the People's Republic of China, Taiwan, Japan, Korea, Southeast Asia, most European countries, and Quebec (Canada). However, applicants who, at the time of application, have already completed at least one year of full-time academic course work with grades of B or better at a US university may submit an official transcript from the US university to fulfill this requirement. The following courses will not fulfill this requirement:
    - courses in English as a Second Language,
    - courses conducted in a language other than English,
    - courses that will be completed after the application is submitted, and
    - courses of a non-academic nature.

Applicants who have previously applied to Berkeley must also submit new test scores that meet the current minimum requirement from one of the standardized tests. Official TOEFL score reports must be sent directly from Educational Test Services (ETS). The institution code for Berkeley is 4833 for Graduate Organizations. Official IELTS score reports must be sent electronically from the testing center to University of California, Berkeley, Graduate Division, Sproul Hall, Rm 318 MC 5900, Berkeley, CA 94720. TOEFL and IELTS score reports are only valid for two years prior to beginning the graduate program at UC Berkeley. Note: score reports can not expire before the month of June.

Where to Apply

Visit the Berkeley Graduate Division application page (http://grad.berkeley.edu/admissions/apply/).

Admission to the Program

In addition to the application, transcripts of undergraduate work, and letters of recommendation, applicants may need to submit scores of the General Record Examinations (GRE). A final decision on this will be made at a later date. If applicable, the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) may be required too. Physics Graduate Record Examinations (GRE) are no longer accepted.

Detailed information concerning admission, financial aid, and degree requirements may be found on the department's website. (http://astro.berkeley.edu/academics/graduate/)

The requirements for the Astrophysics PhD degree as follows:

1. Required Courses
    a. ASTRON 290A and 290B (a seminar)
    b. A total of 6 graduate (or equivalent) courses, 3 of which are from the Astronomy Department
2. Teaching
3. Examinations (Preliminary and Qualifying)
4. Thesis (signed by committee)
5. University Registration

Curriculum

Core Courses		
ASTRON 290A	Introduction to Current Research [2] [1]	
ASTRON 290B	Introduction to Current Research [1] [1]	
A total of six graduate or equivalent courses, three of which must be from the Astronomy Department. It is strongly recommended that these be drawn from the following basic courses:		
ASTRON C207	Radiation Processes in Astronomy [4]	
ASTRON C202	Astrophysical Fluid Dynamics [4]	
ASTRON 203	Astrophysical Techniques [3]	
ASTRON 204	Numerical Techniques in Astronomy [3]	
ASTRON C207	Radiation Processes in Astronomy [4]	
ASTRON 218	Stellar Dynamics and Galactic Structure [3]	
ASTRON C228	Extragalactic Astronomy and Cosmology [3]	
ASTRON C249	Solar System Astrophysics [3] *	
ASTRON 252	Stellar Structure and Evolution [3]	
ASTRON C254	High Energy Astrophysics [3]	
ASTRON 255	Computational Methods in Theoretical Astrophysics [3]	
Recommended Courses		
ASTRON 298	Directed Group Study	1-4
ASTRON 375	Instruction Techniques in General Astronomy	2-6

[1] The Introduction to Current Research seminar is required of all students in their first year. This consists of weekly lectures by different faculty members and research staff, and introduces the student to current research being carried out in the department and nearby labs. (This course is not a preliminary exam topic.)

* These courses are offered based on interest.

Teaching

All candidates for the Ph.D. in Astrophysics must acquire two semesters of teaching experience during their graduate career.

It is desirable that this requirement be satisfied early in the graduate career, but it may be delayed for those international students who have not acquired adequate command of English, or other reasons, at the discretion of the Chairperson. The requirement may be waived for transfer students who have acquired similar teaching experience elsewhere.

Examinations

All candidates must pass two oral examinations administered by the faculty. The preliminary examination should be completed by the end of the second academic year of study and focuses on basic competency in three subfields selected by the student. The qualifying examination should be completed by the end of the fourth academic year of study and is composed of a review of a thesis topic and an examination of a student’s competency in his or her research subfield. Students entering with a Master’s Degree or its equivalent may have the preliminary examination requirement waived subject to the discretion of the Chair.

Thesis

The thesis is an original piece of research carried out by the candidate under the supervision of a thesis advisor and two other faculty members (one of whom must be from another discipline). The Graduate Division has published guidelines (http://www.grad.berkeley.edu/policies/forms.shtml/)for dissertations and theses.

University Registration

Registration is required of all students making any use of University facilities, including access to faculty. A student is required to be registered, or pay the filing fee, whichever is applicable for the semester in which the degree is conferred. To be eligible for filing fee status the student must have been continuously registered since entering (allowing for one year of approved withdrawal), and registered in the term immediately preceding the one in which the Filing Fee is requested. You must register each semester before the end of the third week of classes.

Master's Degree

Students are normally not admitted for the master’s degree only, but may find it worthwhile to add to their record en route to the PhD. Once these requirements have been fulfilled, the student should see the student affairs officer to obtain an Application for Candidacy for the master’s degree.

In order to earn the master's, students are required to pass the preliminary exam and must complete 24 units of upper division and graduate courses, including 12 units of “non-research” (lecture) courses.

Astrophysics

Expand all course descriptions [+]Collapse all course descriptions [-]

ASTRON 201 Radiation Processes in Astronomy 4 Units

Terms offered: Spring 2012, Fall 2011, Fall 2010
An introduction to the basic physics of astronomy and astrophysics at the graduate level. Principles of energy transfer by radiation. Elements of classical and quantum theory of photon emission; bremsstrahlung, cyclotron and synchrotron radiation. Compton scattering, atomic, molecular and nuclear electromagnetic transitions. Collisional excitation of atoms, molecules and nuclei.
Radiation Processes in Astronomy: Read More [+]

Rules & Requirements

Prerequisites: Physics 105, 110A; 110B concurrently; open to advanced undergraduates with GPA of 3.70

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructors: Chiang, Quataert

Radiation Processes in Astronomy: Read Less [-]

ASTRON C202 Astrophysical Fluid Dynamics 4 Units

Terms offered: Spring 2022, Spring 2021, Spring 2020
Principles of gas dynamics, self-gravitating fluids, magnetohydrodynamics and elementary kinetic theory. Aspects of convection, fluid oscillations, linear instabilities, spiral density waves, shock waves, turbulence, accretion disks, stellar winds, and jets.
Astrophysical Fluid Dynamics: Read More [+]

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructors: Chiang, Kasen, Ma, Quataert, White

Also listed as: PHYSICS C202

Astrophysical Fluid Dynamics: Read Less [-]

ASTRON 203 Astrophysical Techniques 3 Units

Terms offered: Spring 2021, Spring 2019, Spring 2018
Introduction to the flow of astronomical signals through telescope optics and into detectors; subsequent calibration, deconvolution of instrumental artifacts, and analysis. A broad wavelength approach is maintained with focus on shared fundamental concepts. Students "adopt a wavelength band" for assignments and presentations. Analysis and simulation of astronomical signals, noise, and errors.
Astrophysical Techniques: Read More [+]

Rules & Requirements

Prerequisites: 201 and 290A; 290B must be taken concurrently

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of laboratory per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructor: Graham

Astrophysical Techniques: Read Less [-]

ASTRON 204 Numerical Techniques in Astronomy 3 Units

Terms offered: Fall 2011, Spring 2010, Spring 2008
Methods of data analysis, model fitting, and data display, all oriented towards the detailed analysis of astronomical observation data and/or numerical results from simulations. Specific topics include probability density functions, error propagation, maximum likelihood, least squares, data and function fitting, Fourier transforms, wavelets, principal components analysis, color images. The software language used is the Interactive Data Language (IDL).
Numerical Techniques in Astronomy: Read More [+]

Rules & Requirements

Prerequisites: Mathematics 54

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of seminar per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructor: Heiles

Numerical Techniques in Astronomy: Read Less [-]

ASTRON C207 Radiation Processes in Astronomy 4 Units

Terms offered: Fall 2022, Fall 2021, Fall 2020
An introduction to the basic physics of astronomy and astrophysics at the graduate level. Principles of energy transfer by radiation. Elements of classical and quantum theory of photon emission; bremsstrahlung, cyclotron and synchrotron radiation. Compton scattering, atomic, molecular and nuclear electromagnetic transitions. Collisional excitation of atoms, molecules and nuclei.
Radiation Processes in Astronomy: Read More [+]
Rules & Requirements

Prerequisites: Physics 105, 110A; 110B concurrently; open to advanced undergraduates with GPA of 3.70

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructors: Chiang, Kasen, Quataert

Also listed as: PHYSICS C207

Radiation Processes in Astronomy: Read Less [-]

ASTRON 218 Stellar Dynamics and Galactic Structure 3 Units

Terms offered: Fall 2021, Fall 2019, Spring 2018
A basic course. Structure and kinematics of the galaxy; stellar population concepts; dynamics of stellar systems with and without encounters.
Stellar Dynamics and Galactic Structure: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructors: Blitz, Davis, Graham

Stellar Dynamics and Galactic Structure: Read Less [-]

ASTRON C228 Extragalactic Astronomy and Cosmology 3 Units

Terms offered: Fall 2022, Spring 2021, Fall 2016
A survey of physical cosmology - the study of the origin, evolution, and fate of the universe. Topics include the Friedmann-Robertson-Walker model, thermal history and big bang nucleosynthesis, evidence and nature of dark matter and dark energy, the formation and growth of galaxies and large scale structure, the anisotropy of the cosmic microwave radiation, inflation in the early universe, tests of cosmological models, and current research areas. The course complements the material of Astronomy 218.
Extragalactic Astronomy and Cosmology: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructors: Holzapfel, Lee, Ma, Seljak, White

Also listed as: PHYSICS C228

Extragalactic Astronomy and Cosmology: Read Less [-]

ASTRON C249 Solar System Astrophysics 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
The physical foundations of planetary sciences. Topics include planetary interiors and surfaces, planetary atmospheres and magnetospheres, and smaller bodies in our solar system. The physical processes at work are developed in some detail, and an evolutionary picture for our solar system, and each class of objects, is developed. Some discussion of other (potential) planetary systems is also included.
Solar System Astrophysics: Read More [+]
Rules & Requirements

Prerequisites: 149, 169, C160A or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructors: Chiang, de Pater

Also listed as: EPS C249

Solar System Astrophysics: Read Less [-]

ASTRON 250 Special Topics in Astrophysics 3 Units

Terms offered: Spring 2022, Fall 2021, Fall 2020
Topics will vary from semester to semester. See department for announcements.
Special Topics in Astrophysics: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Special Topics in Astrophysics: Read Less [-]

ASTRON 252 Stellar Structure and Evolution 3 Units

Terms offered: Spring 2022, Spring 2020, Fall 2017
Equations of stellar structure, radiative transfer and convection, thermonuclear reactions and stellar energy generations; stellar models, degenerate configurations, evolutionary sequences, supernovae, neutron stars, black holes, nucleosynthesis.
Stellar Structure and Evolution: Read More [+]
Rules & Requirements

Prerequisites: Physics 110A-110B, 112, 137A-137B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructor: Filippenko

Stellar Structure and Evolution: Read Less [-]

ASTRON C254 High Energy Astrophysics 3 Units

Terms offered: Spring 2022, Fall 2018, Spring 2017, Spring 2014
Basic physics of high energy radiation processes in an astrophysics environment. Cosmic ray production and propagation. Applications selected from pulsars, x-ray sources, supernovae, interstellar medium, extragalactic radio sources, quasars, and big-bang cosmologies.
High Energy Astrophysics: Read More [+]
Rules & Requirements

Prerequisites: 201 or consent of instructor. 202 recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructors: Boggs, Quataert

Formerly known as: Physics C254, Astronomy C254

Also listed as: PHYSICS C254

High Energy Astrophysics: Read Less [-]

ASTRON 255 Computational Methods in Theoretical Astrophysics 3 Units

Terms offered: Spring 2020, Spring 2018, Spring 2016
A broad in-depth survey of state-of-the-art numerical approaches to astrophysical self-gravitational gas dynamics with application to large scale simulation of coupled non-linear astrophysical flows. Finite-difference approaches for Lagrangian and Eulerian astrophysical hydrodynamics and coupled radiation-hydrodynamics. N-body gravitation techniques including direct N-body, P-M, P3M, and hierarchical Tree. Particle gas dynamics methods such as smooth particle hydrodynamics (SPH), adaptive SPH and unification of SPH, and gravity tree hierarchies (TREE-SPH). Advanced techniques such as higher order Godunov finite difference methods with adaptive mesh refinement (AMR). Applications of these approaches in three broad areas: cosmology, high energy astrophysics, and star formation and the interstellar medium.
Computational Methods in Theoretical Astrophysics: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructor: Klein

Computational Methods in Theoretical Astrophysics: Read Less [-]

ASTRON 256 Astronomy Data Science Laboratory 4 Units

Terms offered: Fall 2022, Spring 2021, Spring 2020
This course features 3 data-centric laboratory experiments that draw on a variety of tools used by professional astronomers. PhD students will learn to procure and clean data (drawn from a variety of world-class astronomical facilities), assess the fidelity/quality of data, build and apply models to describe data, learn statistical and computational techniques to analyze data (e.g., Bayesian inference, machine learning, parallel computing), and effectively communicate data and scientific results. There is a heavy emphasis on software development in the Python language, statistical techniques, and high-quality communication (e.g., written reports, oral presentations, and data visualization).
Astronomy Data Science Laboratory: Read More [+]
Rules & Requirements

Prerequisites: This class assumes that you have completed introductory astrophysical instruction (at the Astro 7A and 7B level) as well as knowledge of calculus (e.g. similar to Math 53) and linear algebra (e.g., similar to Math 54 or Physics 89).You should have proficiency or fluency in the Python programming language. This class heavily emphasizes software development, and is not the place to learn Python for the first time

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of laboratory per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Instructor: Bloom

Astronomy Data Science Laboratory: Read Less [-]

ASTRON C285 Theoretical Astrophysics Seminar 1 Unit

Terms offered: Fall 2022, Spring 2022, Fall 2020, Fall 2019, Spring 2019
The study of theoretical astrophysics.
Theoretical Astrophysics Seminar: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Quataert

Also listed as: PHYSICS C285

Theoretical Astrophysics Seminar: Read Less [-]

ASTRON 290A Introduction to Current Research 2 Units

Terms offered: Fall 2021, Fall 2020, Fall 2019
Professional Skills and Directed Reading (a.k.a. "how to be a professional astronomer")
Introduction to Current Research: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: Lu

Introduction to Current Research: Read Less [-]

ASTRON 290B Introduction to Current Research 1 Unit

Terms offered: Spring 2020, Spring 2019, Spring 2018
Continuation of 290A. Study of a research topic with an individual staff member.
Introduction to Current Research: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructor: de Pater

Introduction to Current Research: Read Less [-]

ASTRON C290C Cosmology 2 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021, Spring 2021, Fall 2020
Cosmology: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Instructors: White, Cohn

Formerly known as: Physics C290C, Astronomy C290C

Also listed as: PHYSICS C290C

Cosmology: Read Less [-]

ASTRON 292 Seminar 1 - 2 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
In addition to the weekly colloquium, the Department offers seminars in advanced topics, several of which are announced at the beginning of each semester. A maximum of 5 units may be taken per semester with a limitation of 2 in any one section.
Seminar: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Seminar: Read Less [-]

ASTRON C292 Planetary Science Seminar 1 Unit

Terms offered: Fall 2022, Spring 2022, Fall 2021, Fall 2020
The departments of Astronomy and Earth and Planetary Science offer a joint research seminar in advanced topics in planetary science, featuring speakers drawn from graduate students, postdoctoral researchers, faculty, and visiting scholars. Topics will span planetary interiors; surface morphology; atmospheres; dynamics; planet formation; and astrobiology. Speakers will vary from semester to semester. Meetings will be held once a week for 1 hour each, and the schedule of speakers will be determined on the first day of class. To pass the class, participants will be required to give a 30-minute presentation, either on their own research or on recent results from the literature.
Planetary Science Seminar: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-1 hours of seminar per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Also listed as: EPS C292

Planetary Science Seminar: Read Less [-]

ASTRON 298 Directed Group Study 1 - 4 Units

Terms offered: Fall 2021, Fall 2020, Fall 2019
Tutorial for groups of two or three students.
Directed Group Study: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Directed Group Study: Read Less [-]

ASTRON 299 Advanced Study and Research 2 - 12 Units

Terms offered: Fall 2022, Spring 2022, Fall 2021
Advanced Study and Research: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-12 hours of independent study per week

Additional Details

Subject/Course Level: Astronomy/Graduate

Grading: Letter grade.

Advanced Study and Research: Read Less [-]

ASTRON 301 Undergraduate Astronomy Instruction 1 - 2 Units

Terms offered: Fall 2004, Fall 2003, Fall 2002
Open to a limited number of highly qualified undergraduate students interested in astronomy teaching at the college level. Students will participate in a seminar on educational methods and engage in tutorial or laboratory teaching under supervision of a faculty member.
Undergraduate Astronomy Instruction: Read More [+]
Rules & Requirements

Prerequisites: An elementary astronomy course and consent of instructor

Repeat rules: Course may be repeated for credit up to a total of 4 units.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 3-6 hours of laboratory per week

Additional Details

Subject/Course Level: Astronomy/Professional course for teachers or prospective teachers

Grading: Offered for pass/not pass grade only.

Undergraduate Astronomy Instruction: Read Less [-]

ASTRON 375 Instruction Techniques in General Astronomy 2 - 6 Units

Terms offered: Spring 2022, Fall 2021, Fall 2020
Discussion and practice of teaching techniques as applied to astronomy. Open to graduate students who are presently teaching assistants or associates. Two units for course plus one section; three units for two discussion sections.
Instruction Techniques in General Astronomy: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Astronomy/Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

Formerly known as: Astronomy 300

Instruction Techniques in General Astronomy: Read Less [-]

ASTRON 602 Individual Study for Doctoral Students 1 - 8 Units

Terms offered: Fall 2015, Fall 2014, Fall 2013
Individual study in consultation with the major field adviser, intended to provide an opportunity for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D. (and other doctoral degrees). May not be used for unit or residence requirement for the doctoral degree.
Individual Study for Doctoral Students: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-8 hours of independent study per week

Additional Details

Subject/Course Level: Astronomy/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.

Individual Study for Doctoral Students: Read Less [-]