

ASTRONOMY

Emeriti: (Professors) Ronald N. Bracewell, Von R. Eshleman, Peter A. Sturrock, G. Leonard Tyler, Robert V. Wagoner

Committee in Charge: Vahé Petrosian (*Director*), Roger W. Romani, Sarah Church

Professors: Roger Blandford (Physics, SLAC), Blas Cabrera (Physics), Steven Kahn (Physics, SLAC), Peter Michelson (Physics, SLAC), Vahé Petrosian (Physics, Applied Physics), Roger W. Romani (Physics)

Associate Professors: Tom Abel (Physics, SLAC), Sarah Church (Physics)

Assistant Professors: Steve Allen (Physics, SLAC), Stefan Funk (Physics, SLAC), Chau-Lin Kuo (Physics, SLAC), Risa Wechsler (Physics, SLAC)

Professor (Research): Philip H. Scherrer (Physics)

Program Offices: Varian, Room 316

Mail Code: 94305-4060

Phone: (650) 723-1439

Web Site: <http://www.stanford.edu/dept/astro>

Astronomy courses are offered primarily through the Physics department, with subject code PHYSICS, and are listed in the “Physics (PHYSICS) Courses” section of this bulletin.

Although Stanford University does not have a degree program in astronomy or astrophysics, teaching and research in various branches of these disciplines are ongoing activities in the departments of Applied Physics, Electrical Engineering, and Physics.

For the convenience of students interested in astronomy, astrophysics, and cosmology, a course program for undergraduate and graduate study is listed in the “Astronomy Cognate Courses” section of this bulletin. The list provides introductory courses for the student who wishes to be informed about the fields of astronomy without the need for prerequisites beyond high school algebra and physics. Courses in astronomy numbered below 100 are designed to serve this group of students. Astronomy courses numbered 100-199 serve the student interested in an initial scientific study of astronomy. The courses numbered 200 and above are for graduate students and advanced undergraduates, subject to prior approval by the course instructor.

UNDERGRADUATE PROGRAMS IN ASTRONOMY

The University does not offer a separate undergraduate major in Astronomy. Students who intend to pursue graduate study in astronomy or space science are encouraged to major in physics, following the advanced sequence if possible, or in electrical engineering if the student has a strongly developed interest in radioscience. The course descriptions for these basic studies are listed under the appropriate department sections of this bulletin. Students desiring guidance in developing an astronomy-oriented course of study should contact the chair of the Astronomy Program Committee. The following courses are suitable for undergraduates and are recommended to students considering advanced study in astronomy or astrophysics: PHYSICS 100, Introduction to Observational and Laboratory Astronomy; PHYSICS 160, Introduction to Stellar and Galactic Astrophysics; PHYSICS 161, Introduction to Extragalactic Astrophysics and Cosmology; GES 222, Planetary Systems: Dynamics and Origins. Students planning study in astronomy beyond the B.S. are urged to take PHYSICS 260 and 262, Introduction to Astrophysics and to Gravitation, and to consider an undergraduate thesis (PHYSICS 169) or honors thesis in an astrophysics related area. The above-mentioned courses are required for physics majors who choose the curriculum with a concentration in astrophysics (see the “Physics” section of this bulletin). The student observatory, located in the hills to the west of the campus and equipped with a 24-inch and other small reflecting telescopes, is used for instruction of the observation-oriented courses.

MINORS

The minor program in Astronomy is described in the “Physics” section of this bulletin. The non-technical minor, intended for students whose major does not require the PHYSICS 40 series, requires 10 units of Physics courses (PHYSICS 21, 23, 25/26) and 9-10 units of Astronomy courses (3-4 units of PHYSICS 50 or 100, and 6 units of PHYSICS 15, 16, 17). The technical minor for other students consists of 14 units of PHYSICS 70, 100, 160, 161, and EE 164, in addition to the 40 series.

To be accepted to the minor program, students need to obtain an adviser selected from the faculty in the Astronomy Course Program. The minor declaration deadline is three quarters before graduation (that is, beginning Autumn Quarter if the student is graduating at the end of Spring Quarter). All courses for the minor must be taken at Stanford University, and a letter grade of ‘C’ or better must be received for all units applied toward the minor.

GRADUATE PROGRAMS IN ASTRONOMY

Graduate programs in astronomy and astrophysics and related topics are carried out primarily in the Department of Physics but also the departments of Applied Physics and Electrical Engineering. Students should consult the course listings, degree requirements, and research programs of these departments for more detailed information. Graduate research opportunities are available in many areas of theoretical and observational astronomy, including research projects using the Hobby Eberly telescope, a 10-meter-class telescope located at McDonald Observatory in Texas. Other observational and experimental opportunities are in ground-based observations of CMB and in the future, space observations by GLAST. For further information on graduate research opportunities see the “Center for Space Science and Astrophysics” section of this bulletin and the Kavli Institute of Particle Astrophysics and Cosmology at <http://kipac.stanford.edu>.

Students planning to conduct research in astronomy and astrophysics are required to take PHYSICS 360, Physics of Astrophysics, and at least one of the following: PHYSICS 361, Stellar and Galactic Astrophysics; 362, Extragalactic Astrophysics and Cosmology; or 363, Solar and Solar-Terrestrial Physics. Students lacking a background in astrophysics, gravitation, and plasma physics should take PHYSICS 260 and 262, Introduction to Astrophysics and to Gravitation, and PHYSICS 312, Basic Plasma Physics. Students with special interests in gravitation should take PHYSICS 364, Advanced Gravitation.

Students interested in research programs in space physics involving spacecraft studies of the planets, their satellites, and their near-space environments should see the “Center for Space Science and Astrophysics” section of this bulletin.

ASTRONOMY COGNATE COURSES

ELEMENTARY LECTURES

The following courses provide a descriptive knowledge of astronomical objects and astrophysics of the universe. PHYSICS 15, 16, and 17 are for students not majoring in the sciences and are taught in different quarters by different instructors, and may be taken individually or in any order.

PHYSICS 15. The Nature of the Universe

PHYSICS 16. Cosmic Horizons

PHYSICS 17. Black Holes

OBSERVATORY

The following courses are intended to familiarize students with observational methods and analysis of astronomical data. PHYSICS 100 involves more advanced observations and is intended for students with a college level background in physics.

PHYSICS 50. Astronomy Laboratory and Observational Astronomy

PHYSICS 100. Introduction to Observational and Laboratory

Astronomy

ADVANCED UNDERGRADUATE

The following courses are for students with a more advanced knowledge of basic physics and mathematics, and form the core courses for a concentration in astrophysics for Physics majors.

EE 106. Planetary Exploration

PHYSICS 160. Introduction to Stellar and Galactic Astrophysics

PHYSICS 161. Introduction to Extragalactic Astrophysics and Cosmology

PHYSICS 169A,B,C. Independent Study in Astrophysics and Honors Thesis: Selection of the Problem

GRADUATE

GES 222. Planetary Systems: Dynamics and Origins

PHYSICS 260. Introduction to Astrophysics and Cosmology

PHYSICS 262. Introduction to Gravitation

PHYSICS 301. Astrophysics Laboratory

PHYSICS 312. Basic Plasma Physics

PHYSICS 360. Physics of Astrophysics

PHYSICS 361. Stellar and Galactic Astrophysics

PHYSICS 362. Advanced Extragalactic Astrophysics and Cosmology (not given 2008/09)

PHYSICS 363. Solar and Solar-Terrestrial Physics (not given 2008/09)

PHYSICS 364. Advanced Gravitation

PHYSICS 463. Special Topics in Astrophysics: Theoretical Cosmology (not given 2008/09)