Astronomy

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Courses are concerned with the planets, stars, and galaxies which compose the physical universe, and with the techniques for investigating the nature of these objects. The introductory courses contribute to a general understanding of our place in the universe. The advanced courses have frequent relevance for students in physics, chemistry, and other sciences.

Students interested in graduate work in astronomy are encouraged to major in physics with an astronomy minor, or in physics-astronomy, since most graduate schools look for the equivalent of an undergraduate degree in physics. Some students with other interests have also designed individual combined majors such as astronomy-mathematics.

The Astronomy major: Astronomy 177, 178, 179, 310, 320, 330, at least four credits from 340, 350, 380, 391, 392, and at least four credits from 490, 498; Physics 155, 156, 245, 246, 255, 256; Mathematics 125, 126, 225, 235; introductory courses in geology and computer programming are strongly recommended. In the final semester the student must pass a senior assessment consisting of a comprehensive written examination and an approximately one-hour oral exam.

The astronomy major requires coursework in astronomy, physics, and mathematics. A student who enters Whitman with no prior college-level work in any of these areas would need to complete 32 credits in astronomy, 16 credits in physics, and 11 credits in mathematics. Courses completed in this major apply to the science and quantitative analysis distribution areas.

The Astronomy-Geology combined major: Astronomy 177, 178, 179, two credits of 490, one of the following: 310, 320, 330, 340, 350, 380, and at least two additional credits in courses numbered 310-392; either Geology 110, 120 or 210, and 220, 345, 350, 470, and a minimum of one credit in 358, two credits of 490, and two of the following: 310, 346, or 420; Physics 155, 156, Mathematics 125, 126, and Chemistry 125, 135 are also required. Mathematics 167, 225, 235, 236, 244, Chemistry 126, 136, and Physics 245, 246, 255, 256 are strongly recommended. In the final semester the student must pass a senior assessment consisting of a two-part comprehensive written examination and an approximately one-hour oral exam conducted jointly by astronomy and geology faculty.

The astronomy-geology combined major requires coursework in astronomy, geology, chemistry, physics, and mathematics. A student who enters Whitman with no prior college-level work in any of these areas would need to complete twenty credits in astronomy, 23 to 24 credits in geology, four credits in chemistry, eight credits in physics, and six credits in mathematics. Courses completed in this major apply to the science and quantitative analysis (selected courses) distribution areas.

The Physics-Astronomy combined major: Astronomy 177, 178, 179, 310, 320; at least two credits in any of the following: 330, 340, 350, 380, 391, 392 or 490; Physics 155, 156, 245, 246, 255, 256, either 325 or 347, and five credits from physics courses numbered from 300-480; Mathematics 225, 235, 236, and 244. Additional physics courses, Mathematics 167 and 300 are strongly recommended. In the final semester the student must pass a senior assessment consisting of a two-part comprehensive written examination and an approximately one-hour oral exam conducted jointly by physics and astronomy faculty.

The physics-astronomy combined major requires coursework in astronomy, physics, and mathematics. A student who enters Whitman with no prior college-level work in any of these areas would need to complete 22 credits in astronomy, 24 credits in physics, and 14 credits in mathematics. Courses completed in this major apply to the science and quantitative analysis (selected courses) distribution areas.

The Astronomy minor: A minimum of 18 credits in astronomy, to include Astronomy 177, 178, 179, and six additional credits to be chosen from courses at the 300-level. Courses taken P-D-F may not be used to satisfy course or credit requirements for the minor after the minor has been declared.

100 Fundamentals of Astronomy
4; not offered 2007-08

This course offers an introduction to our present knowledge of the universe and the historical develop-

ment of humanity's changing understanding of the cosmos. Emphasis not only on the nature of planets, stars and galaxies, but also on the evolutionary processes which occur in the universe, including cosmology and the origin of the elements, the formation and life cycles of stars, and the development of planetary systems. Three lectures and one evening lab session per week. *Not open* to physical science majors.

110 Principles of Astronomy
4, 4 **Sofia**

This course offers an introduction to our present knowledge of the universe and the historical development of humanity's changing understanding of the cosmos. Emphasis not only on the nature of planets, stars, and galaxies, but also on the evolutionary processes which occur in the universe, including cosmology and the origin of the elements, the formation and life cycles of stars, and the development of planetary systems. Three lecture/lab sessions per week. *Not open* to physical science majors or to students who have received credit for Astronomy 100.

120 Current Problems in Astronomy
x, 2 **Sofia**

This course offers an introduction to cosmology, as well as other Astronomical topics of interest to the students. The first half of the semester is two lectures per week on Cosmology. The second half of the semester is two days of student presentations per week. Students papers and presentations are based on their choice of topics in current Astronomy. *Not open* to physical science majors. *Prerequisite*: Astronomy 100 or Astronomy 110.

177 Sky and Planets
4, x **A. Dobson**

A survey of planets and their motions, planetary satellites, comets, meteorites, and interplanetary material. Several problem sets and exams, short research paper, and one evening lab session each week. Offered in rotation with Astronomy 178, 179. *Prerequisites:* three years of high school mathematics and one year of high school physics, or consent of instructor; Mathematics 125/126 recommended.

178 Sun and Stars
x, 4 **A. Dobson**

An introduction to the properties of stars, their motions and distributions in space. Several problem sets and exams, short research paper, and one evening lab session each week. Offered in rotation with Astronomy 177, 179. *Prerequisites:* three years of high school mathematics and one year of high school physics, or consent of instructor; Mathematics 125/126 recommended.

179 Galaxies and Cosmology
4; not offered 2007-08

An introduction to the structure of galaxies and to the large-scale structure and evolution of the universe. Several problem sets and exams, short research paper, and one evening lab session each week. Offered in rotation with Astronomy 177, 178. *Prerequisites:* three years of high school mathematics and one year of high school physics, or consent of instructor; Mathematics 125/126 recommended.

310 Astrophysics
4, x **A. Dobson**

Of interest to majors in physics or physics-astronomy, this course considers the application of the principles of atomic structure and the radiation laws to the interpretation of the spectra of stars and nebulae; the physical principles underlying the study of the structure of stars, energy generation by thermonuclear reactions, and nucleosynthesis; and theoretical and observational aspects of stellar evolution. Several problem assignments and a mid-term examination. *Prerequisites*: Astronomy 178 and Physics 156, or consent of instructor. *Recommended*: Physics 245. *Offered* in alternate years with Astronomy 320.

320 Galactic Astronomy
4; not offered 2007-08

Intended for physics-astronomy majors but also open to majors in related sciences. The constituents and structure of our own and other galaxies, the nature of quasars and active galaxies, and the large-scale structure of the universe itself. Reading assignments will be made in various books and scientific journals. Several problem assignments and a mid-term test. *Prerequisites:* Astronomy 179, Mathematics 225 and Physics 156, or consent of instructor. *Offered* in alternate years with Astronomy 310.

330 Cosmology
x, 4 **Sofia**

Intended for majors in physics-astronomy and related sciences. The study of the universe: how it originated, the formation and evolution of structures, the curvature of space and time. Several problem sets, exams, research paper. *Prerequisites:* Astronomy 179 and Physics 245, or consent of instructor.

340 Interstellar Medium
4; not offered 2007-08

Intended for majors in astronomy, physics-astronomy and related sciences. The study of the interstellar medium: composition and distribution of dust and gas, interactions with magnetic fields, and observational methods. Several problem sets, exams, research paper. *Prerequisites*: Astronomy 178 or 179, and Physics 245, or consent of instructor.

350 Planetary Science
4; not offered 2007-08

Intended for majors in astronomy, astronomy-geology and related sciences. The study of solar system objects: interiors, surfaces, atmospheres, and orbital mechanics. Several problem sets, exams, research paper. *Prerequisites:* Astronomy 177, Physics 155, and Geology 110 or 120, or consent of instructor.

380 Special Topics in Astronomy

4; not offered 2007-08

Selected topics in contemporary astronomy and astrophysics; the precise area of study will be designated prior to registration for the semester in which the course is offered. *Prerequisite*: consent of instructor.

391, 392 Independent Study
1-4, 1-4 **A. Dobson and Sofia**

Discussion and directed reading and/or observational work on a topic of interest to the individual student. *Prerequisite*: consent of instructor.

490 Senior Research
1-3, 1-3 **A. Dobson and Sofia**

An advanced interdisciplinary independent study project for astronomy-combined majors; students wishing to do a senior research project should choose project advisers and propose an interdisciplinary topic during the second semester of their junior year. *Prerequisite:* consent of instructor.

498 Honors Thesis
2-4, 2-4 **Staff**

Preparation of an honors thesis. *Required of* and limited to senior honors candidates in astronomy. *Prerequisite*: admission to honors candidacy.