

ASTRONOMY (ASTR)

Explanation of Course Numbers

- Courses in the 1000s are primarily introductory undergraduate courses
- Those in the 2000s to 4000s are upper-division undergraduate courses that also may be taken for graduate credit with permission and additional work assigned
- Those in the 6000s and 8000s are for master's, doctoral, and professional-level students
- The 6000s are open to advanced undergraduate students with approval of the instructor and the dean or advising office

ASTR 1000. Dean's Seminar. 3 Credits.

The Dean's Seminars provide Columbian College first-year students focused scholarship on specific intellectual challenges. Topics vary by semester; see department for more details.

ASTR 1001. Stars, Planets, and Life in the Universe. 4 Credits.

Primarily for non-science majors. An introduction to how our Universe is structured, including the basic principles underlying astronomical systems and observations. Topics include the known laws of nature, stars, and planetary systems and the conditions for extraterrestrial life and exploration. Prerequisite: high school algebra. Laboratory fee.

ASTR 1002. Origins of the Cosmos. 4 Credits.

Primarily for non-science majors. A description of the Universe, its origins and its evolution, based on known physical principles. Topics include galactic and stellar structure, black holes, origin of the elements, and big bang cosmology. Prerequisite: high school algebra. Laboratory fee.

ASTR 1099. Variable Topics. 1-36 Credits.

ASTR 2121. Introduction to Modern Astrophysics. 3 Credits.

Introduction to the concepts and methods of modern astrophysics. Physical processes behind the origin, structure and evolution of stars and galaxies, based on physical principles and modern astronomical observations. Topics include the energy source of the Sun, the stellar life cycle, galaxies, and the structure and fate of the Universe. Prerequisites: PHYS 1012 or PHYS 1022.

ASTR 2131. Astrophysics Seminar. 3 Credits.

Course led each week by a different expert in the research on various astrophysical sources and phenomena. Topics may include the life and death of stars; most violent explosions in the universe; evolution of galaxies; and evolution of the universe on the largest scales. Prerequisite: PHYS 1012 or PHYS 1022.

ASTR 3141. Data Analysis in Astrophysics. 3 Credits.

Principles of data analysis in astrophysics and basic analysis of astronomical data from NASA satellites and ground-based telescopes. Prerequisites: PHYS 1012 or PHYS 1022. Recommended background: Prior study in physics or astrophysics.

ASTR 3161. Space Astrophysics. 3 Credits.

Physical processes of celestial phenomena as determined from space-based instrumentation. While the entire electromagnetic spectrum is covered, the high-energy (X-ray and gamma ray) region is emphasized. Results from ground-based instrumentation (e.g., radio and optical) may be introduced. Prerequisites: PHYS 2023.

ASTR 3183. General Relativity. 3 Credits.

Einstein's general theory of relativity; special theory of relativity, the nature of space and time, the equivalence principle, Riemannian geometry, Einstein's proposal, tests of the theory, Schwarzschild and Kerr solutions, Hawking radiation, and cosmological models. Prerequisites: MATH 3342 and PHYS 2023.

ASTR 4195. Undergraduate Research in Astrophysics. 3 Credits.

Research on problems in astrophysics approved by the faculty. May be repeated once for credit.