ASTR 10B: GENERAL ASTRONOMY: STARS, GALAXIES, COSMOLOGY

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2025
Units:	5
Hours:	5 lecture per week (60 total per quarter)
Advisory:	Concurrent enrollment in ASTR 10L; not open to students with credit in ASTR 10BH.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Area 5: Natural Sciences w/ Lab
Transferable:	CSU/UC
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

Student Learning Outcomes

- Understand the position of the Earth in the universe at large and the arrangement and scale of matter the universe.
- Understand the life story of the stars and be able to explain how that life story relates to their own lives.

Description

Non-technical introduction to astronomy, with emphasis on stars, galaxies, and the origin and evolution of the universe. Topics covered include the nature of light, atoms, and telescopes; the birth, evolution, and death of stars (including an introduction to black holes); the Milky Way Galaxy and its development over time; normal galaxies, active galaxies, and interacting galaxies; and the Big Bang model of the origin and ultimate fate of the cosmos. No background in science or math is assumed.

Course Objectives

The student will be able to:

1. Demonstrate an understanding of the scientific method and how it applies to astronomy
2. Describe the evolution of stars from birth to death and discuss how this evolution relates to their own lives on the Earth
3. Demonstrate a conceptual understanding of the scales of time and distance in the cosmos and what scientific evidence we have for these scales
4. Explain our modern understanding of the large scale structure and evolution of the universe of galaxies (including the expansion of the universe), and what the observational evidence is that underlies them
5. Understand the role of different types of telescopes and detectors in making astronomical observations
6. Describe the challenges women and people of color in astronomy have faced in the past, and describe how the situation is changing

Course Content

1. Grand tour of the universe
   a. Definitions of basic astronomy terms
2. The nature of science and the Scientific Method
3. How do we get information about the universe
   a. Electromagnetic radiation
   b. Atoms and spectra
   c. How we use radiation to understand the characteristics of cosmic objects (including the Doppler Shift)
   d. Telescopes and detectors
4. The life stories of the stars
   a. Star formation and protostars
   b. Energy mechanisms in stars (nuclear fusion)
   c. H-R Diagrams, the Main Sequence, and stellar lifetimes
   d. Post-Main Sequence evolution in low mass stars
   e. Post-Main Sequence evolution in high mass stars
   f. Endpoints in stellar evolution: white dwarfs, neutron stars, supernovae
   g. Introduction to General Relativity and black holes
5. The Milky Way Galaxy: its contents and structure
   a. Methods of measuring distances in astronomy
   b. Experiments to detect the presence of dark matter
   c. Galactic and globular clusters
   d. Extra-solar planets and how we detect them
   e. The structure and contents of the Milky Way
6. Other galaxies
   a. Normal galaxies and galaxy types
   b. Active galaxies and quasars
   c. Observational evidence for supermassive black holes
   d. The large scale structure of the universe
7. Cosmology
   a. Hubble's Law and the expanding universe: theory and observations
   b. The Big Bang model
   c. The ultimate fate of the universe: different scenarios
   d. Observational tests of cosmology
8. Cosmic evolution: summing up

Lab Content

Not applicable.

Special Facilities and/or Equipment

1. Physics equipment for demonstrations.
2. Internet access for in-class use of web-based tools.
3. Audio-visual equipment.

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Cooperative group activities
Repeated use of formative assessment throughout each class meeting
Homework incorporating feedback and correction opportunities
Quizzes
Exams (midterm and final)

A term paper may or may not be required

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Cooperative learning exercises
Lecture with continuous use of formative assessment
Multiple practice opportunities outside of class
Discussions
Demonstrations
Preparatory reading before class meetings

Representative Text(s) and Other Materials

Fraknoi, Andrew, David Morrison, and Sidney Wolff. Astronomy 2nd ed. (OpenStax). 2022.

Prather, Ed, Gina Brissenden, Colin S. Wallace, and Jeffery P. Adams. Lecture Tutorials for Introductory Astronomy, 4th ed.. 2021.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

Reading Assignments:

1. Each topic in the course has assigned preparatory reading in the textbook related to that topic.
2. Some topics have additional reading for students to interpret using skills taught in the course.

Writing Assignment Examples:

1. Collaborative group activities may require writing collective answers from the group.
2. Preparations for class may include written descriptions of prior thinking or interpretation of observations prior to teaching of new skills.
3. Post-class or weekly homework may require writing to interpret scenarios in light of newly taught skills.
4. Exams may include essay or short answer questions.

Discipline(s)

Physics/Astronomy