Astro 1040

For additional course information, including prerequisites, corequisites, and course fees, please refer to the Catalog: https://catalog.uvu.edu/

Semester: Spring
Year: 2025
Course Prefix: Astro
Course and Section #: 1040 013
Course Title: Elementary Astronomy
Credits: 3

Course Description

This course introduces astronomy and cosmology. It provides a physics-based overview of the solar system, the lives and deaths of stars, galaxies, and the evolution of the Universe. It explores the basic principles of physics and light, the tools of astronomy, and interesting concepts such as the Big Bang and black holes

Course Attributes

This course has the following attributes:
☐ General Education Requirements
☐ Global/Intercultural Graduation Requirements
☐ Writing Enriched Graduation Requirements
☐ Discipline Core Requirements in Program
☐ Elective Core Requirements in Program
☒ Open Elective
Other: *Click here to enter text.*

Instructor Information

Instructor Name: Dr. Benjamin Coughenour

Student Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Describe the process of science and tools by which astronomers gain knowledge about the universe, including how our understanding of the universe, its scale and our place in it has changed over time.
2. Make connections between the earth's daily and yearly motions and their experience of the sky, including positions and motions of celestial bodies, seasons, phases of the moon, and eclipses.
3. Recognize how underlying physical laws govern the formation and evolution of stars, planetary systems, galaxies, and the universe as a whole.
4. Apply basic principles of physics and light to the interpretation of astronomical observations and phenomena.
5. Identify scientific information conveyed in various forms, including simple equations, numbers, diagrams, charts, and graphs.
6. Answer conceptual questions with correct terminology in the fields of stellar astronomy, cosmology, and solar system science.

7. Apply concepts learned in the course to observations of the real night sky, current news and events, and representations of astronomy in the media and popular culture.
8. Communicate how their understanding of class topics relates to actual observations of the night sky through Observation Projects.

Course Materials and Texts

Mastering Astronomy Course Bundle

Course Requirements

Assignments:

Syllabus Quiz: 3% - A short quiz to encourage students to read over the syllabus.

Pre/Post-Class Quiz: 2% - A short quiz to measure how much is learned over the semester.

Homework Assignments 35% - To be completed regularly on the Mastering Astronomy website, covering material from class lectures and the course textbook. Each textbook chapter has an assigned set of homework exercises (18 in total). Homework is assigned and due once or twice each week.

Observing Projects (2) 10% - Two separate projects will be completed during the semester outside of class, which require going outside and observing the actual night sky. A typed report will be submitted which summarizes the observations and shows analysis by the student.

In-Class Participation 15% - Most days in class we will take a short quiz to track student engagement and attendance. Students must be in class to participate. The worst 5 scores will be dropped, so students can miss up to 10 classes without it affecting their grade.

Exams (4) 35% - The course is split into 4 units, each of which will have a timed exam to be taken online outside of class. Exams are open-note and open-book, but no other internet resources should be used. Each unit exam is worth 7% of a students' final grade, while the Unit 4 is combined with a cumulative final exam and worth 14%.

Final Letter grades are given using a standard grade scale. If your grade is in the range, you are guaranteed that letter grade. I occasionally bump grades up if you are very close to a boundary, but I will never move someone to a lower letter grade.

A	94.0 -100.
A-	90.0 - 93.9
B+	87.0 - 89.9
B	84.0 - 86.9
B-	80.0 - 83.9
C+	77.0 - 79.9
C	74.0 - 76.9
C-	70.0 - 73.9
D+	67.0 - 67.9
D	64.0 - 66.9
D-	60.0 63.9
F	Below 60.0

Recommended Reading Assignments and General Subject for Each Day

Date	Class Day	Topics	Book Sections
Jan 6	1	Syllabus, Accessing the Homework and Textbook, Modern Astronomy	1.1
Jan 8	2	The Scale and History of the Universe	1.2-1.3
Jan 10	3	Earth's Motion, the Night Sky, Constellations & the Celestial Sphere	2.1
Jan 13	4	Seasons & the Sun's Motion	2.2
Jan 15	5	Phases of the Moon, Eclipses, Planets in the Night Sky	2.3-2.4
Jan 17	6	Ancient Roots of Science, The Geocentric System	3.1-3.2
Jan 20	---	Martin Luther King Jr Day – No Class	---
Jan 22	7	The Copernican Revolution & The Nature of Science	3.3-3.4
Jan 24	8	Newton's Laws of Motion	4.1-4.2
Jan 27	9	Conservation Laws & Newton's Gravity	4.3-4.4
Jan 29	10	Light and Matter	5.1
Jan 31	11	Measuring Light, Spectroscopy, Telescopes	5.2-5.3
Feb 3	12	Review for Exam 1, Introduction to the Observing Projects	Review
Feb 5	13	Tour of the Solar System, Patterns in the Solar System	6.1-6.2
Feb 7	14	Solar System Formation & the Age of the Solar System	6.3-6.4
Feb 10	15	Earth as a Planet	7.1
Feb 12	16	The Moon, Mercury, and Mars	7.2-7.3
Feb 14	17	Venus and Climate Change on Earth	7.4-7.5
Feb 17	---	President's Day – No Class	---
Feb 19	18	Jovian Planets: Gas Giants	8.1
Feb 21	19	Moons and Rings of the Outer Solar System	8.2-8.3
Feb 24	20	Asteroids and Comets	9.1-9.3
Feb 26	21	The Kuiper Belt & Collisions in the Solar System	9.4-9.5
Feb 28	22	Review for Exam 2	Review
Mar 3	23	Exoplanets: Worlds Around Other Stars	10.1-10.3
Mar 5	24	Nuclear Fusion in the Sun	11.1-11.2
Mar 7	25	Observing the Sun, Solar Weather	11.3
Mar 10	---	Spring Break	---
Mar 12	---	Spring Break	---
Mar 14	---	Spring Break	---
Mar 17	26	Measuring the Properties of Stars	12.1
Mar 19	27	Patterns of Stellar Properties, Star Clusters	12.2-12.3
Mar 21	28	Stellar Birth, Low-Mass Stars	13.1-13.2
Mar 24	29	High-Mass Stars, Binary Star Systems	13.3-13.4

Mar 26	30	Stellar Death: White Dwarfs and Neutron Stars	14.1-14.2
Mar 28	31	Black Holes and Extreme Astrophysics	14.3-14.4
Mar 31	32	Review for Exam 3, Observing the Milky Way	Review, 15.1
Apr 2	33	Galactic Recycling, Milky Way Formation, & the Galactic Center	15.2-15.4
Apr 4	34	Measuring the Distances to Galaxies	16.1-16.2
Apr 7	35	Galaxy Evolution & Supermassive Black Holes	16.3-16.4
Apr 9	36	The Big Bang	17.1
Apr 11	37	Evidence for the Big Bang & Inflation	17.2-17.4
Apr 14	38	Dark Matter	18.1-18.2
Apr 16	39	Dark Energy & the Fate of the Universe	18.3-18.4
Apr 18	40	Life in the Universe	19.1-19.5
Apr 21	41	Review for Final Exam	Review
Apr 23	---	Interim/Study Day – No Class	---
Apr 30	---	Final Exam due on Canvas by Midnight	---

Required Course Syllabus Statements

Generative AI

In this digital age you have nearly infinite resources at your fingertips, including internet search engines and Artificial Intelligence (AI). I encourage you to make use of these resources, but I include a warning that the first thing that pops up after a search or AI prompt may not be accurate. Do not accept the first thing you see as the answer. You need to investigate and make sure it is what you are actually searching for and corresponds to what you already know. You may also find other theories (models) to describe aspects of the universe that are different from what is presented in class. Homework correct answers will be based on the theories given in class and in the text accompanying our course.

Using Artificial Intelligence and Plagiarism:

AI programs are not a replacement for your human creativity, originality, and critical thinking. Writing, thinking, and researching are crafts that you must develop over time to develop your own individual voice. At the same time, you should learn how to use AI and in what instances AI can be helpful to you.

AI is **good** for:

- Brainstorming
- Finding information (you should confirm this yourself; errors are rampant. Go to the website it suggests.)
- Checking grammar, style, etc.
- Creating Images of your spaceship, etc.

AI **cannot** be used for:

- Writing your answers to the pre-class assignments. Please use your own voice.
- Doing your work for you including blindly answering homework
- Writing your Mission projects or
- Writing your conclusions and/or summaries (such as for your explorations, observing projects and media experience

Using Remote Testing Software

☒ This course does not use remote testing software.

☐ This course uses remote testing software. Remote test-takers may choose their remote testing locations. Please note, however, that the testing software used for this may conduct a brief scan of remote test-takers' immediate surroundings, may require use of a webcam while taking an exam, may require the microphone be on while taking an exam, or may require other practices to confirm academic honesty. Test-takers therefore shall have no expectation of privacy in their test-taking location during, or immediately preceding, remote testing. If a student strongly objects to using test-taking software, the student should contact the instructor at the beginning of the semester to determine whether alternative testing arrangements are feasible. Alternatives are not guaranteed.

Required University Syllabus Statements

Accommodations/Students with Disabilities

Students needing accommodations due to a permanent or temporary disability, pregnancy or pregnancy-related conditions may contact UVU Accessibility Services at accessibilityservices@uvu.edu or 801-863-8747.

Accessibility Services is located on the Orem Campus in BA 110.

Deaf/Hard of Hearing students requesting ASL interpreters or transcribers can contact Accessibility Services to set up accommodations. Deaf/Hard of Hearing services can be contacted at DHHservices@uvu.edu

DHH is located on the Orem Campus in BA 112.

Academic Integrity

At Utah Valley University, faculty and students operate in an atmosphere of mutual trust. Maintaining an atmosphere of academic integrity allows for free exchange of ideas and enables all members of the community to achieve their highest potential. Our goal is to foster an intellectual atmosphere that produces scholars of integrity and imaginative thought. In all academic work, the ideas and contributions of others must be appropriately acknowledged and UVU students are expected to produce their own original academic work.

Faculty and students share the responsibility of ensuring the honesty and fairness of the intellectual environment at UVU. Students have a responsibility to promote academic integrity at the university by not participating in or facilitating others' participation in any act of academic dishonesty. As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, assessments, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Likewise, instructors are responsible to clearly state expectations and model best practices.

Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*.

Equity and Title IX

Utah Valley University does not discriminate on the basis of race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, age (40 and over), disability, veteran status, pregnancy, childbirth, or pregnancy-related conditions, citizenship, genetic information, or other basis protected by applicable law, including Title IX and 34 C.F.R. Part 106, in employment, treatment, admission, access to educational programs and activities, or other University benefits or services. Inquiries about nondiscrimination at UVU may be directed to the U.S. Department of Education's Office for Civil Rights or UVU's Title IX Coordinator at 801-863-7999 – TitleIX@uvu.edu – 800 W University Pkwy, Orem, 84058, Suite BA 203.

Religious Accommodation

UVU values and acknowledges the array of worldviews, faiths, and religions represented in our student body, and as such provides supportive accommodations for students. Religious belief or conscience broadly includes religious, non-religious, theistic, or non-theistic moral or ethical beliefs as well as participation in religious holidays, observances, or activities. Accommodations may include scheduling or due-date modifications or make-up assignments for missed class work.

To seek a religious accommodation, a student must provide written notice to the instructor and the Director of Accessibility Services at accessibilityservices@uvu.edu. If the accommodation relates to a scheduling conflict, the notice should include the date, time, and brief description of the difficulty posed by the conflict. Such requests should be made as soon as the student is aware of the prospective scheduling conflict.

While religious expression is welcome throughout campus, UVU also has a specially dedicated space for meditation, prayer, reflection, or other forms of religious expression.

Student Conduct

Academic integrity is a basic principle which requires that students take credit only for ideas and efforts that are their own. Cheating, plagiarism, fabrication, and other forms of academic dishonesty are often defined as the submission of materials in assignments, exams, or other academic work that is based on sources that are prohibited by the faculty member or in ways that do not properly cite the source of a student's ideas and content. Further information on what constitutes academic dishonesty is detailed in UVU Policy 541: *Student Code of Conduct*Links to an external site.

Cheating is the act of using or attempting to use or providing others with unauthorized information, materials or study aids in academic work. Cheating includes, but is not limited to, passing examination answers to or taking examinations for someone else, or preparing or copying others' academic work.

Plagiarism is the act of presenting another person's ideas, research or writing as your own.

Fabrication is the use of invented information or the falsification of research or other findings.

If students are discovered to be cheating, the relevant grade will be a zero and you will be reported to the University's Judicial Affairs.

All course materials (e.g., outlines, handouts, syllabi, exams, quizzes, PowerPoint presentations, lectures, audio and video recordings, etc.) are proprietary. All planetarium videos are filmed using our Digistar system and are also proprietary. Students are prohibited from posting or selling any such course materials without the express written permission of the professor teaching this course.

University Resources are found in the syllabus in Canvas