

# **Astronomy 1B: Exploring the Universe Course Syllabus**

## **What you will learn in this course**

### **Astronomy 1B: Exploring the Universe**

Building upon the prior prerequisite course, dive deeper into the universe and develop a lifelong passion for space exploration and investigation. Become familiar with the inner and outer planets of the solar system as well as the sun, comets, asteroids, and meteors. Additional topics include space travel and settlements as well as the formation of planets.

### **Unit 1: Space Explorers**

Ancient civilizations the world over all developed methods of observing and tracking the heavens above. Some of these techniques the cultures shared in common, and some are unique to different parts of the world. But they all form the fabric of the history of astronomy and paved the way for some of the most technologically advanced scientific feats known to mankind: space missions! In this unit, we will travel from ancient China to ancient Egypt, Europe, and the Americas tracing the astronomical contributions of various civilizations before we arrive to consider our own civilization—and some of the most significant space missions to date.

#### **What will you learn in this unit?**

- Discover how ancient Chinese and Egyptian cultures integrated astronomy into their everyday lives.
- Understand how ancient Europeans and Native Americans built their civilizations around the movement of celestial objects.
- Trace the history of the space race between the United States and the Soviet Union.
- Discuss how and why noteworthy American space missions made history.

### **Unit 2: Inner Planets**

The inner planets of our solar system are more closely related than the outer planets of the solar system. These planets are sometimes referred to as terrestrial planets and include Mercury, Venus, Earth, and Mars. Although all of these planets are notably rocky and dense, each one is unique. In this unit, we will examine the formation of our solar system, describe the unique features of the four inner planets, Mercury, Venus, Earth, and Mars, and compare and contrast their characteristics. Finally, you will discover the special attributes that make life on Earth possible.

#### **What will you learn in this unit?**

- Describe how planetary matter is distributed within the solar system.
- Explain the formation of the solar system.
- Differentiate and describe the inner planets within our solar system.

- Identify the shared characteristics among all inner planets in the solar system.
- Explain the features of Earth that are essential to the development of life.

### **Unit 3: Outer Planets**

In this unit, we will examine the first two of our outer planets: Jupiter and Saturn. We'll learn more about their structure, motion, atmosphere, and moons. We'll examine what space expeditions, observations, and mathematical predictions are telling us about these planets and their roles in our solar system.

#### **What will you learn in this unit?**

- Identify the shared features and characteristics among the outer planets in the solar system.
- Differentiate and describe the unique characteristics of Jupiter and Saturn.
- Understand how weight and mass measurements differ from Earth to Jupiter and Saturn.
- Compare and contrast the outer planets with Earth.

### **Unit 4: Outer Planets: Uranus, Neptune, and the Dwarf Planets**

It's time to journey to the last two outer planets: Uranus and Neptune, and learn more about the dwarf planet Pluto. If you grew up learning that Pluto was actually a planet, you are not alone! As we journey to the outer edges of the solar system, we will examine the controversy over Pluto's reclassification as a dwarf planet from its former classification as our solar system's ninth planet.

#### **What will you learn in this unit?**

- Describe the characteristics of Uranus, Neptune, and the dwarf planets
- Understand how Uranus, Neptune, and the dwarf planets got their names
- Discuss how weight, mass, and gravity differ on Uranus, Neptune, and the dwarf planets
- Explain why Pluto is no longer classified as a true planet of the solar system

### **Astronomy 1B Midterm Exam**

- Review information acquired and mastered from this course up to this point.
- Take a course exam based on material from the first four units in this course (Note: You will be able to open this exam only one time.)

### **Unit 5: The Sun**

The Sun plays one of the most important roles in our solar system and certainly in life on Earth. In this unit, we will learn more about this closest star to Earth. We'll discuss the structure and composition of the Sun, including the different layers of the Sun's atmosphere. We'll also learn how the Sun creates energy through nuclear fusion and the process by which this takes place.

Finally, we'll learn more about solar weather and the events that take place in and around the Sun, including sunspots, solar flares, and coronal mass ejections.

### **What will you learn in this unit?**

- Identify the five regions of the Sun.
- Discuss the structure and composition of the Sun.
- Learn about nuclear fusion in the Sun, including the proton-proton chain reaction.
- Examine solar activity, such as sunspots and solar flares.
- Define and discuss solar eclipses.

## **Unit 6: Comets, Asteroids, and Meteors**

In this unit, we will examine comets, asteroids, and meteors. Although smaller than the Sun, Moon, and planets, these celestial bodies are an important part of our solar system. They can also produce dramatic visions in the Earth's skies and have the potential to collide with the Earth. We'll consider their composition, structure, and function in our solar system.

### **What will you learn in this unit?**

- Define comet, asteroid, meteoroid, meteor, and meteorite.
- Examine the origin of comets and how their tails form.
- Discuss the location of asteroids in the solar system.
- Learn about the different types of meteorites.
- Investigate how comets, asteroids, and meteorites influence life on Earth.

## **Unit 7: Living and Working in Space**

With space as vast as it is, it seems wrong that we are confined to just one planet. Sending equipment and satellites out into space is one thing, but sending people out into space is a whole other thing. What is it like to leave Earth? How do you brush your teeth in space? What will future space exploration look like? Let's prepare for this information in 20 seconds and counting....T-15 seconds, guidance is internal ... 12, 11, 10, 9 ... ignition sequence start ...6, 5, 4, 3, 2, 1, 0 ... all engines running ... Houston; we have liftoff!

### **What will you learn in this unit?**

- Explore space programs in countries around the world.
- Discover the International Space Station.
- Understand how spacesuits protect astronauts in the harsh outer space environment.
- Consider the daily realities of living and working in space.
- Examine the "New Space Race."

## **Unit 8: The Future of Space Travel**

With all that we've learned about space explorations of the past—it's now time to look forward into the future. At the rate at which technology accelerates, we can really only begin to guess what the future of space exploration looks like, but we do know a few projects that are currently in the works, including a manned mission to Mars! Who knows, in a few years we might even be able to take a vacation through the stars!

### **What will you learn in this unit?**

- Describe future plans for space travel and tourism from SpaceX and NASA
- Summarize locations in space that are most likely to harbor life
- Explore how computer technology supports space missions
- Analyze the role NASA plays in combating climate change

### **Astronomy 1B Final Exam**

- Review information acquired and mastered from this course up to this point.
- Take a course exam based on material from units five to eight in this course – the last four units. (Note: You will be able to open this exam only one time.)

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