FBEAE 305 - ASTRONOMY - Eğitim Fakültesi - Matematik ve Fen Bilimleri Eğitimi Bölümü

General Info

Objectives of the Course

The aim of this course is to foster and develop students' curiosity about astronomy by providing them with knowledge of the basic concepts of astronomy and space technologies. It also aims to enable them to create materials they will need in their professional lives.

Course Contents

Meaning of astronomy, basic concepts, units in astronomy; branches of astronomy, its historical development; contributions of different civilizations to astronomy, tools used in astronomy; Solar system, models of solar system from past to present, movements of earth, moon and sun; Keppler's laws, time-calendar-seasons, solar system elements, stars, sun as a star, sky coordinate system, constellations, galaxies, milky way galaxy, universe and the structure of the universe, formation of the universe and universe models from past to present, space technologies and reflections on daily life .

Recommended or Required Reading

1) Kuramdan Uygulamaya Eğitimde Astronomi, Prof. Dr. İbrahim Ünal, Dr. Merve Taşcan, Palme Yayınevi <br />(2022)<br /> 2) Astronomi, Editör: Prof. Dr. Mehmet Altan Kurnaz, Pegem Akademi (2021)<br /> 3) Astronomi ve Uzay Bilimine Giriş, Editör: Prof. Dr. Hakan Şevki Ayvacı, Pegem Akademi (2024).<br /> 4) Etkinliklerle Astronomi Öğretimi, Editör: Doç. Dr. Sedat Karaçam, Palme Yayınevi (2021)

Planned Learning Activities and Teaching Methods

brainstorming, role playing, question and answer, concept cartoon, problem solving

Recommended Optional Programme Components

Before coming to class, the suggestions in the preparation section should be followed for preparation and for review after class.

Instructor's Assistants

There is no teaching assistant teaching the course.

Presentation Of Course

Face to face.

Dersi Veren Öğretim Elemanları

Prof. Dr. Şeyma Akkaya Deviren

Program Outcomes

1. Have knowledge about the development of astronomy and history of astronomy
2. Knows the instruments used in astronomy from past to present.
3. Have an idea about the creation, general structure and future of the universe
4. Can understand Newton's Law of Universal Gravitation and Kepler's laws.
5. Can explain the real and apparent movements of the Earth, the Sun and the Moon.
6. Can determine the relative position of an object in three-dimensional space with coordinate systems in astronomy
7. Can create a model of the Solar System
8. Can explain the basic properties and evolution of stars.
9. Gains knowledge about space research and technologies.

Weekly Contents

| Order | PreparationInfo | Laboratory | TeachingMethods | Theoretical | Practise |
|---|---|---|---|---|---|
| 1 | In the book "Astronomy in Education from Theory to Practice," chapter 1, pages 1-4, the topics "definition of astronomy, basic concepts of astronomy, sub-branches of astronomy" must be read. To repeat a course, the 20 questions in the "Questions Related to the Topic" section, pages 9-12, must be solved. | | Question-answer, educational game, | The definition of astronomy, basic concepts related to astronomy and sub-branches of astronomy will be given. | Activities related to astronomy concepts and sub-branches will be held: Activity 1: We Picture the Universe; Purpose: To teach basic concepts related to astronomy. Activity 2: We Play Taboo with Astronomy Concepts; Purpose: To teach concepts related to astronomy. |

| Order | PreparationInfo | Laboratory | TeachingMethods | Theoretical | Practise |
|---|---|---|---|---|---|
| 2 | The following topics should be read in his book titled "Astronomy", chapter 2, pages 29-42: "Historical Development of Astronomy and Contributions of Civilizations, Astronomy in Ancient Civilizations, Mesopotamian Astronomy, Egyptian Astronomy, Indian Astronomy, Chinese Astronomy, Astronomy in Ancient Turks, Ancient Greek Astronomy, Middle Age Astronomy, Islamic Astronomy, Astronomy in the Ottoman Period." | | Question and answer, explanation | The historical development of astronomy and the contributions of civilizations: Astronomy in Ancient Civilizations, Medieval Astronomy, Islamic Astronomy, and Ottoman Period Astronomy will be discussed. | |
| 3 | The book "Astronomy", chapter 2, pages 48-53, "Observation instruments used in astronomy, binoculars, telescopes, radio telescopes, x-ray, infrared ray, gamma ray telescopes" should be read. To repeat the course, the evaluation questions on page 53 of the same book should be answered. | | Question and answer, explanation | Information will be given about the observation tools used in astronomy, such as binoculars, telescopes, optical telescopes, radio telescopes, x-ray, infrared ray and gamma ray telescopes. | You will be given the assignment of making a simple binocular. |
| 4 | In the textbook "Astronomy in Education from Theory to Practice," chapter 2, pages 11-20, topics titled "Earth coordinate systems, celestial coordinate systems, horizon coordinate system, equatorial coordinate system and hour coordinate system, ecliptic coordinate systems" should be studied. The 20 questions in the "Questions Related to the Topic" section on page 27 of the same book should be solved. | | Question and answer, narration, observation | Coordinate systems used in astronomy will be introduced, and how the location of a three-dimensional celestial body is determined will be demonstrated. The Earth coordinate system and the celestial sphere coordinate system and their properties will be presented. | Observation will be carried out to determine the Sun's altitude and zenith distances on different dates. |
| 5 | "Kuramdan Uygulamaya Astronomi Eğitimi" adlı kitab, bölüm V, sayfa 73-82 arasındaki "Newton'un evrensel çekim kanunu, Kepler kanunları, Çekim potansiyel enerjisi ve toplam enerji, kurtulma hızı" adlı konu başlıkları okunmalı. Ders tekrarı için sayfa 84-86 arasındaki "Konu ile İlgili Sorular" kısmındaki 20 adet soru çözülmeli. | | Problem solving, explanation, demonstration experiment. | The laws of universal gravitation and related problem solutions will be discussed. Newton's law of universal gravitation, the measurement of the gravitational constant, Kepler's Laws, and the relationship between Kepler's Laws and Newton's Laws will be discussed. | Problems related to Newton's laws of universal gravitation and Kepler's laws will be solved. A demonstration experiment titled "Does the Magnitude of the Force Exerted by the Earth on Objects Change?" will be conducted to understand Newton's Law of Universal Gravitation. |
| 6 | In the book "Astronomy Education from Theory to Practice," chapter 3, pages 31-44, topics titled "The Earth's true and apparent motions, the Moon's true and apparent motions, the Sun's true and apparent motions, and solar and lunar eclipses" should be studied. To repeat a course, the "Questions Related to the Topic" section, pages 53-56, of the same book should be solved. | | Role playing, question and answer, narration. | The real and apparent motions of the Earth, the real and apparent motions of the Moon, and the real and apparent motions of the Sun will be taught. Solar and lunar eclipses will be covered. | Students will be able to participate in an activity called "Sun, Earth, and Moon Game" using materials such as role-play cards, Styrofoam balls, straws, ping-pong balls, and balloons. This role-playing activity will help them learn about the visible and real movements of the Sun, Earth, and Moon. |

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|---|---|---|---|---|---|
| 7 | The topics titled "Sun, Planets, Mercury, Venus, Earth, Mars" on pages 87-95 of chapter 6 of the book "Astronomy Education from Theory to Practice" should be read. | | Role playing, design, question and answer | The elements of the solar system and their basic properties will be taught. The terrestrial planets of the solar system; Mercury, Venus, Earth, and Mars will be covered. | The following activity will be done for the application. Activity: All elements of the solar system will be learned through role-playing. |
| 8 | | | | Midterm Week | |
| 9 | In the book "Astronomy Education from Theory to Practice," chapter 6, pages 95-100, the topics titled "Jupiter, Saturn, Uranus, Neptune, other members of the solar system, comets, and meteors" should be read. To repeat the course, the "Questions Related to the Topic" section, pages 107-110, should be solved. | | Question-answer, design. | Information will be provided on the gaseous planets of the solar system: Jupiter, Saturn, Uranus, and Neptune. Other members of the solar system: minor planets, comets, meteoroids, and meteoroids will be discussed. | Activity: Solar system model design; A model will be designed by learning the orbital inclination, radius and distance from the Sun for all the planets in the solar system. |
| 10 | The book titled "Astronomy in Education from Theory to Practice", chapter 7, pages 111-117 should be read under the headings "Stars and stellar evolution, main sequence phase, red giant phase, helium burning phase, final stages of stellar evolution, White dwarfs, neutron stars, black holes". | | Concept map, question and answer | Stars and stellar evolution: Main sequence phase, red giant phase, helium burning phase; Final stages of stellar evolution: White dwarfs, neutron stars and black holes will be given. | A concept map depicting the evolution of stars will be created. (Star life cycle poster) |
| 11 | In the book "Astronomy in Education from Theory to Practice," chapter 8, pages 130-130, students should read the topics titled "Constellations and Angles, Dippers and Some Constellations Always Visible from the Northern Hemisphere, and the Andromeda Galaxy and Constellation." The 20 questions in the "Questions on the Topic" section, pages 146-150, of the same book should be answered. | | Question and answer, direct explanation. | Topics related to sky observation will be given such as constellations and angles, Dippers and some constellations that are always visible from the Northern Hemisphere: Big Dipper and Big Bear, Little Dipper, Little Bear, Dragon, King, Queen, Giraffe, Andromeda Galaxy and constellations. | Examining the sky map given for 12 months in the celestial events yearbook. |
| 12 | The following topics should be read in the book "Astronomy" on page 210: "The Universe, Galaxies, Classification of Galaxies, Spiral Galaxies, Elliptical Galaxies, Irregular Galaxies, Galaxy Clusters, The Milky Way Galaxy, The Universe and Its Structure, The Big Bang and the Formation of the Universe." For the course repetition, the assessment questions on page 232 of the same book will be answered. | | Question and answer, explanation | Galaxies, their classification, and the Milky Way Galaxy will be covered. The universe and its structure, the Big Bang, and the formation of the universe will be discussed. | The expansion of the universe will be modeled with a balloon. |
| 13 | The book titled "Astronomy in Education from Theory to Practice", chapter 9, pages 151-153, "History of space exploration, rockets" should be read. | | Brainstorming, question and answer | To understand space research and technologies, a chronological history of space exploration will be presented. The operating principles of rockets, which play a significant role in space technology, will be discussed. | Prospective teachers will be encouraged to use their creativity to create rockets and to experiment with the ideas they will come up with to launch the rockets they design as high as possible |
| 14 | The book "Astronomy Education from Theory to Practice" should be read on pages 154-160, under the headings "space shuttles, space stations, space probes, artificial satellites, and basic principles of space studies." To repeat a course, 10 questions from the "Questions Related to the Topic" section on pages 163-164 should be solved. | | Brainstorming, question and answer, explanation. | Information will be given about space shuttles, space stations, space probes, artificial satellites, and the basic rules of space plans. | Prospective teachers will be asked to use their creativity to design a lunar probe. The mechanism used in this design and the reasons for using it will be discussed. |

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|---|---|---|---|---|---|
| 15 | The book titled "Introduction to Astronomy and Space Science", chapter 4, pages 80-94, will cover the topics "Space research, the role and goals of Turkey's Space Agency, the International Space Station, the first Turkish astronaut sent into space, space mining, the effects of space research on technology, the effects of space research on daily lives." | | Question and answer. | The Role and Goals of Turkey's Space Agency, the International Space Station, the first Turkish astronaut sent into space, technological advances in space research, the effects of space research on the scientific world, the effects of space research on technology, and the effects of space research on daily life will be discussed. | |

Workload

| Activities | Number | PLEASE SELECT TWO DISTINCT LANGUAGES |
|---|---|---|
| Vize | 1 | 1,00 |
| Final | 1 | 1,00 |
| Derse Katılım | 10 | 1,00 |
| Ders Öncesi Bireysel Çalışma | 1 | 14,00 |
| Ders Sonrası Bireysel Çalışma | 1 | 14,00 |
| Ara Sınav Hazırlık | 7 | 2,00 |
| Final Sınavı Hazırlık | 14 | 2,00 |
| Ödev | 6 | 1,00 |
| Bütünleme | 1 | 1,00 |

Assesments

| Activities | Weight (%) |
|---|---|
| Final | 60,00 |
| Vize | 40,00 |

Fen Bilgisi Eğitimi Ana Bilim Dalı / FEN BİLGİSİ ÖĞRETMENLİĞİ X Learning Outcome Relation

| | P.O. 1 | P.O. 2 | P.O. 3 | P.O. 4 | P.O. 5 | P.O. 6 | P.O. 7 | P.O. 8 | P.O. 9 | P.O. 10 | P.O. 11 | P.O. 12 | P.O. 13 | P.O. 14 | P.O. 15 | P.O. 16 | P.O. 17 | P.O. 18 | P.O. 19 | P.O. 20 | P.O. 21 | P.O. 22 | P.O. 23 | P.O. 24 | P.O. 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L.O. 1 | | 5 | 5 | | | | | | | | | | | | | | | | | | | | | | |
| L.O. 2 | | | 5 | | | | 5 | | | | | | | | | | | | | | | | | | |
| L.O. 3 | | | 5 | | | | 5 | | | | | | | | | | | | | | | | | | |
| L.O. 4 | | | 5 | 5 | | | | | | | | | | | | | | | | | | | | | |
| L.O. 5 | | | 5 | | | | 5 | | | | | | | | | | | | | | | | | | |
| L.O. 6 | | | 5 | 5 | | | | | | | | | | | | | | | | | | | | | |

| | P.O. 1 | P.O. 2 | P.O. 3 | P.O. 4 | P.O. 5 | P.O. 6 | P.O. 7 | P.O. 8 | P.O. 9 | P.O. 10 | P.O. 11 | P.O. 12 | P.O. 13 | P.O. 14 | P.O. 15 | P.O. 16 | P.O. 17 | P.O. 18 | P.O. 19 | P.O. 20 | P.O. 21 | P.O. 22 | P.O. 23 | P.O. 24 | P.O. 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **L.O. 7** | | | 5 | | | | 5 | | | | | | | | | | | | | | | | | | |
| **L.O. 8** | | | 5 | | | | | | | | | | | | | | | | | | | | | | |
| **L.O. 9** | | | 5 | | | | | | | | | | | | | | | | | | | | | | |

Table :

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**P.O. 1 :** Alanı ile ilgili öğretim programları, öğretim strateji, yöntem ve teknikleri ile ölçme ve değerlendirme bilgisine sahiptir.

**P.O. 2 :** Bilginin doğası, kaynağı, sınırları, doğruluğu, güvenirliliği ve geçerliğinin değerlendirilmesi konusunda bilgi sahibidir.

**P.O. 3 :** Öğrencilerin ihtiyaçlarını karşılayabilecek düzeyde Fen ve teknoloji dersi alan (Fizik, kimya, biyoloji, yer bilimleri vb.) bilgisine sahiptir.

**P.O. 4 :** Alanıyla ilgili olay ve olguları kavramsallaştırır, bilimsel yöntem ve teknikleri kullanarak problemleri çözer.

**P.O. 5 :** Öğrencilerin gelişim özelliklerini, bireysel farklılıklarını; konu alanının özelliklerini ve kazanımlarını dikkate alarak en uygun öğretim strateji, yöntem ve tekniklerini uygular.

**P.O. 6 :** Milli Eğitim Bakanlığı tarafından hazırlanan Fen Bilimleri Dersi Öğretim Programının özelliklerini bilir ve programı etkin bir şekilde uygular.

**P.O. 7 :** Konu alanına ve öğrencinin gereksinimlerine uygun materyal geliştirir.

**P.O. 8 :** Öğrencinin kazanımlarını farklı teknik ve yöntemler kullanarak çok yönlü değerlendirir.

**P.O. 9 :** Laboratuvar deneyleri ve etkinlikleri ile ilgili bilgi ve becerileri meslek hayatında uygular.

**P.O. 10 :** Bireysel ve grup çalışmalarında sorumluluk alır ve alınan görevi etkin bir şekilde yerine getirir.

**P.O. 11 :** Kendini bir birey olarak tanır; yaratıcı ve güçlü yönlerini kullanır ve zayıf yönlerini geliştirir.

**P.O. 12 :** Edindiği bilgi ve becerileri eleştirel bir yaklaşımla değerlendirir.

**P.O. 13 :** Bilgiye ulaşma yollarını etkin bir şekilde kullanır.

**P.O. 14 :** Düşüncelerini ve sorunlara ilişkin çözüm önerilerini nicel ve nitel verilerle destekleyerek uzman olan ve olmayan kişilerle paylaşır.

**P.O. 15 :** Alanı ile ilgili yabancı kaynakları takip edebilecek düzeyde yabancı dil bilgisine sahiptir.

**P.O. 16 :** Bilgi ve iletişim teknolojilerini fen bilimleri öğretiminde etkin bir şekilde kullanır.

**P.O. 17 :** Fen, Teknoloji, Mühendislik, Matematik ve Eğitim disiplinlerinde; edindiği bilgi ve becerileri eleştirel biçimde değerlendirerek, bunları problemlerin çözümünde kullanır.

**P.O. 18 :** Çevre koruma ve iş güvenliği konularında yeterli bilince sahiptir.

**P.O. 19 :** Güvenli okul ortamının oluşturulması ve sürdürülebilmesi amacıyla kişisel ve kurumsal etkileşim kurar.

**P.O. 20 :** Kalite yönetimi ve süreçlerine uygun davranır ve katılır.

**P.O. 21 :** Farklı kültürlere ve sosyal yaşama uyum sağlar.

**P.O. 22 :** Dış görünüm, tutum, tavır ve davranışları ile topluma örnek olur.

**P.O. 23 :** Sanatsal ve kültürel etkinliklere etkin olarak katılır.

**P.O. 24 :** Toplumun ve dünyanın gündemindeki olaylara/gelişmelere duyarlıdır ve bu gelişmeleri izler.

**P.O. 25 :** Toplumsal sorumluluk bilinciyle yaşadığı sosyal çevre için mesleki proje ve etkinlikler planlar ve uygular

**L.O. 1 :** Astronominin ve bilim tarihinin gelişimi hakkında bilgi sahibi olur

**L.O. 2 :** Astronomide geçmişten günümüze kadar kullanılan aletleri bilir.

**L.O. 3 :** Evrenin yaratılışı, genel yapısı ve geleceğine dair fikir sahibi olur

**L.O. 4 :** Newton'un Evrensel Çekim Yasasını ve Kepler yasalarını kavrayabilir

**L.O. 5 :** Dünya'nın, Güneş'in, Ay'ın gerçek ve görünür hareketlerini açıklayabilir.

**L.O. 6 :** Astronomideki koordinat sistemleri ile bir cismin üç boyutlu uzaydaki göreceli konumunu belirleyebilir

**L.O. 7 :** Güneş Sistemi ile ilgili model oluşturabilir.

**L.O. 8 :** Yıldızların temel özelliklerini ve evrimini açıklayabilir.

**L.O. 9 :** Uzay araştırmaları ve teknolojileri hakkında bilgi sahibi olur.