FBEAE 101 - Physics 1 - Eğitim Fakültesi - Matematik ve Fen Bilimleri Eğitimi Bölümü

General Info

Objectives of the Course

The aim of course; to recognize the science of physics, to understand the basic concepts of physics and the laws of physics, to learn how to use physics in natural phenomena, to sample in daily life, to establish and solve problems.

Course Contents

Unit and dimensional analysis, vectors, linear motion, free fall, motion in two dimensions, uniform circular motion, relative motion, Newton's laws of motion, work and energy, kinetic energy, potential energy, conservation of energy, impulse, momentum, the law of conservation of momentum, one-dimensional collisions, two-dimensional collisions, center of mass, rotational motion of rigid bodies, angular kinematics, moment of a force, calculus of inertia, rolling motion, angular momentum and its conservation, static equilibrium

Recommended or Required Reading

1) Karaoğlu B. (2017). Üniversiteler için Fizik. Seçkin Yayıncılık
 2) Paul G. Hewitt (2021). (Ed. Prof. Dr. Bilal Güneş, Prof. Dr. Salih Ateş, Prof. Dr. Ali Eryılmaz). Kavramsal Fizik, Ankara: Palme Yayınevi
 3) Mehmet Farih Taşar, Metin Orbay (2014) Genel Fizik II, Pegem Akademi 4. Baskı
 4) Serway, Raymond A., and Beichner, Robert J. (2000). Fen ve Mühendislik için Fizik II. Çeviri Ed. Kemal Çolakoğlu, Palme Yayınevi.
 5) Bueche, F. J., and D. A. Jerda. (2019). Fizik İlkeleri 2. Çeviri Ed. Kemal, Çolakoğlu, Palme Yayınev

Planned Learning Activities and Teaching Methods

Questions and answers, problem solving, experimentation, expository instruction

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. Can understand the importance of measurement in physics.
2. Can express the basic quantities in physics together with their units.
3. Can distinguish vector and scalar quantities.
4. Can analyze the relationship between position, displacement, velocity, speed and acceleration.
5. Knows the basic concepts of motion knowledge (kinematics).
6. Can draw graphs showing the variation of kinematic quantities over time.
7. Can analyze the effect of force on the motion of objects.
8. Explain linear momentum and collision.
9. Can solve problems involving the concepts of work, power and energy.
10. Can analyze rotation and rolling motion.
11. Explain the concepts of work, energy and power in physics
12. Calculate the center of a continuously distributed mass.
13. Know the conditions of static equilibrium.

Weekly Contents

Order	PreparationInfo	Laboratory	TeachingMethods	Theoretical	Practise
1	The topics included in the Physics for Universities textbook, pages 7 through 25, should be studied: 1.1 Dimensions and units; the international system of units, derived units, consistency of units, margin of error, and significant figures; 1.3 Vectors, the sum of two vectors, subtraction of vectors, components of a vector, unit vectors, scalar product, vector product, and expressing vector product in terms of components. At the end of this week, the test on pages 23-25 should be solved. Problems 1.9-1.25 of the problems on pages 25-26 should be solved.		explanation and problem solving	Within the scope of the Units and Vectors unit, dimensions and units, margin of error and number of significant digits and properties of vectors will be covered.	Applications related to vector calculations will be made.

Order	PreparationInfo	Laboratory	TeachingMethods	Theoretical	Practise
2	The topics 2.1 Position, displacement, velocity, and acceleration; 2.2 Motion with constant acceleration; and 2.3 Free fall, from the textbook "Physics for Universities" on pages 27-36, should be studied as preliminary preparation. At the end of the week, the test on page 37 will be solved. Problems 2.1-2.25 in the Problems section on page 38 will be solved.		Question and answer, Problem solving	Within the scope of the Linear Motion unit, the concepts of position, displacement, velocity and acceleration will be defined, the kinematic equations of uniform linear motion and free fall will be obtained and relevant problem solutions will be made.	Problem solutions involving uniform linear motion and free fall will be performed.
3	In the book "Physics for Universities," pages 41-47, topics titled 3.1 Position, acceleration, and displacement vectors, and 3.2 Projectile motion should be read. At the end of the week, to reinforce what you've learned, the test section on pages 52-53 should be solved, and problems 3.1-3.14 should be solved from pages 53-55.		Question-answer, problem-solving	Within the scope of the "Motion in Two Dimensions" unit; Projectile motion (oblique and horizontal projectile), Uniform circular motion, Relative motion topics will be covered.	Practices regarding shooting will be held.
4	In the book "Physics for Universities," pages 47-53, sections 3.3 "Uniform circular motion, centripetal acceleration, tangential acceleration, and relative motion" should be read. To check your learning, problems 3.15-3.25 should be solved in the problem section on pages 54-55.		Question and answer, direct explanation, problem solving	Within the scope of the two-dimensional motion unit, uniform circular motion, centripetal acceleration, and relative motion topics will be covered.	Practicing problem solving exercises related to uniform circular motion and relative motion.
5	In the book "Physics for Universities," pages 57-61, "1. Newton's Law," "2. Newton's Law," and "3. Newton's Law" should be read. To reinforce what you've learned, the test on pages 72-73 should be taken.		Question-answer, problem-solving	Within the scope of the Newton's Laws of Motion unit, topics will be covered: 1. Newton's Law, 2. Newton's Law, 3. Newton's Law, and the Action-Reaction Principle. Within the scope of these laws, the definition of force, the concepts of inertia, and the action-reaction pair will be introduced.	
6	In the book "Physics for Universities," pages 61-72, students should read the topics on types of forces encountered in mechanics, tension in a rope, free-body diagrams, applications of Newton's Laws, and circular motion, and examine examples 4.4-4.12. To repeat a course, students should solve problems 4.1-4.20 in the Problems section on page 74.		question answer, problem solving	Types of Forces Encountered in Mechanics: Weight, Gravitational Law, Normal Force on Surfaces, Friction Force. Different Applications of Newton's Laws will be covered.	Different applications of Newton's law will be made: Atwood apparatus, inclined plane, sliding block systems on frictional and frictionless surfaces.

Order	PreparationInfo	Laboratory	TeachingMethods	Theoretical	Practise
7	In the book "Physics for Universities," pages 77-83, topics titled "Work, Work Done by a Constant Force, Work Done by a Variable Force, Work Done by a Spring Force, Power, and Kinetic Energy" should be read and examples from example 5.1 to example 5.5 should be examined. To repeat the course, problems 5.1-5.12 in the Problems section on page 92 should be solved.		question and answer, problem solving	Within the scope of the Work and Energy Unit; the definitions of the work done by constant and variable forces, the calculation of the work done by the spring force, the necessary definitions and equations covering the topics of power and kinetic energy will be given and the solution methods of the related problems will be covered.	Applications will be made regarding the work and power calculations done by the spring force.
8				Midterm Week	
9	In the book "Physics for Universities," pages 8-903, students should read the topics titled "Potential energy, conservative and non-conservative forces, potential energy, and the law of conservation of energy" and examine examples from example 5.6 to example 5.15. To repeat the course, problems 5.13-5.22 in the Problems section on page 92 should be solved.		Question and answer-problem solving	Topics such as work-energy theorem, potential energy, gravitational potential energy, elastic potential energy, gravitational potential energy, and the law of conservation of energy will be discussed.	Applications and calculations that can teach the work-energy theorem and the law of conservation of energy will be made.
10	In the book "Physics for Universities," pages 95-100, you should read the topics titled "Impulse and momentum," "The law of conservation of momentum," "One-dimensional collisions," and "Elastic collisions," and examine examples from example 6.1 to example 6.5. To repeat the course, solve problems 6.1-6.6 in the Problems section on page 109. Google		Question and answer-problem solving	Within the scope of the Impulse, Momentum, and Center of Mass unit, the definitions of impulse and momentum will be given, and the equations of the law of conservation of momentum will be derived, and methods for solving related problems will be demonstrated. Using the law of conservation, equations for elastic and elastic collisions, which are types of one-dimensional collisions, will be derived.	Applications of the impulse-momentum theorem will be performed. Problems involving elastic collisions will be solved.
11	In the book "Physics for Universities," pages 99-104, you should read the topics titled "Plastic (inelastic) collisions, perfectly plastic collisions, and two-dimensional collisions" and examine examples from example 6.1 to example 6.10. To repeat the course, problems 6.7-6.19 in the Problems section on pages 109-11 should be solved.		Question and answer, problem solving	The properties of inelastic and perfectly plastic collisions will be given, and the relevant equations will be derived from conservation laws. The equations for two-dimensional collisions will be obtained, and methods for solving related problems will be presented.	Ballistic pendulum applications will be made.
12	In the book "Physics for Universities," pages 103-108, topics on center of mass, center of continuously distributed mass, mass dynamics, and rocket motion should be read and examples from example 6.11 to example 6.15 should be examined. To repeat the course, problems 6.20-6.25 in the Problems section on pages 109-11 should be solved.		explanation, question and answer, problem solving.	The center of mass will be examined by finding the center of a continuously distributed mass using 1) objects consisting of homogeneous and symmetrical parts and 2) integral center of mass methods, and the dynamics of the center of mass and rocket motion.	Applications will be made to find the center of a continuously distributed mass.

Order	PreparationInfo	Laboratory	TeachingMethods	Theoretical	Practise
13	In the book "Physics for Universities," pages 113-119, students should read the topics of angular kinematics, motion with constant angular acceleration, the relationship between angular and linear kinematics, and moment of a force. They should also examine the sample solved problems in examples 7.1-7.5. To reinforce the course, problems 7.1-7.13 in the problem section on pages 131-132 should be solved at the end of the week.		Question-answer, problem-solving	Within the scope of the Rotational Motion of Rigid Bodies unit, the angular kinematics of an object, angular position, angular velocity, and angular acceleration will be defined and their equations will be obtained. From these, the equations for rotational and translational motions with constant angular acceleration will be derived, and methods for solving related problems will be discussed. The moment of a force will be calculated.	Applications will be made to examine the rotational motion of rigid objects.
14	In the book "Physics for Universities," pages 119-129, students should read the topics "Rotational dynamics, moment of inertia calculations, parallel axis theorem, rolling motion, angular momentum and its conservation" and examine the solved examples 7.16-7.17. To repeat the course, problems 7.7-7.23 should be solved in the problem section on page 131.		Problem solving, question and answer, explanation	In the section titled "Rotational Dynamics," concepts and equations related to the rotational dynamics of both solids and rigid bodies will be presented. Inertia calculations for objects such as rods, spheres, and rings will be performed, and the parallel axis theorem will be presented. The rotational kinetic energy equation will be derived, and methods for solving related problems will be discussed.	Inertia calculations of some objects and applications of rolling motion will be given.
15	In the book "Physics for Universities," pages 135-139, students should read the topics "Static equilibrium," "The first condition of static equilibrium," and "The second condition of static equilibrium," and examine the solved examples 8.1-8.8. To review the course, problems 8.1-8.10 should be solved in the problem section on page 140.		case study question-answer problem solving	Within the scope of the static balance unit, the conditions of static balance will be emphasized.	The Mostar Bridge, built by the student of Mimar Sinan, will be discussed on what the resultant force should be to keep the bridge balanced.

Workload

Activities	Number	PLEASE SELECT TWO DISTINCT LANGUAGES
Vize	1	1,00
Final	1	1,00
Ders Öncesi Bireysel Çalışma	14	2,00
Ders Sonrası Bireysel Çalışma	14	2,00
Ara Sınav Hazırlık	4	4,00
Final Sınavı Hazırlık	4	4,00
Bütünleme	1	1,00

Assesments

Activities	Weight (%)
Ara Sınav	40,00
Final	60,00

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																						
L.O. 3			5	5																					
L.O. 4			5	5																					
L.O. 5			5	5																					
L.O. 6			5	5																					
L.O. 7			5	5													5								
L.O. 8			5	5													5								
L.O. 9			5	5													5								
L.O. 10			5	5													5								
L.O. 11			5	5													5								
L.O. 12			5	5													5								
L.O. 13			5	5													5								

Table :

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 : Fizikte ölçmenin önemini kavrayabilir.

L.O. 2 : Fizikteki temel nicelikleri birimleriyle birlikte ifade edebilir.

L.O. 3 : Vektörel ve skaler nicelikleri ayırt edebilir.

L.O. 4 : Konum, yer değiştirme, hız, sürat ve ivme arasındaki ilişkileri analiz edebilir.

L.O. 5 : Hareket bilgisi (kinematik) konusundaki temel kavramları bilir.

L.O. 6 : Kinematik niceliklerin zamanla değişimini gösteren grafikler çizebilir.

L.O. 7 : Kuvvetin cisimlerin hareketine olan etkisini analiz edebilir.

L.O. 8 : Çizgisel momentum ve çarpışmayı açıklayabilr

L.O. 9 : İş, güç ve enerji kavramlarını içeren problemleri çözebilir.

L.O. 10 : Dönme ve yuvarlanma hareketini analiz edebilir.

L.O. 11 : Fizikte iş, enerji ve güç kavramlarını açıklayabilir.

L.O. 12 : Sürekli dağılmış kütlenin merkezini hesaplayabilir.

L.O. 13 : Statik dengenin koşullarını bilir.