暨南大學
JINAN UNIVERSITY

Summer 2019

0702P100
Fundamentals of Physics I

Instructor: Stefan Kautsch
Time: Monday through Friday (June 17, 2019 - July 19, 2019)
Office Hours: 2 hours (according to the teaching schedule)
Contact Hours: 50 (50 minutes each)
Credits: 3
Location: Huiquan Building
Office: Huiquan Building 518
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Course Description

Fundamentals of Physics I is a general education course designed as an introduction to college physics for students majoring in the biological, environmental, earth, and social sciences, as well as disciplines such as architecture, business, and the humanities. The mathematical techniques used in this course include algebra and trigonometry, but not calculus. The main emphasis of the course is on the fundamentals of Newtonian mechanics and the physics of fluids. The goal of this course is to provide the student with a clear and logical presentation of the basic concepts and principles of physics, and to strengthen concept understanding through a range of interesting applications to the real world, including practical examples that demonstrate the role of physics in other disciplines.

Required Textbook(s)

The Physics of Everyday Phenomena: A Conceptual Introduction to Physics, 8th edition (2014), by W. Thomas Griffith and Juliet Brosing.Publisher: McGraw-Hill, ISBN 978- 0073513904.

Prerequisites

No prerequisites

Course Hours

The course has 20 sessions in total. Each class session is 120 minutes in length. The course meets from Monday to Thursday.

Course Structure

The course content is divided into 8 modules:
Module I (Introduction and Vectors) discusses mathematical concepts and techniques used throughout the course, such as dimensional analysis, significant figures, unit conversion, mathematical notation, and coordinate systems. This module will also define the basic quantities of measurement in mechanics (length, time, mass), and discuss the difference between scalar and vector quantities, as well as the properties and components of vectors.

Module II (Motion in One and Two Dimensions) investigates kinematics, the part of mechanics that describe motion without regard to the causes of motion. We will start by describing motion along a straight line and define the concepts of velocity and acceleration. We will then investigate the motion of free-falling bodies influenced by gravity, and conclude this module by exploring projectile motion.

Module III (The Laws of Motion) is an introduction to the classical (Newtonian) mechanics. Here we shall use the concepts of force and mass to describe the change in the motion of an object, relate mass and acceleration, and explore the laws of motion proposed by Newton. We will conclude this module by investigating some of the applications of Newton's laws and discuss the forces of friction.

Module IV (Circular Motion and the Law of Gravity) deals with circular motion, a specific type of two-dimensional motion. We explore the concepts of angular velocity, angular acceleration, and centripetal force, and introduce Newton's universal law of gravity. We discuss how this law, together with the laws of motion, enables us to understand many familiar phenomena, including the motion of satellites. We will also explore Kepler's laws of planetary motion.

Module V (Work and Energy) will focus on the mechanical forms of energy. We will introduce the concepts of work, power, and kinetic and potential energy, and explore how the ideas of work and energy can be used in place of Newton's laws to solve certain problems. We will conclude this module by discussing the law of conservation of energy and applying it to various problems.

Module VI (Momentum and Collisions) will discuss momentum and impulse, and investigate how they relate to the law of conservation of momentum. We will apply this understanding to a number of elastic/inelastic collisions.

Module VII (Equilibrium and Rotational Motion) will examine the relationship between angular velocity, angular acceleration, and the forces that produce rotational motion. We will also explore the conditions for equilibrium, and the relationship between torque, rotational inertia, and conservation of momentum.

Module VIII (Solids, Fluids, and Fluid Dynamics) will explore the states of matter and some properties of solids and fluids (liquids and gases). We will investigate concepts of density and pressure, explore buoyant forces and the Archimedes ' principle, then understand how these properties and concepts explain the behavior of fluids, both the fluids at rest and the fluids in motion.

Course Schedule

Please note that the schedule is meant to give an overview of the major concepts in this course. Changes may occur in this calender as needed to aid in the student`s development.

Week 1
Lecture 1:Introduction to Mechanics-Measurements and Vectors (Chapter 1)
Lecture 2: Describing Motion in One and Two Dimensions (Chapter 2)
Lecture 3: Falling Objects and Projectile Motion (Chapter 3)
Lecture 4: Introduction to Classical Mechanics (Chapter 4)

Week 2
Lecture 5: Applications of Newton's Laws (Chapter 4)
Lecture 6: Circular Motion, Angular Velocity and Acceleration (Chapter 5)
Lecture 7: Planetary Motion and Newton's Law of Universal Gravitation (Chapter 5)
Lecture 8: Work and Energy - Kinetic and Potential Energy (Chapter 6)

Week 3
Lecture 9: Conservative and Non-conservative Forces (Chapter 6)
Lecture 10: Review session for the Mid-Term Exam (Chapters 1-6)
Mid-Term Exam (Chapters 1 to 6)
Lecture 11: Momentum and Impulse (Chapter 7)

Week 4
Lecture 12: Elastic and Inelastic Collisions (Chapter 7)
Lecture 13: Rotational Motion (Chapter 8)
Lecture 14: Objects in Equilibrium-Torque, Balance, and Center of Gravity (Chapter 8)

Lecture 15: Rotational Inertia and Conservation of Momentum (Chapter 8)

Week 5
Lecture 16: Solids and Fluids-States of Matter, Density, and Pressure (Chapter 9)
Lecture 17: Fluids Dynamics and the Bernoulli's Equation (Chapter 9)
Final Exam Review Session
Final Exam (Chapters 1 to 9)

Course Requirements

Quizzes/Homework
Multiple self-assessment quizzes and homework assignments will be offered for students to practice their concept understanding and to prepare for the lectures. These quizzes and homework assignments will be distributed in class on a weekly basis. Late homework will NOT be accepted, except in the case of a documented medical reason (documentation is required).

Attendance Participation
Attendance at lectures and recitations. Continued absences will detract from your final grade. If you have missed/will be missing a class or recitation session for an acceptable reason, such as illness or religious observance, please let me know in person with a written document. Ideally, you should let me know of your absence prior to missing the class. In addition, **missing a class for an acceptable reason will not excuse you from completing the class exercises and the out-of class assignments** so, if you miss a class, it is your responsibility to obtain notes from a classmate and contact the instructor in order to complete all the assignments by their original or extended deadlines.

Grading Policy

Your final grade is based on the following components:

Quizzes/Homework	30%
Midterm Exam	30%
Final Exam	40%
Total	100%

Grading Scale

The instructor will use the grading system as applied by JNU:

Definition	Letter Grade	Score
Excellent	A	90~100

Good	B	80~89
Satisfactory	C	70~79
Poor	D	60~69
Failed	E	Below 60

Attendance

Attendance is mandatory in the class. It would be recorded each class and forms part of students' participation record. Students should inform the instructor at the earliest opportunity if they need to ask for a leave. All absences may have negative effect on students` final grades. Any students with more than three unexcused absences will automatically fail the course.

Academic Integrity

As members of the Jinan University academic community, students are expected to be honest in all of their academic coursework and activities. Academic dishonesty, includes (but is not limited to) cheating on assignments or examinations; plagiarizing, i.e., misrepresenting as one's own work any work done by another; submitting the same paper, or a substantially similar paper, to meet the requirements of more than one course without the approval and consent of the instructors concerned; or sabotaging other students' work within these general definitions. Instructors, however, determine what constitutes academic misconduct in the courses they teach. Students found guilty of academic misconduct in any portion of the academic work face penalties that range from the lowering of their course grade to awarding a grade of E for the entire course.