



0702P101

Fundamentals of Physics I (With Lab)

Instructor: TBA

E-mail: TBA

Time: May 17, 2027 - June 18, 2027; M, T, Th, 8:40am-12:00pm

Office Hours: 2 hours (according to the teaching schedule)

Contact Hours: 60 (50 minutes each)

Location: Online, Zoom

Credits: 4

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 main emphasis of the course is on the fundamentals of Newtonian mechanics and the physics of fluids. The goals of this course are to provide the student with a clear and logical presentation of the basic concepts and principles of physics, and to strengthen student's understanding of concepts through a range of interesting applications to the real world, including practical examples that demonstrate the role of physics in our universe.

Course Requirements

College Physics 2e from OpenStax College

Textbook. Go to <https://openstax.org/subjects> and click on green colored College Physics 2e to download the e-book.

A laptop or desktop with camera.

Access to a scanner or cell phone with Adobe Scan App for preparing pdf files.

A calculator with square-root, square, sine, cosine and tangent functions.

Access to reliable and high-speed internet connection.

Course Structure

This course covers 5 units on the topics listed below:

Unit 1: Units and significant figures, one and two-dimensional kinematics, position, velocity, and acceleration vs. time graphs, free-fall, projectile motion, vectors, trigonometric analysis of vectors, coordinate systems and vector components

Unit 2: Newton's three laws of motion, identifying forces, Hooke's law, static and kinetic friction, drag, free-body diagrams, equilibrium, statics in two dimensions, motion on inclined planes, dynamics in two dimensions, ropes and pulleys.

Unit 3: Impulse, momentum, the impulse-momentum theorem in one and two dimensions, conservation of momentum, collisions, work, power output, kinetic energy, gravitational potential energy, elastic potential energy, thermal energy, the work-energy theorem, and conservation of energy

Unit 4: Rotational motion, equations of motion for rotational motion, centripetal forces and accelerations, center of mass, torque, gravitational torque and stability, rotational inertia, Newton's second law for rotational motion, angular momentum, conservation of angular momentum, rotational kinetic energy

Unit 5: Fluids, pressure, hydraulic lifts, Buoyancy, fluid dynamics and Bernoulli's principle.

Assignments of the Course

There will be a total of 720 points which will be convert to a percentage to assign letter grade (shown in grading scale in the next page).

Tests - 300 points.

There will be three unit tests during week 4 and week 5, each worth 100 points.

Homework - 100 points.

Four weekly homework will be assigned.

Labs – 120 points.

Three lab assignments will be assigned and completed during class. Three labs total; 40 points each.

Final Exam – 200 points.

The final is cumulative and required. Each student will be given 2-hour time to complete the final exam.

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

Class Schedule

Week 1:

Monday

- a. Units and significant figures
- b. Motion in one dimension
 - i. Average vs. instantaneous speed
 - ii. Velocity

Tuesday

- b. Motion in one dimension
 - iii. Uniform Acceleration
 - iv. Free-fall
- c. Graphing motion
 - i. Position, velocity, and acceleration vs. time graphs

Thursday

- d. Vectors
 - i. Trigonometric representations of vectors
 - ii. Coordinate systems and Vector components
 - iii. Projectile motion
- e. Motion and Force
 - i. Newton's first law
 - ii. Identifying forces: friction, normal, tension, etc..
 - iii. Free-body diagrams
 - iv. Newtons Second Law
 - v. Applying Newton's Second Law in 1 and 2D
 - vi. Newton's Third Law

Week 2:

Monday

- b. Equilibrium
 - i. Static and dynamic equilibrium
- c. Dynamics and Newton's second Law
- d. Mass vs. weight and weightlessness

Tuesday

- e. Inclined planes

- f. Friction and drag
- g. Pulley systems
- h. Momentum and Impulse
 - i. Conservation of momentum
 - ii. Impulse-momentum Theorem
 - iii. Inelastic collisions vs elastic collisions

Thursday

- i. Work and Energy
 - i. Work and power
 - ii. Kinetic energy
 - iii. Gravitational potential energy

Week 3:

Monday

- a. Work and Energy
 - iv. Elastic potential energy
 - v. Work-energy theorem
 - vi. Conservation of energy

Tuesday

- b. Rotational motion
 - i. Uniform circular motion
 - ii. Centripetal forces and accelerations

Thursday

- c. Rotational motion
 - iii. Angular displacement, velocity, and acceleration
- d. Torque

- i. Gravitational torque and center of gravity

Week 4:

Monday

- a. Midterm Exam Unit 1
- b. Rotational dynamics
 - i. Moment of inertia
 - ii. Newton's second law for rotational motion

Tuesday

- c. Midterm Exam Unit 2
- d. Fluids
 - i. Pressure
 - ii. Buoyancy
 - iii. Fluid dynamics

Thursday

- e. Exp 1 Kinematics
- f. Exp 2 Determine Coefficient of Friction on an Inclined Plane

Week 5:

Monday

- a. Midterm Exam Unit 3
- b. Fluids
 - iv. Pascal Principle
 - v. Archimedes Principle
 - vi. Bernoulli Principle

Tuesday

- c. Final Exam

Thursday

- d. Exp 3 Momentum and Collision
- e. Additional Topics

Experiment Description

Exp 1: Kinematics. In this experiment, students will study the effect of angle, mass, surface friction and radii on the rolling of a sphere down an incline. Students will collect the velocity-time data and analyze data to see if the motion has constant acceleration.

Exp 2: Determine coefficient of friction on an inclined plane. In this experiment, students are going to perform the experiment at home and hope students can gain the experience of determining coefficient of friction of any surface. Students will increase the angle of slope until a coin starts to slip on the slope. That angle is associated with the coefficient of friction.

Exp 3: Momentum and collision. In this experiment, students will use a simulator to study two different collisions (elastic vs inelastic collision). Students are asked to answer a series of questions in differentiating two different collisions using data.

Attendance

You are expected to log into Zoom to attend the class and participate in class discussions. Attendance will be recorded each class, contributing to students' participation record. It is essential for students to notify the instructor as soon as possible if they need to request a leave of absence.

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 receiving a failing grade (E) in the course.