暨南大學 JINAN UNIVERSITY

Summer 2021

0702P101
Fundamentals of Physics I (With Lab)

Instructor: TBA

E-mail: TBA

Time: June 14, 2021-July 16, 2021

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

Contact Hours: 60 (50 minutes each)

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.

Required Textbook

***College Physics* from OpenStax College**

Go to https://openstax.org/subjects and click on blue colored College Physics to download the e-book.

A laptop or desktop with Microsoft Office.

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.

Access to a printer (optional)

Have a WeChat account (optional)

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.

Assessment

There will be a total of 720 points available during this semester. The breakdown of these points, as well as the grading scale, is shown below. Note based on Beijing time.

Tests - 300 points.

There will be three unit tests at the end of first three units, each worth 100 points.

Tests will be administered on Tuesdays at 5 am.

Homework - 100 points.

Weekly homework for 4 weeks will be assigned on Mondays at 5 am and will be due on Fridays at 5 am.

Labs – 120 points.

Labs will be assigned on Wednesdays at 5 am and done online or at home. It is due on Mondays at 5 am. Three labs total; 40 points each.

Final Exam – 200 points.

The final is cumulative and required. (given at most 12 hours to complete)

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

Online Submission Procedures

In order to receive any grade for your assignments or tests, do the followings:

If you have a printer, print the assignment and fill in the answers. If you do not have a printer, write the answers, your name and student ID clearly on paper or by using your electronic device. Then take picture on each page (note one picture per page to have the words large enough to read). Use Adobe Scan App to convert images into a pdf file. Submit this pdf file to Moodle. All assignments are due at 5 pm Beijing time according to the dates shown below. Failure to provide readable page will result no score on that page, but do not worry because you will be given a chance to correct any scanning error.

Summary of due dates (based on Beijing time)

	Monday	Tuesday	Wednesday	Thursday	Friday
Week 1					Homework 1 due
Week 2	EXP1 due		Unit Test 1 due		Homework 2 due
Week 3	EXP2 due		Unit Test 2 due		Homework 3 due

Week 4	EXP3 due		Unit Test 3 due		Homework 4 due
Week 5					Final Exam due

Late Assignments and No Make-up Exam

Tests, lab reports and assignments cannot be made up under any circumstances. All the tests, lab reports and assignments must submit online (see "online submission procedures" for general assignment guideline). Please inform the instructor if you foresee any difficulty in meeting required item listed (see page 1) on day 1 of this class.

Late submission may be accepted except the Final Exam within 12 hour past the due time (before 5 am Beijing time) but with some penalty. After the late submission is received, the instructor reserves his right to give zero grade and deduct points according to his discretion for late submission.

No late submission is allowed for the final exam so plan your time accordingly.

Class Schedule

Week 1:

a. Units and significant figures

b. Motion in one dimension

   i. Average vs. instantaneous speed

   ii. Velocity

   iii. Uniform Acceleration

   iv. Free-fall

c. Graphing motion

   i. Position, velocity, and acceleration vs. time graphs

d. Vectors

   i. Trigonometric representations of vectors

   ii. Coordinate systems and Vector components

   iii. Projectile motion

Week 2:

a. 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
b. Equilibrium
    i. Static and dynamic equilibrium
c. Dynamics and Newton's second Law
d. Mass vs. weight and weightlessness
e. Inclined planes
f. Friction and drag
g. Pulley systems

Week 3:

a. Momentum and Impulse
    i. Conservation of momentum
    ii. Impulse-momentum Theorem
    iii. Inelastic collisions vs elastic collisions
b. Work and Energy
    i. Work and power
    ii. Kinetic energy
    iii. Gravitational potential energy
    iv. Elastic potential energy
    v. Work-energy theorem
    vi. Conservation of energy

Week 4:

a. Rotational motion
    i. Uniform circular motion
    ii. Centripetal forces and accelerations
    iii. Angular displacement, velocity, and acceleration
b. Torque
    i. Gravitational torque and center of gravity
c. Rotational dynamics
    i. Moment of inertia
    ii. Newton's second law for rotational motion

Week 5:

Fluids

i. Pressure
ii. Buoyancy
iii. Fluid dynamics
iv. Pascal Principle
v. Archimedes Principle
vi. Bernoulli Principle

Lab Description

Exp 1: Kinematics. In this experiment, you will study the effect of angle, mass, surface friction and radii on the rolling of a disk down an incline. You 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, you are going to perform the experiment at home and hope you can gain the experience of determining coefficient of friction of any surface. You 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, you will use a simulator to study two different collisions (elastic vs inelastic collision). You are asked to answer a series of questions in differentiating two different collisions using data.

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.