

**PHYS 013: General Physics I (With Lab)**

Term: 2020 Winter Session
Instructor: Staff
Language of Instruction: English
Classroom: TBA
Office Hours: TBA
Class Sessions Per Week: 6
Total Weeks: 4
Total Class Sessions: 25
Class Session Length (minutes): 145
Credit Hours: 5
Total Lab sessions: 10

Course Description:

This course gives an introduction to the basic theories and principles of physics. Students will examine the following topics, including: Newton's laws; gravitation; mechanics, kinematics; energy and momentum conservation, rotational motion, and angular momentum conservation; simple harmonic motion; mechanical waves; fluids; ideal gas law; heat and the first and second laws of thermodynamics. We will also discuss Atomic and nuclear physics, and relativity meanwhile. This course is calculus-based.

Course Materials:

Fundamentals of Physics, Volume 1 (Chapter 1 - 20), David Halliday, Robert Resnick, Jearl Walker, 10th edition.

Course Format and Requirements:**Lectures:**

Students should do the assigned readings before coming to the lectures. During some of the lectures there will be in-class discussions, with two or three students discussing the problem together for a few minutes before discussing the problem as a whole class. An active participation in lecture will help a student to better understand the material and prepare for exams.

**Labs:**

The goal of the labs is to provide a hands-on experience with General Physics material and to enhance abilities in scientific methodology, critical thinking, and communicating about General Physics. Attendance is mandatory. No make-up labs will be provided.

Attendance:

Students are expected to attend and participate in class. Strong attendance and participation are good indicators of success. Each student is responsible for all course material, announcements, quizzes and exams made in class, whether or not the student attended that day's class.

Grading Scale:

A+: 98%-100%

A: 93%-97%

A-: 90%-92%

B+: 88%-89%

B: 83%-87%

B-: 80%-82%

C+: 78%-79%

C: 73%-77%

C-: 70%-72%

D+: 68%-69%

D: 63%-67%

D-: 60%-62%

F: Below 60%

Course Assignments:**Quizzes**

There will be 6 quizzes administered through the whole semester and the LOWEST score will be dropped. Quizzes will always be completed in the first ten minutes of class. The quiz problems will be similar to homework problems and in-class examples. There will be no make-up quizzes.

Midterm Exams

There will be two midterm exams in this course. The midterm exam will be based on concepts covered in class. It will be in-class, close-book and non-cumulative.

Final Exam



The final will be cumulative and close-book. Note that the final will not be taken during the normal class times. Exact time and location for final will be announced later.

Labs

It is expected that all lab reports will be neatly typed (word processed) with college level grammar and spelling. Each report should include the following sections: The purpose of the experiment, the physical phenomenon observed and the concept or numerical constant to be verified; data collected and graphs of results with clearly labeled axes; an explanation and interpretation of the results and how they compare to the stated objective. Questions related to the experiment should be included and answered completely and clearly.

Course Assessment:

Quizzes (5 out of 6)	15%
Labs	15%
Midterm Exams 1	20%
Midterm Exams 2	20%
Final Exam	30%
Total	100%

Course Schedule:

Week	Topics	Activities
1.	Go through syllabus Intro to the field of General Physics Review on needed Mathematical Formulas Measurement (Lengths, Time and Mass) Motion Along a Straight Line: Acceleration, Constant Acceleration, Falling-fall Acceleration Application of Graph in Motion Analysis Vectors Motions in Two and Three Dimensions:	Quiz 1 Quiz 2



	<p>Average Velocity and Acceleration, and Instantaneous Velocity and Acceleration</p> <p>Projectile Motion, Uniform Circular Motion, 1-D Motion and 2-D motion</p>	
2.	<p>Newtonian Mechanics:</p> <p>Newton's First Law and Second Law</p> <p>Some Particular Forces</p> <p>Newtons' Third and the Application of Newton's Law</p> <p>Friction</p> <p>Kinetic Energy and Work:</p> <p>Work Done by the Gravitational Force</p> <p>Work Done by a Spring</p> <p>Work Done by a General Variable Force</p> <p>Potential Energy and Conservation of Energy</p> <p>Center of Mass and Linear Momentum</p> <p>Rotation</p> <p>Rolling, Torque and Angular Momentum</p>	<p>Midterm 1</p> <p>Quiz 3</p>
3.	<p>Oscillations:</p> <p>Simple Harmonic Motion</p> <p>An Angular Simple Harmonic Oscillator</p> <p>Pendulums, Circular Motion</p> <p>Damped Simple Harmonic Motion</p>	<p>Quiz 4</p> <p>Midterm 2</p> <p>Quiz 5</p>



	Forced Oscillations and Resonance Equilibrium and Statics Gravitation and Newton's Law of Gravitation Fluids, Density and Pressure	
4.	Temperature, Heat, The First Law of Thermodynamics, Heat Transfer Mechanics Ideal Gas Law Entropy and the Second Law of Thermodynamics Wave: Types of Wave Transverse and Longitudinal Waves Wavelength and Frequency The Speed of a Traveling Wave Sound Wave Interference, Beats and Doppler Effects Course Summary and Review for Final	Quiz 6 Final exam

Lab Schedule:

Lab 1: Graph Matching; One-Dimensional Motion

Lab 2: Addition of Vectors; Velocity and Acceleration

Lab 3: Newton's Second Law; Projectile Motion

Lab 4: Centripetal Force; Static and Kinetic Friction

Lab 5: Work and Energy; Conservation of Energy; Buoyant Forces



Lab 6: Collisions and Momentum; Rotational Inertia

Lab 7: Harmonic Motion; Pendulum

Lab 8: Standing Waves; Resonance Tube; Oscillations of a String

Lab 9: Phase Changes; Heat Capacity

Lab 10: Heat of Fusion; Heat of Vaporization

Lab Final Presentation

Academic Integrity:

Students are encouraged to study together, and to discuss lecture topics with one another, but all other work should be completed independently.

Students are expected to adhere to the standards of academic honesty and integrity that are described in the Shanghai Normal University's *Academic Conduct Code*. Any work suspected of violating the standards of the *Academic Conduct Code* will be reported to the Dean's Office.

Penalties for violating the *Academic Conduct Code* may include dismissal from the program. All students have an individual responsibility to know and understand the provisions of the *Academic Conduct Code*.

Special Needs or Assistance:

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.