



## PHYS 011: General Physics I

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: 4

### Course Description:

This course studies the basic theories and principles of physics. Topics covered include 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. Atomic and nuclear physics, and relativity are discussed as well. This is a calculus-based physics course.

### Course Materials:

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

### Course Format and Requirements:

#### **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.

### Course Assessment:

|                      |             |
|----------------------|-------------|
| Quizzes (5 out of 6) | 20%         |
| Midterm Exams 1      | 20%         |
| Midterm Exams 2      | 20%         |
| Final Exam           | 40%         |
| <b>Total</b>         | <b>100%</b> |

**Course Schedule:**

|   |   |
|---|---|
| Week 1- Class 1   | Week 1- Class 2   |
| Introduction to the course<br>Basic units<br>One-dimensional motion                                   | Continued topics on 1D motion<br>Idea of vectors<br>Scalar VS. Vector:<br>Speed & Velocity<br>Displacement and Distance<br>2D motions   |
| Week 1- Class 3   | Week 1- Class 4   |
| <b><u>Quiz 1</u></b><br>3D motions<br>Newton's laws: first law<br>Understand idea of force and motion | Newton's laws: first law<br>Understand idea of force and motion<br>Newton's laws: second law<br>Acceleration, velocity and displacement |
| Week 1- Class 5   | Week 1- Class 6   |
| Newton's laws: second law<br>Centripetal acceleration   | <b><u>Quiz 2</u></b><br>Newton's law: third law<br>Friction: static friction, sliding friction and rolling friction<br>Normal Force     |
| Week 2- Class 7   | Week 2- Class 8   |
| Work<br>Idea of negative work<br>Intro to Potential energy  | <b><u>Midterm 1</u></b><br>Potential energy:<br>Elastic Potential energy<br>Gravitational Potential energy                              |
| Week 2- Class 9   | Week 2- Class 10  |
| Equation of Conservation of energy<br>Center of mass<br>How to find the Centroid                      | Linear momentum<br>Conservation of linear momentum<br>Linear momentum<br>Conservation of linear momentum                                |



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|  | Different types of collisions  |
| Week 2- Class 11   | Week 2- Class 12   |
| <b><u>Quiz 3</u></b><br>Conservation of linear momentum<br>Apply equations of momentum conservation and energy conservation to model elastic/inelastic collision | Conservation of linear momentum<br>Impulse   |
| Week 3- Class 13   | Week 3- Class 14   |
| Average force<br>Intro to Rotation<br>Angular Displacement   | <b><u>Quiz 4</u></b><br>Angular Velocity<br>Angular Acceleration<br>Angular Displacement<br>Angular Velocity                                   |
| Week 3- Class 15   | Week 3- Class 16   |
| Angular Acceleration<br>Topics on rigid body dynamics: angular acceleration, angular velocity and centripetal acceleration                                       | Torque<br>Angular momentum<br>Apply conservation of angular momentum<br>Equilibrium  |
| Week 3- Class 17   | Week 3- Class 18   |
| <b>Midterm 2</b><br>Statics and Free Body Diagram<br>Gravitational Force   | <b><u>Quiz 5</u></b><br>Gravitational force<br>Back to gravitational potential energy<br>More type of energy: intro to heat and thermodynamics |
| Week 4- Class 19   | Week 4- Class 20   |
| First law<br>Second First law of thermodynamics<br>Ideal gas law<br>Fluids: Hydrostatics   | Finish topics on fluids: Buoyancy<br>Simple Harmonic Motion  |



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| Week 4- Class 21   | Week 4- Class 22   |
| Oscillations<br>Wave Dynamics:<br>Waves on strings               | Waves on strings<br>Sound waves<br>Beats and doppler effect  |
| Week 4- Class 23   | Week 4- Class 24   |
| <b><u>Quiz 6</u></b><br>Sound waves<br>Beats and doppler effect  | Atomic and nuclear physics<br>The Rutherford–Bohr model<br>Isolated atoms<br>Fission & Fusion<br>History and developments of atomic theory |
| Week 4- Class 25   | <b><u>Final Exam (Cumulative): TBA</u></b>   |
| Relativity<br>Time, length and velocity under special relativity |  |

**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.

