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# **PHYS 0174: Physics for Science and Engineering 1**

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Spring-semester, 2021

*(Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on Blackboard system and announced in class.)*

## **Lecturer:**

**Dr. Lin Fang**

Institute: Physics College, Sichuan University

Office: Room 321 Zone 3

Email: Frank\_lynn@qq.com

Office-hour: Not fixed, appointment first. Online support is always available.

## **Time and Location:**

1. 10:15 - 11:55 Monday, Room 101 Zone 3.
2. 10:15 - 11:55 Thursday, Room 101 Zone 3.

## **Teaching Assistant:**

Mr. Wang Yi, a senior student in Pittsburgh College, SCU.

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## **Catalog Description:**

4 Credits.

As the first part of a two-semester introduction to general physics, this course introduces students to the basic principles of classical Newtonian mechanics and gravitation. Topics covered include description of motion, Newton's Laws, momentum and impulse, work and energy, rotational motion, angular momentum, rigid bodies and fluid dynamics.

## **Suggested Textbook:**

## Course Objective:

The goal of this course is to give students an introductory overview of the subject of physics, starting from the description of the fundamental quantities such as time, distance, and mass, and to progress through the description of nature using Newtonian mechanics and its application to gravity. **Strong mathematical skills** are needed to test the understanding of the models and theories that the students will be introduced to. As the semester progresses the students are required to:

1. Be familiar with the basic concepts and methods physicists use to analyze the world. Interpret the different units and scales of measurable quantities.
2. Convert units of mechanical quantities.
3. Make use vectors to describe and analyze motion.
4. Describe and analyze motion with constant acceleration Apply differential calculus to the analysis of motion. Analyze simple situations and explain them to other people.
5. Make use of motion diagrams. Acquire a thorough understanding of the concept of force Apply newton's laws to simple physical systems.
6. Apply the principle of conservation of energy to mechanical systems. Interrelate the concepts of physical work, forces, potential, and kinetic energy Apply the principle of conservation of linear momentum.
7. Apply concepts such as torque and angular momentum to rotation of rigid bodies Apply newton's law of gravitation to planetary motion.
8. Assimilate new material and apply it to analyze different situations.

## Course Outline:

### Section 1:

Measurement (Ch. 1)

Motion along a Straight Line (Ch. 2)

Vectors (Ch. 3)

Motion in Two and Three Dimensions (Ch. 4)

### Section 2:

Force and Motion (Ch. 5-6)

Energy and Work (Ch. 7)

Potential Energy and Conservative Force (Ch. 8)

Elasticity (Ch. 12)

Gravitation (Ch. 13)

### Section 3:

Center of Mass and Linear Momentum (Ch. 9)

Rotation and Rigid Bodies (Ch. 10)

Rolling, Torque and Angular Momentum (Ch. 11)

### **Section 4:**

Fluid Dynamics (Ch. 14)

## **Examination Schedule:**

**Midterm Exam:** Early May (Section 1 and 2);

**Final Exam:** Late June (Section 3 and 4).

## **Course Grading:**

### **Homework:**

40%. Full score of 10 points each time.

### **Midterm Exam:**

30%.

### **Final Exam:**

30%.

### **Bonus:**

1. At most 10 points added to the total.
2. Several small but open and innovative problems will be given with the course going on.
3. Students can freely choose to do or not to do the works.
4. Teams can be formed of which the number of members are no more than 3.
5. Students can deliver their works by paper, presentation (in video) or animated demo.

**The up-limit of total score is 100. If exceeded, it will be counted as 100.**

## **Grading Scale:**

A 10-point scale will be used as a baseline for final grades (A, A- > 90, 89 > B+, B, B- > 80, etc.). An additional curve may be applied, as determined by the overall final grade distribution of the class. Grades of A-, B+, B-, etc. will be determined at the instructor's discretion.