PHYS 0174: Physics for Science and Engineering 1

Fall-semester, 2023

(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:

A.P. YU TIAN (余天)

Institute: Physics College, Sichuan University

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

Time and Location:

1. 10:15 - 11:55 Monday, Room 316 Zone 3.

2. 10:15 - 11:55 Wednesday, Room 316 Zone 3.

Teaching Assistant:

Mort (杨艺航), a senior student in SCUPI.

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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:

Principles of Physics, 10th Edition, Halliday, Resnick, Walker. International Student Version.

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:

<u>Section 0:</u>

Basic Math

<u>Section 1:</u>

Dimension and Unit (Ch. 1)
Motion Description (Ch.2-4)

<u>Section 2:</u>

Force and Motion (Ch. 5-6)
Energy and Work (Ch. 7)
Potential Energy and Conservative Force (Ch. 8-13)

<u>Section 3:</u>

Center of Mass and Linear Momentum (Ch. 9)
Rotation and Rigid Bodies (Ch. 10-11)

<u>Section 4:</u>

Fluid Dynamics (Ch. 14)

Examination Schedule:

Quiz: randomly; on class.

Final Exam: on late December.

Chapter Summary：Hand in after each chapter

Course Grading:

Homework:
20%. Full score of 10 points each section.

Quiz (4):
5% each; 20% total.

Section Summary(4)：
5% each; 20% total.

Final Exam:
40%

Bonus:
1. At most 5 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.
6. One paper rule: Publish one research paper or finish a project (strong related to this course's content) within this semester, you get all 60% and do not need hand in exercise.

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

Grading Scale:

Final grades will be determined according to the table below. An additional curve may be applied, as determined by the overall final grade distribution of the class.

字母等级	A	A-	B+	B	B-	C+	C	C-	D+	D	F
中文等级	优秀		良好		中等		合格				不合格
百分制	100~90	89~85	84~80	79~76	75~73	72~70	69~66	65~63	62~61	60	<60
绩点	4	3.7	3.3	3	2.7	2.3	2	1.7	1.3	1	0