PHYS 0175: Physics for Science and Engineering 2

Fall-semester, 2020

(*Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on Backboard 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: 13:00 – 14:00 Tuesday; 9:00 – 10:00 Thursday. Online support is always available.

Time and Location:

1. 13:50 - 15:30 Monday, Room 102 Zone 3.

2. 13:50 - 15:30 Thursday, Room 102 Zone 3.

Teaching Assistant:

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

QQ: 1229940536

Email: 2018141521034@stu.scu.edu.cn

Catalog Description:

4 Credits.

As the second part of a two-semester introduction to general physics, this course introduces students to the basic principles of fluid dynamics, thermodynamics, electromagnetic field and wave optics; modern physics such as theory of relativity and quantum mechanics is briefly introduced as well.

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:

Part 1:

Fluid Dynamics (Ch. 14)

Part 2:

Thermodynamics (Ch. 18-20)

Part 3: Electromagnetic Field

Electric field: Chapter 21 – 25
Current and Circuit: Chapter 26 – 27
Magnetic field: Chapter 28 – 29
Induction and inductance: Chapter 30 – 31
Maxwell's equations: Chapter 32 – 33

Part 4: Oscillation and Wave

Oscillations: Chapter 15
Wave: Chapter 16 – 17

Part 5 (optional): Wave Theory of Light

Interference: Chapter 35
Diffraction: Chapter 36

Examination Schedule:

Midterm Exam: Early November;

Final Exam: late December.

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.