

## Syllabus of Fudan University

Department: Department of Physics		Date: Nov. 2018	
Course Code	PHYS120015		
Course Title	Fundamental Physics Laboratory		
Credit	2	Credit Hours	3
Course Nature	<input type="checkbox"/> Specific General Education Courses <input type="checkbox"/> Core Courses <input type="checkbox"/> General Education Elective Courses <input checked="" type="checkbox"/> Basic Courses in General Discipline <input type="checkbox"/> Professional Compulsory Courses <input type="checkbox"/> Professional Elective Courses <input type="checkbox"/> Others		
Prerequisite course	College Physics		
Course Objectives	<p>Master the basic knowledge, the basic approach and basic skills of physics experiments.</p> <p>Learn to investigate the physical laws by the experimental method, to deepen understanding and mastery of physical laws, and enhance the ability to raise questions in the experiment, analyze and solve problems:</p> <p>To be familiar with the experimental research on the physical phenomena.</p> <p>How to design an experiment to reach the proposed objective.</p> <p>How to analyze the experimental data and the errors.</p> <p>How to report what you obtain in a physics laboratory to others.</p> <p>Cultivate the scientific attitude.</p>		
Course Description	<p>“Fundamental Physics Laboratory” is a course for foreign students of the medical school. It is a one-semester course with 3 course-hours per week.</p> <p>The course consists of</p> <ul style="list-style-type: none"><li>● 2 lectures on “data processing” and “introduction”</li><li>● 9 laboratories from mechanics, thermodynamics, electromagnetics, optics and atomic physics.</li><li>● 3 group-discussions</li><li>● Oral test at the end of the course</li></ul>		
Course Requirements:			
1. A preview report must be prepared before the experiment.			
2. Write the experiment report independently.			

**Teaching Methods:**

Explain the experiment principle, experiment operation and so on, enlighten the students to solve the problems by themselves.

**Instructor's Academic Background:**

Weifeng Su, Ph.D. Associate Professor, Physics experiment teaching and Physics education research

Yongkang Le, Ph.D. Professor, Physics experiment teaching and Physics education research

Rui Peng, Ph.D. Associate Professor, Complex quantum materials and their microstructures

Members of Teaching Team				
Name	Gender	Professional Title	Department	Responsibility
Weifeng Su	F	Associate Professor	Department of Physics	Experimental guidance teacher
Yongkang Le	M	Professor	Department of Physics	Experimental guidance teacher
Rui Peng	F	Associate Professor	Department of Physics	Experimental guidance teacher

**Course Schedule (Please supply the details about each lesson in a total of 18 weeks):**

1<sup>st</sup> week: lecture on data processing: significant figure, error and Uncertainty, how to draw a figure.

2<sup>nd</sup> week: lecture on how to do physics experiments, the requirement of the course, how to write the lab report.

3<sup>rd</sup> week: Mechanics laboratory — Target hitting through collision: This experiment is designed for the review of mechanics. In this experiment, learn to predict, operate, observe, analysis, and then improve.....

4<sup>th</sup> week: Torsional pendulum: This experiment is designed for a review of the rotation of rigid body. Determine the torsional constant  $K$  of the spiral spring with a plastic cylinder. Employ the theoretically calculated moment of inertia of the plastic cylinder as a known value. Measure the moment of inertia of differently shaped objects. Compare the measured results with the theoretically calculated values.

5<sup>th</sup> week: The latent heat of vaporization of liquid nitrogen: Review the physical concepts and relationships associated with the flow of heat into and out of materials. Determine the latent heat of liquid nitrogen (LN). Determine the specific heat of copper in the temperature range between liquid nitrogen (LN) and room temperature water.

6<sup>th</sup> week: Group Discussion.

7<sup>th</sup> week: Digital oscilloscope: Learn how to use the digital storage oscilloscope (DSO) and the function generator.

8<sup>th</sup> week: Wheatstone bridge: Learn the operation of the Wheatstone bridge and measure an unknown resistor.

9<sup>th</sup> week: Magnetic field variation along the axis of a circular coil and a Helmholtz coil: To study the variation of magnetic field along the axis of a circular coil and the principle of superposition of magnetic field using a Helmholtz coil

10<sup>th</sup> week: Group Discussion.

11<sup>th</sup> week: Converging Lens: To determine the focal lengths of converging lenses by different methods, and to learn the structure of simple optical instrument such as microscope and telescope.

12<sup>th</sup> week: Frank-Hertz experiment with Neon: Study of the quantized excitation of Neon atom and to observe the light emission resulted from the de-excitation of excited atoms. To determine the first excitation potential of neon.

13<sup>th</sup> week: X-ray experiment: Observe the image of an opaque object on the luminous screen, and to study how the image quality can be improved. Investigate the lattice spacing of an NaCl monocrystal.

14<sup>th</sup> week: Group Discussion.

15<sup>th</sup> week: Q and A.

16<sup>th</sup> week: Oral test.

The design of class discussion or exercise, practice, experience and so on:  
Lectures + lab guidance + discussions

If you need a TA, please indicate the assignment of assistant:

Grading & Evaluation (Provide a final grade that reflects the formative evaluation process):

The final score of the course consists of the score given according to the students performance in the laboratories and discussions(70%) and the score from the oral test(30%).

Teaching Materials (Including Author, Title, Publisher and Publishing time):

Author	Title	Publisher	Publishing time
Weifeng Su, Yongkang Le	Lab guides		

Teaching References (Including Author, Title, Publisher and Publishing time):

Author	Title	Publisher	Publishing time

Table column size can be adjusted according to the content.