**Syllabus of Fudan University**

**(2024)**

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| **Department:** Department of Physics **Date: 2024.11.06** | | | | | | | | | | | | | | |
| **Course Code** | | PHYS120003.07 | | | | | | | | | | | | |
| **Course Title** | | General Physics B | | | | | | | | | | | | |
| **Credit** | | 3.0 | | **Experiment**  **(including Computer) Credit** | | | | | 0 | **Practice Credit** | | 0 | **Aesthetic Education**  **Credit** | 0 |
| **Credit Hours Per Week** | | 4 | | **Education on The Hard-Working Spirit Credit Hours** | | | | | 0 | [**Language of Instruction**](http://www.baidu.com/link?url=47JJa4qk0LrDpLNqaOc5vq3QapQmx50Zq2Si4vRilP0LBh4dhC7LdZ11ucoXf4IUT8hpalC4TDsTvQgZFq5vOkmJp5rQO-DihNiIVE0Ui-SRoTDGpQwonRCT8aiX7pDO) | | English | **Honors**  **Course** | □Yes  🗹No |
| **Course Type** | | □Core General Education Course □Specific General Education Course 🗹Basic Course in General Discipline  □Others | | | | | | | | | 2+X Major ：  □Professional Core Course  □Professional Advanced Course | | | |
| Non 2+X Major ：  □Professional Compulsory Course □Professional Elective Course | | | |
| **Course Objectives** | | （Including value, knowledge and ability objectives） | | | | | | | | | | | | |
| **Course Description** | |  | | | | | | | | | | | | |
| **Course Requirements:**  Students will be requested: 1) to attend classes regularly; 2) to accomplish homework and tasks assigned by the Principal Instructor and the Teaching Assistant, by the deadlines that will be fixed; 3) to study regularly the content of classes, before the next class. | | | | | | | | | | | | | | |
| **Teaching Methods:**  **Arrangement：**🗹 In class (offline) ○ hybrid (online & offline)  **Main activities:**  ☑A lecture ☑B discussions ☑C demonstrations  □D case analysis □E teamwork projects □F competitions  □G experiments □H field investigations ☑J exercises  □K other \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Classes are provided with the explanation of the principles and laws of mechanics and electromagnetism, including their derivations, at the blackboard, and are complemented with some laboratory demonstrations. | | | | | | | | | | | | | | |
| **Course Director's Academic Background:**  Yang Zhongqin: female, professor of the Department of Physics at Fudan University, doctoral supervisor. Bachelor of Nanjing University (1994), Master of Fudan University (1997), Doctor of Philosophy (2000). She is enthusiastic about teaching and has taught courses such as General Physics, Solid State Physics, College Physics, and Nanophysics. Her research focuses on computational condensed matter physics, mainly using first-principles-based computational methods to engage in theoretical research on topological electronic states, novel material electronic structures, nanostructure charge, spin quantum transport properties. | | | | | | | | | | | | | | |
| **Instructor's Academic Background:**  Yan-Wen Tan is currently a tenured professor at the Department of Physics, Fudan University. Prof. Tan acquired her undergraduate and master of Science degree at the Physics department of National Taiwan University. She then went to Columbia University for her PhD study under the guidance of Horst Stormer. Afterwards, she did her postdoctorial studies at the department of Chemistry of UC Berkeley and Princeton University. Prof. Tan’s field of expertise is single-molecule fluorescence spectroscopies. Her research interests are focused on the working principles of biological macromolecules, especially for signaling proteins. | | | | | | | | | | | | | | |
| **Members of Teaching Team** | | | | | | | | | | | | | | |
| **Name** | | **Gender** | | | **Professional Title** | | | **Department** | | | | **Responsibility** | | |
| Yan-Wen Tan | | female | | | Professor | | | Physics | | | | Principal Instructor | | |
| Zhongqin Yang | | female | | | Professor | | | Physics | | | | Course Director | | |
| Faxian Xiu | | male | | | Professor | | | Physics | | | | Joint Developer | | |
| Fang Guan | | male | | | Researcher | | | Institute for Micro-Nano Electronic Devices and Quantum Computing | | | | Joint Developer | | |
| Weijuan Fu | | female | | | Lecturer | | | Physics | | | | Joint Developer | | |
| Jihui Yang | | male | | | Professor | | | Physics | | | | Joint Developer | | |
| Wei Chen | | male | | | Professor | | | Physics | | | | Joint Developer | | |
| **Course Schedule** (Please supply the details and objectives about each lesson)**:**  *The Schedule is tentative and subjected to variations, depending on students’ feedback*  **Introduction + prep (4 hrs)**  Vectors, concept of Calculus  **Particle Kinematics (5 hrs)**  Time and space; Position and trajectory; Velocity, acceleration, angular velocity, angular acceleration; Cartesian coordinate, Natural coordinate; Linear motion, curvilinear motion, relative motion.  **Dynamics (6.5 hrs)**  Newton's laws, common forces; Principle of relativity and Galilean transformation; Inertial frame, non-inertial frame, and inertial force; Moment of inertia and rotational laws; Momentum, momentum theorem, and conservation of momentum; Angular momentum, angular momentum theorem, and conservation of angular momentum; Introduction to biomechanics\*.  **Work and energy, conservation of mechanical energy (4.5 hrs)**  Work and power of a force, Work and power of a torque, Conservative force and potential energy, Kinetic energy theorem, work-energy principle, law of conservation of mechanical energy; Collision.  **Fluid Mechanics (4 hrs)**  Description of fluid motion, Continuity equation for ideal fluids, Bernoulli's equation and its applications, Viscosity law, Bernoulli's equation for viscous fluids; Blood flow\*.  **Electrostatic field (10 hrs)**  Electric field strength, electric potential; Coulomb's law, superposition principle, Gauss's theorem, loop theorem, electric potential gradient; Conditions and properties of electrostatic equilibrium in conductors; Capacitance, Introduction to dielectrics.  **Steady Magnetic Field (6 hrs)**  Magnetic field, Biot-Savart law, Gauss's theorem for magnetism, Ampère's circuital law and its applications, Ampère's force, Magnetic moment, Motion of charged particles in an electromagnetic field, Introduction to ferromagnetic materials, biological effects of magnetic fields\*.  **Electromagnetic induction and electromagnetic waves (6 hrs)**  Basic laws of electromagnetic induction; Motional and induced electromotive force; Self-induction and mutual induction; Basic introduction to electromagnetic waves.  **Vibration and Wave motion (8 hrs)**  Description and superposition of simple harmonic motion; Damped oscillation, forced oscillation, resonance; Generation and propagation of mechanical waves, wave equation; Wave interference, standing waves; Doppler effect; Ultrasound and its medical applications\*.  **Wave Optics (8 hrs)**  Interference of parallel thin films; Wedge interference; Newton's rings, Michelson interference, Huygens-Fresnel principle, Single-slit and circular aperture Fraunhofer diffraction; Resolving power of optical instruments; Gratings; Introduction to light polarization; X-rays and their medical applications\*.  **Flexible time (2 hrs)** | | | | | | | | | | | | | | |
| **The design of class discussion or exercise, practice, experience and so on:**  Problems and exercises will be regularly discussed during classes, once the basis of each topic will have been specified.  Exercises assigned as homework and in preparation for the final exam, will be discussed during classes. | | | | | | | | | | | | | | |
| **If you need a TA, please indicate the assignment of assistant:**  Assignment of TA: grading of exercises assigned during classes; addressing students’ requests in first instance; assisting in-class experimental demonstrations. | | | | | | | | | | | | | | |
| **Grading & Evaluation** (Provide a final grade that reflects the formative evaluation process)**:**  Homework: 25%  In-class Quiz: 5%  Midterm Exam: 30%  Final Exam: 40% | | | | | | | | | | | | | | |
| **Usage of Textbook：**🗹Yes(complete textbook information form below) □No  **Textbook Information** (No more than two textbooks) **:** | | | | | | | | | | | | | | |
| **Title** | **Author** | | **ISBN** | | | **Publishing Time** | **Publisher** | | | **Type Ⅰ** | | | **Type Ⅱ** | |
| **Serway’s College Physics** | **Faughn/Serway** | | **0-534-49318-1** | | | **2014** | **THOMSON BROOKS/COLE** | | | □Self-compiled Textbook (Published)  🗹Non-mainland Textbook  □Other Textbook (Published) | | | □National Planning Textbook  □Provincial and Ministerial Planning Textbook  □School Level Planning Textbook  🗹Others | |
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| **Teaching References** (Including author, title, publisher, publishing time,ISBN)**:**  P. Urone, College Physics, 2nd edition China Machine Press, 2008.  R.K. Hobbie, B.J. Roth, “Intermediate Physics for Medicine and Biology,” Springer New York, NY, 2007.  R. A. Muller, “Physics for Future Presidents,” Princeton University Press, 2010. | | | | | | | | | | | | | | |

Table column size can be adjusted according to the content.