PHYA22H3 Introduction to Physics IIB

Course calendar description:
PHYA22H3 Introduction to Physics IIB
The course covers the main concepts of Electricity and Magnetism, Optics, and Atomic and Nuclear Physics. It provides basic knowledge of these topics with particular emphasis on its applications in the life sciences. It also covers some of the applications of modern physics such as atomic physics and nuclear radiation.

Prerequisite: [PHYA10H3 or PHYA11H3 or (PHYA01H3)] and [MATA29H3 or MATA30H3 or MATA31H3]
Corequisite: (MATA21H3) or MATA35H3 or MATA36H3 or MATA37H3. Note: (MATA21H3) & MATA35H3 do not allow for many future programs in science.
Exclusion: PHYA21H3, (PHY110Y), PHY132H, PHY135Y, (PHY138Y), PHY152H
Breadth Requirement: Natural Sciences

Course organization: 3 hours of lecture, 3 hours of practical every week.

Instructor: Dr. Jian Yuan
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Office: SW506G
Office Hours: Wednesday noon-1PM
Alternative times can be arranged by appointment.

Course Evaluation:

Practical:	**25%**
Test 1	**15%**
Test 2:	**15%**
Final Exam:	**45%**
Clicker Questions:	**3% bonus**
Mastering Physics Assignments:	**2% bonus**

Required text:
Physics for Scientists and Engineers: A Strategic Approach, Fourth Edition by Randall D. Knight.

Course outline:

Topic	***Lecture hours***
Introduction to the course	*1*
TRAVELING WAVES • 16.1 The Wave Model • 16.2 One-Dimensional Waves • 16.3 Sinusoidal Waves • 16.5 Sound and Light • 16.7 Waves in Two and Three Dimensions • 16.8 Power, Intensity, and Decibels • 16.9 The Doppler Effect	*5*
SUPERPOSITION OF WAVES • 17.1 The Principle of Superposition • 17.2 Standing Waves • 17.3 Standing Waves on a String • 17.4 Standing Sound Waves and Musical Acoustics • 17.5 Interference in One Dimension	*6*

• 17.6 The Mathematics of Interference • 17.7 Interference in Two and Three Dimensions • 17.8 Beats	
WAVE OPTICS • 33.1 Models of Light • 33.2 The Interference of Light (with the exception of Intensity) • 33.3 The Diffraction Grating • 33.4 Single-Slit Diffraction • 33.6 Circular-Aperture Diffraction • 33.7 Interferometers (with the exception of Holography)	*4*
ELECTRIC CHARGES AND FORCES • 22.1 The Charge Model • 22.2 Charge • 22.3 Insulators and Conductors • 22.4 Coulomb's Law • 22.5 The Field Model	*2*
THE ELECTRIC FIELD • 23.1 Electric Fields Models • 23.2 The Electric Field of Point Charges • 23.3 The Electric Field of a Continuous Charge Distribution • 23.4 The Electric Fields of Rings, Discs, Planes, and Spheres • 23.5 The Parallel-Plate Capacitor	*3*
THE ELECTRIC POTENTIAL • 25.1 Electric Potential Energy • 25.2 The Potential Energy of Point Charges • 25.3 The Potential Energy of a Dipole • 25.4 The Electric Potential • 25.5 The Electric Potential Inside a Parallel-Plate Capacitor • 25.6 The Electric Potential of a Point Charge • 25.7 The Electric Potential of Many Charges	*3*
POTENTIAL AND FIELD • 26.2 Finding the Electric Field from the Potential	*1*
CURRENT AND RESISTANCE • 27.1 The Electron Current • 27.2 Creating a Current • 27.3 Current and Current Density • 27.4 Conductivity and Resistivity • 27.5 Resistance and Ohm's Law	*1*
THE MAGNETIC FIELD • 29.1 Magnetism • 29.2 The Discovery of the Magnetic Field • 29.3 The Source of the Magnetic Field: Moving Charges • 29.4 The Magnetic Field of a Current • 29.5 Magnetic Dipoles • 29.6 Ampère's Law and Solenoids	*5*
THE FOUNDATION OF MODERN PHYSICS • 37.1 Matter and Light • 37.2 The Emission and Absorption of Light	*1*
QUANTIZATION • 38.1 The Photoelectric Effect • 38.2 Einstein's Explanation	*2*
NUCLEAR PHYSICS • 42.1 Nuclear Structure • 42.2 Nuclear Stability	*2*
Total:	36