

Course Syllabus

Course Description Physics B is designed to acquaint you with topics of physics, including a quick review of Physics A (first semester course), units on sound, light, electricity, magnetism, atomic physics and nuclear physics. Class activities include discussion, problem solving, online lab simulations and other interactive activities, lab reports, and an exploration project.

Textbook(s) This course is not textbook dependent.

Course Objectives

Waves

1. Students know waves carry energy from one place to another.
2. Students know how to identify transverse and longitudinal waves in mechanical media, such as springs and ropes, and on the earth (seismic waves).
3. Students know how to solve problems involving wavelength, frequency, and wave speed.
4. Students know sound is a longitudinal wave whose speed depends on the properties of the medium in which it propagates.
5. Students know radio waves, light, and X-rays are different wavelength bands in the spectrum of electromagnetic waves whose speed in a vacuum is approximately 3×10^8 m/s (186,000 miles/second).
6. Students know how to identify the characteristic properties of waves: interference (beats), diffraction, refraction, Doppler effect, and polarization.

Electric and Magnetic Phenomena

1. Students know how to predict the voltage or current in simple direct current (DC) electric circuits constructed from batteries, wires, resistors, and capacitors.
2. Students know how to solve problems involving Ohm's law.
3. Students know any resistive element in a DC circuit dissipates energy, which heats the resistor. Students can calculate the power (rate of energy dissipation) in any resistive circuit element by using the formula $\text{Power} = IR$ (potential difference) $\times I$ (current) $= I^2R$.
4. Students know the properties of transistors and the role of transistors in electric circuits.
5. Students know charged particles are sources of electric fields and are subject to the

forces of the electric fields from other charges.

6. Students know magnetic materials and electric currents (moving electric charges) are sources of magnetic fields and are subject to forces arising from the magnetic fields of other sources.

7. Students know how to determine the direction of a magnetic field produced by a current flowing in a straight wire or in a coil.

8. Students know changing magnetic fields produce electric fields, thereby inducing currents in nearby conductors.

9. Students know plasmas, the fourth state of matter, contain ions or free electrons or both and conduct electricity.

10. Students know electric and magnetic fields contain energy and act as vector force fields.

11. Students know the force on a charged particle in an electric field is qE , where E is the electric field at the position of the particle and q is the charge of the particle.

12. Students know how to calculate the electric field resulting from a point charge.

13. Students know static electric fields have as their source some arrangement of electric charges.

14. Students know the magnitude of the force on a moving particle (with charge q) in a magnetic field is $qvB \sin(a)$, where a is the angle between v and B (v and B are the magnitudes of vectors v and B , respectively), and students use the right-hand rule to find the direction of this force.

15. Students know how to apply the concepts of electrical and gravitational potential energy to solve problems involving conservation of energy.

**Course
Outline**

Unit	Topics	Activities
1	Review of Physics A Concepts	Lecture: Science Fundamentals Activity Lecture: Mechanics Activity Lecture: Properties of Matter

			<p>Activity</p> <p>Lecture: Heat</p> <p>Activity</p> <p>Diagnostic Exam</p>
	2	Sound and Light	<p>Lecture: Vibrations and Waves</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Vibrations and Waves Quiz</p> <p>Lecture: Sound</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Sound Quiz</p> <p>Lecture: Light</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Light Quiz</p> <p>Lecture: Color</p> <p>Assignment</p> <p>Reading Assignment</p>

			<p>Key Terms</p> <p>Key Terms Quiz</p> <p>Color Quiz</p> <p>Discussion</p> <p>Labs: Time That Period, Wave Interference, Catch That Wave!, Secret Bells, Candemonium, Benham's Disk, Gray Step, Black Magic (Marker), Blue Sky, Glue Stick Sunset, Build Your Own Spectroscope, and Spectra</p> <p>Project</p>
	3	Sound and Light (Continued)	<p>Lecture: Reflection and Refraction</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Reflection and Refraction Quiz</p> <p>Lecture: Lenses</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Lenses Quiz</p> <p>Lecture: Diffraction and Interference</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p>

			<p>Diffraction and Interference Quiz</p> <p>Discussion</p> <p>Labs: Spherical Reflections, Disappearing Glass Rods, Seeing Rainbows, Water, Sphere, Lens, Real Image, Seeing Your Retina, Finding Your Blind spot, and Peripheral Vision.</p> <p>Project</p>
	<p>4</p>	<p>Electricity and Magnetism</p>	<p>Lecture: Electrostatics</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Electrostatics Quiz</p> <p>Lecture: Electric Fields and Potential</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Electric Fields and Potential Quiz</p> <p>Lecture: Electric Currents</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Electric Currents Quiz</p> <p>Lecture: Electric Circuits</p> <p>Assignment</p>

		<p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Electric Circuits Quiz</p> <p>Discussion</p> <p>Labs: Electric Fleas, Charge and Carry, and Short Circuit</p> <p>Project</p> <p>Midterm</p>
5	Electricity and Magnetism	<p>Lecture: Magnetism</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Magnetism Quiz</p> <p>Lecture: Electromagnetic Induction</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Electromagnetic Induction Quiz</p> <p>Discussion</p> <p>Labs: Strange Attractor, Magnetic Shielding, Diamagnetism, Eddy Currents, Magnetic Suction, and Motor Effect</p> <p>Project</p>

6	The Atom and The Quantum	<p>Lecture: Atom and the Quantum</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Atom and the Quantum Quiz</p> <p>Lecture: Atomic Nucleus and Radioactivity</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Atomic Nucleus and Radioactivity Quiz</p> <p>Discussion</p> <p>Labs: Radioactive Decay</p> <p>Project</p>
7	The Atom and The Quantum	<p>Lecture: Nuclear Fission and Fusion</p> <p>Assignment</p> <p>Reading Assignment</p> <p>Key Terms</p> <p>Key Terms Quiz</p> <p>Nuclear Fission and Fusion Quiz</p> <p>Discussion</p> <p>Project</p>

**Grading
Policy**

8	Course Closure	Cumulative Review Activity Pre-Test Final Exam Final Project Submission
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Grading Scale	
Letter Grade	Percentage Earned
A	90% - 100%
B	80% - 89%
C	70% - 79%
D	60% - 69%
F	59% and lower

- This is an inquiry-based course. Students will generate knowledge through online readings, synchronous chats, asynchronous discussions with students and their instructor, interactions with online tutorials, and online and hands-on simulations.
 - A semester project developed by each student will be used to demonstrate knowledge and understanding of the material in the course.
 - The instructor will act as a guide, a facilitator, an events planner, and a resource advisor. He/she will always be available through e-mail.
 - The student must actively construct and acquire knowledge by being intrinsically motivated to succeed. To succeed, students must participate and complete all readings and activities. This course requires the student's active participation.
 - Both formal and informal assessment methods will be used in the course. Informal assessment will include an evaluation of the quality and timeliness of participation in class activities. Formal assessment may include multiple-choice quizzes, tests, discussion board participation, and written assignments. A final exam will be given at the end of the course.
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