

## COURSE OVERVIEW

Integrated Physics and Chemistry is a physical science course designed for high school students needing an entry-level science course covering basic concepts found in chemistry and physics. Topics included in this study are:

- matter,
- motion and forces,
- work and energy,
- electricity and magnetism, and
- waves.

Throughout the course, students will have opportunities to observe simulations, investigate ideas, and solve problems—both on screen and away from the computer.

The course seeks to help students expand their knowledge and skills so that they may achieve the following goals:

- Gain an understanding of foundational concepts in physics and chemistry.
- Make careful observations of the surrounding environment.
- Analyze problems and solutions scientifically.
- Integrate science knowledge with real world situations at local, regional, national, and international levels.
- Appreciate the impact of science discovery on everyday life.

UNIT 1: EXPLORATIONS IN PHYSICAL SCIENCE		
INTEGRATED PHYSICS AND CHEMISTRY	<b>Assignment Titles</b>	
	1. Course Overview	10. Mass and Density
	2. What is Science?	11. Experiment: Determining Density
	3. The Scientific Method	12. Experiment: Density Column*
	4. Experiment: Making Observations	13. Quiz 2: Measuring Matter
	5. Quiz 1: Nature of Science	14. Special Project*
	6. The Metric System	15. Review
	7. Scales	16. Test
	8. Volume	17. Alternate Test*
	9. Experiment: Determining Volume	18. Glossary and Credits

UNIT 2: THE STRUCTURE OF MATTER		
INTEGRATED PHYSICS AND CHEMISTRY	<b>Assignment Titles</b>	
	1. The History of Atomic Theory	11. Mixtures
	2. Experiment: Atomic Structure	12. Separating Mixtures
	3. The Atomic Model	13. Experiment: Separating a Mixture
	4. Quiz 1: Atomic Structure	14. Quiz 3: Mixtures
	5. Elements and Their Properties	15. Special Project*
	6. The Periodic Table	16. Review
	7. Trends on the Periodic Table	17. Test
	8. Experiment: Identifying an Unknown	18. Alternate Test*
	9. Compounds	19. Glossary and Credits
10. Quiz 2: Pure Substances		

UNIT 3: MATTER AND CHANGE	
INTEGRATED PHYSICS AND CHEMISTRY	<b>Assignment Titles</b>
	1. States of Matter
	2. Changes of State
	3. Experiment: Graphing Changes of State
	4. Solutions - The Dissolving Process
	5. Acids and Bases
	6. Experiment: The Cabbage Indicator
	7. Quiz 1: Physical Changes
	8. Chemical Bonding
	9. Atomic Structure and Bonding
	10. Experiment: Chemical Changes
	11. Chemical Reactions and Conservation of Mass
	12. Types of Chemical Reactions
	13. Quiz 2: Chemical Changes
	14. Radioactivity
	15. Nuclear Reactions
	16. Experiment: Half-Life
	17. Nuclear Energy
	18. Quiz 3: Nuclear Changes
	19. Special Project*
	20. Review
	21. Test
	22. Alternate Test*
23. Glossary and Credits	

UNIT 4: STATES OF MATTER	
INTEGRATED PHYSICS AND CHEMISTRY	<b>Assignment Titles</b>
	1. Properties of Solids
	2. Experiment: Comparing Hardness and Density of Solids
	3. Elasticity and Strength in Solids
	4. Electrical Conductivity in Solids
	5. Quiz 1: Solids
	6. Characteristics of Liquids
	7. Experiment: Viscosity
	8. Pressure in Liquids
	9. Archimedes' Principle and Flotation
	10. Liquids and Capillary Action
	11. Quiz 2: Liquids
	12. General Characteristics of Gases
	13. Pressure and Volume in Gases
	14. Experiment: Pressure in Gases
	15. Temperature and Volume Changes in Gases
	16. Quiz 3: Gases
	17. Special Project*
	18. Review
	19. Test
	20. Alternate Test*
21. Glossary and Credits	

UNIT 5: MOTION AND FORCES	
INTEGRATED PHYSICS AND CHEMISTRY	<b>Assignment Titles</b>
	1. Distance and Displacement
	2. Speed and Velocity
	3. Acceleration
	4. Motion Graphs
	5. Experiment: Motion Graphs
	6. Momentum
	7. Quiz 1: Motion
	8. Forces
	9. Friction
	10. Newton's Laws
	11. Experiment: Propulsion
	12. Centripetal Force
	13. Quiz 2: Forces
	14. Special Project*
	15. Review
	16. Test
	17. Alternate Test*
18. Glossary and Credits	

UNIT 6: SEMESTER REVIEW AND EXAM	
INTEGRATED PHYSICS AND CHEMISTRY	<b>Assignment Titles</b>
	1. Review
	2. Exam
	3. Alternate Exam - Form A*
4. Alternate Exam - Form B*	

UNIT 7: WORK AND ENERGY	
INTEGRATED PHYSICS AND CHEMISTRY	<b>Assignment Titles</b>
	1. Forms of Energy
	2. Work
	3. Mechanical Energy
	4. Conservation of Energy
	5. Experiment: Potential and Kinetic Energy
	6. Power
	7. Quiz 1: Work, Energy, and Power
	8. Simple Machines; Levers
	9. Mechanical Advantage and Efficiency
	10. Pulleys; Wheels and Axles
	11. Inclined Planes, Wedges, and Screws
	12. Experiment: Inclined Planes
	13. Quiz 2: Simple Machines
	14. Special Project*
	15. Review
	16. Test
17. Alternate Test*	
18. Glossary and Credits	

UNIT 8: HEAT FLOW	
INTEGRATED PHYSICS AND CHEMISTRY	<b>Assignment Titles</b>
	1. Thermodynamics and Entropy
	2. Specific Heat Capacity
	3. Heat Flow
	4. Experiment: Insulators
	5. Quiz 1: Energy Transfer
	6. Heating Systems
	7. Experiment: Heat and Expansion
	8. Cooling and Refrigeration
	9. Heat Engines
	10. Quiz 2: Heat Flow and Technology
	11. Special Project*
	12. Review
	13. Test
	14. Alternate Test*
15. Glossary and Credits	

UNIT 9: ELECTRICITY AND MAGNETISM	
INTEGRATED PHYSICS AND CHEMISTRY	<b>Assignment Titles</b>
	1. Electric Charges
	2. Static Electricity
	3. Experiment: Electrostatic Investigations
	4. Electric Current
	5. Circuits
	6. Electrical Energy and Power
	7. Quiz 1: Electricity
	8. Magnetism
	9. Magnetism and Electricity
	10. Experiment: Diverting a Magnetic Field
	11. Magnetic Fields in Space
	12. Quiz 2: Magnetism
	13. Special Project*
	14. Review
	15. Test
	16. Alternate Test*
17. Glossary and Credits	

UNIT 10: WAVES	
INTEGRATED PHYSICS AND CHEMISTRY	<b>Assignment Titles</b>
	1. Waves and Energy Transfer
	2. Types of Waves
	3. Properties of Waves
	4. Experiment: Changing the Speed of a Wave
	5. The Behavior of Waves
	6. Quiz 1: Wave Characteristics and Properties
	7. Sound Vibrations
	8. Detecting Sound
	9. Experiment: Using Vibrations to Produce Sound
	10. Doppler Effect
	11. Beats, Resonance, and Harmonics
	12. Quiz 2: Sound
	13. Light and the Electromagnetic Spectrum
	14. Properties of Light
	15. Reflection and Mirrors
	16. Experiment: Law of Reflection
	17. Lenses
	18. Quiz 3: Light
	19. Special Project*
	20. Review
	21. Test
	22. Alternate Test*
23. Glossary and Credits	

INTEGRATED PHYSICS AND CHEMISTRY	UNIT 11: CHEMISTRY AND PHYSICS IN OUR WORLD	
	Assignment Titles	
	1. Carbon Dioxide and Global Warming	9. Experiment: Kepler's Second Law
	2. Experiment: Carbon Dioxide and Water Acidity	10. Quiz 2: Space Physics
	3. Fossil Fuels' Effect on the Environment	11. Special Project*
	4. Experiment: Water Acidity and the Environment	12. Review
	5. Quiz 1: Environmental Chemistry	13. Test
	6. Atomic Spectra and Moving Stars	14. Alternate Test*
	7. The Temperature of Stars	15. Glossary and Credits
	8. Kepler and the Motion of the Spheres	

INTEGRATED PHYSICS AND CHEMISTRY	UNIT 12: SEMESTER REVIEW AND EXAM	
	Assignment Titles	
	1. Review	3. Alternate Exam - Form A*
	2. Exam	4. Alternate Exam - Form B*

INTEGRATED PHYSICS AND CHEMISTRY	UNIT 13: FINAL EXAM	
	Assignment Titles	
	1. Exam	3. Alternate Exam - Form B*
	2. Alternate Exam - Form A*	

(\*) Indicates alternate assignment