

## Integrated Physics and Chemistry

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	
Assignments	
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	
Assignments	
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: The Structure of Matter																									
Integrated Physics and Chemistry	<b>Assignments</b>																								
	<table border="0"> <tr> <td>1. States of Matter</td> <td>13. Quiz 2: Chemical Changes</td> </tr> <tr> <td>2. Changes of State</td> <td>14. Radioactivity</td> </tr> <tr> <td>3. Experiment: Graphing Changes of State</td> <td>15. Nuclear Reactions</td> </tr> <tr> <td>4. Solutions - The Dissolving Process</td> <td>16. Experiment: Half-Life</td> </tr> <tr> <td>5. Acids and Bases</td> <td>17. Nuclear Energy</td> </tr> <tr> <td>6. Experiment: The Cabbage Indicator</td> <td>18. Quiz 3: Nuclear Changes</td> </tr> <tr> <td>7. Quiz 1: Physical Changes</td> <td>19. Special Project*</td> </tr> <tr> <td>8. Chemical Bonding</td> <td>20. Review</td> </tr> <tr> <td>9. Atomic Structure and Bonding</td> <td>21. Test</td> </tr> <tr> <td>10. Experiment: Chemical Changes</td> <td>22. Alternate Test*</td> </tr> <tr> <td>11. Chemical Reactions and Conservation of Mass</td> <td>23. Glossary and Credits</td> </tr> <tr> <td>12. Types of Chemical Reactions</td> <td></td> </tr> </table>	1. States of Matter	13. Quiz 2: Chemical Changes	2. Changes of State	14. Radioactivity	3. Experiment: Graphing Changes of State	15. Nuclear Reactions	4. Solutions - The Dissolving Process	16. Experiment: Half-Life	5. Acids and Bases	17. Nuclear Energy	6. Experiment: The Cabbage Indicator	18. Quiz 3: Nuclear Changes	7. Quiz 1: Physical Changes	19. Special Project*	8. Chemical Bonding	20. Review	9. Atomic Structure and Bonding	21. Test	10. Experiment: Chemical Changes	22. Alternate Test*	11. Chemical Reactions and Conservation of Mass	23. Glossary and Credits	12. Types of Chemical Reactions	
	1. States of Matter	13. Quiz 2: Chemical Changes																							
	2. Changes of State	14. Radioactivity																							
	3. Experiment: Graphing Changes of State	15. Nuclear Reactions																							
	4. Solutions - The Dissolving Process	16. Experiment: Half-Life																							
	5. Acids and Bases	17. Nuclear Energy																							
	6. Experiment: The Cabbage Indicator	18. Quiz 3: Nuclear Changes																							
	7. Quiz 1: Physical Changes	19. Special Project*																							
	8. Chemical Bonding	20. Review																							
	9. Atomic Structure and Bonding	21. Test																							
	10. Experiment: Chemical Changes	22. Alternate Test*																							
	11. Chemical Reactions and Conservation of Mass	23. Glossary and Credits																							
	12. Types of Chemical Reactions																								

Unit 4: States of Matter																							
Integrated Physics and Chemistry	<b>Assignments</b>																						
	<table border="0"> <tr> <td>1. Properties of Solids</td> <td>11. Quiz 2: Liquids</td> </tr> <tr> <td>2. Experiment: Comparing Hardness and Density of Solids</td> <td>12. General Characteristics of Gases</td> </tr> <tr> <td>3. Elasticity and Strength in Solids</td> <td>13. Pressure and Volume in Gases</td> </tr> <tr> <td>4. Electrical Conductivity in Solids</td> <td>14. Experiment: Pressure in Gases</td> </tr> <tr> <td>5. Quiz 1: Solids</td> <td>15. Temperature and Volume Changes in Gases</td> </tr> <tr> <td>6. Characteristics of Liquids</td> <td>16. Quiz 3: Gases</td> </tr> <tr> <td>7. Experiment: Viscosity</td> <td>17. Special Project</td> </tr> <tr> <td>8. Pressure in Liquids</td> <td>18. Review</td> </tr> <tr> <td>9. Archimedes' Principle and Flotation</td> <td>19. Test</td> </tr> <tr> <td>10. Liquids and Capillary Action</td> <td>20. Alternate Test*</td> </tr> <tr> <td></td> <td>21. Glossary and Credits</td> </tr> </table>	1. Properties of Solids	11. Quiz 2: Liquids	2. Experiment: Comparing Hardness and Density of Solids	12. General Characteristics of Gases	3. Elasticity and Strength in Solids	13. Pressure and Volume in Gases	4. Electrical Conductivity in Solids	14. Experiment: Pressure in Gases	5. Quiz 1: Solids	15. Temperature and Volume Changes in Gases	6. Characteristics of Liquids	16. Quiz 3: Gases	7. Experiment: Viscosity	17. Special Project	8. Pressure in Liquids	18. Review	9. Archimedes' Principle and Flotation	19. Test	10. Liquids and Capillary Action	20. Alternate Test*		21. Glossary and Credits
	1. Properties of Solids	11. Quiz 2: Liquids																					
	2. Experiment: Comparing Hardness and Density of Solids	12. General Characteristics of Gases																					
	3. Elasticity and Strength in Solids	13. Pressure and Volume in Gases																					
	4. Electrical Conductivity in Solids	14. Experiment: Pressure in Gases																					
	5. Quiz 1: Solids	15. Temperature and Volume Changes in Gases																					
	6. Characteristics of Liquids	16. Quiz 3: Gases																					
	7. Experiment: Viscosity	17. Special Project																					
	8. Pressure in Liquids	18. Review																					
	9. Archimedes' Principle and Flotation	19. Test																					
	10. Liquids and Capillary Action	20. Alternate Test*																					
		21. Glossary and Credits																					

Unit 5: Motion and Forces																							
Integrated Physics and Chemistry	<b>Assignments</b>																						
	<table border="0"> <tr> <td>1. Distance and Displacement</td> <td>11. Newton's Laws</td> </tr> <tr> <td>2. Speed and Velocity</td> <td>12. Project: Virtual Lab - Newton's Laws</td> </tr> <tr> <td>Acceleration</td> <td>13. Experiment: Propulsion</td> </tr> <tr> <td>3. Motion Graphs</td> <td>14. Centripetal Force</td> </tr> <tr> <td>4. Experiment: Motion Graphs</td> <td>15. Quiz 2: Forces</td> </tr> <tr> <td>5. Momentum</td> <td>16. Project: Virtual Lab - Circular Motion</td> </tr> <tr> <td>6. Project: Virtual lab - Conservation of Momentum</td> <td>17. Special Project*</td> </tr> <tr> <td>7. Quiz 1: Motion</td> <td>18. Review</td> </tr> <tr> <td>8. Forces</td> <td>19. Test</td> </tr> <tr> <td>9. Friction</td> <td>20. Alternate Test*</td> </tr> <tr> <td>10. Distance and Displacement</td> <td>21. Glossary and Credits</td> </tr> </table>	1. Distance and Displacement	11. Newton's Laws	2. Speed and Velocity	12. Project: Virtual Lab - Newton's Laws	Acceleration	13. Experiment: Propulsion	3. Motion Graphs	14. Centripetal Force	4. Experiment: Motion Graphs	15. Quiz 2: Forces	5. Momentum	16. Project: Virtual Lab - Circular Motion	6. Project: Virtual lab - Conservation of Momentum	17. Special Project*	7. Quiz 1: Motion	18. Review	8. Forces	19. Test	9. Friction	20. Alternate Test*	10. Distance and Displacement	21. Glossary and Credits
	1. Distance and Displacement	11. Newton's Laws																					
	2. Speed and Velocity	12. Project: Virtual Lab - Newton's Laws																					
	Acceleration	13. Experiment: Propulsion																					
	3. Motion Graphs	14. Centripetal Force																					
	4. Experiment: Motion Graphs	15. Quiz 2: Forces																					
	5. Momentum	16. Project: Virtual Lab - Circular Motion																					
	6. Project: Virtual lab - Conservation of Momentum	17. Special Project*																					
	7. Quiz 1: Motion	18. Review																					
	8. Forces	19. Test																					
	9. Friction	20. Alternate Test*																					
	10. Distance and Displacement	21. Glossary and Credits																					

Unit 6: Semester Review and Exam		
IPC	<b>Assignments</b>	
	1. Review	3. Alternate Exam - Form A*
	2. Exam	4. Alternate Exam - Form B*

Unit 7: Work and Energy	
Integrated Physics and Chemistry	<b>Assignments</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. Project: Virtual Lab - Simple Machines	
13. Experiment: Inclined Planes	
14. Quiz 2: Simple Machines	
15. Project: Virtual Lab - Projectiles	
16. Special Project*	
17. Review	
18. Test	
19. Alternate Test*	
20. Glossary and Credits	

  

Unit 8: Heat Flow	
Integrated Physics and Chemistry	<b>Assignments</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>Assignments</b>
	1. Electric Charges
	2. Static Electricity
	3. Experiment: Electrostatic Investigations
	4. Electric Current
	5. Circuits
	6. Electrical Energy and Power
	7. Project: Virtual Lab - Circuits
	8. Quiz 1: Electricity
	9. Magnetism
10. Magnetism and Electricity	
11. Experiment: Diverting a Magnetic Field	
12. Magnetic Fields in Space	
13. Quiz 2: Magnetism	
14. Special Project*	
15. Review	
16. Test	
17. Alternate Test*	
18. Glossary and Credits	

  

Unit 10: Waves	
Integrated Physics and Chemistry	<b>Assignments</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. Project: Virtual Lab - Sound
10. Experiment: Using Vibrations to Produce Sound	
11. Doppler Effect	
12. Project: Virtual Lab - Doppler Effect	
13. Beats, Resonance, and Harmonics	
14. Quiz 2: Sound	
15. Light and the Electromagnetic Spectrum	
16. Properties of Light	
17. Reflection and Mirrors	
18. Experiment: Law of Reflection	
19. Lenses	
20. Quiz 3: Light	
21. Project: Virtual Lab - Light	
22. Special Project*	
23. Review	
24. Test	
25. Alternate Test*	
26. Glossary and Credits	

Integrated Physics and Chemistry	<b>Unit 11: Chemistry and Physics in Our World</b>	
	<b>Assignments</b>	
	1. Carbon Dioxide and Global Warming	9. Kepler and the Motion of the Spheres
	2. Experiment: Carbon Dioxide and Water Acidity	10. Experiment: Kepler's Second Law
	3. Fossil Fuels' Effect on the Environment	11. Quiz 2: Space Physics
	4. Media and Science	12. Special Project*
	5. Experiment: Water Acidity and the Environment	13. Review
	6. Quiz 1: Environmental Chemistry	14. Test
	7. Atomic Spectra and Moving Stars	15. Alternate Test*
	8. The Temperature of Stars	16. Glossary and Credits
IPC	<b>Unit 12: Semester Review and Exam</b>	
	<b>Assignments</b>	
	1. Review	3. Alternate Exam - Form A*
	2. Exam	4. Alternate Exam - Form B*
IPC	<b>Unit 6: Final Exam</b>	
	<b>Assignments</b>	
	1. Final Exam	3. Alternate Exam - Form B*
	2. Alternate Exam - Form A*	