Centerville Senior High School Curriculum Mapping
Integrated Chemistry & Physics
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Integrated Chemistry & Physics Overview

The Indiana Academic Standards specify the core, fundamental skills students should learn, master, and apply at grade level beginning in kindergarten and continuing through grade twelve. These academic standards serve as the basis to our curriculum in Centerville-Abington Community Schools but do not serve as curriculum alone. The Indiana Academic Standards are supported through grade-level, content-specific curriculum maps and resources. These curriculum maps and resources are aligned to the Indiana Academic Standards and provide the tools which are necessary to meet the needs of all learners. As a result, the Centerville-Abington Community Schools' curriculum maps are examined regularly and undergo periodic revisions.

Integrated Chemistry and Physics introduces the fundamental concepts of scientific inquiry, the structure of matter, chemical reactions, forces, motions, and the interaction between energy and matter. The ultimate goal of this class is to produce scientifically literate students capable of using their knowledge of physical science to solve real world problems, and to make personal, social, and ethical decisions that have consequences beyond the classroom walls.

Textbook: Glencoe/McGraw Hill. (2017). *Integrated Chemistry & Physics*

Unit 1 Theme	**Duration of Unit**	**Essential Question(s)**
Motion and Forces	6 weeks	● How is the scientific method used to learn and communicate information about the natural world? ● What are ways that motion can occur? ● How do Newton's Laws explain how forces and motion are related?

End of Unit 1 Authentic Learning Task

Momentum Summary Activity: Students will work in small groups to collect data related to the momentum of differently sized balls. Analysis will include calculating velocity of a baseball, tennis ball and golf ball that is rolled into a stationary softball. Momentum is also calculated based on the mass of the moving balls. Students also measure how far the softball moves. Data will be presented graphically to show the greater momentum an object has, the larger the distance it causes the softball to move.
Assessment: Students' work will be assessed with a rubric that checks for demonstration of correct measurements and calculations as well as clear and concise answers to the conclusion questions.
Standards:HS-ICP2-1, 9-10.LST.3.2,

Pacing: Chapters 1-3, 16 block days

Indiana Academic Standards

HS-ICP2-1, 9-10.LST.2.1, 9-10.LST.2.2, 9-10.LST.2.3, 9-10.LST.3.1, 9-10.LST.3.2, 9-10.LST.3.3, 9-10.LST.4.1, 9-10.LST.4.1, 9-10.LST.4.3, 9-10.LST.6.1, 9-10.LST.6.2, 9-10.LST.7.1, 9-10.LST.7.2, 9-10.LST.7.3

Academic Vocabulary

Chapter 1

scientific methods, hypothesis, experiment, variable, dependent variable, independent variable, constant, control, bias, model, theory, scientific law, standard, SI, volume, matter, mass, density

Chapter 2

displacement, motion, speed, momentum, velocity, acceleration, centripetal acceleration

Chapter 3

field, force, friction, gravity, net force, weight, inertia, Newton's first law of motion, Newton's second law of motion, Newton's third law of motion, air resistance, centripetal force, free fall, law of conservation of momentum, terminal velocity

Key Concepts/Learning Targets

Chapter 1

- I can identify the variables in the science experiment, and understand why they are used.
- I can explain the difference between a scientific law and a scientific theory.
- I can explain why standard units of measurements are used in science.
- I can list the multiples of ten that each SI prefix represents.
- I can list the SI units and symbols for length, volume, mass, density, time, and temperature.
- I can convert from one SI unit to another using conversion factors.
- I can describe the three different types of graphs and know when to use each type.
- I can place and label the dependent and independent variables in the correct location on a graph.

Chapter 2

- I can determine how distance and displacement are different.
- I can calculate the speed of an object.
- I can identify information from a distance-time graph.
- I can calculate the momentum of an object.
- I can identify three ways an object can accelerate.
- I can calculate the acceleration of an object.
- I can identify differences and similarities among straight line motion, circular motion, and projectile motion.

Chapter 3

- I can explain how force and motion are related.
- I can explain why there is friction between objects.
- I can define inertia and explain how it is related to Newton’s first law of motion.
- I can use Newton’s second law to calculate acceleration.
- I can use Newton’s laws of motion to explain what happens in a car crash and the effects of air resistance.

Resources/Activities

Chapter 1

- Graph interpretation assignment
- Data interpretation and graph formation assignment

Question Stems

Chapter 1

- Why do scientists use variables?
- What is the difference between a scientific law and a scientific theory?
- What is a standard of measurement?

- SI unit lab
- SI unit conversion practice
- Pennies Lab activity
- Crossword Vocabulary Puzzle
- Quizlet
- SmartBook

Chapter 2

- Speed of Hot Wheels activity
- Calculations - speed and acceleration
- Foldable reference with formulas and examples
- Bowling Ball activity
- Quizlet
- SmartBook

Chapter 3

- Momentum Lab activity
- Calculations momentum
- Close Reading activity
- Quizlet
- SmartBook

- What multiple of ten does each SI prefix represent?
- What are the SI units and symbols for length, volume, mass, density, time, and temperature?
- How can related SI units be converted?
- What are the three types of graphs, and how are they used?
- How are dependent and independent variables expressed in a graph?

Chapter 2

- How are distance and displacement different?
- How is an object's speed calculated?
- What information does a distance-time graph provide?
- How can an object's momentum be calculated?
- How are acceleration, time and velocity related?
- What are three ways an object can accelerate?
- How can an object's acceleration be calculated?
- What are the similarities and differences between straight line motion, circular motion and projectile motion?

Chapter 3

- How are force and motion related?
- How is the net force on an object determined?
- Why is there friction between objects?
- What is inertia and how is it related to Newton's first law of motion?
- How can an object's acceleration be calculated using Newton's second law of motion.
- How does Newton's first law explain what happens in a car crash?
- How does Newton's second law explain the effects of air resistance?
- When is momentum conserved?

Assessment(s)

Bell ringers
Exit tickets
Quizzes
Chapter Tests
Lab Assignments

Unit 2 Theme	**Duration of Unit**	**Essential Question(s)**
Energy	9 weeks	● How can energy be transformed through work? ● How is thermal energy transferred or converted into other forms? ● What is electricity? ● How do magnets exert forces on magnetic materials?

End of Unit 2 Authentic Learning Task

Motion, Work and Power: Students will work together in small groups to collect data by measuring distance and time walk and run up a set of stairs. They will calculate velocity, work and power and explain how the amount of work is the same but running up the stairs requires more power.

Assessment: Students' work will be assessed with a rubric that checks for demonstration of correct measurements and calculations as well as clear and concise answers to the conclusion questions.

Standards:HS-ICP3-1, 9-10.LST.2.3, 9-10.LST.3.2,

Pacing- chapters 4-7: 22 block days (quarter 1&2)

Indiana Academic Standards

HS-ICP3-1, HS-ICP3-2, HS-ICP3-3
HS-ICP3-4, HS-ICP3-5, 9-10.LST.2.1, 9-10.LST.2.2, 9-10.LST.2.3, 9-10.LST.3.1, 9-10.LST.3.2, 9-10.LST.3.3, 9-10.LST.4.1, 9-10.LST.4.1, 9-10.LST.4.3, 9-10.LST.6.1, 9-10.LST.6.2, 9-10.LST.7.1, 9-10.LST.7.2, 9-10.LST.7.3

Academic Vocabulary

Chapter 4

compound machine, efficiency, mechanical advantage, simple machine, work, chemical potential energy, elastic potential energy, gravitational potential energy, kinetic energy, potential energy, law of conservation of energy, mechanical energy, power

Key Concepts/Learning Targets

Chapter 4

- I can define and calculate work.
- I can explain the difference between kinetic and potential energy.
- I can calculate kinetic energy.
- I can calculate gravitational potential energy.
- I can explain the law of conservation of energy.

Chapter 5

- I can describe how thermal energy and temperature are related.
- I can calculate changes in thermal energy.
- I can explain how conduction, convection and radiation are used to transfer energy.
- I can distinguish between thermal conductors and insulators.

Chapter 6

- I can compare gravitational force and electric force.
- I can describe how objects become electrically charged.
- I can explain how electric current is produced.

<table>
<tr>
<td>Chapter 5
heat, specific heat capacity, temperature, thermal energy, conduction, convection, radiation, thermal insulator, first law of thermodynamics, heat engine, internal combustion engine, second law of thermodynamics, solar collector

Chapter 6
charging by contact, charging by induction, conductor, electric field, electroscope, static electricity, electric current, Ohm’s law, resistance,
voltage difference, electric power, parallel circuit, series circuit

Chapter 7
magnetic domain, magnetic field, magnetism, pole, electric motor, electromagnet, galvanometer, solenoid, alternating current, direct current, electromagnetic induction, generator, transformer, turbine</td>
<td>● I can describe how batteries work.
● I can use Ohm’s law to relate current, voltage difference and resistance.
● I can explain how series and parallel circuits differ.
● I can calculate electrical power.
● I can describe the function of a circuit breaker.
Chapter 7
● I can explain how magnetic poles interact.
● I can determine what materials are magnetic.
● I can define electromagnetic force.
● I can explain how an electric motor operates.
● I can distinguish between alternating and direct current.
● I can determine how a transformer changes the voltage of current.</td>
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<td>Resources/Activities

Chapter 4
● Work/energy foldable
● Calculations -kinetic and potential energy
● Work/Power lab activity
● KE/GPE lab
● SmartBook
● Quizlet

Chapter 5
● Calorimetry Lab (calculate specific heat capacity)
● Virtual lab
● Close Reading
● Convection demonstration
● Quizlet
● SmartBook</td>
<td>Question Stems
Chapter 4
● What is work?
● How do machines make doing work easier?
● What are mechanical advantage and efficiency?
● What is the difference between kinetic energy and potential energy?
● How can you calculate kinetic energy?
● What are different forms of potential energy?
● How can you calculate GPE?
● What is the law of conservation of energy?
● What is mechanical advantage?
● How are power and energy related?
Chapter 5
● What is temperature?
● How are thermal energy and temperature related?
● How do you calculate changes in thermal energy?
● What are conduction, convection and radiation?</td>
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Chapter 6 ● Foldable - calculate Ohm's law, power and electrical energy ● SmartBook ● Virtual lab ● Quizlet Chapter 7 ● Electric field lab ● Quizlet ● Virtual lab ● SmartBook	● How do thermal conductors differ from thermal insulators? Chapter 6 ● How do gravitational force and electric force compare? ● What is the difference between conductors and insulators? ● How can objects become electrically charged? ● When and how does a voltage difference produce an electric current? ● How do batteries produce a voltage difference in a circuit? ● How does Ohm's law relate current, voltage difference and resistance? ● How do series circuits differ from parallel circuits? ● How can you calculate electrical power? ● How can you calculate the cost of using an electrical appliance? Chapter 7 ● How do magnetic poles interact? ● Why are some materials magnetic but others are not? ● How do moving electric charges and magnets interact? ● What is electromagnetic force? ● How do an electromagnet's properties affect its magnetic field strength? ● How does an electric motor operate? ● What is electromagnetic induction? ● How does a generator produce an electric current? ● What is the difference between alternating current and direct current? ● How does a transformer change the voltage of an alternating current? **Assessment(s)** Bell ringers Exit tickets Quizzes Chapter Tests Lab Assignments

Unit 3 Theme	**Duration of Unit**	**Essential Question(s)**
Waves	3 weeks	● How do waves transfer energy? ● How do electromagnetic waves transfer energy through matter and space?

End of Unit 3 Authentic Learning Task

Electromagnetic Waves Application:

Part A- Radio Broadcasts: Students will research which frequencies are used by different local radio stations (two FM and two AM). A table of the findings that demonstrate the relationship between broadcasting power and range that the signal reaches.

Part B- Investigating Infrared Photographs: Students will investigate the uses of infrared photography and will conduct an investigation using an infrared photograph.

Assessment: Students' work will be assessed with a rubric that checks for demonstration of correct values in tables as well as clear and concise answers to the conclusion questions.

Standards:HS-ICP4-1, ST.2.1, 9-10.LST.2.2, 9-10.LST.3.1, 9-10.LST.3.2, 9-10.LST.3.3, 9-10.LST.4.1

Pacing- chapters 9 &11: 6 block days (quarter 2)

Indiana Academic Standards

HS-ICP4-1, 9-10.LST.2.1, 9-10.LST.2.2, 9-10.LST.2.3, 9-10.LST.3.1, 9-10.LST.3.2, 9-10.LST.3.3, 9-10.LST.4.1, 9-10.LST.4.1, 9-10.LST.4.3, 9-10.LST.6.1, 9-10.LST.6.2, 9-10.LST.7.1, 9-10.LST.7.2, 9-10.LST.7.3

Academic Vocabulary

Chapter 9

longitudinal wave, mechanical wave, medium, transverse wave, amplitude, compression, crest, frequency, period, rarefaction, trough, wavelength, diffraction, interference, node, node, refraction, resonance, standing wave.

Chapter 11

electromagnetic waves, photon, gamma ray, infrared wave, microwave, radio wave, ultraviolet wave, visible light,

Key Concepts/Learning Targets

Chapter 9

- I can explain how waves transfer energy.
- I can define mechanical waves.
- I can show how wavelength and period are related.
- I can explain the relationship between frequency and wavelength.
- I can calculate the speed of a wave.

Chapter 11

- I can explain how a vibrating electric charge produces an electromagnetic wave.
- I can describe the properties of electromagnetic waves.
- I can give the main divisions of the electromagnetic spectrum.
- I can describe the properties and uses of the types of electromagnetic waves.
- I can describe technologies that use radio waves and microwaves for communication.

X-ray, analog signal, carrier wave, digital signal, Global Positioning System (GPS), modulation, transceiver	

Resources/Activities

Chapter 9

- Wavelength, frequency and wave speed lab.
- Waves foldable and sample problems
- Quizlet.
- Vocabulary Crossword puzzle
- SmartBook

Chapter 11

- Scientific notation applications
- Investigation of the effects of microwaves
- Quizlet

Question Stems

Chapter 9

- How do waves transfer energy?
- What are mechanical waves?
- How do transverse waves differ from longitudinal waves?
- How are wavelength and period related?
- What is the relationship between frequency and wavelength?
- How do you calculate the speed of a wave?
- What is the law of reflection?
- Why do waves change direction when they travel from one material to another?
- How are refraction and diffraction similar? How are they different?
- What happens when waves interfere with each other?

Chapter 11

- How does a vibrating electric charge produce an electromagnetic wave?
- What properties describe electromagnetic waves?
- How do electromagnetic waves transfer energy?
- What are the main divisions of the electromagnetic spectrum?
- What are the properties and uses of each type of electromagnetic wave?
- What technologies use radio waves and microwaves for communication?

Assessment(s)

Bell ringers
Exit tickets
Quizzes
Chapter Tests
Lab Assignments

Unit 4 Theme	**Duration of Unit**	**Essential Question(s)**
Matter	6 weeks	How is matter classified based on properties and the motion of particles? What is the structure of an atom? What allows you to classify elements as metals, nonmetals and metalloids?

End of Unit 4 Authentic Learning Task

Physical and Chemical Reaction Lab-When the water vapor pressure inside a popcorn kernel is great enough, the kernel bursts and releases the water vapor. Students will use the kinetic theory of matter to explain the change in pressure in the kernel as it bursts.
Assessment: Comprehension will be assessed with a lab report.
Standards: HS-ICP1-1, HS-ICP1-2, LST.2.1, 9-10.LST.2.2, 9-10.LST.3.1

Pacing: Unit 4, Semester 2, Quarter 3, 15 block classes, 30 calendar days

Indiana Academic Standards

HS-ICP1-1, HS-ICP1-2,, 9-10.LST.2.1, 9-10.LST.2.2, 9-10.LST.2.3, 9-10.LST.3.1, 9-10.LST.3.2, 9-10.LST.3.3, 9-10.LST.4.1, 9-10.LST.4.1, 9-10.LST.4.3, 9-10.LST.6.1, 9-10.LST.6.2, 9-10.LST.7.1, 9-10.LST.7.2, 9-10.LST.7.3

Academic Vocabulary

Chapter 14

boiling point, heat of fusion, heat of vaporization, kinetic theory, melting point, plasma, sublimation, thermal expansion, buoyancy, pressure, viscosity, Boyle's law, Charles's law

Chapter 15

colloid, compound, element, heterogeneous mixture, homogeneous mixture, solute, chemical change, chemical property, distillation, law of conservation of mass, physical change, physical property.

Key Concepts/Learning Targets

Chapter 14

- I can explain the kinetic theory of matter.
- I can classify matter as solid, liquid or gas.
- I can explain how a gas is affected when pressure, temperature or volume changes.

Chapter 15

- I can explain the differences between substances and mixtures.
- I can classify substances as elements or compounds.
- I can distinguish between physical and chemical properties.
- I can apply the law of conservation of mass to chemical changes.

Chapter 16

- I can identify the names and symbols of the common elements.
- I can diagram the structure of an atom.
- I can explain the electron cloud model of the atom.
- I can determine the atomic mass of an atom given the periodic table.
- I can explain isotopes and mass numbers.
- I can explain the organization of the periodic table.
- I can explain periodic trends from the periodic table.
- I can list the properties of metals, nonmetals, and metalloids.

Chapter 16
atom, nucleus, proton, neutron, electron, quark, electron cloud, atomic number, mass number, isotope, average atomic mass, periodic table, period, group, electron dot diagram,

Chapter 17
metal, malleable, ductile, metallic bonding, radioactive element, transition element, nonmetal, diatomic molecule, allotrope, metalloid, semiconductor, transuranium element

Chapter 17
- I can explain how atoms bond in metallic bonding.
- I can find groups on a periodic table according to their group name.
- I can explain how nonmetals bond.
- I can explain why hydrogen is considered a nonmetal.
- I can explain why noble gasses are unreactive.
- I can list properties of the groups on a periodic table according to their group names.

Resources/Activities

Chapter 14
- Phase changes lab
- Quizlet
- SmartBook

Chapter 15
- Classifying matter lab activity
- SmartBook
- Quizlet
- Foldable notes on matter

Chapter 16
- Periodic Table Bingo
- Foldables
- Atomic Model Drawings
- Atomic Model Creation-Group Activity
- Virtual Lab
- Phet Demonstration
- Quizlet
- SmartBook

Question Stems

Chapter 14
- What are the boiling and melting points for water?
- What is the kinetic theory of matter?
- How is a gas affected when pressure, temperature or volume changes?

Chapter 15
- How is matter classified as an element, compound or mixture?
- What are physical and chemical properties?
- What are the differences and similarities of physical and chemical changes?
- How does the law of conservation of mass apply to chemical changes?

Chapter 16
- What is the name of the element that has the atomic symbol "C"?
- Where do the protons go in the model of the atom?
- Why do we use the electron cloud model to describe the atom?
- What is the atomic mass of carbon?
- Does an isotope have a different number of protons? Or a different number of neutrons?
- What are the four major blocks of the periodic table?
- As you move from left to right across a period, what happens to the atomic radius? Why?

Chapter 17 ● Periodic Table Bingo ● Foldables ● Concept Map Book ● Mini Lab-Discovering what's in cereal ● Element Project ● Quizlet ● SmartBook	● I have an unknown element that is malleable and conducts electricity as a solid. Is this a metal, a nonmetal, or a metalloid? **Chapter 17** ● Where are the electrons found during metallic bonding? ● What is group 7A on the periodic table called? ● How are chemical bonds formed between two nonmetals? ● Why is hydrogen considered a nonmetal? ● Why are noble gasses unreactive? ● What is a trait that a halogen has that a noble gas does not have? **Assessment(s)** Bell ringers Exit tickets Quizzes Chapter Tests Lab Assignment

Unit 5 Theme	**Duration of Unit**	**Essential Question(s)**
Chemical Reactions & Energy	8 weeks	Why does chemical bonding occur? How does a chemical reaction change one or more substances into different substances?

End of Unit 5 Authentic Learning Task

Chemical Reaction lab-Students will perform reactions in each of 5 reaction types, and will predict the products based on the reaction type and chemicals involved. Students will then balance chemical equations for the reactions they performed.
Assessment: Students' work will be assessed with a lab report and rubric.
Standards: HS-ICP1-2, HS-ICP1-3 , 9-10.LST.2.2, 9-10.LST.3.1, 9-10.LST.3.2, 9-10.LST.4.1, 9-10.LST.4.3, 9-10.LST.6.1, 9-10.LST.7.2, 9-10.LST.7.3

Pacing: Unit 5, Chapters 18 & 19
Semester 2, Quarter 3 & 4, 20 block days, 40 school calendar days

Indiana Academic Standards

HS-ICP1-2, HS-ICP1-3, HS-ICP1-4, 9-10.LST.2.1, 9-10.LST.2.2, 9-10.LST.2.3, 9-10.LST.3.1, 9-10.LST.3.2, 9-10.LST.3.3, 9-10.LST.4.1, 9-10.LST.4.1, 9-10.LST.4.3, 9-10.LST.6.1, 9-10.LST.6.2, 9-10.LST.7.1, 9-10.LST.7.2, 9-10.LST.7.3

Academic Vocabulary

Chapter 18

chemical bond, chemical formula, covalent bond, ion, ionic bond, molecule, nonpolar bond, nonpolar molecule, polar bond, polar molecule, binary compound, hydrate, oxidation number, polyatomic ion

Chapter 19

balanced chemical reaction, chemical equation, chemical reaction, coefficient, molar mass, mole, products, reactants, combustion reaction, decomposition reaction, double-displacement reaction, oxidation, precipitate, reduction, single-displacement reaction, synthesis reaction, endergonic reaction, endothermic reaction, exergonic reaction, exothermic reaction, catalyst, collision model, equilibrium, inhibitor, reaction rate, reversible reaction

Key Concepts/Learning Targets

Chapter 18

- I understand that a compound has different chemical properties from the elements of which it is composed.
- I understand what a chemical formula represents.
- I can use an electron dot diagram to determine how many bonds an atom of an element will make.
- I understand why chemical bonding occurs.
- I can describe the differences between ionic and covalent bonds.
- I can compare and contrast nonpolar and polar covalent bonds.
- I can determine the oxidation number of an element by using its position on the periodic table.
- I can correctly write the formula for ionic compounds.
- I can accurately name covalent and ionic compounds if given the chemical formula.

Chapter 19

- I can correctly identify the reactants and products in a chemical equation.
- I can balance a chemical equation in order to represent the fact that matter is not created or destroyed.
- I can list the five general types of chemical reactions and describe differences between them.
- I can use an activity chart to determine if one metal will replace another in a chemical reaction.
- I can explain the difference between oxidation and reduction.
- I can identify how energy has changed in a chemical reaction.
- I can explain the differences between exergonic and endergonic, and between exothermic and endothermic.

Resources/Activities

Chapter 18

- Metal vs. Non-metal review
- Covalent vs. Ionic Practice

Question Stems

Chapter 18

- How does a compound differ from its component elements?
- What does a chemical formula represent?

• Lewis Dot Diagram Practice • Interpreting Graphics Practice • Oxidation Number practice • Close Reading activity - Nonstick surfaces • Quizlet • SmartBook **Chapter 19** • Interpreting Activity Series Practice • Design a team equation mini lab • Symbol interpretation practice • Chemical Equation practice-group activity • Balancing Equations Practice • Equation Types practice • Chemical Reactions demonstrations • Quizlet • Smartbook	• How do electron dot diagrams help predict chemical bonding? • Why does chemical bonding occur? • What are ionic and covalent bonds? • How do nonpolar and polar covalent bonds compare? • How are oxidation numbers determined? • How are formulas for ionic and covalent compounds written? • How are ionic and covalent compounds named? **Chapter 19** • What are the reactants and products in a chemical reaction? • How do you balance a chemical equation? • What are the five general types of chemical reactions? • How can you predict if a metal will replace another in a compound? • What do the terms oxidation and reduction mean? • How can the source of energy changes in chemical reactions be identified? • How do exergonic and endergonic reactions compare? • How do exothermic and endothermic reactions compare? **Assessment(s)** Bell ringers Exit tickets Quizzes Chapter Test Lab Reports

Unit 6 Theme	**Duration of Unit**	**Essential Question(s)**
Nuclear Energy	3 weeks	How is a nuclear reaction different from a chemical reaction?

End of Unit 6 Authentic Learning Task

Half-life lab: Students will use statistics and M & M candies to simulate the "half life" of M & M's . Students will also use the half-life of radioactive materials to calculate the hypothetical age of that object.
Assessment: Students' work will be assessed with a rubric that checks for demonstration of correct measurements, neatly created graphy, and calculations as well as clear and concise answers to the conclusion questions.
Standards: HS-ICP1-5, 9-10.LST.2.2, 9-10.LST.3.1, 9-10.LST.3.2, 9-10.LST.4.1, 9-10.LST.4.3, 9-10.LST.6.1, 9-10.LST.7.2, 9-10.LST.7.3

Pacing: Unit 6, Semester 2, Quarter 4, Block Classes 8, School Calendar Days 16

Indiana Academic Standards

HS-ICP1-5, HS-ICP3-1, 9-10.LST.2.1, 9-10.LST.2.2, 9-10.LST.2.3, 9-10.LST.3.1, 9-10.LST.3.2, 9-10.LST.3.3, 9-10.LST.4.1, 9-10.LST.4.1, 9-10.LST.4.3, 9-10.LST.6.1, 9-10.LST.6.2, 9-10.LST.7.1, 9-10.LST.7.2, 9-10.LST.7.3

Academic Vocabulary

Chapter 20

radioactivity, strong force, alpha particle, beta particle, chain reaction, transmutation, half-life, tracer

Key Concepts/Learning Targets

Chapter 20

- I can identify the forces within the atomic nucleus.
- I can describe the differences between the strong force and the electric force.
- I can describe the differences between radioactive and stable nuclei.
- I can describe the differences between alpha particles, beta particles, and gamma rays.
- I can identify nuclear fission and nuclear fusion.
- I can explain how mass and energy are related.
- I can explain how to detect radiation.
- I can list some common sources of background radiation.
- I can calculate the half-life of a radioactive material.
- I can use the half-life of a radioactive material to help find the age of an object.
- I can use the context to determine the meaning of words and symbols.

Resources/Activities

Chapter 20

- Videos
- Animations
- WebQuests
- Vocab Crossword
- Science & History- the atomic bomb research
- Half-life practice
- Nuclear equations practice
- Transmutations Lab
- Quizlet
- SmartBook

Question Stems

Chapter 20

- What force holds the atomic nucleus together?
- How do the strong force and the electric force compare to each other?
- How are radioactive atomic nuclei different from stable nuclei?
- What are alpha particles, beta particles, and gamma rays?
- Based on the context, what does the key terms or domain-specific mean?
- Based on the context, what does this symbol mean?
- How does nuclear fission differ from nuclear fusion?
- How are mass and energy related?
- How can radioactivity be detected?
- What are some common sources of background radiation?
- What is the half-life of a radioactive material?
- How can radioactivity be used to help find the age of an object?

Assessment(s)

Bell ringers
Exit tickets

	Quizzes Chapter Tests Lab Reports

Indiana Academic Standards Addressed and Assessed Each Term Integrated Chemistry & Physics (A=assessed; I=introduced; P=practiced; R=reviewed) (Green=high priority; Yellow=moderate priority; Blue=low priority)					
Standard	**Standard Statement**	**Term 1**	**Term 2**	**Term 3**	**Term 4**
Matter and its Interactions					
HS-ICP1-1	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.			I, P, R, A	R
HS-ICP1-2	Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.			I, P, R, A	R
HS-ICP1-3	Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.			I, P, R, A	P, R, A
HS-ICP1-4	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.			I, P, R, A	P, R, A
HS-ICP1-5	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion and radioactive decay. .				I, P, R, A
Forces					
HS-ICP2-1	Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic		I, P, R, A		

	object, its mass, and its acceleration.				
Energy					
HS-ICP3-1	Quantitatively analyze various scenarios to describe how the change of energy in one component in a system responds to the change in energy of the other components and flow of energy into and out of the system are known.	I, P, R, A	P, R, A	P, R, A	P, R, A
HS-ICP3-2	Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects).	I, P			
HS-ICP3-3	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	I, P, R, A	P, R, A		
HS-ICP3-4	Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.		I, P, R, A		
HS-ICP3-5	Gather data to build a model to describe and explain the flow of current through series and parallel electric circuits.		I, P, R, A		
Waves and their Applications in Technologies for Information Transfer					
HS-ICP4-1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves		I,P, R, A		
Literacy in Science and Technical Subjects					
9-10.LST.2.1	Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.	P	P	P	P
9-10.LST.2.2	Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate, objective summary of the text.	P	P	P	P

9-10.LST.2.3	Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.	P	P	P	P
9-10.LST.3.1	Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9-10 texts and topics.	I	P	P	P
9-10.LST.3.2	Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy).	P	P	P	P
9-10.LST.3.3	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.	P	P	P	P
9-10.LST.4.1	Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.	P	P	P	P
9-10.LST.4.2	Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.		P		P
9-10.LST.4.3	Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.	P	P	P	P
9-10.LST.5.1	Write arguments focused on discipline-specific content.	P	P	P	P
9-10.LST.5.2	Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research.	P	P	P	P
9-10.LST.6.1	Plan and develop; draft; revise using appropriate reference materials; rewrite; try a new approach, focusing on addressing what is most significant for a	P			

	specific purpose and audience; and edit to produce and strengthen writing that is clear and coherent.				
9-10.LST.6.2	Use technology to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically.	P			
9-10.LST.7.1	Conduct short as well as more sustained research assignments and tasks to answer a question (including a self-generated question), test a hypothesis, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.	P	P	P	P
9-10.LST.7.2	Gather relevant information from multiple authoritative sources, using advanced searches effectively; annotate sources; assess the usefulness of each source in answering the research question; synthesize and integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation (e.g., APA or CSE).	P	P	P	P