

Basic IPC

Calendar: 1st Semester

Target Group: High School

First Semester

Section/Name	Objectives	Possible Labs/Activities	Time	TEKS	TAKS Objective
Chapter 1: The Metric System The Methods of Science	Identify steps scientists use to solve problems Describe why scientists use variables Compare/Contrast science and technology	Measurement Lab Lab Safety Relationships lab	1 wk	1, 2A, 2B, 2C, 2D, 3, 3A, 3C	§112.42.c.1.A demonstrate safe practices during field and laboratory investigations
Standards of Measurement	SI units and symbols, length, volume, mass, density, time and temperature. Conversion of SI units.	Standards of measurement labs.	1 wk	1, 1A, 2A, 2B, 2C, 2D, 3A	§112.42.c.1.A demonstrate safe practices during field and laboratory investigations
Chapter 7- Communicating with Graphs	Identify three types of graphs and explain the ways they are used. Distinguish between dependent and independent variables. Analyze data using the various types of graphs.	Calculating speed, velocity, acceleration, net force, balanced force Newton's 1 st Law Identifying displacement, inertia	2 wks	1, 1A, 2, 2A, 2B, 2C, 2D	§112.42.c.1.A demonstrate safe practices during field and laboratory investigations

Section/Name	Objectives	Possible Labs/Activites	Time	TEKS	TAKS Objective
Describing Motion	Distinguish between distance and displacement. Explain the difference between speed and velocity. Interpret motion graphs.	Model race cars and speed Graph speed of model cars		1, 2, 2B, 2C, 2D, 3, 4, 4A	TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Acceleration	Identify how acceleration, time, and velocity are related. Explain how positive and negative acceleration affect motion. Describe how to calculate the acceleration of an object.	Model race cars showing change in acceleration, velocity and negative acceleration		2C, 2D, 3A, 4, 4A, 4C	TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Motion and Forces	Explain how force and velocity are related. Describe what inertia is and how it is related to Newton's first law of motion. Identify the forces and motion that are present during a car crash.	Tennis ball lab Marble Magic lab Friction lab		2D, 3A, 3B, 4, 4A, 4B, 4C	TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.

Section/Name	Objectives	Possible Labs/ Activities	Time	TEKS	TAKS Objective
Newton's Second Law	Explain how force, mass and acceleration are related Observe the effects of air resistance on falling objects.	Different size mass and acceleration		1, 1A, 2, 2B, 2C, 2D, 3, 3A, 4, 4A	TAKS Objective 1: The student will demonstrate an understanding of the nature of science. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Gravity	Describe gravitation force. Distinguish between mass and weight. Explain why objects that are thrown or shot will follow a curved path.	Paper races- flat and crumpled Various weight dropped balls race		1, 1A, 2, 2B, 2C, 2D, 3, 3A, 4, 4B	TAKS Objective 1: The student will demonstrate an understanding of the nature of science. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
The Third Law of Motion	Identify when action and reaction forces occur. Calculate momentum. Demonstrate how momentum is conserved.	Clacky balls Skateboard-ball to wall Balloon race		2A, 2D, 3, 3A, 3E, 4, 4A, 4B, 4C	TAKS Objective 1: The student will demonstrate an understanding of the nature of science. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.

Section/Name	Objectives	Possible Labs/ Activities	Timetable	TEKS	TAKS Objective
Chapter 8- “Work and Machines” The Nature of Energy	Distinguish between kinetic and potential energy. Recognize different ways that energy can be stored.	Swings	2 wks	1, 1A, 2, 2A, 2B, 2C, 2D, 3, 3A, 4, 4B, 6, 6A, 6B	TAKS Objective 1: The student will demonstrate an understanding of the nature of science. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Conservation of Energy	Describe how energy is conserved when changing from one form to another. Apply the law of conservation of energy to familiar situations.			1, 1A, 2B, 2C, 2D, 3, 3A, 3C, 3E, 4, 6, 6A, 6H, 8, 8A, 8D	TAKS Objective 1: The student will demonstrate an understanding of the nature of science. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Work	Explain the meaning of work. Explain how work and energy are related. Calculate work. Calculate power.	Work lab Comparison tool lab		1, 1A, 2, 2B, 2C, 2D, 3, 3A, 4, 4A, 4D, 6	TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Using Machines	Explain how machines make work easier. Calculate mechanical advantage. Calculate efficiency.	Tool lab with levers		2C, 3, 3A, 3C, 4, 4C, 4D	TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Simple Machines	Describe the six types of simple machines.	Finding simple machines- using Making pulleys		1A, 2, 2A, 2B, 2C, 2D, 3, 3A, 3D, 4A, 4C, 4D	TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.

Section/Name	Objectives	Possible Labs/ Activities	Timetable	TEKS	TAKS Objective
Chapter 9 “Heat” Temperature and Heat	Explain the difference between heat and temperature. Define thermal energy. Explain the meaning of specific heat.	Forms of thermal energy Hairdryer, hot pot, solar experiment	2 wks	1, 1A, 2B, 2C, 2D, 3A, 6, 6B	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Transferring Thermal Energy	Compare and contrast thermal energy transfer by conduction, convection and radiation. Compare and contrast conductors and insulators. Explain how insulation affects the transfer of energy.	Conduction/ convection lab Insulation lab		1, 1A, 2, 2A, 2B, 2C, 2D, 3, 3A, 6, 6B, 6H	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Using Heat	Compare and contrast three types of conventional heating systems. Distinguish between solar passive and active heating systems.	Solar house model		2C, 2D, 6, 6B, 6H	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.

Section/Name	Objectives	Possible Labs/ Activities	Timetable	TEKS	TAKS Objective
Chapter 11 “Electricity” Electric Charge	Describe the properties of static electricity.	Static electricity lab	3 wks	1A, 2A, 2C, 2D, 6, 6B, 6E, 6H	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Electric Current	Describe how electric current is different from static electricity. Explain how a dry cell provides a source of voltage difference. Describe the relationship among voltage difference, resistance, and current.	Schematic drawings		1, 2, 2B, 2C, 2D, 3, 6, 6B	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Electrical Energy	Describe the differences between series and parallel circuits. Recognize the function of circuit breakers and fuses. Explain and calculate electrical power.	Wire series and parallel circuits light kits		2C, 2D, 3, 6, 6B, 6D, 6F	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.

Section/Name	Objectives	Possible Labs/ Activities	Timetable	TEKS	TAKS Objective
Chapter 12 “Magnets and Electro- magnetism” Magnetism	Describe the properties of temporary and permanent magnets. Explain how a magnet exerts a force on an object. Explain why some materials are magnetic and others are not. Model magnetic behavior using magnetic domains.	Magnet lab, iron shavings and force fields	2 wks	1, 1A, 2, 2A, 2B, 2C, 2D, 3, 3C, 3E	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Electricity and Magnetism	Understand the relationship between electric current and magnetism. Explain how electric magnets are constructed. Describe how electromagnets are used. Describe how an electric motor operates.	Small motor lab Making electromagnets		5D, 6, 6G	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Producing Electric Current	Describe how a generator produces an electric current. Distinguish between alternating current and direct current. Explain how a transformer can change the voltage of an alternating current.	Direct and alternating current lab		6, 6C, 6E, 6F, 6G	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.

Section/Name	Objectives	Possible Labs/ Activities	Timetable	TEKS	TAKS Objective
Chapter 10- “Sound and Light” The Nature of Waves	Recognize that waves carry energy but not matter. Define mechanical waves. Distinguish between transverse waves and compressional waves.	The power of sound lab Music & noise Tuning forks	2.5 wks	3, 5, 5A	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Wave Properties	Compare and contrast transverse and compressional waves. Describe the relationship between frequency and wavelength. Explain how a wave’s amplitude is related to the wave’s energy. Calculate the wave’s speed.	Slinky lab Dominos lab Rubber band & cup lab		1, 1A, 2B, 2C, 3, 5, 5A	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Behavior of Waves	Identify the law of reflection. Recognize what makes waves bend. Explain how waves combine.	Reflection & refraction		3, 5, 5A, 5B, 5D	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.

Section/Name	Objectives	Possible Labs/ Activities	Timetable	TEKS	TAKS Objective
The Nature of Sound	Explain how sound travels through different mediums. Identify what influences the speed of sound.	Power sound of in different mediums		1, 1A, 2, 2B, 2C, 2D, 5, 5A, 5D, 6	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Properties of Sound	Recognize how amplitude intensity and loudness are related. Describe how sound intensity is measured and what levels can damage hearing. Explain relationship between frequency and pitch. Discuss the Doppler Effect.	Frequency lab Doppler Effect practical lab		1, 2C, 2D, 5, 5A, 5B, 6	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.
Music	Distinguish between noise and music. Describe why different instruments have different sound qualities. Explain how string, wind, and percussion instruments produce music. Describe the formation of beats.	Percussion "music"		2D, 5, 5A, 5B, 5D, 6	TAKS Objective 4: The student will demonstrate an understanding of the structures and properties of matter. TAKS Objective 5: The student will demonstrate an understanding of motion, forces and energy.

Basic IPC

Calendar: 2nd Semester

Target Group: High School

Chapter/Name	Objectives	Possible Labs/Activities	Time	TEKS	TAKS
Chapter 2 “The Properties of Matter”	List examples of the branches of chemistry Compare/contrast basic research, applied research, technological development Distinguish between the physical properties & chemical properties of matter Classify changes as physical or chemical Explain gaseous, liquid & solid states in terms of particles	Physical Chemical Properties lab Physical -Chemical lab What state am I game	2 wks	1A, 2A, 2B, 2C, 3A, 3E	1: The student will demonstrate an understanding of the nature of science. 4: The student will demonstrate an understanding of the structures and properties of matter
Matter and Change	Distinguish between a mixture and a pure substance Identify & name symbols given a periodic table Describe the arrangement of the periodic table List characteristics that distinguish between metals, nonmetals & metalloids	Make a symbol from periodic table	2 wk	1A, 2A, 2B, 2C, 3A, 3E	1: The student will demonstrate an understanding of the nature of science. 4: The student will demonstrate an understanding of the structures and properties of matter.
Measurements and Calculations	Describe the purpose of the scientific method Describe the difference between hypothesis, theories & models Distinguish between a quantity, a unit & measurement standard Give SI units for length, time, volume & density Distinguish between mass & weight Perform density calculations Distinguish between accuracy & precision	Scientific method lab Measurement lab Density lab Displacement lab Scale- weight & mass	1 wk	1A, 2A	1: The student will demonstrate an understanding of the nature of science. 4: The student will demonstrate an understanding of the structures and properties of matter.

Chapter/Name	Objectives	Possible Labs/Activities	Time	TEKS	TAKS
Chapter 3 “The structure of Matter” Atoms – The building Blocks of Matter	Summarize Rutherford’s experiment that led to the discovery of the nucleus List the properties of the proton, neutron & electron Define atom, atomic number, mass number; Explain how they apply to isotopes Determine the identity element given its atomic information (# of protons, neutrons, or electrons) Understand the various atom models	Play dough atoms with protons, neutrons & electrons What element am I? game Flashcards/ posters of the relationships	3 wks	1A, 1B, 3D, 3E, 7B, 7D, 7E	1: The student will demonstrate an understanding of the nature of science. 4: The student will demonstrate an understanding of the structures and properties of matter.
Chapter 4 “Classifying Elements”	Identify symbols of periodic chart Determine the classification of elements as metals, nonmetals or noble gases Understand the organization of the periodic chart Differentiate elements based on properties	Periodic table of Student made element boxes Box of elements lab Research the use of various elements Study properties of various elements	3 wks	1A, 1B, 3C, 3D, 3E, 7B, 7D, 7E	1: The student will demonstrate an understanding of the nature of science. 4: The student will demonstrate an understanding of the structures and properties of matter.
Chapter 5 “Compounds”	Identify compounds in everyday life Determine how compounds are formed Relate the number of sublevels corresponding to an atoms main energy levels Understand energy levels in atomic structure Determine the information in formulas Understand nomenclature of compounds Differentiate acids and bases	Chemical/ Physical change lab Represent energy levels with layers of colored paper Play Dough molecules Slushy lab Naming game Acid/Base lab-pH lab	4 wks	1A 1B, 2B, 2D,7C 7D, 7E, 8E, 9A, 9B, 9C	1: The student will demonstrate an understanding of the nature of science. 4: The student will demonstrate an understanding of the structures and properties of matter.

Chapter/Name	Objectives	Possible Labs/Activities	Time	TEKS	TAKS
Chapter 6 “How matter changes”	Explain ➤ Law of conservation of mass Understand solutions Understand reactions Differentiate types of chemical reactions Master interpretation and writing balanced chemical equations	Solution lab Separation lab- mixtures & solutions Demonstrate law of conservation of mass Reaction lab	3 wks	1A, 1B, 2A, 2B, 3D, 7D, 7E, 8A, 8B, 8E, 9A, 9B, 9D, 9E	1: The student will demonstrate an understanding of the nature of science. 4: The student will demonstrate an understanding of the structures and properties of matter.

§112.42. Integrated Physics and Chemistry.

(a) General requirements. Students shall be awarded one credit for successful completion of this course. Prerequisites: none. This course is recommended for students in Grades 9 or 10.

(b) Introduction.

(1) In Integrated Physics and Chemistry, students conduct field and laboratory investigations, use scientific methods during investigations, and make informed decisions using critical-thinking and scientific problem-solving. This course integrates the disciplines of physics and chemistry in the following topics: motion, waves, energy transformations, properties of matter, changes in matter, and solution chemistry.

(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.

(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.

(c) Knowledge and skills.

(1) Scientific processes. The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during field and laboratory investigations; and

(B) make wise choices in the use and conservation of resources and the disposal or recycling of materials.

(2) Scientific processes. The student uses scientific methods during field and laboratory investigations. The student is expected to:

(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology;

- (B) collect data and make measurements with precision;
- (C) organize, analyze, evaluate, make inferences, and predict trends from data; and
- (D) communicate valid conclusions.

(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

- (A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;
- (B) draw inferences based on data related to promotional materials for products and services;
- (C) evaluate the impact of research on scientific thought, society, and the environment;
- (D) describe connections between physics and chemistry, and future careers; and
- (E) research and describe the history of physics, chemistry, and contributions of scientists.

(4) Science concepts. The student knows concepts of force and motion evident in everyday life. The student is expected to:

- (A) calculate speed, momentum, acceleration, work, and power in systems such as in the human body, moving toys, and machines;
- (B) investigate and describe applications of Newton's laws such as in vehicle restraints, sports activities, geological processes, and satellite orbits;
- (C) analyze the effects caused by changing force or distance in simple machines as demonstrated in household devices, the human body, and vehicles; and
- (D) investigate and demonstrate mechanical advantage and efficiency of various machines such as levers, motors, wheels and axles, pulleys, and ramps.

(5) Science concepts. The student knows the effects of waves on everyday life. The student is expected to:

- (A) demonstrate wave types and their characteristics through a variety of activities such as modeling with ropes and coils, activating tuning forks, and interpreting data on seismic waves;
- (B) demonstrate wave interactions including interference, polarization, reflection, refraction, and resonance within various materials;

(C) identify uses of electromagnetic waves in various technological applications such as fiber optics, optical scanners, and microwaves; and

(D) demonstrate the application of acoustic principles such as in echolocation, musical instruments, noise pollution, and sonograms.

(6) Science concepts. The student knows the impact of energy transformations in everyday life. The student is expected to:

(A) describe the law of conservation of energy;

(B) investigate and demonstrate the movement of heat through solids, liquids, and gases by convection, conduction, and radiation;

(C) analyze the efficiency of energy conversions that are responsible for the production of electricity such as from radiant, nuclear, and geothermal sources, fossil fuels such as coal, gas, oil, and the movement of water or wind;

(D) investigate and compare economic and environmental impacts of using various energy sources such as rechargeable or disposable batteries and solar cells;

(E) measure the thermal and electrical conductivity of various materials and explain results;

(F) investigate and compare series and parallel circuits;

(G) analyze the relationship between an electric current and the strength of its magnetic field using simple electromagnets; and

(H) analyze the effects of heating and cooling processes in systems such as weather, living, and mechanical.

(7) Science concepts. The student knows relationships exist between properties of matter and its components. The student is expected to:

(A) investigate and identify properties of fluids including density, viscosity, and buoyancy;

(B) research and describe the historical development of the atomic theory;

(C) identify constituents of various materials or objects such as metal salts, light sources, fireworks displays, and stars using spectral-analysis techniques;

(D) relate the chemical behavior of an element including bonding, to its placement on the periodic table; and

(E) classify samples of matter from everyday life as being elements, compounds, or mixtures.

(8) Science concepts. The student knows that changes in matter affect everyday life. The student is expected to:

- (A) distinguish between physical and chemical changes in matter such as oxidation, digestion, changes in states, and stages in the rock cycle;
- (B) analyze energy changes that accompany chemical reactions such as those occurring in heat packs, cold packs, and glow sticks to classify them as endergonic or exergonic reactions;
- (C) investigate and identify the law of conservation of mass;
- (D) describe types of nuclear reactions such as fission and fusion and their roles in applications such as medicine and energy production; and
- (E) research and describe the environmental and economic impact of the end-products of chemical reactions.

(9) Science concepts. The student knows how solution chemistry is a part of everyday life. The student is expected to:

- (A) relate the structure of water to its function as the universal solvent;
- (B) relate the concentration of ions in a solution to physical and chemical properties such as pH, electrolytic behavior, and reactivity;
- (C) simulate the effects of acid rain on soil, buildings, statues, or microorganisms;
- (D) demonstrate how various factors influence solubility including temperature, pressure, and nature of the solute and solvent; and
- (E) demonstrate how factors such as particle size, influence the rate of dissolving.

Source: The provisions of this §112.42 adopted to be effective September 1, 1998, 22 TexReg 7647.