SCIENCE CURRICULUM FRAMEWORK

INTEGRATED PHYSICS & CHEMISTRY

2004-2005

TABLE OF CONTENTS

Table of Contents……1
Mission Statement and Belief Statement ……2
Acknowledgement……...3
Introduction……4
Student Participation in TEKS-Based Inquiry and the BISD Science Fair……..5
Scope & Sequence……6
Curriculum Framework
First Six Weeks……7-9
Second Six Weeks……10-12
Third Six Weeks……13-16
Fourth Six Weeks……17-19
Fifth Six Weeks……20-22
Sixth Six Weeks……23-26
Appendix
Texas Essential Knowledge and Skills (http://www.tea.state.tx.us/teks/index.html)
Seventh Grade Science
Eighth Grade Science
Integrated Physics and Chemistry
Biology
Chemistry
Physics
Texas Assessment of Knowledge and Skills Objectives
(http://www.tea.state.tx.us/student.assessment/taks/booklets/index.html)
Tenth Grade and Exit Level (10^{th} and 11^{th} Grade)
National Science Education Standards
Science TEKS Toolkit Excerpts (http://www.tenet.edu/teks/science/instruction/index.html)
Materials and Safety Equipment List
Checklist for Science Field Investigations
Science Facility Safety Checklist
Laboratory Safety Survey
Assessment Methods
Web-Based Resources
Texas Environmental Education Advisory Committee Contact Information
(http://www.tea.state.tx.us/curriculum/teeac.html)
Pre-AP and AP Science Scope and Sequence Grades 6-12
Update on CPO IPC Program (May 2003)
Required Exemplar Labs

Brownsville Independent School District
MISSION STATEMENT

The mission of the Brownsville Independent School District, an international community respected for its rich cultural heritage is to produce responsible, well-rounded graduates

who

- have the ability to pursue a post-secondary education and/or career
- possess a capability for independent learning and thinking with a competitive edge in a multi-cultural, multi-lingual world

by

- identifying and maximizing physical, financial, and human resources and
- unifying community and school commitment to excellence in education and equal educational opportunity.

Brownsville Independent School District
BELIEF STATEMENT

- Excellence is our common goal.
- Parental responsibility is an integral factor in student success.
- Belief in self is fundamental to success.
- Everyone deserves respect as a human being.
- Perseverance and hard work are essential for success.
- Change creates opportunities for growth.
- Truthfulness is important for effective communication.
- Public schools are an extension of the community.
- Sensitivity is essential for understanding the needs of others.
- Great achievements follow high expectations.
- Cooperation is necessary to get things done.
- Active listening is essential for effective communication.
- Successful students are active participants in the learning process.

Acknowledgment

The Brownsville Independent School District gratefully acknowledges the contributions given by the Science teachers who participated in the development of this secondary Science curriculum framework. Science teachers from the following campuses assisted in the development of the framework:

- Hanna High School
- Lopez High School
- Pace High School
- Porter High School
- Rivera High School
- Lincoln Park School
- Besteiro Middle School
- Cummings Middle School
- Faulk Middle School
- Garcia Middle School
- Lucio Middle School
- Oliveira Middle School
- Perkins Middle School
- Stell Middle School
- Stillman Middle School
- Vela Middle School
- BUSP Secondary Science Mentors
- Secondary Science Curriculum Specialist

Introduction

Texas Legislation requires that all Texas school districts develop, implement, and evaluate a comprehensive educational program aimed at student mastery of the Texas Essential Knowledge and Skills as defined in Chapter 112.

The purpose of this Secondary Science Curriculum Framework is to match learning experiences to the Texas Essential Knowledge and Skills and provide a sequence of objectives and lab activities that are also aligned, including the **40% lab requirement** for all High School Science courses. Brownsville ISD also requires the 40% lab minimum curriculum requirement for all Middle School Science courses.

In addition, this document includes sample activities and **required "EXEMPLAR" labs** to be taught in each course. EXEMPLAR labs are not intended to be the only labs taught in each course, but are provided to ensure consistency in high-quality instruction throughout the district. They should further serve to avoid overemphasis in one area while neglecting another, and thus, focus on student needs.

Pre-AP accommodations are indicated throughout the document, either as additional TEKS added to the course to meet the needs of the Pre-AP course sequence, or emphasized TEKS that need to be taught with added depth to the Pre-AP student in order to prepare them for the AP or Dual Enrollment course. Adaptations for other special populations will be made as needed, but the basic curriculum is the same for all students.

The textbook provided by the state is a resource for teaching the course, not the curriculum. Although the textbook "covers" all TEKS for the course, it does not necessarily provide instructional support for teaching the TEKS to the level of depth necessary to fulfill the TEKS intention. Therefore, it is highly recommended that teachers use a variety of additional resources from multiple sources in order to meet the TEKS requirements. Some of these resources may include, but are not limited to required Exemplar Labs, FOSS kits (which should be taught in their entirety as a unit), TEXTEAMS activities, Calculator Based Labs, Snapshot Activities and Vistas provided through the Charles A. Dana Center Science Toolkit.

This curriculum framework is primarily a working document that prescribes what is to be taught in a given subject or area of study. It gives both structure and direction to the educational program. As a formal document, it is an official statement of the curriculum and a teacher's guide to instruction.

Student Participation in TEKS-Based Inquiry and the BISD Science Fairs

Research, inquiry and invention are essential skills successful students must develop as they grow academically. Students must be able to discuss and evaluate social, technological and scientific issues evident today and trends influencing the future. A challenge for educators is to exploit the natural curiosity all students possess. Allowing time, opportunity and support during school hours for student-based inquiry permits learners to expose their misconceptions and pursue the "why" questions they have. Students should plan investigations and conduct research that can help them test their ideas, interpret differing points of view and justify consequent discoveries. Students are much more likely to internalize and remember concepts learned if they are actively involved with them, rather than passively observing them take place.

TEKS-based investigations enable students to effectively learn and use content-area concepts and skills. Through these types of direct investigations students are able to "maximize their ability to make sense of the world and to learn more about it." (*Science for All Americans)* Therefore, it is a BISD requirement that all students participate in a research-based inquiry project at the sixth, eighth, and ninth grades. Participation at other grades or courses is highly recommended since successful research projects take two to four years. When students are engaged in research-based inquiry, they are involved in using a rich variety of primary and secondary source materials and the Science Process Skills as required by law in the Science TEKS.

A successful classroom science investigation may be developed into a research-based inquiry project and entered in the **Science Fair**. Students who choose to enter the fair will be able to create investigations from among fifteen different categories. The Science Fair will be held annually in the fall, allowing teachers and students to prepare for one science competition per year following the rules of the Intel International Science and Engineering Fair, (www.sciserv.org/isef). All students will have the opportunity to complete an original investigation. Individual campuses, teachers and students will be able to choose which projects to enter in the Science and Engineering Fair.

SECONDARY SCIENCE
INTEGRATED PHYSICS & CHEMISTRY
SCOPE AND SEQUENCE

Three-Week Units and Chapters	Exemplar Lab(s)* and Unit Content	Concepts TEKS	Processes TEKS
1st Six Weeks Force & Motion Newton's Laws Work and Energy Chapters 1-3, & 5	**"Investigations and Experiments"** **"Position and Time"** **"Acceleration"** **"Force,Mass, and Acceleration"** **"Energy Conservation",** *Science Project*	4 A, B, C, D 6A	1 A, B 2 A, B, C, D 3 A, B, C, D, E
2nd Six Weeks Machines and Mechanical Advantage Electricity and Magnetism Waves Chapters 4, 6-10, & 12	**"Forces in Machines"** **"Ohm's Law"** **"Work, Power, and Energy"** **"Waves"** *Science Project*	4 A, C, D, 5 A, B, 6 C, D, E, F, G, 8E	1 A, B 2 A, B, C, D 3 A, B, C, D, E
3rd Six Weeks Sound and Waves Light and Optics Chapters 13 -15	**"Music",** **"Optical Technology"** *Science Project*	5 A, B, C, D	1 A, B 2 A, B, C, D 3 A, B, C, D, E
4th Six Weeks Properties of Matter Chapters 16 – 18	**"Density of Fluids",** **"Viscosity of Fluids"**	7 A, B, C, D, E	1 A, B 2 A, B, C, D 3 A, B, C, D, E
5th Six Weeks Changes in Matter Water and Solutions Heating and Cooling Chapters 19,21,22,25,28	**"Chemical Changes",** **"Conservation of Mass" ,** **"Specific Heat"**	6 H, 7 D, C, 8 A, C, E, 9 A, B, D, E	1 A, B 2 A, B, C, D 3 A, B, C, D, E
6th Six Weeks Changes in Matter Water and Solutions Heating and Cooling Chapters 19,21,22,25,28	**"What is Acid Rain?",** **"What is pH?"**	6H, 7 D, 8 A, B, D, E 9 B, C, D, E	1 A, B 2 A, B, C, D 3 A, B, C, D, E

*Required Lab as part of 40% TEKS Lab/Field Requirement

Integrated Physics & Chemistry

High School Time Frame: 1st Six Weeks—*weeks 1-6* (page 1 of 3)

Unit Concepts:	Chapters:
Force & Motion Newton's Laws Work and Energy Science Project	Chapter 1 - Science and Measurements Chapter 2 – Mathematical Models Chapter 3 – Forces and Motion Chapter 5 – Work, Energy, and Power

TAKS Objective(s)	Concept and Process TEKS 4 A, B, C, D, 6 A 1 - 3	Required Exemplar Labs, "Investigations and Experiments", "Position and Time", "Acceleration", "Force,Mass, and Acceleration", "Energy Conservation", and Suggested Instructional Activities Integrating Concepts & Processes	Suggested Resources (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1 5	**Scientific Processes:** **1 A, B** **2 A, B, C, D, E** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit. **(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;	**Activity:** The students will demonstrate an understanding of the concepts of force and motion in everyday life: • Use the scientific method to plan an experiment that will identify the variables that affect speed. **(TEKS 1A, 2A)** • Use data collected in an investigation, construct graphs to analyze the motion of an object and make predictions on the affects of the motion if variables were changed. **(TEKS 2B, C)** • Identify and present how Newton's Laws of Motion are involved in a particular sporting event. **(TEKS 2A, 2D)** **Activity:** The student will demonstrate an understanding of the impact of energy transformations in everyday life: • Observe energy transformations and analyze the conversions from one form of energy to another. **(TEKS 1A, 2)**	Cambridge Physics Outlet (CPO) textbook. Chapters: 1-3 & 5 ISEF Science Fair: http://www.sciserv.org/isef/teachers/index.asp Snapshot Activities: 4A, 4B, 4C, 4D http://www.tenet.edu/teks/science/instruction/teksperts/ipc.pdf TEXTEAMS IPC Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html

Integrated Physics & Chemistry

High School Time Frame: 1st Six Weeks—*weeks 1-6* (page 2 of 3)

TAKS Objective(s)	Concept and Process TEKS 4 A, B, C, D, 6 A 1 - 3	Required Exemplar Labs, "Investigations and Experiments", "Position and Time", "Acceleration", "Force, Mass, and Acceleration", "Energy Conservation", **and Suggested Instructional Activities Integrating Concepts & Processes**	Suggested Resources (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
5 5	(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. **(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;	**Science Project: (required at 9th grade)** • Choose a limited subject, ask a question; identify or originate/define a problem to study. • Review published materials related to problem or question. • Evaluate possible solutions and make hypothesis. **Exemplar Labs:** "Investigations and Experiments" – CPO Manual, Lab 1.2 "Position and Time" – CPO Manual, Lab 2.2 "Acceleration"— CPO Manual, Lab 2.3 "Force,Mass, and Acceleration" - CPO Manual, Lab 3.1 "Energy Conservation" – CPO Manual,Lab 5.2	Vistas: "Chem Rockets", "Controlled Motion": http://www.tenet.edu/teks/science/instruction/vistas/index.html?hi Classic Newton: http://www.physicsclassroom.com/Default2.html **Suggested Labs:** Activity 3.3 – "Equilibrium, Action, and Reaction", CPO Lab Manual "Work With and Without an Inclined Plane" – in Appendix "Levers" – in Appendix

STUDENT PRODUCTS may include (but are not limited to): ● Models ● Projects ● Labs ● Research Papers ● Presentations

Integrated Physics & Chemistry
Alignment and Correlations Charts

High School Time Frame: 1st Six Weeks—*weeks 1-6* (page 3 of 3)

TEKS/TAKS Correlations*

Integrated Physics and Chemistry TEKS	Prior Knowledge (7th grade) TEKS	Prior Knowledge (8th grade) TEKS	Subsequent Knowledge (Biology, Chemistry, Physics) TEKS	Exit level TAKS Correlation
Concepts: 4 a,b,c,d, 6 a	7.6 a, b	8.7 a	Phys.: 4a, b, c, d, 6 a	Objective 5
Processes: 1a, b 2 a, b, c, d 3 a, b, c, d, e	7.1 a, b 7.2 a, b, c, d, e 7.3 a, b, c, d, e 7.4 a, b	8.1 a, b 8.2 a, b, c, d, e 8.3 a, b, c, d, e 8.4 a, b 8.5 a, b, c	Bio: 1 a, b, 2 a, b, c, d, 3 a, b, c, d, e, f. Chem: 1 a, b, 2 a, b, c, d, e, 3 a, b, c, d, e Phys: 1a, b, 2 a, b, c, d, e, f, 3 a, b, c, d, e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts: 4 a 4 b 4 c, d, 6 a	 Physical Science Standard B Physical Science Standard B Earth and Space Science Standard D Physical Science Standard B
Processes: 1 a, b 2 a, b, c, d 3 a, b, c, d, e	 Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F Science as Inquiry Standard A Science and Technology E Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

Integrated Physics & Chemistry

High School Time Frame: 2nd Six Weeks—*weeks 7-12* (page 1 of 3)

Unit Concepts:	Chapters:
Machines and Mechanical Advantage Electricity and Magnetism Waves	Chapter 4 – Machines and Mechanical Systems Chapter 6 – Electricity and Electric Circuits Chapter 7 – Measuring Electricity Chapter 8 – Electrical Relationships Chapter 9 – Circuits Chapter 10 – Magentism Chapter 12 – Introduction to Waves

TAKS Objective(s)	**Concept and Process TEKS 4 A, C, D, 5 A, B, 6 C, D, E, F, G, H, 8 E**	**Required Exemplar Labs,** "Forces in Machines", "Ohm's Law", "Work, Power, and Energy", "Waves",**and Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1 5	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit. **(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;	**Activity:** The students will demonstrate an understanding of the concepts of force and motion in everyday life: • Choose a simple machine to complete a preset task and explain how and why that machine was chosen based on mechanical advantage and efficiency. **(TEKS 2A, 2B, 2C, 2D)** **Activity:** The student will demonstrate an understanding of the impact of energy transformations in everyday life: • Through multimedia and technology resources, identify the energy conversions involved in delivering electrical energy to your home and analyzing the efficiency of these conversions. **(TEKS 3)**	Cambridge Physics Outlet (CPO) textbook. Chapters: 4, 6-10 & 12 ISEF Science Fair: http://www.sciserv.org/isef/teachers/index.asp Snapshot Activities: http://www.tenet.edu/teks/science/instruction/teksperts/ipc.pdf TEXTEAMS IPC Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html

3, 5	(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. **(6)** Science concepts. The student knows the impact of energy transformations in everyday life. The student is expected to: (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;	• Use multimedia and technology to research the economic and environmental impact of rechargeable batteries, disposable batteries, and solar cells. **(TEKS 3)** • Measure the electrical conductivity of various metals by placing samples of electrical wiring in a circuit containing an ammeter and voltmeter. **(TEKS 1A, 2)** • Implement a laboratory investigation using Ohm's law to compare series and parallel circuits. **(TEKS 1A, 2)** • Construct an electromagnet and analyze the relationship between an electric current and the strength of the electric field by counting the number of paper clips the device will pick up. **(TEKS 1A, 2)** **Activity:** The student will demonstrate an understanding of the effects of waves on everyday life by: • Use guitar strings or other sources to plan and implement a lab to identify the parts of a wave and the effects of changing frequency, amplitude, and tension. **(TEKS 1A, 2A, 2B)**	**Suggested Labs:** Activity 6.1 – "What is a Circuit?", CPO Lab Manual Activity 7.1 – "Voltage", CPO Lab Manual Activity 7.2 – "Current", CPO Lab Manual Activity 9.2 – "Series Circuits", CPO Lab Manual Activity 9.3 – "Parallel Circuits", CPO Lab Manual Activity 10.1 – "Permanent Magnets", CPO Lab Manual Activity 10.2 – "Electromagnets", CPO Lab Manual

	(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 **(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;	**Science Project:** (continued from 1st six weeks) • Create a plan for an experiment. • Complete ISEF Required paperwork; before beginning experimentation; consult with project sponsors. • Challenge and test hypothesis through experimentation (data collection) and analysis. Evaluate the results of experiment and reach conclusions based on data **Exemplar Labs:** "Forces in Machines" – CPO Manual, Lab 4.1 "Ohm's Law"— CPO Manual, Lab 8.1 "Work, Energy, and Power" – CPO Manual, Lab 8.2 "Waves" – CPO Manual, Lab 12.1	

Integrated Physics & Chemistry
Alignment and Correlations Charts

High School Time Frame: 2nd Six Weeks—*weeks 7-12* (page 4 of 4):

TEKS/TAKS Correlations*

Integrated Physics and Chemistry TEKS	Prior Knowledge (7th grade) TEKS	Prior Knowledge (8th grade) TEKS	Subsequent Knowledge (Biology, Chemistry, Physics) TEKS	Exit level TAKS Correlation
Concepts: 4 a, c, d 5 a, b 6 c, d, e, f, g 8 e	7.5a, 7.6 a, b, 7.8 a, b, 7.12 b, 7.13 b, 7.14 c	8.7 a, 8.7 b, 8.10 a, b, c, 8.12 b, 8.13a, 8.14 a, c	Bio: 9d Chem: 5a, c,15, 9c, d Phys: 4 a, b, c, d, 5 d, 6 a, c, e, 7a, b, 8 a, b, c	Objective 3, 5
Processes: 1a, b 2 a, b, c, d 3 a, b, c, d, e	7.1 a, b 7.2 a, b, c, d, e 7.3 a, b, c, d, e 7.4 a, b	8.1 a, b 8.2 a, b, c, d, e 8.3 a, b, c, d, e 8.4 a, b 8.5 a, b, c	Bio: 1 a, b, 2 a, b, c, d, 3 a, b, c, d, e, f. Chem: 1 a, b, 2 a, b, c, d, e, 3 a, b, c, d, e Phys: 1a, b, 2 a, b, c, d, e, f, 3 a, b, c, d, e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts: 4 a 4 c, d 5 a, b, c, d 6c 6 d 6 e, f, g	 Physical Science Standard B Physical Science Standard B Physical Science Standard B Physical Science Standard B Earth and Space Standard D Physical Science Standard B Science in Personal and Social Perspectives Standard F Physical Science Standard B
Processes: 1 a, b 2 a, b, c, d 3 a, b, c, d, e	 Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F Science as Inquiry Standard A Science and Technology E Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

Integrated Physics & Chemistry

High School Time Frame: 3rd Six Weeks—*weeks 13-18* (page 1 of 3)

Unit Concepts:	Chapters:
Sound and Waves Light and Optics Science Project	Chapter 13 – Introduction to Sound Chapter 14 – Light and Color Chapter 15 - Optics

TAKS Objective(s)	Concept and Process TEKS 5 A, B, C, D 1-3	Required Exemplar Labs, "Music", "Optical Technology" and Suggested Instructional Activities Integrating Concepts & Processes	Suggested Resources (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1 5 5	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit. **(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;	**Activity:** The student will demonstrate an understanding of the effects of waves on everyday life by: • Use guitar strings or other sources to plan and implement a lab to identify the parts of a wave and the effects of changing frequency, amplitude, and tension. **(TEKS 1A, 2A, 2B)** • Use a glass prism to determine when total internal reflection occurs as in fiber optics and discuss the applications of fiber optics technology. **(TEKS 1A, 2, 3A)** • Construct an instrument that demonstrates pitch, intensity, loudness, and timbre. **(TEKS 1A, 2)** **Science Project:** (continued) • Prepare report and exhibit.	Cambridge Physics Outlet (CPO) textbook. Chapters: 13-15 ISEF Science Fair: http://www.sciserv.org/isef/teachers/index.asp Snapshot Activities: http://www.tenet.edu/teks/science/instruction/teksperts/ipc.pdf TEXTEAMS IPC Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html Vista: "What do You Think?" http://www.tenet.edu/teks/science/instruction/vistas/index.html?hi

5	(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.	**Exemplar Labs:** "Music"—CPO Manual, Lab 13.3 "Optical Technology"—CPO Manual, Lab 15.3 **<u>Suggested Lab:</u>** "Color" – CPO Manual, Lab 14.2	

3rd Three/Six Weeks Unit continued on next page

Integrated Physics & Chemistry
Alignment and Correlations Charts

High School Time Frame: 3rd Six Weeks—*weeks 13-18* (page 3 of 3)

TEKS/TAKS Correlations*

Integrated Physics and Chemistry TEKS	Prior Knowledge (7th grade) TEKS	Prior Knowledge (8th grade) TEKS	Subsequent Knowledge (Biology, Chemistry, Physics) TEKS	Exit level TAKS Correlation
Concepts: 5 a, b, c, d		8.7 b, 8.13 a, 8.14 a	Phys: 8 a, b, c	Objectives 5
Processes: 1a, b 2 a, b, c, d 3 a, b, c, d, e	 7.1 a, b 7.2 a, b, c, d, e 7.3 a, b, c, d, e 7.4 a, b	 8.1 a, b 8.2 a, b, c, d, e 8.3 a, b, c, d, e 8.4 a, b 8.5 a, b, c	Bio: 1 a, b, 2 a, b, c, d, 3 a, b, c, d, e, f. Chem: 1 a, b, 2 a, b, c, d, e, 3 a, b, c, d, e Phys: 1a, b, 2 a, b, c, d, e, f, 3 a, b, c, d, e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts: 5 a, b, c, d	Physical Science Standard B
Processes: 1 a, b 2 a, b, c, d 3 a, b, c, d, e	 Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F Science as Inquiry Standard A Science and Technology E Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

Integrated Physics & Chemistry

High School Time Frame: 4th Six Weeks—*weeks 19-24* (page 1 of 3)

Unit Concepts:	**Chapters:**
Properties of Matter	Chapter 16 – What is Matter? Chapter 17 – Properties of Matter Chapter 18 – Atoms and Elements

TAKS Objective(s)	**Concept and Process TEKS 7 A, B, C, D, E 1 - 3**	**Required Exemplar Labs,** "Density of Fluids", "Viscosity of Fluids" **and Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1 4	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit. **(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;	**Activity:** The students will demonstrate an understanding that a relationship exists between the properties of matter and its components: • Obtain the mass and volume of different materials in a lab setting and determine where an object will sit in a density column. **(TEKS 1A, 2A, 2B, 2C, 2D)** • Investigate and describe the effects of viscosity on the motion of an object released into fluids such as shampoos, syrups, and cooking oils. Investigate and identify the factors that cause a change in viscosity. **(TEKS 1A, 2)** • Use multimedia and technology resources to prepare a presentation on the historical development of the atomic theory. **(TEKS 3)**	Cambridge Physics Outlet (CPO) textbook. Chapters: 16-18 Snapshot Activities: http://www.tenet.edu/teks/science/instruction/teksperts.ipc.pdf TEXTEAMS IPC Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html

4th Three/Six Weeks Unit continued on next page

Integrated Physics & Chemistry

High School Time Frame: 4th Six Weeks—*weeks 19-24* (page 2 of 3)

T A K S Objective(s)	**Concept and Process TEKS 7 A, B, C, D, E 1 - 3**	**Required Exemplar Labs,** "Density of Fluids", "Viscosity of Fluids" **and Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
	(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.	• Use the information on the periodic table to build accurate models of atoms and predict how different elements will combine with other elements. **(TEKS 2C, 2D)** • Use safe lab practices to analyze different materials and their composition to determine if they are elements, compounds, or mixtures. **(TEKS 1A, 2B, 2C)** **EXEMPLAR LABS:** "Density of Fluids"—CPO Manual, Lab 17.2 "Viscosity of Fluids"—CPO Manual, Lab 17.4.	

STUDENT PRODUCTS may include (but are not limited to): ● Models ● Projects ● Labs ● Research Papers ● Presentations

4th Three/Six Weeks Unit continued on next page

Exemplar Labs located in Cambridge Physics Outlet Lab Manual.

Integrated Physics & Chemistry
Alignment and Correlations Charts

High School Time Frame: 4th Six Weeks—*weeks 19-24* (page 3 of 3)

TEKS/TAKS Correlations*

Integrated Physics and Chemistry TEKS	Prior Knowledge (7th grade) TEKS	Prior Knowledge (8th grade) TEKS	Subsequent Knowledge (Biology, Chemistry, Physics) TEKS	Exit level TAKS Correlation
Concepts: 7 a, b, c, d, e	7.6 c, 7.7 b, c	8.10 a, 8.8 b, 8.9 a, b, d	Chem: 4 a, b, c, d, 11 a	Objective 4
Processes: 1a, b 2 a, b, c, d 3 a, b, c, d, e	7.1 a, b 7.2 a, b, c, d, e 7.3 a, b, c, d, e 7.4 a, b	8.1 a, b 8.2 a, b, c, d, e 8.3 a, b, c, d, e 8.4 a, b 8.5 a, b, c	Bio: 1 a, b, 2 a, b, c, d, 3 a, b, c, d, e, f. Chem: 1 a, b, 2 a, b, c, d, e, 3 a, b, c, d, e Phys: 1a, b, 2 a, b, c, d, e, f, 3 a, b, c, d, e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts: 7 a, b, c, d, e	Physical Science Standard B
Processes: 1 a, b 2 a, b, c, d 3 a, b, c, d, e	Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F Science as Inquiry Standard A Science and Technology E Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

Integrated Physics & Chemistry

High School Time Frame 5th Six Weeks—*weeks 25-30* (page 1 of 4)

Unit Concepts:	**Chapters:**
Changes in Matter Solution Chemistry Heating and Cooling	Chapter 20- Chemical Reactions Chapter 23- Solutions Chapter 24- Water Quality Chapter 26- Measuring Heat Chapter 27- Heat Transfer

TAKS Objective(s)	**Concept and Process TEKS 6 A, B, C, E, 7 C, D,8 A, C, 8 E, 9 A, D, E 1 - 3**	**Required Exemplar Labs,** "Chemical Changes", "Conservation of Mass", " Specific Heat" **and Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit.	**Activity:** The student will demonstrate an understanding of the impact of energy transformations in everyday life: • Observe energy transformations and analyze the conversions from one form of energy to another. **(TEKS 1A, 2)**	Cambridge Physics Outlet (CPO) textbook. Chapters: 20, 23, 24, 26, 27 Snapshot Activities: http://www.tenet.edu/teks/science/instruction/teksperts/ipc.pdf
2, 3, 4	**(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;	• Observe and measure the movement of heat through everyday objects. Differentiate between the three methods of heat conversion. **(TEKS 1A, 2)**	TEXTEAMS IPC Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html
4	(B) investigate and demonstrate the movement of heat through solids, liquids, and gases by convection, conduction, and radiation;	• Through multimedia and technology resources, identify the energy conversions involved in delivering electrical energy to your home and analyzing the efficiency of these conversions. **(TEKS 3)**	Vista: "True Solutions" http://www.tenet.edu/teks/science/instruction/vistas/index.html?hi
	(C) analyze the efficiency of energy conversions that are	• Measure the electrical conductivity of various metals by placing samples of electrical wiring in a circuit containing an ammeter and voltmeter. **(TEKS 1A, 2)**	

4	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; (E) measure the thermal and electrical conductivity of various materials and explain results; **(7)** Science concepts. The student knows relationships exist between properties of matter and its components. The student is expected to: (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	**Activity:** The students will demonstrate an understanding that a relationship exists between the properties of matter and its components: • Use the information on the periodic table to build accurate models of atoms and predict how different elements will combine with other elements. **(TEKS 2C, 2D)** • Measure the thermal conductivity of different cookware by placing thermographic paper at the bottom of the cookware to measure the conductivity. **(TEKS 1A, 2, 3)** **Activity:** The students will demonstrate an understanding of how changes in matter affect everyday life: • Use safe laboratory practice to, conduct a series of reactions, collect data, and determine the type of change that is occurring. **(TEKS 1A, 2B, 2C, 2D)** • Place 2 mL of Na_2SO_4 in one test tube and 2 mL of $SrCl_2$ in another test tube and determining the total mass of the two substances. After combining the two substances into one test tube, determine the mass of the new substance.	
4	**(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,		

4	changes in states, and stages in the rock cycle; and (C) investigate and identify the law of conservation of mass. (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; (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.	The students will demonstrate an understanding of solution chemistry: • Produce a model of a water molecule and use its polar characteristics to relate its structure to its function as a universal solvent. • Use various indicators to determine the pH of several everyday solutions. **(TEKS 1A, 2)** • Implement a laboratory procedure that tests the solubility of salt based on surface area, temperature of the solvent, and stirring. **(TEKS 1A, 2)** **Exemplar Labs:** "Chemical Changes"—CPO Manual, Lab 20.1 " Conversion of Mass"- CPO Manual, Lab 20.3 "Specific Heat"- CPO Manual, Lab 26.3	

Integrated Physics & Chemistry

Alignment and Correlations Charts

High School Time Frame: 5th Six Weeks—*weeks 25-30* (page 4 of 4)

TEKS/TAKS Correlations*

Integrated Physics and Chemistry TEKS	Prior Knowledge (7th grade) TEKS	Prior Knowledge (8th grade) TEKS	Subsequent Knowledge (Biology, Chemistry, Physics) TEKS	Exit level TAKS Correlation
Concepts: 6 a, b, c, e 7 c, d 8 a, c, e 9 a, b, d, e	7.5 a, 7.6 c, 7.7 a, b, c, 7.8 a, b 7.9 a, 7.12 b, 7.13 b, 7.14 c	8.6 a, 8.8 b, 8.9 a, b, c, d, 8.10 a, b, c, 8.12 a, b, 8.14 a, c	Bio: 9d, 10 a, 4 d Chem: 4 a, b, c, d, 5a, c, 9 c, d, 11 a, c, 12 a, b, c, 13 a, b, c Phys: 5 d, 6 c, e, 7 a, b	Objectives 2, 3, 4, 5
Processes: 1a, b 2 a, b, c, d 3 a, b, c, d, e	7.1 a, b 7.2 a, b, c, d, e 7.3 a, b, c, d, e 7.4 a, b	8.1 a, b 8.2 a, b, c, d, e 8.3 a, b, c, d, e 8.4 a, b 8.5 a, b, c	Bio: 1 a, b, 2 a, b, c, d, 3 a, b, c, d, e, f. Chem: 1 a, b, 2 a, b, c, d, e, 3 a, b, c, d, e Phys: 1a, b, 2 a, b, c, d, e, f, 3 a, b, c, d, e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts: 6 a, b, e 6c 7 c, d, 8 a, c 9 a, b, d	 Physical Science Standard B Physical Science Standard B Earth and Space Science Standard D Physical Science Standard B Physical Science Standard B
Processes: 1 a, b 2 a, b, c, d 3 a, b, c, d, e	 Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F Science as Inquiry Standard A Science and Technology E Science as Inquiry Standard A History and Nature of Science Standard G

****Refer to Appendix for complete TEKS Objectives and National Science Education Standards***

Integrated Physics & Chemistry

High School Time Frame: 6th Six Weeks—*weeks 31-36* (page 1 of 4)

Unit Concepts:	Chapters:
Changes in Matter Solution Chemistry Heating and Cooling	Chapter 19- Molecules and Compounds Chapter 21- Types of reactions Chapter 22- Chemistry and the Environment Chapter 25- Acids and Bases Chapter 28- Heating, Cooling, and Systems

T A K S Objective(s)	Concept and Process TEKS 6 H, 7 D, 8 A, B, D, E 9 B, C, D 1 - 3	Required Exemplar Labs, "Acid Rain" and " "Acids, Bases, and pH" **and** Suggested Instructional Activities Integrating Concepts & Processes	Suggested Resources (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
1 1 1	**Scientific Processes:** **1 A, B,** **2 A, B, C, D, E** **3 A, B, C, D, E** (40% Course Requirement minimum) Ongoing / Integrated with concepts throughout unit. **(6)**Science concepts. The student knows the impact of energy transformations in everyday life. The student is expected to: (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: (D) relate the chemical behavior of an element including bonding, to its	**Activity:** The student will demonstrate an understanding of the impact of energy transformations in everyday life: • Use multimedia and technology to research and collect weather data from cities with various latitudes, altitudes, and proximity to the Gulf of Mexico to analyze the effects of heating and cooling found in weather **(TEKS 2B, 2C, 2D, 3)** **Activity:** The students will demonstrate an understanding that a relationship exists between the properties of matter and its components: • Use the information on the periodic table to build accurate models of atoms and predict how different elements will combine with other elements. **(TEKS 2C, 2D)**	Cambridge Physics Outlet (CPO) textbook. Chapters: 19, 21, 22, 25, 28 Snapshot Activities: 8B, 8D, 8E, 9C, 9D http://www.tenet.edu/teks/science/instruction/teksperts.html TEXTEAMS Chemistry Institute Activities. Graphs, Charts and Tables Activities: http://www.tenet.edu/teks/science/instruction/tutorial.html

	placement on the periodic table; and **(8)** Science concepts. The student knows that changes in matter affect everyday life. The student is expected to: (A) 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; (B) analyze energy changes that accompany chemical reactions such as those occurring in heat packs, cold packs, and glow sticks to classify (D) describe types of nuclear reactions such as fission and fusion and their roles in applications such as medicine and energy production; and	**Activity:** The students will demonstrate an understanding of how changes in matter affect everyday life: • Analyze the reactions that occur in heat packs, glow sticks, and other reactions provided. **(TEKS 1A, 2B, 2C)** • Do a presentation, using media and technology, how nuclear reactions play a role in any medical or energy production application. **(TEKS 3)** • Use multimedia and technology to present the environmental and economic impact of a chemical product that is made in the valley. **(TEKS 2C, 2D, 3B)**	

6th Three/Six Weeks Unit continued on next page

Integrated Physics & Chemistry

High School Time Frame: 6th Six Weeks—*weeks 31-36* (page 3 of 4)

T A K S Objective(s)	**Concept and Process TEKS 8 A, B, D, E 9 B,C, D 1 - 3**	**Required Exemplar Labs,** "Acid Rain" and "Acid, Bases, and pH" **and Suggested Instructional Activities Integrating Concepts & Processes**	**Suggested Resources** (Use of additional & various resources from multiple sources is necessary to meet the TEKS)
	(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: (B) simulate the effects of acid rain on soil, buildings, statues, or microorganisms; and (C) demonstrate how various factors influence solubility including temperature, pressure, and nature of the solute and solvent; and (D) demonstrate how various factors influence solubility including temperature, pressure, and nature of the solute and solvent; and	**Activity:** The students will demonstrate an understanding of solution chemistry: • Determine the effects of acid rain on Daphnia and determining the overall effects on the ecosystem. **(TEKS 1A, 2)** • Demonstrate that the nature of the solvent influences the solubility of a solute by using two test tubes, one containing 10 mL of water and the other containing 10 mL of ethanol. Add 10 mL of KNO_3 to each and gently shake. **(TEKS 1A, 2)** **Exemplar Labs:** "Acid, Bases, and pH" – CPO Manual, Lab 25.1 "Acid Rain" – CPO Manual, Lab 25.2	"What is Acid Rain?" Cambridge Physics Outlet Lab Manual. Lab 25.2 "Conservation of Mass" Cambridge Physics Outlet Lab Manual. Lab 20.3

Integrated Physics & Chemistry
Alignment and Correlations Charts

High School Time Frame: 6th Six Weeks—*weeks 31-36* (page 4 of 4)

TEKS/TAKS Correlations*

Integrated Physics and Chemistry TEKS	Prior Knowledge (7th grade) TEKS	Prior Knowledge (8th grade) TEKS	Subsequent Knowledge (Biology, Chemistry, Physics) TEKS	Exit level TAKS Correlation
Concepts: 6 h 7 d 8 a, b, d, e 9 b, c, d	7.6c, 7.7 a, b, c, 7.9 a	8.6 a, 8.8 b, d, 8.9, a, b, c, d, 8.10 a, 8.12 a, 8.14 c	Bio: 10 a, 4 d Chem: 4 a, b, c, d, 5 a, 11 a, c, 12 a, b, c, 13 a, b, c	Objecitve 4
Processes: 1a, b 2 a, b, c, d 3 a, b, c, d, e	7.1 a, b 7.2 a, b, c, d, e 7.3 a, b, c, d, e 7.4 a, b	8.1 a, b 8.2 a, b, c, d, e 8.3 a, b, c, d, e 8.4 a, b 8.5 a, b, c	Bio: 1 a, b, 2 a, b, c, d, 3 a, b, c, d, e, f. Chem: 1 a, b, 2 a, b, c, d, e, 3 a, b, c, d, e Phys: 1a, b, 2 a, b, c, d, e, f, 3 a, b, c, d, e	Objective 1

Refer to Appendix for complete TEKS and TAKS objectives.

TEKS/National Science Education Standards Correlations***

TEKS	National Science Education Standards
Concepts:	
6 h	Physical Science Standard B Life Science Standard C
7 d	Physical Science Standard B
8 a, b, d	Physical Science Standard B
8 e	Physical Science Standard B
9 b, d	Science in Personal and Social Perspectives Standard F
9 c	Physical Science Standard B Science in Personal and Social Perspectives Standard F
9 e	Physical Science Standard B
Processes:	
1 a, b	Science as Inquiry Standard A Science in Personal and Social Perspectives Standard F
2 a, b, c, d	Science as Inquiry Standard A Science and Technology E
3 a, b, c, d, e	Science as Inquiry Standard A History and Nature of Science Standard G

Refer to Appendix for complete TEKS Objectives and National Science Education Standards

APPENDIX

Texas Essential Knowledge and Skills
- Seventh Grade Science
- Eighth Grade Science
- Integrated Physics and Chemistry
- Biology
- Chemistry
- Physics

Texas Assessment of Knowledge and Skills Objectives
- Tenth Grade and Exit Level (10^{th} and 11^{th} Grade)

National Science Education Standards

Science TEKS Toolkit Excerpts
- Materials and Safety Equipment List
- Checklist for Science Field Investigations
- Science Facility Safety Checklist
- Laboratory Safety Survey
- Assessment Methods
- Web-Based Resources

Texas Environmental Education Advisory Committee Contact Information

Pre-AP and AP Science Scope and Sequence Grades 6-12

Update on CPO IPC Program (May 2003)

Required Exemplar Labs:
- "Using a Scientific Model to Predict Speed"
- "Acceleration"
- "Music"
- "Optical Technology"
- "Energy Conservation"
- "Ohm's Law"
- "Electromagnets"
- "Density of Fluids"
- "Viscosity of Fluids"
- "Chemical Changes"
- "What is pH?"
- "What is Acid Rain?"
- "Conservation of Mass"

All exemplar labs can be found in Cambridge Physic Outlet Lab Manual, "Investigations".

Integrated Physics and Chemistry (IPC) Exemplar Labs

Number	TEKS	Exemplar Lab	Source
1.	4 1st three/six weeks	"Using a Scientific Model to Predict Speed"	Cambridge Physics Outlet Lab Manual Lab 2.1
2.	4 1st three/six weeks	"Acceleration"	Cambridge Physics Outlet Lab Manual Lab 2.3
3.	5 2nd three/six weeks	"Music"	Cambridge Physics Outlet Lab Manual Lab 13.3
4.	5 2nd three/six weeks	"Optical Technology"	Cambridge Physics Outlet Lab Manual Lab 15.3
5.	6 3rd three/six weeks	"Energy Conservation"	Cambridge Physics Outlet Lab Manual Lab 5.2
6.	6 3rd three/six weeks	"Ohm's Law"	Cambridge Physics Outlet Lab Manual Lab 8.1
7.	6 3rd three/six weeks	"Electromagnets"	Cambridge Physics Outlet Lab Manual Lab 10.2
8.	7 4th three/six weeks	"Density of Fluids"	Cambridge Physics Outlet Lab Manual Lab 17.2
9.	7 4th three/six weeks	"Viscosity of Fluids"	Cambridge Physics Outlet Lab Manual Lab 17.4
10.	8 5th three/six weeks	"Chemical Changes"	Cambridge Physics Outlet Lab Manual Lab 20.1
11.	9 5th three/six weeks	"What is pH?"	Cambridge Physics Outlet Lab Manual Lab 25.1
12.	9 6th three/six weeks	"What is Acid Rain?"	Cambridge Physics Outlet Lab Manual Lab 25.2
13.	8 6th three/six weeks	"Conservation of Mass"	Cambridge Physics Outlet Lab Manual Lab 20.3

Exemplar Labs located in Cambridge Physics Outlet Lab Manual.

National Science Education Content Standards For Grades 5-8

Content Standard	
A: Science As Inquiry	Abilities to do scientific inquiry Understandings about scientific inquiry
B: Physical Science	Properties and changes of properties in matter Motions and forces Transfer of energy
C: Life Science	Structure and function in living systems Reproduction and heredity Regulation and Behavior Populations and ecosystems Diversity and adaptations of organisms
D: Earth and Space Science	Structure of the earth system Earth's history Earth in the solar system
E: Science and Technology	Abilities of technological design Understandings about science and technology
F: Science in Personal and Social Perspectives	Personal health Populations, resources, and environments Natural hazards Risks and benefits Science and technology in society
G: History and Nature of Science	Science as a human endeavor Nature of science History of science

National Science Education Content Standards for Grades 9 - 12

Content Standard	
A: Science As Inquiry	Abilities to do scientific inquiry Understandings about scientific inquiry
B: Physical Science	Structure of atoms Structure and properties of matter Chemical reactions Motions and forces Conservation of energy and increase in disorder Interactions of energy and matter
C: Life Science	The cell Molecular basis of heredity Biological evolution Interdependence of organisms Matter, energy, and organization in living systems Behavior of organisms
D: Earth and Space Science	Energy in the earth system Geochemical cycles Origin and evolution of the earth system Origin and evolution of the universe
E: Science and Technology	Abilities of technological design Understandings about science and technology
F: Science in Personal and Social Perspectives	Personal and community health Population growth Natural resources Environmental quality Natural and human-induced hazards Science and technology in local, national, and global challenges
G: History and Nature of Science	Science as a human endeavor Nature of scientific knowledge Historical perspectives