

# FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



## CHEMISTRY OF THE EARTH SYSTEMS

<b>Board Approval Date: March, 2019</b>	<b>Course Length: 2 Semesters</b>
<b>Grading: A-F</b>	<b>Credits: 5 Credits per Semester</b>
<b>Proposed Grade Level(s): 10, 11, 12</b>	<b>Subject Area: Physical Science</b> <b>Elective Area (if applicable):</b> N/A
<b>Prerequisite(s):</b> None	<b>Corequisite(s):</b> Integrated Math 1
<b>CTE Sector/Pathway: N/A</b>	
<b>Intent to Pursue 'A-G' College Prep Status: Yes</b>	
<b>A-G Course Identifier: (d) Laboratory Science</b>	
<b>Graduation Requirement: Yes</b>	
<b>Course Intent: District Course</b> <b>Program (if applicable):</b>	

### COURSE DESCRIPTION:

Chemistry of the Earth System is a course in the California Next Generation Science Standards (CA NGSS) three course model and includes disciplinary core ideas related to Physical Science and integrates a selection of the Earth and Space Science concepts. This course also incorporates the eight Science and Engineering Practices and seven Crosscutting Concepts related to the NGSS. In this course, students will explore the structure and properties of matter, conservation and transfer of energy, chemical reactions and processes in everyday life, and chemical changes in Earth systems. Engineering Core Ideas are used to explore applications of chemistry concepts. Students apply algebraic processes to describe and predict phenomena.

**DETAILED UNITS OF INSTRUCTION:**

<b>Unit Number/Title</b>	<b>Unit Essential Questions</b>	<b>Examples of Formative Assessments</b>	<b>Examples of Summative Assessment</b>
<b>1. Particle Model: Combustion</b>	What is energy, how is it measured, and how does it flow within a system? What mechanisms allow us to utilize the energy of our foods and fuels?	*Activities from Particle Model: Claim-Evidence-Reasoning (CER), student explanations through whiteboarding, Robbie's review *Drawing models of energy/combustion	*Particle test *Lab design
<b>2. Heat and Energy in the Earth System</b>	How is energy transferred and conserved? How can energy be harnessed to perform useful tasks?	*PhET Simulation - States of Matter *Lava Lamp Activity *Investigating the interior of the Earth *Heat capacity of glass and cans *Mapping of plate motion	*Claim/Evidence/Reasoning of Plate Tectonic Theory *Coffee cup challenge
<b>3. Patterns and Interactions of the Periodic Table</b>	What is inside atoms and how does this affect how they interact? What models can we use to predict the outcomes of chemical reactions?	*Periodic table card sort *Analysis of periodic data *Investigating Chemical Formulas *POGIL - Periodicity	*Investigation of an unknown chemical formula *Design experiment *Analyzing periodic data to predict formulas
<b>4. Applications of Chemical Reactions</b>	What holds atoms together in molecules? How do chemical reactions absorb and release energy?	*Investigating bulk properties of compounds *Building energy diagram models using PhET simulations and provide explanations *Intro to Collision Model *Investigation into the release and absorption of energy in chemical reactions	*Microplastics Project
<b>5. Chemistry of Climate Change</b>	What regulates weather and climate? What effects are humans having on the climate?	*Investigation of greenhouse gases through PhET simulation: Molecules and Light *Analyzing and providing evidence to explain climate data	*Evaluating solutions to determine the implications of reducing carbon production among Humans

		*Expanding on knowledge of combustion reaction and revising original model	
<b>6. Dynamics of Chemical Reactions and Ocean Acidification</b>	How can you alter chemical equilibrium and reaction rates? How can you predict the relative quantities of products in a chemical reaction?	*Investigation into Le Chatelier's Principles from a relative perspective *Observations about acids and bases and the effects on living things *Investigation into factors affecting collision model/reaction rates	*Design a chemical system that would produce increased products at equilibrium

### **ESSENTIAL STANDARDS:**

HS-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems. (ELA/Literacy CCSS: RST.11-12.1, RST.11-12.2 and Math CCSS: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.3)

HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. (Math CCSS: MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3)

HS-PS1-1. 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. (ELA/Literacy CCSS: RST.9-10.7)

HS-PS1-2. 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. (ELA/Literacy CCSS: RST.11-12.2, RST.11-12.5 and Math CCSS: HSN-Q.A.1, HSN-Q.A.3)

HS-PS1-5. Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. (ELA/Literacy CCSS: RST.11-12.1, RST.11-12.2 and Math CCSS: MP.2, HSN-Q.A.1, HSN-Q.A.3)

HS-PS1-6. Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.\* (ELA/Literacy CCSS: RST.11-12.7)

HS-PS1-7. Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. (Math CCSS: MP.2, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3)

### **RELEVANT STANDARDS AND FRAMEWORKS, CONTENT/PROGRAM SPECIFIC STANDARDS:**

#### **Link to Common Core Standards (if applicable):**

Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.

9th-10th <http://www.corestandards.org/ELA-Literacy/RST/9-10/>  
 11th-12th <http://www.corestandards.org/ELA-Literacy/RST/11-12/>

**Link to Framework (if applicable):**

Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which also reviews and recommends textbooks and other instructional materials to be adopted by the SBE.

<https://www.cde.ca.gov/ci/sc/cf/documents/scifwchapter7.pdf>

**Link to Subject Area Content Standards (if applicable):**

Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.

<https://www.nextgenscience.org/>

**Link to Program Content Area Standards (if applicable):**

Program Content Area Standards applies to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

**TEXTBOOKS AND RESOURCE MATERIALS:**

**Textbooks**

<b>Board Approved</b>	<b>Pilot Completion Date (If applicable)</b>	<b>Textbook Title</b>	<b>Author(s)</b>	<b>Publisher</b>	<b>Edition</b>	<b>Date</b>
<i>Yes</i>		<i>World of Chemistry</i>	Zumdahl, Zumdahl & DeCoste	Houghton Mifflin	2002, 2006	
<i>We are currently piloting this material</i>		<i>TBD</i>	TBD	TBD	TBD	

**Other Resource Materials**

**Supplemental Materials**

Board Approved Supplemental Materials (Including but not limited to: Film Clips, Digital Resources, Supplemental texts, DVDs, Programs (Pebble Creek, DBQ, etc.):