

# FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



## Agriscience 2: The Chemistry of Soil, Plants and Animals

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| <b>Board Approval Date: June 18, 2025</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</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>Subject Area: Chemistry, CTE<br/>Elective Area (if applicable):</b> |
| <b>Prerequisite(s):<br/>Agriscience 1</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <b>Corequisite(s):</b>                                                 |
| <b>CTE Sector/Pathway: Agriculture and Natural Resources</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                        |
| <b>Intent to Pursue 'A-G' College Prep Status: Yes</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                        |
| <b>A-G Course Identifier: (d) Laboratory Science</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                        |
| <b>Graduation Requirement: No</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                        |
| <b>Course Intent: Site Specific<br/>Program (if applicable): CTE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                        |
| <p style="text-align: center;"><b>Folsom Cordova Unified School District<br/>2024-2025 Nondiscrimination Statement</b></p> <p>The Folsom Cordova Unified School District prohibits discrimination, intimidation, harassment (including sexual harassment) or bullying based on a person's actual or perceived ancestry, color, disability, gender, gender identity, gender expression, immigration status, nationality, race or ethnicity, religion, sex, sexual orientation, or association with a person or a group with one or more of these actual or perceived characteristics. For questions or complaints, contact:</p> <p><b>Jim Huber, Ed.D., Assistant Superintendent, Educational Services<br/>Compliance Officer, Section 504 Coordinator, ADA Coordinator (students)<br/>jhuber@fcusd.org<br/>916-294-9000 x 104580</b></p> <p><b>Shannon Diaz, Director of Compliance<br/>Compliance Officer and Title IX Coordinator<br/>sdiaz@fcusd.org<br/>916-294-9000 x 104415</b></p> |                                                                        |

**1965 Birkmont Drive  
Rancho Cordova, CA 95742**

**The Folsom Cordova Unified School District does not discriminate on the basis of sex and prohibits sex discrimination in any education program or activity that it operates, as required by Title IX and its regulations, including in admission and employment.**

**Inquiries about Title IX may be referred to the Folsom Cordova Unified School District's Title IX Coordinator, the U.S. Department of Education's Office for Civil Rights, or both. The District Title IX Coordinator is:**

**Shannon Diaz, Director of Compliance  
Compliance Officer and Title IX Coordinator  
sdiaz@fcusd.org  
916-294-9000 x 104415  
1965 Birkmont Drive  
Rancho Cordova, CA 95742**

**The District nondiscrimination policy can be located at:**

**<https://www.fcusd.org/district/about-us/nondiscrimination-statementpolicy>**

**The District's nondiscrimination complaint procedures can be located at:**

**Students: <https://www.fcusd.org/departments/compliance/complaints/uniform-complaints>**

**Staff: <https://www.fcusd.org/departments/compliance/complaints/nondiscrimination-in-employment>**

**To report information about conduct that may constitute sex discrimination or sex-based harassment, or make a complaint of sex discrimination or sex-based harassment under Title IX, please refer to:**

**Students: <https://www.fcusd.org/district/about-us/title-ix-notificationsexual-harassment>**

**Staff: <https://www.fcusd.org/departments/compliance/complaints/sexual-harrassment-title-ix>**

## **COURSE DESCRIPTION:**

**The Chemistry of Soils, Plants, and Animals is a hands-on, laboratory-based course that explores the chemical principles vital to agricultural science. Aligned with chemistry standards, this course examines the chemistry underlying soil properties, plant nutrition, and animal health, integrating agricultural applications with core scientific principles. Students will delve into soil chemistry and fertility, analyze plant and animal nutrient cycles, investigate water quality in agricultural contexts, and explore chemical interactions impacting crop and livestock production.**

**DETAILED UNITS OF INSTRUCTION:**

| Unit Number/Title                                                                                                                                                                                                                                                                                                                                                                                                  | Unit Essential Questions                                                                      | Examples of Formative Assessments                                                                                             | Examples of Summative Assessment                                                                     |
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| <b>1. Introduction to Agricultural Chemistry</b>                                                                                                                                                                                                                                                                                                                                                                   | What role do chemical processes play in the life cycles of plants and animals?                | *Group discussions analyzing case studies where chemistry improves agricultural practices (e.g., fertilization, pest control) | *A reflective essay on the impact of agricultural chemistry on food production and sustainability    |
| <b>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.</b>                                                                                                                                                                                                                                       |                                                                                               |                                                                                                                               |                                                                                                      |
| <b>2. Soil Composition and Chemistry</b>                                                                                                                                                                                                                                                                                                                                                                           | What chemical properties of soil contribute to plant health?                                  | *Guided practice on reading soil test reports, focusing on chemical indicators                                                | *Lab report detailing the chemical properties of a soil sample and its suitability for various crops |
| <b>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.</b><br><b>HS-PS1-3 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. (chemical properties of substances)</b> |                                                                                               |                                                                                                                               |                                                                                                      |
| <b>3. Plant Chemistry and Photosynthesis</b>                                                                                                                                                                                                                                                                                                                                                                       | What are the chemical pathways in photosynthesis, and why are they essential for agriculture? | *Hands-on experiment: Measuring the rate of photosynthesis under different light conditions                                   | *Research report on how varying environmental factors impact the photosynthetic efficiency of crops  |
| <b>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.</b>                                                                                                                                                                            |                                                                                               |                                                                                                                               |                                                                                                      |
| <b>4. Soil Fertility and Nutrient Cycles</b>                                                                                                                                                                                                                                                                                                                                                                       | What role does chemistry play in nutrient cycles within soil ecosystems?                      | *Soil testing activity, where students apply fertilizers and analyze the nutrient changes                                     | *Lab reports on the effects of different fertilizers on soil                                         |

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|                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                              |                                                                                      | chemistry and plant growth                                                                |
| <b>C10.0 Explain soil science principles.</b>                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                              |                                                                                      |                                                                                           |
| <b>5. Animal Nutrition and Biochemistry</b>                                                                                                                                                                                                                                                                                                                                                                                                  | What biochemical components are necessary for animal growth and health?                                                                      | *Digestion lab: Students simulate enzymatic breakdown of macronutrients              | *Diagram and explain the process of cellular respiration, linking it to dietary needs     |
| <b>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</b><br><b>C6.0 Explore animal anatomy and systems.</b><br><b>C8.0 Understand fundamental animal nutrition and feeding.</b>                                                                                                    |                                                                                                                                              |                                                                                      |                                                                                           |
| <b>6. Water in Agricultural Systems</b>                                                                                                                                                                                                                                                                                                                                                                                                      | How does water chemistry impact soil quality and plant growth?                                                                               | * Group discussion on water cycle's role in agriculture and environmental impact     | *Water management plan for a farm that considers chemical water properties and crop needs |
| <b>HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.</b>                                                                                                                                                                                                                                                                                                                   |                                                                                                                                              |                                                                                      |                                                                                           |
| <b>7. Chemical Control of Pests and Diseases</b>                                                                                                                                                                                                                                                                                                                                                                                             | What are the benefits and risks of chemical pest control in agriculture?                                                                     | *Case study analysis on common agricultural chemicals and their environmental impact | *Lab experiment on the effect of a safe pesticide on a sample plant                       |
| <b>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</b><br><b>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.*</b><br><b>C12.0 Understand fundamental pest management.</b> |                                                                                                                                              |                                                                                      |                                                                                           |
| <b>8. Animal Physiology and Endocrine Chemistry</b>                                                                                                                                                                                                                                                                                                                                                                                          | What is the role of hormones in animal growth, health, and reproduction?<br>How do chemical reactions occur within an animal's body systems? | *Diagram of endocrine system pathways, identifying key hormones and their functions  | *Presentation on the chemistry of hormone production and how it impacts animal health     |
| <b>HS-PS1-7: Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.</b>                                                                                                                                                                                                                                                                                             |                                                                                                                                              |                                                                                      |                                                                                           |
| <b>9. Biochemistry of</b>                                                                                                                                                                                                                                                                                                                                                                                                                    | How can biochemistry inform regenerative                                                                                                     | *A collaborative brainstorming session on                                            | *Research project on a chosen regenerative                                                |

|                                                                                                                                                                                |                           |                                                                                    |                                                                                |
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| <b>Regenerative Practices</b>                                                                                                                                                  | practices in agriculture? | regenerative practices, with an emphasis on the chemistry underlying each practice | practice, detailing the chemical principles involved and its ecological impact |
| <b>HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human Activity.</b> |                           |                                                                                    |                                                                                |

## **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.

### **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.

### **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.cde.ca.gov/ci/ct/sf/documents/agnatural.pdf>

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

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

<https://www.cde.ca.gov/ci/ct/sf/documents/ctestdfontpages.pdf>

**TEXTBOOKS AND RESOURCE MATERIALS:****Textbooks**

| <b>Board<br/>Approved</b> | <b>Pilot<br/>Completion<br/>Date<br/>(If applicable)</b> | <b>Textbook Title</b>                                                                                          | <b>Author(s)</b>                                                                 | <b>Publisher</b>                                                                       | <b>Edition</b> | <b>Date</b>     |
|---------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------|-----------------|
| <i>Yes</i>                |                                                          | <i>Principles of<br/>Agriculture, Food and<br/>Natural Resources 2nd<br/>Edition *Digital<br/>availability</i> | John S.<br>Rayfield, Kasee<br>L. Smith, Travis<br>D. Park, and D.<br>Barry Croom | John S.<br>Rayfield,<br>Kasee L.<br>Smith,<br>Travis D.<br>Park, and D.<br>Barry Croom | 2nd<br>Edition | <i>1/1/2023</i> |