FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT

SUSTAINABLE AGRICULTURE BIOLOGY

DATE: MARCH 2015
SUBJECT AREA: SCIENCE

PROPOSED GRADE LEVEL(s): 9th-10th
COURSE LENGTH: ONE YEAR

GRADING: A-F
NUMBER OF CREDITS: 5 per SEMESTER

PREREQUISITES: PASSING GRADE in AG. EARTH or TEACHER APPROVAL

COURSE DESCRIPTION:

Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our environment. Sustainability creates and maintains the conditions under which humans and the biotic world can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations. Sustainability is important to making sure that we have and will continue to have, the water, materials, and resources to protect human health and our environment.

Sustainable Agriculture is a one year course designed to integrate biological science practices and knowledge into the practice of sustainable agriculture. The course is organized into four major sections, or units, each with a guiding question. Unit one addresses the question, what is sustainable agriculture? Unit two, does sustainable agriculture fit into our environment? Unit three, what molecular biology principles guide sustainable agriculture? Unit four, How do we make decisions to maximize sustainable agricultural practices within a functioning ecosystem? Within each unit specific life science principles will be identified with agricultural principles and practices guiding the acquisition of this knowledge, culminating in the development of a sustainable farm model and portfolio of supporting student research.

GENERAL GOALS/ESSENTIAL PURPOSES:

The introductory unit will focus on the biological classifications of agriculture and their associated industry sectors, what sustainability is, and how the scientific method is the driving force behind advancements and developments in sustainable biological practices within agriculture.

While unit one examines whole systems, unit two takes a closer look at components within that system. Students will use evidence gathered from a series of laboratory exercises to be able to describe the transfer of energy from one trophic level to another as well as the cycling of nutrients and energy through ecosystems.

In unit three, students will examine the science of agriculture and evaluate the efficiency and sustainability of current methods. Students will explore the concepts of taxonomy of plants and nomenclature of animals, cell structure, cellular division, DNA, and chromosomes. Students will apply this knowledge to evaluate desirable inheritable traits in each species to artificially select characteristics to breed more efficient and productive offspring as a part of their created breeding plan.

In unit four, students will understand common practices in the agriculture industry that promote sustainability. They will evaluate and/or refine technological solutions that reduce impacts of human activities on natural systems by using practices that utilize cellular biology, genetics, energy cycles, biological systems, plant and animal nomenclature and how these units collectively create ecosystems that were covered in the previous units.
CCSS READING COMPONENT:

Unit 1:
RST.11-12.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

RST.11-12.8 Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.

RST.11-12.9 Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

Unit 2:
RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

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Unit 4:
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RST.11-12.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

**CCSS WRITING COMPONENT:**

Unit 2:

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Unit 3:

WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.9-12.1 Write arguments focused on discipline-specific content.

WHST.9-12.5 Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

WHST.11-12.8 Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

WHST.9-12.9 Draw evidence from informational texts to support analysis, reflection, and research.
CCSS SPEAKING & LISTENING COMPONENT:

Unit 2:

SL.11-12.5 Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

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DETAILED UNITS OF INSTRUCTION:

<table>
<thead>
<tr>
<th>Unit of Instruction/Objectives</th>
<th>CCSS Standards</th>
<th>Key Assignments</th>
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<tbody>
<tr>
<td><strong>Unit 1: Agriculture and Agricultural Research Skills</strong></td>
<td></td>
<td>• Categorical Based Mini-Labs</td>
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<tr>
<td><strong>What is sustainable agriculture?</strong></td>
<td>MP.2</td>
<td>• Scientific Method and Sustainability Lab - “Work Like a Scientist”</td>
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<tr>
<td>This introductory unit will focus on the biological classifications of agriculture and their associated industry sectors, what sustainability is, and how the scientific method is the driving force behind advancements and developments in sustainable biological practices within agriculture.</td>
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<td><strong>Unit II: Environment, Energy and Agriculture</strong></td>
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<td>• Nitrogen Fixation</td>
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<td><strong>How does sustainable agriculture fit into our environment?</strong></td>
<td>HS-LS1-5</td>
<td>• Photosynthesis Lab</td>
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<td>While unit one examined whole systems, unit two takes a closer look at components within that system. Students will use evidence gathered from a series of laboratory exercises to be able to describe the transfer of energy from one trophic level to another as well as the cycling of nutrients and energy through ecosystems.</td>
<td>HS-LS1-6</td>
<td>• Transpiration Lab</td>
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<td>HS-LS1-7</td>
<td>• Sustainable Waste Management</td>
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<td>HS-LS2-3</td>
<td>• Plant, Grow, Rotate, Repeat Sustainable Crop Management Plan</td>
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<td>HS-LS2-4</td>
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### Unit III: Molecular Biology and Agriculture

**What molecular biology principles guide sustainable agriculture?**
In this unit, students will examine the science of agriculture and evaluate the efficiency and sustainability of current methods.

| HSN-Q.A.3 | HS-LS1-1 | HS-LS1-2 | HS-LS1-3 | HS-LS1-4 | HS-LS3-1 | HS-LS3-2 | HS-LS3-3 | HS-LS4-3 | HS-LS4-1 | RST.11-12.1 | RST.11-12.7 | RST.11-12.9 | RST.11-12.8 | RST.9-10.8 | WHST.9-12.1 | WHST.9-12.2 | WHST.9-12.5 | WHST.9-12.7 | WHST.9-12.9 | MP.2 | MP.4 | HSF-IF.C.7 | HSF-BF.A.1 | SL.11-12.5 |
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- Sustainable Production Plan
- Biotechnology Use in Agriculture
- Formal Research Project

Labs and activities have been done in this unit that represent the common applications of biological factors such as genetic potential and variability of plants and animals, the symbiosis of animals and plants within an ecosystem and the impact of new species introduced into an established environment.

### Unit IV: Agriculture’s relationship with technology and the natural world

**Driving Question:** How do we make decisions to maximize sustainable agricultural practices within a functioning ecosystem?

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<tr>
<th>HSS-ID.A.1</th>
<th>HSS-IC.B.6</th>
<th>HSS-IC.A.1</th>
<th>MP.2</th>
<th>MP.4</th>
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- Practice in Animal Health Management
- Sustainable Practices in Horticulture
- Growing Green Communities” - Landscaping
- Using Nature’s Natural Resources
- Bio prospecting - Discovering Cellulose Microbes for Biofuel Efficiency
- Sustainable Farming Project

**TEXTBOOK AND RESOURCE MATERIALS:**

**Primary Textbook:**
District Approved Biology Text

**Secondary Texts:**

**Supplemental Materials:**

**COMMON CORE STANDARDS TO BE ADDRESSED:**

* See middle column titled “CCSS Standards” above under Units of Instruction.

**DISTRICT ESLRs TO BE ADDRESSED:**

Students will be:

- **Self-Directed Learner:** Students will be required to work independently, monitor their progress and meet assignment requirements at stated intervals. This class will prepare students to be self-directed lifelong learners.

- **Effective Communicator:** Students will communicate their understanding of agriculture and floral design concepts through written, visual and oral expression.

- **Quality Producer/Performer:** Students will demonstrate successful performance through instructor assessments, completed FFA Record Book, and floral arrangements.

- **Constructive Thinkers:** Reading and analysis of text provided case studies and opposing points of view will develop students’ problem solving/critical thinking skills.

- **Collaborative Workers:** Students will need to identify and gather resources and information from outside the school and home to complete assignments in class. Students will need to work together to produce floral arrangements to meet the consumers needs.

- **Responsible Citizens:** Students will become more knowledgeable of floral design skills needed and workplace expectations on a regional and global scale.