

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT

Agriculture Biology

Date: May 2011

Subject Area: Lab Science

Proposed Grade Level(s): 10th

Course Length: One Year

Grading: A-F

Number of Credits: 5 per Semester

Prerequisites: Algebra 1 or concurrent enrollment.

COURSE DESCRIPTION:

Agricultural Biology is a laboratory science course designed for the college-bound student. The course emphasizes detailed knowledge of the biological principles of the following areas: molecular and cellular aspects of living things, structure and function of agricultural plants and animals, genetics, physiology, plant and animal diversity and principles of classification, ecological relationships, and animal behavior.

GENERAL GOALS / PURPOSES:

Overall course goals include:

1. To learn the nature of scientific inquiry and incorporate the use of the scientific method in laboratory investigations that pertain to biological and agricultural principles.
2. To be familiar with the theory of cell biology and its application to the organization of all living organisms.
3. To identify and understand the processes of cellular and organism growth and reproduction.
4. To recognize the diversity of life and the interrelationships among all organisms.
5. To understand the role of genetics in organism variation and adaptation.
6. To understand the role of genetics as it pertains to the development of multicellular organisms and appreciate how encoded genes specify the characteristics of living organisms.
7. To acquire biological and agricultural research vocabulary, and the reading, writing, and critical thinking skills pertaining to scientific inquiry.
8. To understand the stability in an ecosystem is a balance between competing effects.
9. To understand fundamental cellular and systemic functions and processes.
10. To recognize the interrelationships between biotic and physical factors to energy flow in the biosphere.

By the end of the course, each student will be able to:

1. Intelligently discuss theories on the origins of life.
2. Describe the characteristics of living organisms.
3. Describe the characteristics of plant and animal cells with respect to their structure and chemistry.
4. Compare and contrast the roles of meiosis and mitosis in cellular and organism reproduction.
5. Define the chromosome theory of heredity, Mendelian genetics, gene-enzyme relationships, and apply this knowledge to animal inheritance.
6. Distinguish between historical and modern taxonomy systems and scientific nomenclature that demonstrate evolutionary relationships among plants and animals.
7. Identify the structural and functional similarities and differences among the major animal, plant, and protist phyla.
8. Analyze the major organ systems of animals and understand their function.
9. Recognize the structure and function of ecosystems, populations, and communities, and the impact of human society on the natural and agricultural environment.

10. Describe the three cycles that involve biotic and abiotic factors: nitrogen, carbon-oxygen, and water; and explain the importance of their interrelationships to the biosphere.
11. Identify the environmental and genetic factors that influence variation among organisms.
12. Demonstrate basic laboratory techniques including the use of microscopes, microscope slide preparation, maintenance and examination of micro-organism cultures, tests demonstrating fundamental biochemical reactions, dissection of representatives of plant and animal phyla, and the sharpening of interpretative skills.

STUDENT READING COMPONENT:

Students will be required to:

- A. Read text and handout materials. The text for this course is *Biology: Principles and Explorations*, published by Holt, Rinehart and Winston (2001).
- B. Research concepts using internet and literary resource materials
- C. Laboratory Background and Instructional Materials
- D. Read scientific articles and periodicals for current research and studies

STUDENT WRITING COMPONENT:

Students will be required to:

- A. Plan, Organize and Write a Research Report on Agriculture Biology Topics.
- B. Compose Presentation Materials
- C. Write Laboratory Reports following a prescribed format.
- D. Keep an ongoing interactive notebook of topic knowledge and conceptual understanding
- E. Create a plan for a science fair project

STUDENT ORAL COMPONENT:

Students will be required to:

- A. Answer questions in class.
- B. Communicate concepts being instructed on in class.
- C. Present research findings in Oral Presentations to classmates.
- D. Present and explain projects and research findings to teachers, judges, and classmates.
- E. Utilize classroom technology, such as Smartboard and PowerPoint, to enhance delivery.

DETAILED UNITS OF INSTRUCTION:

- A. Introduction to Agricultural Biology
 1. What is Agricultural Biology and its Importance
 2. Research Uses of Agricultural Biology
 3. The Scientific Method
 4. The Metric System
- B. Organisms and Their Ecological Environment
 1. Biodiversity
 2. Conserving Natural Resources
 3. Agricultural Practices Beneficial and Harmful to the Environment
 4. The Ecosystem and Population Fluctuations
 5. The Nitrogen Cycle
 6. The Oxygen Cycle
 7. The Food Web
- C. Cell Biology
 1. Plant and Animal Cell Identification and Functions
 2. Plant and Animal Cell Structure and Functions
 3. Cellular Respiration

4. Cellular Transport
5. Cell Differentiation
6. Chemiosmotic Gradients and ATP Production
7. Macromolecules in Cells

D. Inorganic Foundations that Support Life

1. Soil and Water: The Chemical Foundation
2. Atomic and molecular structure and chemical bonding
3. Basic Soil Components
4. Soil Formation Factors and Horizons
5. Soil Texture and Structure
6. Soil Organisms and Organic Matter
7. Interrelationships of Plants and Soil
8. Water Movement Properties
9. Soil and Water Management

E. Plant & Animal Classifications

1. Development of the Binomial System of Nomenclature
2. Classifications of Major Groups of Plants and Animals
3. Evolutionary Relationships
4. Development of the Kingdom Concept
5. Comparisons of Modern Agricultural Plants and Animals

F. Plant Physiology, Reproduction, Photosynthesis and Growth

1. Plant Structures & the Process of Photosynthesis
2. Plant Growth Requirements
3. Monocotyledons and Dicotyledons
4. Sexual and Asexual Reproduction
5. Research Applications to Plant Biotechnology
6. Chemical and Environmental Factors Affecting Plant Growth

G. Animal Physiology and Reproduction

1. Internal Systems of Animals
2. The Digestive Process
3. The Respiratory System
4. The Reproductive System
5. The Circulatory System
6. The Endocrine System
7. The Nervous System
8. The Immune System

H. Animal Nutrition

1. Feed Identification and Nutrient Evaluation
2. Feed Additives
3. Ration Formulation
4. Animal Nutrient Requirements
5. Vitamin and Amino Acid Requirements
6. Nutritional Diseases

I. Animal Health & Diseases

1. Disease Agents
2. Causes of Disease

3. Infectious and Noninfectious Diseases
 4. Animal Health Practices
 5. Common Internal & External Parasites Lifecycles
- J. Plant and Animal Genetics
1. Heritability and Genetic Traits
 2. Dominant and Recessive Genes
 3. Genotype and Phenotype
 4. Cellular Reproduction: Mitosis and Meiosis
 5. Physical and Chemical Structures Involved in Genetics
 6. DNA and Types of DNA
 7. DNA Replication
 8. Mendel – Independent Assortment and Segregation
 9. Biotechnology and Cloning
 10. Proteins and RNA
 11. Role and Function of Amino Acids in Genetics
 12. Mutation and Sexual Reproduction
- K. Agricultural Biology Research Project
1. Development and Formulation of Agriscience/Science Fair Project
 2. Research Principles & Design
 3. Statistical Management & Analysis of Agriscience/Science Fair Project
 4. Instructional Supervision & Coordination
- L. Leadership & Team Building Development
1. Oral and speaking presentations
 2. Critical Thinking Exercises
 3. Problem Solving Exercises

THIS COURSE WILL PREPARE STUDENTS FOR THE CAHSEE AND/OR CST'S:

Writing, Reading, Language Arts, Math, Social Science and Science

LAB FEE, IF REQUIRED: None

SUBJECT AREA CONTENT STANDARDS TO BE ADDRESSED:

- A. Introduction to Agricultural Biology - (Investigation & Experimentation)
- B. Organisms and Their Ecological Environment - (Biology 6 a-g)
- C. Cell Biology - (Biology 1 a-h)
- D. Inorganic Foundations that Support Life - (Agriculture C 10.2; Earth Science 1 c, 3 c; Investigation & Experimentation)
- E. Plant and Animal Classifications - (Biology 8 c, d)
- F. Plant Physiology, Reproduction, Photosynthesis and Growth - (Agriculture C 11; Biology 1 f-g, 5 c)
- G. Animal Physiology and Reproduction - (Agriculture C 6; Biology 9 a)
- H. Animal Nutrition - (Agriculture C 8; Biology 9 f, i)
- I. Animal Health & Diseases - (Agriculture C 9; Biology 9 b, c)
- J. Plant and Animal Genetics - (Biology 2 a-g, 3 a-c, 4 a-f, 5 a-e)
- K. Agricultural Biology Research Project - (Investigation & Experimentation)
- L. Leadership & Team Building Development - (Agriculture Foundations 2.4, 5, 9)

These standards correlate to all chapters in *Holt Biology Principles and Explorations* and laboratory experiments done throughout the course.

DISTRICT ESLRs TO BE ADDRESSED:

Students will be:

- **Self –Directed learners:** Students will be expected to take responsibility for their learning by participating in class activities, labs, and discussions. Students will be expected to keep up with homework and lab prep assignments.
- **Effective communicators:** Students will actively participate in class discussions on a regular basis. Students will communicate their understanding of science concepts through written and oral expression.
- **Quality Producers/Performers:** Assessment of class work requires students to be quality producers in order to be successful in class. This includes labs, presentations, and student projects.
- **Constructive Thinkers:** Students will participate in many hands-on activities and labs that require them to analyze their results critically and apply what they have learned to new situations. Students will also develop models for molecular behavior.
- **Collaborative Workers:** Students will participate in cooperative groups for laboratory assignments and in class activities. They will be expected to collaborate with each other in developing class concepts.
- **Responsible Citizens:** In order to become responsible citizens, students will use their knowledge of agriculture, biology and scientific inquiry to make informed decisions about issues related to their daily lives.