

EL DORADO UNION HIGH SCHOOL DISTRICT

Educational Services

New Course of Study Information Page

Course Title: Agricultural Biology (Course #0706)	
Rationale: In the ever-changing field of Agriculture, it has become evident that most of our graduates will not enter an occupation that is directly related to production. Although 30% of our nation's jobs are somehow related to agriculture, only 3% of the population is directly involved in production. The fastest growing areas of agriculture are related to science, communication, and public relations. We must therefore prepare our students for the workplace or further education by offering courses in higher agricultural science. Courses like this one enable a student to learn or reinforce scientific concepts while pursuing their career interest in Agriculture.	
Course Description: Agricultural Biology is a one year, laboratory science course, designed for the student with career interests in agriculture. Using agriculture as the learning vehicle, the course emphasizes the principles, central concepts, and inter-relationships among the following topics: the molecular and cellular aspects of life, the chemical and structural basis of life, energetics of life, growth and reproduction in animals, evolution of modern plants and livestock species, plant and animal genetics, taxonomy of modern agricultural plants and animals, animal behavior, ecological relationships among plants, animals, humans and the environment, nutrition in animals, health and diseases in animals, and the similarities between animals and humans. The course is centered around an extensive laboratory component in order to connect the big ideas of life science with agricultural applications, earth and physical science principles, and other curricular areas, including written and oral reporting.	
Length of Course:	1 Year
Grade Level:	11 - 12
Credit: ☒ Number of units <u>10</u> ☒ Meets graduation requirements ☒ Request for UC "a-f" requirements ☒ College Prep ☒ Elective ☐ Vocational	Students who successfully complete this one year course of study will receive Life Science credit.
Prerequisites:	Ag Core 1 and 2
Department(s):	Agriculture
District Sites:	Ponderosa High
Board of Trustees Adoption Date:	12-10-96
Textbook(s)/Instructional Materials:	Biology: Visualizing Life George B. Johnson, Copyright date: 1994
Date Adopted by the Board of Trustees:	5-13-97

TABLE OF CONTENTS

<u>UNIT</u>	<u>UNIT TITLE</u>	
UNIT 1:	Introduction to Ag Biology	6 Weeks
UNIT 2:	Agriculture and the Environment	5 Weeks
UNIT 3:	Plant Science	8 Weeks
UNIT 4:	Soil Science and Conservation	2 Weeks
UNIT 5:	Irrigation, Harvesting, and Preservation	1 Week
UNIT 6:	Agriculture and California Resources	2 Weeks
UNIT 7:	Nomenclature	1 Week
UNIT 8:	Animal Physiology	6 Weeks
UNIT 9:	Evolution and Animal Behavior	2 Weeks
UNIT 10:	Nutrition and Feeds	2 Weeks
UNIT 11:	Animal Health and Disease	3 Weeks
UNIT 12:	Genetics	2 Weeks

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

Course Goals:	1. Utilize agricultural applications as a relevant vehicle to teach biological science principles and improve the scientific literacy of students. 2. Strengthen instruction in science for students pursuing careers in agriculture. 3. Integrate mathematics standards, language arts standards, and career employability standards including creative thinking and problem solving skills, and technological literacy related to the agriculture industry. 4. Meet a portion of the laboratory science requirement for admissions to the University of California and California State University systems. 5. Develop a sense of the interrelationships between life, earth, and physical science and their relationship to agricultural applications. 6. Motivate under-represented populations to study and pursue careers in science and agriculture.
Student Performance Objectives:	
Instructional Units:	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 1: Introduction to Agricultural Biology

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Explain the importance of Agricultural Biology in our society	· Discussion (1) · Career Searches (2) · Portfolio Updates (3) · Mock Interviews (3) · Various Labs which Reinforce the Scientific Method (4, 5, 6, 7, 8) · Research Projects (4, 5, 6, 7, 8) · Record Book Updates (8) · Lab Reports (8)
2. Compare various careers in the area of agricultural biology.	
3. Prepare a resume, cover letter, and interview for the FFA Job Interview Contest.	
4. Explain the importance of scientific research methods in agriculture.	
5. Describe the process of scientific methods in agriculture.	
6. Develop a Supervised Agricultural Experience Project which involves the scientific method.	
7. Develop a research project that can be entered in the FFA Agriscience competition.	
8. Review record keeping, data collection, and reporting on experiments.	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 2: Agriculture and the Environment

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Identify the roles of plants and animals and their interactions in life.	· Construction of Mini-Ecosystems (1, 2, 3, 4, 7) · Map Population Fluctuations of Wildlife (6, 7) · Research on Agricultural Revolution (7) · Microscope Work Involving Plant and Animal Cells (8, 9, 10, 12, 15) · Bull Semen Lab (11, 13, 14) · Drawing Blood and Blood Smears (10) · Various Blood Tests Performed in Veterinary Hospitals (10, 13, 14)
2. Describe the flow of energy through the biosphere.	
3. Compare and contrast the oxygen, carbon, and nitrogen cycles.	
4. Define the term ecosystem.	
5. Appraise at least three current issues in agriculture which biologically affect the environment.	
6. Explain the impact of populations on the environment and the effect of the environment on populations.	
7. Report on both the good and bad effects of the agricultural revolution on the environment.	
8. Compare the internal systems of a single celled organism to those of multicellular organisms.	
9. Describe the difference between plant cells and animal cells.	
10. Identify blood, bone, fat, nerve, and muscle cells.	
11. Identify and diagram male and female gametes in both plants and animals.	
12. Compare and contrast the processes of mitosis and meiosis.	
13. Describe how cells respond to certain stimuli.	
14. Explain the concept of cellular adaption.	
15. Review the processes of mitosis and meiosis.	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 3: Agriculture and the Environment

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Compare and contrast the structures of plants from different families.	· Tropism Labs (2, 5, 6, 12) · Transpiration Labs (2, 3, 5, 6, 12) · Photosynthesis Labs (2, 3, 5, 6, 11, 12) · Nature Walks (1, 4, 6, 11) · Vegetative Reproduction Lab (7, 8, 9) · Pollenization Lab (7, 8, 9) · Tissue Culture (7, 8, 9, 10) · Warm Germination Test (1, 4, 5, 6, 12) · Viability of Seed Test (1, 4, 5, 6, 12) · Cold Germination Test (1, 4, 5, 6, 12) · Hydroponics Experiments (2, 5, 6, 11, 12) · Rooting Hormone Experiments (2, 5, 6, 11, 12) · Gibberellic Acid and Germination Lab (2, 5, 6, 11, 12)
2. Design and conduct an experiment which covers the entire life cycle of a plant.	
3. Defend the role of green plants in the maintenance of life.	
4. Compare and contrast monocotyledons and dicotyledons with respect to leaf, stem, flower structure, and agricultural significance.	
5. Analyze the interrelationships among the different systems within the plant.	
6. Discuss abiotic environmental factors that affect plant growth (wind, temperature, solar radiation, soil conditions, humidity, pollution, etc...)	
7. Explain the difference between sexual and vegetative reproduction.	
8. Demonstrate an application of both sexual and vegetative reproduction.	
9. Discuss how sexual and asexual reproduction are used in agriculture.	
10. Research and report on the significant uses of plants in nutrient and medicine.	
11. Compare the life cycle of simple plants, such as algae or moss to a complex plant.	
12. Grow at least one indoor and one outdoor landscaping plant or vegetable. Chart the growth pattern and report the results of observations.	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 4: Soil Science and Conservation

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Review the concepts of soil forming factors, texture, structure, erosion, conservation, and culture and their effect on plant growth.	· Soil Structure Labs (1) · Growing Plant in Various Soils (2, 3) · Water Holding Capacity Lab (4) · Construct a Soil "Drain" to Test Erosion (4, 5, 6) · N-P-K Tissue Test (2) · Root Nodule Variation (2) · Soil Sterilization (2, 3, 5, 6) · Salinity and Seed Germination Test (2, 5)
2. Design and conduct an experiment which shows the relationship between soil characteristics and plant growth.	
3. Describe how agriculture practices can modify soil to improve soil moisture relationships.	
4. Conduct an experiment that involves water movement through soil.	
5. Evaluate the economic effect of pollution and erosion on production agriculture.	
6. Compare modern tillage operations and their effect on resources.	
7. Develop and defend a plan to preserve limited resources related to agriculture.	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 5: Irrigation, Harvesting, and Preservation

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Discuss various methods of irrigation and the impact of each on plants and soil.	· Respiration Experiments (2) · Test Methods of Irrigation and Their Effectiveness (1) · Preservatives and Mold Labs (2, 3) · Meat Curing Labs (3) · Bacterial Growth in Milk Lab (3) · Storage Time and Acidity Experiments (2, 3) · Yogurt or Cheese Making (3)
2. Conduct an experiment on controlled environments and respiration of crops.	
3. Evaluate experiments on animal product preservation	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 6: Agriculture and California Resources

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Analyze the impact of increasing populations on the environment and its resources.	· Conduct Soil Tests (1, 4, 5) · Create Food Webs (1, 3) · Test Various Herbicides, Fertilizers, and Pesticides (5)
2. Compare and contrast five forms of energy used in agriculture.	
3. Draw a food web related to agriculture and livestock.	
4. Conduct an experiment on the “health” of local soils.	
5. Discuss the effect of herbicides, fertilizers, and pesticides on natural resources.	
6. Review the major watersheds of California.	Map California’s Watersheds (6)
7. Identify major pollutants in drinking water.	Test Water for Pollutants (7)
8. Research historically significant water issues (examples: nitrates, pesticides, salinity, siltation).	
9. Review the importance of water to agriculture and life in general.	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 7: Nomenclature

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Discuss the development of the biological concept of "Kingdom."	· Phytogenic Tree (3, 4, 5) · View Members of Each Kingdom (6) · Comparison of Animals from Past and Present (1, 2)
2. Explain three reasons for the current use of the modern system of plant and animal classification.	
3. Apply taxonomy in three ways to the field of agriculture.	
4. Prepare a phytogenic tree for at least one domestic animal species.	
5. Review the nomenclature of common livestock species.	
6. Recognize members of each of the five kingdoms.	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 8: Animal Physiology

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Demonstrate an understanding of the structure and function of the digestive system by tracing the pathways of food through the various types of livestock digestive systems, with emphasis on the function of organs in the digestive process.	· Dissections (1, 2, 3, 8, 9) · Artificial Insemination (2, 3, 4, 5, 8) · Embryo Transfer (2, 3, 4, 5, 7, 8) · Egg Incubation and Embryo Observation (5, 7) · Necropsy (9) · Enzyme Labs (1) · Estrus Detection (4, 8) · Observation of Parturition (7, 8) · Behavior and Handling Lab (8) · Animal Exams and Vital Signs (8)
2. Analyze the function of each mammalian body system.	
3. Compare the interrelationships of each system within the mammalian body.	
4. Compare and contrast the estrous cycles of cattle, sheep, and swine and the menstrual cycle in humans.	
5. Chart the process of fertilization in each species.	
6. Explain the importance of cellular respiration of living organisms.	
7. Develop a flow chart outlining the development of an embryo from conception through parturition.	
8. Describe how animals behavioral patterns affect management and handling practice of domestic animals	
9. Dissect various organisms and identify the organs and systems of each.	
10. Compare and contrast the organ systems of different livestock species.	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 9: Evolution and Animal Behavior

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Report on the importance of natural selection as the driving force of evolution and its importance in production agriculture.	· Futuristic Animal Lab (5, 6, 9) · Evolution of Horse (2, 3, 6, 7) · Role Playing (1, 8)
2. Explain how the process of natural selection affects plants and animals.	
3. Explore Darwin's theories of evolution	
4. Review the history of domestication of animals.	
5. Demonstrate the importance of mutations to production agriculture.	
6. Compare the physiology and behavior of livestock animals of the past with those of today.	
7. Complete a project which will explain the evolution of the horse.	
8. Debate current issues regarding the current treatment of livestock animals.	
9. Predict how current practices in the livestock industry will effect plants and animals in the future.	
10. Discuss the effects of gene splicing and sexing on the agriculture industry.	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 10: Nutrition and Feeds

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Analyze the nutrient requirements of the various domestic species.	· Chemical Tests on Feeds (2) · Class Feed Trail Project (1, 3, 5) · Starch Digestion Labs (2) · Forage Treatment Lab (2) · Silage Making Lab (Fermentation) (2) · Demonstration of Fistulated Cow Results (2, 3) · Feed Additive Experiment (3)
2. Analyze the nutrient content of feeds.	
3. Develop a low cost feed ration of one species of livestock for maintenance, growth, and lactation using concentrates and roughages available locally.	
4. Describe the symptoms of five common nutritional disorders caused by vitamin or mineral deficiencies or toxicity and explain treatment and prevention of these.	
5. Feed an animal through a entire production cycle, recording the types of feed used, rate of gain, and the lean to fat ratio.	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 11: Animal Health and Diseases

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Develop a flow chart outlining the life cycle of one internal and one external parasite.	· Bacteria, Fungi, Virus, Protist Labs (3) · Fecal Collection and Evaluation (1, 2) · protists Growing Lab (3) · Antibiotics and Bacterial Lab (3, 4, 5) · Prevention and Treatment of Sickness at School Farm Laboratory (6) · Medication Comparisons (4, 5)
2. Review the impact of parasites on livestock and on the agricultural industry.	
3. Recognize the causes of typical livestock diseases including bacteria, fungi, viruses, and protists.	
4. Design a disease prevention and health care plan for a project animal.	
5. Appraise the results of human medicine in relation to livestock medicine.	
6. Review the forms of immunity and effective practices for disease prevention.	

EL DORADO UNION HIGH SCHOOL DISTRICT

Department: Agriculture
Course Title: Agricultural Biology

UNIT 12: Genetics

OBJECTIVES	ACTIVITIES
The student will be able to:	
1. Compare and contrast the phenotypic traits of related breeds and varieties of animals and plants.	· Simulation of Heritability (1, 7, 8) · DNA Strand Construction (2, 3) · Rabbit Breeding (1, 5, 7) · Plant Crossing (1, 4, 5, 7, 8) · Pedigree or Expected Progeny Difference Comparisons (1, 6) · Carcass of Merit Results Comparisons (1, 6, 8)
2. Explain the function of each of the following: gene, allele, DNA, and RNA.	
3. Explain the role of enzymes in chromosome replication, and the implications of biotechnology involving these enzymes.	
4. Discuss the contributions of Gregor Mendel to the field of genetics.	
5. Conduct a simple experiment which exhibits dominant and recessive properties.	
6. Evaluate the effectiveness of selection and heritability in production agriculture by comparing modern day crops and animals to their ancestors.	
7. Develop an experiment which develops a trait through selection and heritability.	
8. Analyze the effects of biotechnology on modern agriculture.	