EL DORADO UNION HIGH SCHOOL DISTRICT
Educational Services

Course of Study Information Page

Course Title: Comparative Physiology (#333)	
Rationale: California State Science Standards for the Biological Sciences require all students to master those areas of biology all life have in common: biochemistry, cells, DNA, genetics, evolution, and ecology. Important, more specialized areas of biology are omitted, notably the comparative biology of plans and animals, in all their variety and detail.	
Course Description: Comparative Physiology is an advanced survey course comparing the anatomy and physiology of a variety of representative plans and animals. Study will include a comparison of the biochemistry, cellular, tissue, and organ systems from the perspective of adaptation to the environment and evolutionary relationships.	
How Does This Course Align With or Meet State and District Content Standards? (Please attach a copy of the standards used)	
Length of Course:	One year
Grade Level:	11th or 12th grade
Credit: Number of units: 10 ❒ Meets graduation requirements ❒ Request for UC "a-f" requirements ☒ College Prep ☒ Elective ❒ Vocational	
Prerequisites:	Biology (B or better) and Chem A (B or better) or Chemistry (C or better)
Department(s):	Science
District Sites:	Union Mine High School
Board of Trustees Adoption Date:	February 8, 2000
Textbook(s)/Instructional Materials:	Neil A. Campbell, Jane B. Reece, and Lawrence G. Mitchell, *Biology*, Fifth Edition, Addison Wesley Longman, Inc., 1999
Date Adopted by the Board of Trustees:	May 8, 2001

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UNIT #1: The Chemistry of Life

GOAL: Chemistry is fundamental to the understanding of life. These units offer a review of basic chemistry and biochemistry, quickly moving into the details of metabolism such as cell respiration and photosynthesis. The need to successfully perform these reactions drive the adaptation of form and function of all life forms, and is fundamental to the students' understanding of physiology.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Compare and contrast atoms, molecules, and chemical bonds.	Model building
2. Relate the various properties of water to the requirements of life forms.	Perform acid/base experiments on plants. Study the changes in a pond over time.
3. Link carbon bonding to architecture of organic molecules and their various functional groups.	Identify functional groups in a variety of organic molecules, and relate their properties to the functioning of the molecule.
4. Recognize the structure and function of the 4 major macromolecules.	Model building and computer graphics projects. Chemical testing for the presence of macromolecules.
5. Identify the role of ATP and enzymes in metabolism.	Enzyme experiments.

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UNIT #2: The Single Cell: Form and Function

GOAL: A vast majority of life on earth is comprised of single-celled organisms, upon which all other life is totally dependent. Students will gain a deep understanding of the structure and function of these single-celled organisms and those cells that have grouped together to form their multicellular cousins.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Identify and describe the organelles and structures found in different types of cells, comparing their form with their function.	Internet research and power presentation of one organelle in detail. Microscope observations of living cells.
2. Relate the composition of the cell membrane to its various biochemical functions.	Membrane transport experiments.
3. Describe the steps of cell respiration and compare aerobic and anaerobic catabolism.	Perform cell respiration experiments.
4. Describe the steps of photosynthesis and compare differences found in C4 and CAM plants.	Perform photosynthesis experiments.
5. Review the steps of mitosis and compare plant and animal cell division.	Microscope observation of cells. Research the mechanisms of cancer growth.

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UNIT #3: Plants: Form and Function

GOAL: Most observable life forms in our everyday experience are plants. Students will gain an in depth understanding of the physiology of plants; their various tissue and organ systems, and their mechanisms and strategies for survival in a variety of environments.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Describe plant structure and growth, focusing on root and shoot systems.	Dissect young seedlings of different types. Microscopic observations of tissues.
2. Compare internal transport systems in plants; movement of xylem and phloem, movement of substances in and out of the plant.	Transport experiments. Microscopic examination of stems and roots.
3. Examine the nutritional requirements of plants, availability, nitrogen fixing, and nutritional adaptations such as parasitic and carnivorous lifestyles.	Nutritional experiments. Research project relating nutritional needs, lifestyle, and physiological adaptations.
4. Compare sexual and asexual plant reproduction. Examine the various reproductive strategies in different plant families. Relate reproduction to the co-evolution of plants and insects.	Examination and dissection of various plant reproductive parts. Research one animal/plant reproductive relationship. Plant breeding and genetics experiments.
5. Study plant hormones and the behaviors they invoke: photoperiodism, turgor movements, circadian rhythms.	Plant hormone experiments.

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UNIT #4: Animals: Form and Function

GOAL: Students have a deep fascination with animals and how they function. Traditional physiology focuses on humans. In this unit, students will study the physiology of animals from a comparative perspective, examining an assortment of different animals and their physical and biochemical adaptations to their environments.

OBJECTIVES The student will:	SUGGESTED ACTIVITIES
1. Be able to identify different animal tissue types and relate them to their function.	Microscopic examination of tissues.
2. Compare digestive mechanisms of a variety of animals, and identify the components of the mammalian system in detail.	Hydrolysis experiments. Dissection of organs. Measuring metabolic rates.
3. Examine internal transport and gas exchange mechanisms in a variety of animals (ex.: gills, trachea, lungs). Identify the components of the mammalian system in detail.	Heart and lung dissections. Daphnia heart experiments. Lung volume measurements. Blood staining and examination. Measuring respiration rates.
4. Identify the components needed for defense, both nonspecific and specific.	Research self vs. non self responses. Blood testing. AIDS research.
5. Compare problems and solutions to osmoregulation and temperature regulation in a wide variety of animals.	Urinalysis. Kidney dissection.
6. Identify hormones by their composition, method of cell entry, and production in a variety of vertebrates and invertebrates.	Examination of a variety of vertebrate glands. Research one hormonal disorder.
7. Describe mechanisms of muscle contraction and movement. Compare locomotion of animals with and without skeletons.	Muscle dissection Muscle testing Identification of muscles and bones in the human.
8. Trace the path of a nerve impulse from generation to response. Describe the nature of an impulse. Compare sensory structures in a variety of animals.	Eye dissection. Lab investigation of sight, hearing, smell, and taste.
9. Examine various modes of reproduction, sexual and asexual, internal and external, in a variety of animals. Describe the difference in the developmental process as investigated in a variety of organisms.	Chick, fog, and seastar development labs.