

# FOLSOM-CORDOVA UNIFIED SCHOOL DISTRICT

## GENERAL LIFE SCIENCE

**DATE:** April, 2008

**SCHOOL:** Middle Schools

**COURSE TITLE:** General Science

**SUBJECT AREA:** Science

**PROPOSED GRADE LEVEL(s):** Seventh Grade

**COURSE LENGTH:** One Year

**GRADING:** A-F

**NUMBER OF CREDITS:** NA

**PREREQUISITES:** Seventh Grade Standing

### COURSE DESCRIPTION:

The Seventh Grade Middle School Science program emphasizes individual and active learning. This approach focuses on how a learner fits new information into his or her existing bank of knowledge and attitudes so new concepts will be constructed. Students understand the nature of science both as a way of thinking about the world and as a process. An integration of science, technology, and society will be emphasized to extend the study of science into the student's own home and neighborhood. This program reflects the current state science standards for Seventh grade. Science can be organized in many ways; those presented here should be regarded as only some of the ways the concepts of science may be integrated into a curriculum that spans scientific disciplines. Each grade level includes investigation and experimentation as it relates each of the subject area/standards covered. The subject areas covered as follows:

- Cell Biology
- Genetics
- Evolution
- Earth and Life History
- Structure and Function in Living Systems
- Physical Principles in Living Systems

### GENERAL GOALS/PURPOSES:

Science is an active enterprise, made so by our human capacity to think. Scientific knowledge grows as scientists think about the natural world, act on that knowledge in planned ways, and then develop thoughtful explanations of the results. The knowledge of science is its content. There is continual dynamic interaction between the content of science and the thinking processes that characterize the scientific enterprise. The content of science consists of a highly structured, complex set of facts, hypotheses, and theories in a context where many observations have meaning. Theory development is progressive; theory suggests further observations that often make possible further elaboration and testing of the theory.

Scientists use their senses and extensions of their senses to see, touch, and otherwise view the world, observing its characteristics and behaviors as objectively as possible. Scientists describe and picture what they observe in various ways, thus communicating their ideas to others so that they can exchange views and interpretations and pass along information. They test what they know against what they do not yet know, comparing features and behaviors for similarities and differences. Scientists organize their understandings, ordering and categorizing them into broader, more general groupings and classifications. They study the interactions among objects and describe the events, relating factors that reveal deeper insights into causes and effects. Scientists hypothesize and predict what will happen based on accumulated knowledge and on the events they expect to take place,

inferring something that they have not seen because it has not yet happened or because it cannot be observed directly. And as knowledge grows through the use of these scientific thinking processes, scientists develop expertise, applying both knowledge and processes for useful purposes, to make still further extensions of the explanatory power of theory and to perceive fresh possibilities.

### **STUDENT READING COMPONENT:**

The goal of reading in science is to blend scientific knowledge and process with reading strategies to create scientifically literate students.

The reading strategies emphasize upcoming key concepts in order to guide and ensure comprehension of the material.

Methods to be used may include, but are not limited to, guided reading, supplemental reading worksheets, vocabulary building activities, oral reading, and periodic comprehension checks.

### **STUDENT WRITING COMPONENT:**

Students will be expected and encouraged to express themselves in complete sentences, with correct capitalization and punctuation, and correct spelling. While students will be expected to meet these standards to the best of their ability, they will be evaluated primarily on the content and quality of their work.

### **STUDENT ORAL COMPONENT:**

Students will be engaged in meaningful science programs that stretch their content of understanding and their abilities to communicate their reasoning and problem solving through various methods such as team reporting and oral presentations.

### **DETAILED UNITS OF INSTRUCTION:**

The following time line for instruction is a guide only. As the students become actively involved in exploring science concepts and processes that are part of each unit, the time line will be adjusted to allow for student-initiated learning activities and projects. In these cases, subsequent units may be shortened. While all standards will be covered, timelines are flexible.

#### **Cell Biology (3 weeks)**

California science standards:

- All living organisms are composed of cells, from just one to many trillions, whose details usually are visible only through a microscope. As a basis for understanding this concept, students know:
  - Cells function similarly in all living organisms.
  - The characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.
  - The nucleus is the repository for genetic information in plant and animal cells.
  - Mitochondria liberate energy for the work that cells do, and chloroplasts capture sunlight energy for photosynthesis.
  - Cells divide to increase their numbers through a process of mitosis, which results in two daughter cells with identical sets of chromosomes
  - As multicellular organisms develop, their cells differentiate.

Vocabulary from California science standards: cell, plant cell, animal cell, chloroplast, cell wall, mitochondria, photosynthesis, mitosis, chromosomes

## **Correlates to Prentice Hall California Life Science chapters 3 and 4**

### **Genetics (3 weeks)**

California science standards:

- A typical cell of any organism contains genetic instructions that specify its traits. Those traits may be modified by environmental influences. As a basis for understanding this concept, students know:
  - The differences between the life cycles and reproduction of sexual and asexual organisms.
  - Sexual reproduction produces offspring that inherit half their gene from each parent.
  - An inherited trait can be determined by one or more genes.
  - Plant and animal cells contain many thousands of different genes, and typically have two copies of every gene. The two copies (or alleles) of the gene may or may not be identical, and one may be dominant in determining the phenotype while the other is recessive.
  - DNA is the genetic material of living organisms, and is located in the chromosomes of each cell.

Vocabulary from California science standards: life cycle, reproduction, asexual reproduction, sexual reproduction, inherited trait, gene, alleles, dominant trait, recessive trait, DNA

## **Correlates to Prentice Hall California Life Science chapters 5 and 6**

### **Evolution/Earth and Life History (5weeks)**

California science standards:

- Biological evolution accounts for the diversity of species developed through gradual processes over many generations. As a basis for understanding this concept, students know:
  - Both genetic variation and environmental factors are causes of evolution and diversity of organisms.
  - The reasoning used by Darwin in making his conclusion that natural selection is the mechanism of evolution.
  - How independent lines of evidence from geology, fossils, and comparative anatomy provide a basis for the theory of evolution.
  - How to construct a simple branching diagram to classify living groups of organisms by shared derived characteristics, and expand the diagram to include fossil organisms.
  - Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient for its survival.
- Evidence from rocks allows us to understand the evolution of life on Earth. As the basis for understanding this concept, students know:
  - Earth processes today are similar to those that occurred in the past and slow geologic processes have large cumulative effects over long periods of time.
  - The history of life on Earth has been disrupted by major catastrophic events, such as major volcanic eruptions or the impact of an asteroid.
  - The rock cycle includes the formation of new sediment and rocks. Rocks are often found in layers with the oldest generally on the bottom.
  - Evidence from geologic layers and radioactive dating indicate the Earth is approximately 4.6 billion years old, and that life has existed for more than 3 billion years.
  - Fossils provide evidence of how life and environmental conditions have changed.
  - How movements of the Earth's continental and oceanic plates through time, with associated changes in climate and geographical connections, have affected the past and present distribution of organisms.
  - How to explain significant developments and extinctions of plant and animal life on the geologic time scale.

Vocabulary from California science standards: genetic variation, environmental factors, evolution, diversity, natural selection, fossils, comparative anatomy, theory of evolution, classify, derived characteristics, extinction, adaptive characteristics, species, geologic process, rock cycle, sediment, geologic layers, radioactive dating, continental and oceanic plates, extinction, geologic time scale

**Correlates with Prentice Hall California Life Science chapters 7 and 8**

### **Structure and Function in Living Systems (16 weeks)**

California science standards:

- The anatomy and physiology of plants and animals illustrate the complementary nature of structure and function. As a basis for understanding this concept, students know:
  - Plants and animals have levels of organization for structure and function, including cells, tissues, organs, organ systems, and the whole organism.
  - Organ systems function because of the contributions of individual organs, tissues, and cells. The failure of any part can affect the entire system.
  - How bones and muscles work together to provide a structural framework for movement.
  - How the reproductive organs of the human female and male generate eggs and sperm, and how sexual activity may lead to fertilization and pregnancy.
  - The function of the umbilicus and placenta during pregnancy.
  - The structures and processes by which flowering plants generate pollen and ovules, seeds, and fruit.
  - How to relate the structures of the eye and ear to their functions.

Vocabulary from California science standards: cell, tissue, organ, organ system, organism, egg, sperm, fertilization, pregnancy, umbilicus, pollen, ovules, seeds, fruit

**Correlates with Prentice Hall California Life Science chapters 9, 10, 11, 12, 13, 14, 15 and 16**

### **Physical Principles in Living Systems (4 weeks)**

California science standards:

- Physical principles underlie biological structures and functions. As a basis for understanding this concept, students know:
  - Visible light is a small band within a very broad electromagnetic spectrum.
  - For an object to be seen, light emitted by or scattered from it must enter the eye.
  - Light travels in straight lines except when the medium it travels through changes.
  - How simple lenses are used in a magnifying glass, the eye, camera, telescope, and microscope.
  - White light is a mixture of many wavelengths (colors), and that retinal cells react differently with different wavelengths.
  - Light interacts with matter by transmission (including refraction), absorption, or scattering (including reflection).
  - The angle of reflection of a light beam is equal to the angle of incidence.
  - How to compare joints in the body (wrist, shoulder, thigh) with structures used in machines and simple devices (hinge, ball-and-socket, and sliding joints).
  - How levers confer mechanical advantage and how the application of this principle applies to the musculoskeletal system.
  - Contractions of the heart generate blood pressure, and heart valves prevent backflow of blood in the circulatory system.

Vocabulary from California science standards: visible light, band, electromagnetic spectrum, emitted, medium, simple lens, telescope, microscope, transmission, refraction, absorption, scattering, reflection, angle of incidence, hinge joint, ball and socket joint, sliding joint, mechanical advantage, blood pressure, backflow

**Correlates with Prentice Hall California Life Science chapters 2, 3, 13 and 14**

**Investigation and Experimentation**

California science standards:

- Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept, and to address the content the other three strands, students should develop their own questions and perform investigations. Students will:
  - Select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
  - Utilize a variety of print and electronic resources (including the World Wide Web) to collect information as evidence as part of a research project.
  - Communicate the logical connection among hypothesis, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
  - Construct scale models, maps and appropriately labeled diagrams to communicate scientific knowledge (e.g., motion of Earth's plates and cell structure).
  - Communicate the steps and results from an investigation in written reports and verbal presentations.

This standard shall be met by incorporating activities into lessons throughout the seventh grade science program.

**(This standard is found throughout the text and ancillary materials.)**

**THIS COURSE WILL PREPARE STUDENTS FOR THE CAHSEE AND/OR THE FCUSD EXIT EXAMS:**

Science

**LAB FEE IF REQUIRED:**

None

**SUBJECT AREA CONTENT STANDARDS TO BE ADDRESSED:**

See Detailed Units for Instruction for Seventh Grade Science Standards.

**DISTRICT ESLR's TO BE ADDRESSED:**

**Students will be:**

**Self-Directed Learners:** This course prepares students to be self-directed learners as they pursue mastering major concepts in investigation and experimentation, cell biology, genetics, evolution, earth sciences, structure, function, and physical principals in living systems.

**Effective Communications:** This course prepare students to be effective communicators as they complete the writing and oral components of this class.

**Quality Producers/Performers:** This course prepares students to be quality producers and performers by initiating projects, setting quality standards, and adapting to changing conditions.

**Constructive Thinkers:** This course prepares students to be constructive thinkers with lab assignments that require them to synthesize, apply, and analyze information, applying the concepts to other situations.

**Collaborative Workers**: Lab activities and other projects are done in cooperative groups. Students need to be collaborative workers in order to complete these tasks efficiently.

**Responsible Citizens**: This course will help prepare students to be responsible citizens by using life science knowledge and scientific inquiry skills to make informed decisions about issues related to life science and biotechnology.

## **APPENDIX I**

### **Assessment Resources in Prentice Hall California Science**

1. Progress Monitoring Assessments:
  - Diagnostic tests
  - Reading checkpoints
  - Caption Questions
  - Section Assessments
2. Summative Assessments:
  - Chapter tests
  - Unit Assessments
  - Benchmark tests
  - Midyear exam
  - End-of-year (Outcome) exam
3. Online Self-Assessment Tools for students
  - Chapter review
  - Active Art
  - Success Tracker
4. ExamView® Test Bank