FRESNO UNIFIED SCHOOL DISTRICT
BIOLOGY COURSE OF STUDY

Introduction

The California Science Content Standards include Earth Science, Biology, Chemistry, and Physics. These standards are intended to prepare students for the more formal treatment of concepts, principles, and theories called for at the college level. In the middle school grades students should have developed and enhanced their formal reasoning abilities that reflect science as a way of knowing, and acquiring new science content knowledge. In grade 6-8 they connect concrete observations of a rich array of phenomena and unify models that help to simplify the ever-expanding body of science content knowledge. At the ninth grade level these skills will be revisited, reinforced and developed in depth. In the investigation and experimentation strand students are expected to: formulate hypotheses, to design experiments that will enable them to test predictions, and complete independent research projects utilizing the *World Wide Web*. They will also be expected to make oral reports and arguments based on evidence. In designing, carrying out, and reporting the results of experiments, they will be expected to make use of more complex mathematics.

Teaching and Learning

The National Research Council (1999) in How People Learn has recommended a framework to help guide the design and evaluation of environments that can optimize learning. (National Research Council, 1999, p.19). The framework identifies four interrelated attributes of learning environments that need cultivation:

1. Schools and classrooms must be learner centered. This incorporates prior knowledge, cultural differences, and students' own theories about intelligence and learning (p. 19-20).
2. Attention must be given to what is taught, why it is taught, and what mastery looks like. Many curricula fail to support learning with understanding that knowledge-centered environments emphasize (p. 21).
3. Formative assessments designed to provide evidence of learning are essential. Assessments must be learner friendly and provide the student with opportunities to revise and improve their thinking over a period of time (p. 22).
4. Learning is influenced in fundamental ways by the context in which it takes place. Teachers must design classroom activities and help students organize their work in ways that will build a community of learners. Teachers must also be able to create a community of learners among themselves (p. 22).

The Role of Technology

The use of technology in schools and classrooms will create new opportunities for curriculum and instruction by bringing real-world problems into the classroom. Peck and Dorricott (1994), listed ten reasons for using technology:

1. Students learn and develop at different rates.
2. Graduates must be proficient at accessing, evaluating, and communicating information.
3. Technology can foster an increase in the quantity and quality of students' thinking and writing.
4. Technology can nurture artistic expression.
5. Graduates must be globally aware and able to use resources that exist outside the school.
6. Technology creates opportunities for students to do meaningful work.
7. All students need access to high level and high-interest courses.
8. Graduates must solve complex problems.
9. Students must feel comfortable with the tools of the Information Age.
10. Schools must increase their productivity and efficiency (p. 53).

Science leaders must keep informed about changes in technology and its trends. Rapid changes in communications technology can redefine what the classroom looks like. Technology can also be a powerful pedagogical tool for human interaction that supports learning (National Research Council, 1999; Posner, 1995).

In an effort to establish a consistent content for technology education in schools, the International Technology Education Association (ITEA) has created the Standards for Technological Literacy: Content for the Study of Technology. The standards and associated benchmarks created present a vision of what students should know and be able to do in order to be technologically literate. The intent of the publication is to influence what happens in every K-12 classroom in America through the development of new curricula, textbooks, and student assessments (International Technology Education Association, 2000).

Reading and Language Arts Improvement Through Science Curriculum-The Research

The demand for literacy skills in the U.S. workplace is at an all time high and public schools are attempting to respond by increasing the basic literacy requirements for K-12 students. Despite these efforts, reading scores nationally have not improved over the last 30 years as measured by the National Assessment of Educational Progress (NAEP), and the U.S. continues to lag behind most other countries on international assessments in reading. In addition, the relative poor performance of U.S. students in mathematics and science assessments internationally is believed to also be rooted in their poor performance as readers. The weakness is that reading is seldom effectively integrated across the various content areas in schools. Reading comprehension, in particular, has been identified, as critical skill children must possess to succeed in school beyond grade three. Even though texts remain the primary source of instruction for content, reading is seldom integrated into content area instruction. The development of reading skills is enhanced through the development of classification and oral communication skills and positive attitudes toward science (National Research Council, 2000; Lowery, 1995).

Teaching science in a way that is understandable and meaningful to students, as it promotes increased literacy, can be developed for students using existing science and language arts curricula and recognized best practice strategies (Crandall, 1995). Evidence has been reported that shows inquiry-related teaching effective in fostering ways of thinking, talking, and writing (Fradd & Lee, 1999; Met, 1994; Mohan, 1990; Rosebery et al., 1992).

English Learner Student Achievement Will Improve With Science Learning

Inquiry-oriented science teaching that is contextualized is especially valuable for culturally and linguistically diverse students. Science learning and language acquisition for English Learner students is mutually dependent. Through the contextualized use of language in science inquiry, students develop and practice complex language forms and functions. Through the use of language functions such as description, explanation and discussion in inquiry science, students enhance their conceptual understanding (Merino & Hammond, 1998).

Inquiry-related teaching is also effective in developing vocabulary and conceptual understanding of science. When English Learner students use English to solve real world science problems their acquisition of the language is more effective (Merino & Hammond, 1998). Learning vocabulary and academic language in context is most effective because only the vocabulary needed is used. English Language Learners, in particular, do not need to practice isolated vocabulary that will never be used (Lloyd & Contreras, 1987). Evidence collected in classrooms shows that students with large science vocabulary knowledge learned through memorization give the false impression they have scientific knowledge. The fact is that they do not understand the meaning of the words at all (Fradd & Lee, 1999; Met, 1994; Mohan, 1990; Rosebery et al., 1992).

Reading in the Content Area of Science

Many studies cite that learning science through the use of the English language develops fluency much more effectively. Language-minority students acquire scientific ways of thinking, talking, and writing through inquiry-oriented teaching (August & Hakuta, 1997; Rosebery et al., 1992; Ballenger, 1997). The research also implies that there is a need for explicit instruction in both academic language and reading to learn through text (Holliday, 1994; Kuehn, 1998; Pressley, et al, 1989; Santa & Alvermann, 1991). How students learn science and how they develop language skills and reading skills are interconnected. The contextualized use of language in science inquiry provides students practice with complex language forms and functions. Further, this type of explicit instruction must be embedded in the natural context of effective science instruction (Casteel & Isom, 1994; Lee, Fradd, & Sutman, (1995); Warren & Rosebery, 1993), and teacher professional development (Diaz, 1994). Parallels between this research and the research on reading comprehension are strong. It is all the more reason that a quality standards-based program is important to include in strategic plans to improve student achievement.

Critical thinking is developed through cognitively demanding context-embedded tasks in which children try to make sense out of the world. Their worldview, influenced by cultural perspective and understanding of words in cultural context, determines what is feasible in a scientific sense. English Learner students often understand science concepts in their primary language and may constitute prior knowledge that is never acknowledged (Met, 1994; Lowery, 1995).

Fresno Unified Secondary School Science Program
Natural Sciences Sequence

Science Education Center
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Middle School Grades 6-8 ***High School Grades 9-12***

Grade 6	Grade 7	Grade 8	Grade 9	Grade 10	Grade 11	Grade 12
Earth Science emphasis integrated with Life and Physical Sciences	**Life Science emphasis integrated with Earth and Physical Sciences**	**Physical Science emphasis integrated with Earth and Life Sciences**	**Introductory Earth Science, or Biology Course of Study**	**Biology, Chemistry, or Physics Course of Study**	**Chemistry, Physics, or other standards-based advanced science course**	**Options include *science electives, honors level, or advanced level coarse**

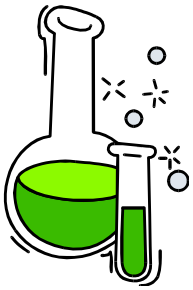
**Science Electives: The fourth year of laboratory science may include optional courses such as Physiology, Environmental Science, Ecology, Zoology, or Advanced Topics. Some sites may not offer all elective courses.*

Advanced Placement coursework that is identified as one of the standards-based course titles qualifies as a "second year" course. For example: Biology and AP Biology, Chemistry and AP Chemistry, Physics, and AP Physics.

State augmented assessments as part of the STAR package are available only for Earth, Biology, Chemistry, Physics, and Integrated Science. Only students enrolled in those courses are eligible to take the exams.

Algebra is a recommended prerequisite for Grade 9 Earth Science and all other science courses.

Some aspects of all four California Content Standards – Biology, Physics, Chemistry, and Earth/Space Science – must be covered in depth. The main goal of the Natural Sciences Sequence is to revisit concepts, principles and theories at successively higher levels of abstraction over six years of schooling.



REFERENCES

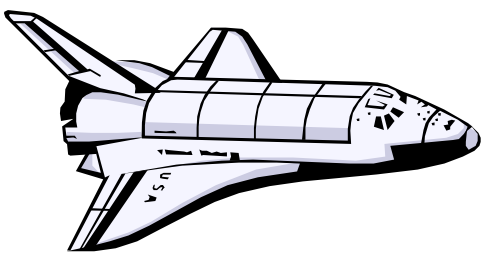
American Association for the Advancement of Science (1989). Science For All Americans. Washington, DC, American Association for the Advancement of Science.
August, D., and, Hakuta, K. (1997). Improving Schooling for Language-Minority Children: A Research Agenda. Washington, D.C., National Research Council.
Ballenger, C. (1997). "Social Identities, Moral Narratives, Scientific Argumentation: Science Talk in A Bilingual Classroom." Language and Education **2**(1): 1-14.
California State Board of Education (1998). Science Content Standards for California Public Schools. Kindergarten Through Grade Twelve.
California State Board of Education (2003). Science Framework for California Public Schools. Kindergarten Through Grade Twelve.
Casteel, C. P., and Isom, B.A. (1994). "Reciprocal Processes in Science and Literacy Learning." The Reading Teacher **47**(7): 538-545.
Diaz, E. (1994). Science Education of Limited English Proficient, English Language Learners. American Educational Research Association, New Orleans, ERIC Document Reproduction Service No. ED376068.
Fradd, S. H., and Lee, O. (1999). "Teachers' Roles in promoting science inquiry with students from diverse language backgrounds." Educational Researcher **28**(6): 14-20.
Holliday, W. G. (1994). "The Reading-Science Learning -Writing Connection: Breakthroughs, Barriers, and Promises." Journal of Research in Science Teaching **31**(9): 102-111.
International Technology Education Association (2000). Standards for Technological Literacy: Content for the Study of Technology. Reston, VA, ITEA.
Kuehn, P., and Wright, E.L. (1998). "The Effects of Academic Language Instruction on College-Bound At-Risk Secondary Students." Journal of Educational Opportunity **17**(1): 9-22.
Lee, O., Fradd, S.H., and Sutman, F.X. (1995). "Science Knowledge and Cognitive Strategy Use Among Culturally and Linguistically Diverse Students." Journal of Research in Science Teaching **32**(8): 797-816.
Lowery, L. (1995). What Does Research Say About the Learner? The Biological Basis for Thinking and Learning. The Catalyst. Washington, D.C., National Research Council. **4**.
Lloyd, C. V., and Contreras, N.J. (1987). "What Research Says: Science Inside-Out." Science and Children **25**(2): 30-31.
Merino, B. J., and Hammond, L. (1998). "Family Gardens and Solar Ovens: Making Science Education Accessible to Culturally and Linguistically Diverse Students." Multicultural Education **5**(3): 34-37.
Met, M. (1994). Teaching Content Through a Second Language. Educating Second Language Children: The Whole child, the Whole Curriculum, the Whole Community. F. Genesee. Oakleigh, Cambridge University Press**:** 159-182.
Mohan, B. (1009). LEP Students and the Integration of Language and Content: Knowledge Structures and Tasks. Research Symposium on Limited English Proficient Student Issues, Washington, D.C., ERIC document Reproduction Service No. ED341264.
National Research Council (1996). National Science Education Standards. Washington, D.C., National Academy Press.
National Research Council. (1999). How People Learn: Bridging Research and Practice. Washington, D.C., National Academy Press.
National Research Council (2000). Inquiry and the National Science Education Standards. Washington, D.C., National Academy Press.
Posner, G. J. (1995). Analyzing the Curriculum. New York, McGraw-Hill, Inc.
Pressley, M., C. J. Johnson, et al. (1989). "Strategies that Improve Children's Memory and Comprehension of Text." The Elementary School Journal 90(1): 3-32.
Rosebery, A. S., and Warren, B., and Conant, F.R. (1992). "Appropriating Scientific Discourse: Findings from Language Minority Classrooms." Journal of Research in Science Teaching **33**(6): 569-600.
Warren, B., and Rosebery, A.S. (1993). Equity in the Future Tense: Redefining Relationships among teachers, students, and science in linguistic minority classrooms. Santa Cruz, National Center for Research on Cultural Diversity and Second Language Learning.

BIOLOGY

There is a single light of science, and to brighten it anywhere is to brighten it everywhere.
--Isaac Asimov

Understanding how living organisms grow and reproduce, adapt to their environment and compete for resources is the focus of this Biology Course. It is important for our students to have a good understanding of how their bodies work, the structure and function of cells, how our bodies respond to disease and injury, the processing of our food to energy and tissue, and how we, as a population use the Earth's resources to meet our needs. This course addresses these topics as well as meets the California State Biology Content Standards.

The high school science standards require more than two years of science courses for students to achieve the breadth and depth described. Schools and districts will be challenged to develop a science curriculum that meets the needs of their students and provides them the maximum opportunity to learn the standards while encouraging students to study further in science. In grades nine through twelve, standards that all students are *expected to achieve* in their science courses are unmarked; standards that all students should have *the opportunity to learn* in those courses are marked with an asterisk



Fresno Unified School District – Biology – Page 1

Investigation and Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations.

Standards and Assessments "Students know…"	Task Analysis "Students are able to…"	Adopted Textbook Correlation(s)	Connections
(a)Select and use appropriate tools and technology to perform tests, collect data, analyze relationships, and display data. (b)Identify and communicate sources of unavoidable error. (c)Identify possible reasons for inconsistent results, such as sources of error or uncontrolled conditions. (d)Formulate explanations by using logic and evidence. (f)Distinguish between hypothesis and theory as scientific terms. (j)Recognize the issues of statistical variability and the need for controlled tests. (l)Analyze situations and solve problems that require combining and applying concepts from more than one area of science. ASSESSMENT **[CST]**	• Use appropriate tools To organize data, create a table, read a graph, make accurate measurements. • Compare and Contrast: hypothesis and theory. • Experiment using Variables and controls to minimize error.	Prentice Hall: Chapter / Section 1-2, 1-4 LABS/DEMOS/ ACTIVITIES & RESOURCES: SE p.2- Inquiry Activity Lab Skills 5 – Microscope LMA 1 LMB 1 TP 1 Safety	KEY VOCABULARY: Controlled experiment Variable Hypothesis Theory Metric system Spontaneous generation SKILLS FOCUS: Observe Experiment Compare/Contrast Identify Select Analyze Distinguish Organize Graph Microscope Usage Measure LITERACY CONNECTIONS Interactive Text Graphic Organizer Definitions Lab Reports EL STRATEGIES GRSW ELL Handbook

Biology – Page 2

Ecology – Standard 6. Stability in an ecosystem is a balance between competing effects.

Standards and Assessments "Students know…"	Task Analysis "Students are able to…"	Adopted Textbook Correlation(s)	Connections
(a) Biodiversity is the sum total of different kinds of organisms and is affected by alterations of habitats. (e) A vital part of an ecosystem is the stability of its producers and decomposers. (f) At each link in a food web some energy is stored in newly made structures but much energy is dissipated into the environment as heat. This dissipation may be represented in an energy pyramid. Note: If time allows, Standards 6-b, c, d as Well as 1-f ASSESSMENT **[CST]**	• Compare and contrast different trophic levels. • Define vocabulary. • Differentiate between the different components that affect an ecosystem. • Construct a food chain and a food web.	Prentice Hall: Chapter / Section 6-3, 3-1, 3-2 *If time allows: 3-3, 4-1, 5-1 LABS/DEMOS/ ACTIVITIES & RESOURCES: TP 3 Resource Pro – Real World Lab 3: Identifying a Limiting Nutrient LMA 3 LMB 3 IF 2: Using Range and Habitat to Track Evidence	KEY VOCABULARY: Biodiversity Extinction Endangered Species Conservation Ecology Species Population Community Ecosystem Biome Biosphere Autotroph/Heterotroph Producer/Consumer Herbivore Carnivore Omnivore Detritivore Decomposer Food Chain/Food Web Trophic level Ecological Pyramid Biomass SKILLS FOCUS: Experiment Observe Analyze Formulate Conclusions Synthesize LITERACY CONNECTIONS Definitions Compare & Contrast EL STRATEGIES GRSW Graphic Organizer ELL Handbook

Biology – Page 3

Cell Biology- Standard 1. The fundamental life processes of plants and animals depend on a variety of chemical reactions that occur in specialized areas of the organism's cells.

Standards and Assessments "Students know…"	Task Analysis "Students are able to…"	Adopted Textbook Correlation(s)	Connections
(a) Cells are enclosed within semi permeable membranes that regulate their inter-action with their surroundings. (b)Enzymes are proteins that catalyze biochemical reactions without altering the reaction equilibrium and the activities of enzymes depend on the temperature, ionic conditions, and the pH of the surroundings. (c)Prokaryotic cells, eukaryotic cells (including those from plants and animals), and viruses differ in complexity and general structure. (e)The role of the endoplasmic reticulum and Golgi apparatus in the secretion of proteins. (h)Most macro-molecules (poly-saccharides, nucleic acids, proteins, lipids) in cells and organisms are synthesized from a small collection of simple precursors. ASSESSMENT **[CST]**	• Compare and contrast different types of cells. • Describe the functions of major cell organelles, including the endoplasmic reticulum and Golgi body. • Demonstrate the action of enzymes. • Compare and contrast prokaryotic & eukaryotic cells. • Describe how macro-molecules are synthesized. • Test for macromolecules in food. • Examine the structure of various cells, tissues, and organs. • Demonstrate how osmosis is affected by the concentration of solutes.	Prentice Hall: Chapter / Section 2-3,2-4,7-1,7-2,7-3 LABS/DEMOS/ ACTIVITIES & RESOURCES: TP 2 & 7 LMA. 2 & 7 LMB 2 & 7 BTM Enzyme lab Resource Pro Labs 2 & 7	KEY VOCABULARY: Carbohydrate Lipid Nucleic Acid RNA/DNA Protein Amino Acid Catalyst Enzyme Substrate Cell/Cell Theory Nucleus Prokaryote/Eukaryote Organelle Cytoplasm Chromosome/Chromatin Ribosome Endoplasmic Reticulum Golgi Apparatus Lysosome Mitochondrion Chloroplast Cell/Plasma membrane Diffusion/Osmosis Equilibrium Active Transport Endo/Exocytosis SKILLS FOCUS: Describe Compare & Contrast Experiment Define LITERACY CONNECTIONS Definitions Word Wall Graphic Organizer EL STRATEGIES GRSW ELL Handbook

Biology – Page 4

Physiology – Standard 9.The internal environment of the human body remains relatively stable (homeostatic) despite changes in the outside environment.

Standards and Assessments "Students know…"	Task Analysis "Students are able to…"	Adopted Textbook Correlation(s)	Connections
Standard 1 (f)Usable energy is captured from sunlight by chloroplasts and is stored through the synthesis of sugar from CO_2. (g)The role of the mitochondria in making stored chemical-bond energy available to cells by completing the breakdown of glucose to CO_2. Standard 9 (a)The complimentary activity of major body systems provides cells with nutrients and O_2 and removes toxic waste products such as CO_2. (b) The nervous system mediates communication between different parts of the body and the body's interactions with the environment. (c) Feedback loops in the nervous and endocrine systems regulate conditions in the body. (d) The functions of the nervous system and the role of neurons in transmitting electrochemical impulses. (e) The roles of sensory, motor, and interneurons in sensation, thought, and response. ASSESSMENT **[CST]**	• Describe the role of the chloroplast and mitochondrion in photosynthesis and respiration. • Identify the reactants and products of photo-synthesis and respiration. • Describe the nerve impulse pathway and reflex arc. • Evaluate the role of hormones. • Describe the mechanism involved in a feedback loop.	Prentice Hall: Chapter / Section 8-2, 8-3, 9-1, 9-2 35-1, 35-2, 39-1, 39-2 LABS/DEMOS/ ACTIVITIES & RESOURCES: LMA 8, 9, 35 LMB 8, 9, 35 VL - 8 TP -8, 9, 35, 39 IDM – 4, 43, 44, 45 Resource Pro Lab 39	KEY VOCABULARY: Photosynthesis Pigment Chlorophyll Light-dependant reactions Calvin cycle Glycolysis Cellular respiration Fermentation Aerobic/Anaerobic Krebs cycle Tissue Homeostasis Feedback inhibition Neuron Synapse Neurotransmitter Hormone Gland Pituitary Gland SKILLS FOCUS: Question Describe Evaluate Identify Experiment Analyze Conclude Model LITERACY CONNECTIONS Interactive Text PHSchool.com Graphic Organizer Analogies EL STRATEGIES GRSW ELL Handbook

Biology – Page 5

Physiology – Standard 10. Organisms have a variety of mechanisms to combat diseases. Understanding the human immune system.

Standards and Assessments "Students know…"	Task Analysis "Students are able to…"	Adopted Textbook Correlation(s)	Connections
(a) The role of the skin in providing nonspecific defenses against infection. (b) The role of antibodies in the body's response to infection. (c) How vaccination protects an individual from infectious disease. (d) There are important differences between bacteria and viruses with respect to growth and replication, the body's primary defense against bacterial and viral infections, and effective treatments of these infections. (e) Why an individual with a compromised immune system may be unable to fight off and survive infections by microorganisms that are usually benign. ASSESSMENT **[CST]**	• Construct models of antibodies. • Define the role of skin. • Outline the human immune system response to infections. • Note the differences between bacteria and viruses, and how the body defends against. • Give examples of immune system disorders and diseases. • Describe how vaccinations work to prevent diseases.	Prentice Hall: Chapter / Section 40-2, 40-3 19-1,19-2,19-3 LABS/DEMOS/ ACTIVITIES & RESOURCES: TP 40 LMB 40 SE p.1030 – Inquiry Activity TE p. 1038 – Demo	KEY VOCABULARY: Prokaryote/Eukaryote Heterotroph/Autotroph Binary fission Conjugation Virus Bacteriophage Retrovirus Pathogen Vaccine Antibiotic Immunity Inflammatory response Interferon Antigen/Antibody Allergy Histamine Asthma SKILLS FOCUS: Construct Define Outline Describe Compare & Contrast Model LITERACY CONNECTIONS Interactive Text Graphic organizer EL STRATEGIES GRSW ELL Handbook

Biology – Page 6

Genetics – Standard 2. Mutation and sexual reproduction lead to genetic variation in a population. Standard 3. A multicellular organism develops from a single zygote, and its phenotype depends on its genotype, which is established a fertilization.

Standards and Assessments "Students know…"	Task Analysis "Students are able to…"	Adopted Textbook Correlation(s)	Connections
Standard 2 (a) Meiosis is an early step in sexual reproduction in which the pairs of chromosomes separate and segregate randomly during cell division to produce gametes containing one chromosome of each type. (c) Random chromosome segregation explains the probability that a particular allele will be in a gamete. (d) New combinations of alleles may be generated in a zygote through the fusion of male and female gametes (fertilization). (e) Why approximately half of an individual's DNA sequence comes from each parent Standard 3. (a) How to predict the probable outcome of phenotypes in a genetic cross from the genotypes of the parents and mode of inheritance (autosomal or X-linked, dominant or recessive). (b) Genetic basis for Mendel's laws of segregation and independent assortment. ASSESSMENT **[CST]**	• Observe traits and relate genotype to phenotype. • Infer how and why traits are inherited. • Use Punnett Squares to determine probability. • Construct a usable model of meiosis. • Create a graphic organizer to Mendel's Laws to observable phenomena. • Summarize historical significance of Mendel's work.	Prentice Hall: Chapter/Section 11-1, 11-2, 11-4, 11-5 LABS/DEMOS/ ACTIVITIES & RESOURCES: SE p. 262 - Inquiry Activity SE p. 268 – Quicklab: Dimples TE pg. 267 - Make Connections 11-2 SE pg. 281 - Meiosis Lab simulation GRSW 11-1, 11-2 TP 11 LMA 11 LMB 11	KEY VOCABULARY: Segregation Gametes Probability Punnett Square Phenotype Genotype Homologous Diploid Haploid Meiosis SKILLS FOCUS: Observe Compare Infer Predict Use models Summarize LITERACY CONNECTIONS Concept mapping Comparisons Definitions Analogies Interactive text EL STRATEGIES GRSW Graphic Organizers Modeling ELL Handbook

Biology – Page 7

Genetics – Standard 4: Genes are a set of instructions encoded in the DNA sequence of each organism that specify the sequence of amino acids in proteins characteristic of that organism. Standard 5: The genetic composition of cells can be altered by incorporation of exogenous DNA into cells.

Standards and Assessments "Students know…"	Task Analysis "Students are able to…"	Adopted Textbook Correlation(s)	Connections
Standard 4 (a) The general pathway by which ribosomes synthesize proteins, using tRNAs to translate genetic information in mRNA. (b) Apply the genetic coding rules to predict the sequence of amino acids from a sequence of codons in RNA. (c) How mutations in the DNA sequence of a gene may or may not affect the expression of the gene or the sequence of amino acids in an encoded protein. (d) Specialization of cells in multicellular organisms is usually due to different patterns of gene expression rather than to differences of the genes themselves. (e) Proteins can differ from one another in the number and sequence of amino acids. **Standard 5** (a) General structures and functions of DNA, RNA, and protein. (b) Apply base-paring rules to explain precise copying of DNA during semiconservative replication and transcription of information from DNA into mRNA. (c) Genetic engineering (biotechnology) is used to produce novel biomedical and agricultural products. ASSESSMENT **[CST]**	• Determine how codes work. • Use models to explain structure of DNA. • Compare DNA to RNA. • Describe transcription and translation. • Explain relationship of genes to proteins. • Identify different types of mutations. • Relate gene expression and regulation to development. • Describe basic DNA technologies (generation of RFLP's, electrophoresis, transformation, recombination).	Prentice Hall: Chapter/Section 12-1, 12-2, 12-3,12-4,12-5 LABS/DEMOS/ ACTIVITIES & RESOURCES: Resources GRSW 12.1 to 12.3 TR 12.1, 12.2, 12.3, 12.5 TP 12-3, 12-5 RSW 12-3, 12-4, 12-5 Activities LMB 12 SE pgs. 286, 296 TE pg. 302 TR – Graphic Organizer	KEY VOCABULARY: Nucleotide DNA polymerase Replication Gene MRNA TRNA Transcription Translation Intron Exon Codon Anticodon Mutation Transformation Bacteriophage PCR Transgenic Endogenous, Exogenous Clone SKILLS FOCUS: Use models Compare and contrast Describe Identify Relate Analysis Explain LITERACY CONNECTIONS Compare and contrast Concept mapping Word Wall Interactive text EL STRATEGIES ELL Handbook GRSW

Biology – Page 8

Genetics – Standard 2: Mutation and sexual reproduction lead to genetic variation in a population. Standard 7. The frequency of an allele in a gene pool of a population depends on many factors.

Standards and Assessments "Students know…"	Task Analysis "Students are able to…"	Adopted Textbook Correlation(s)	Connections
Standard 2 (f) The role of chromosomes in determining an individual's sex. (g) How to predict possible combinations of alleles in a zygote from the genetic makeup of the parents. Standard 7 (b) Why alleles that are lethal in a homozygous individual may be carried in a heterozygote and thus maintained in a gene pool. ASSESSMENT [CST]	• Construct Karyotype models. • Relate dominance and recessiveness to genetic disorders. • Summarize the goals of the Human Genome Project. • Model DNA probes. • Describe how sex is determined. • Model inheritance of traits.	Prentice Hall: Chapter / Section 14-1, 14-2, 14-3 LABS/DEMOS/ ACTIVITIES & RESOURCES: LMA 14 LMB 14 TR 14-1,2,and 3 RSW 14.1,2, and 3 GRSW 14-1,2,and 3 SE pgs. 340-343 IDM 9-12 Resource Pro 14	KEY VOCABULARY: Karyotype Amniocentesis Autosomal Pedigree Sex-linked Non disjunction Gene therapy SKILLS FOCUS: Relate Summary Model Identify Define Investigate LITERACY CONNECTIONS Interactive Text Graphic Organizer Definitions EL STRATEGIES GRSW ELL Handbook

Biology – Page 9

Evolution – Standard 7: The frequency of an allele in a gene pool of a population depends on many factors and may be stable or unstable over time. Standard 8: Evolution is the result of genetic changes that occur in constantly changing environments.

Standards and Assessments "Students know…"	Task Analysis "Students are able to…"	Adopted Textbook Correlation(s)	Connections
Standard 7 (a) Why natural selection acts on the phenotype rather than the genotype of an organism. (c) New mutations are constantly being generated in a gene pool. (d) Variation within a species increases the likelihood that at least some members of a species will survive under changed environmental conditions. Standard 8 (a) How natural selection determines the differential survival of groups of organisms. (b) A great diversity of species increases the chance that at least some organisms survive major environmental changes. (c) The effects of genetic drift on the diversity of organisms in a population. (d) Reproductive or geo-graphic isolation affects speciation. (e) How to analyze fossil evidence with regard to biological diversity, episodic speciation, and mass extinction. ASSESSMENT **[CST]**	• Model Camouflage and Natural selection. • Model Natural selection and changes in the genetic makeup of a population. • Model Index fossils. • Increase awareness regarding issues about Archeological sites and findings. • Evaluate criteria for species determination. • Investigate factors that lead to variation within a species. • Describe the many factors that increase a species chances for survival. • Analyze fossil records and geological time.	Prentice Hall: Chapter / Section 15-3, 16-2, 16-3 17-1, 17-4 18-2 LABS/DEMOS/ ACTIVITIES & RESOURCES: Resources: TR 15-3, 16-2, 16-3, 17 RSW 15-3, 16-2, 16-3, 17 GRSW 15-3, 16-2, 16-3, 17 TP 15, 16-2, 16-3, 17 IDM 14, 16 Activities: LMA 15, 16, 17 LMB 15, 16, 17 VL 14, 15 SE p. 438	KEY VOCABULARY: Fitness Adaptation Natural selection Homologous structure Directional selection Genetic drift Speciation Episodic speciation Mutation Geographic isolation Reproductive isolation Fossil Radioactive dating Geologic time scale Extinction Macroevolution Convergent evolution Adaptive radiation Coevolution Punctuated equilibrium SKILLS FOCUS: Modeling Decision making Evaluate Investigate Analyze LITERACY CONNECTIONS Interactive Text Graphic Organizer Definitions EL STRATEGIES GRSW ELL Handbook

Key to Resource Component Codes		(Annotation)
SE	Student Edition	Okay
TE	Teacher Edition	Useful Wraparound
LMA	Lab Manual A	Uses more materials
LMB	Lab Manual B	Lower level
TR	Teaching Resources	Adequate
IF	Investigations in Forensics	Worthwhile
CTB	Computer Test Bank	Not evaluated
CT	Chapter Test	Not evaluated
LP	Lesson Planner	Daily pacing fast
RSW	Reading and Study Workbook	Grade level study guides
ARSW	Adapted Reading and Study Workbook	Lower level study guides
GRSW	Guided Reading and Study Workbook (on CD)	Additional readings
LA	Lab Assessment and Scoring Guide	Not evaluated
BTM	BioTechnology Manual (on CD)	Not evaluated
IDM	Issues and Decision Making	Good for critical thinking
TP	Transparencies Plus (Presentation Pro)	Good graphic organizers & visuals
PLM	Probeware Lab Manual	Very limited applications
LS	Lab Simulations	Not labs. Animated graphics
VL	Virtual Labs	Boring
CST	California Standards Tests	Good Luck!

Biodetective Videos looks promising. Storylines grab attention.

Interactive Text has good "chunking" of text and links. Appropriate for RSP or AD. Enlargeable graphics good for Visually Impaired and can be used with Audio CD.

Resource Pro (Teacher Express minus Exam View) = most of the above on CD. Very Good.