5/2/2014

# El Monte Union High School District

## Course Outline

**High School** El Monte

Title: Animal Biology 1P

Transitional*_____(Eng. Dept. Only)

Sheltered (SDAIE)*X Bilingual*___

AP**_____Honors**_____

Department: Science

Grade Level (s): 9-10

Semester_____Year X

Year of State Framework Adoption 1998

Next Generation Science Standards 2013

This course meets graduation requirements:

( ) English
( ) Fine Arts
( ) Foreign Language
( ) Health & Safety
( ) Math
( ) Physical Education
( X ) Science
( ) Social Science
( ) Elective

| Department/Cluster Approval | Date |
|---|---|
| _____ | _____ |
| _____ | _____ |
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*Instructional materials appropriate for English Language Learners are required.

**For AP/Honors course attach a page describing how this course is above and beyond a regular course. Also, explain why this course is the equivalent of a college level class.

1. Prerequisite(s):
   Algebra 1 or Integrated Math 1

2. Short description of course which may also be used in the registration manual:
   This one-year animal biology course will provide students a strong foundation in the fundamentals of biology and will also emphasize classification with a focus on comparative anatomy/physiology between organisms within the Animal Kingdom. This course will cover the Biological/Life Science standards outlined in the California Science Content Standards as well as the Life Science Next Generation Standards. Labs will be emphasized to help develop critical thinking and problem solving skills. Students wishing to apply to a UC/CSU must achieve a minimum grade of "C" in this course to meet the "d" laboratory science requirement in the category of biological science. The pre-requisite for this class will be Algebra 1 or Integrated Math 1 or higher.

3. Describe how this course integrates the schools ESLRs (Expected School-wide Learning Results):

   Academic Skills: Students will seek, access, analyze and creatively use information to demonstrate effective communication, computation, critical thinking and technological skills by solving problems for assignments, labs and other assessments aligned to the California Content Standards, the Common Core Next Generation Standards, and the District Course Standards.

Interpersonal Skills: Students will be productive community members by learning to respect diversity, exercise rights, accept responsibility and work cooperatively with others while doing work for the class and while working cooperatively in labs.

Personal Skills: Students will make informed decisions, set goals, take actions and evaluate results while exhibiting honesty, integrity and personal accountability as they complete work for the course.

Career Skills: Students will explore a variety of career options and develop personal attributes and skills that lead to the pursuit of a post-secondary education and/or a productive work life as they complete work for the course, perform labs and do research on computers.

4. Describe the additional efforts/teaching techniques/methodology to be used to meet the needs of English Language Learners:

   a) SIOP (Sheltered Instruction Observation Protocol) strategies will be incorporated into lessons.
   b) SDAIE (Specially Designed Academic Instruction in English) strategies will be incorporated into lessons.
   c) ELL supplementary materials will be incorporated into the lessons.
   d) Glossaries will be used as available.
   e) Visuals/Manipulatives will be used.

5. Describe the interdepartmental articulation process for this course:

   When applicable, the science department is willing to work with other departments to coordinate student work on course projects. All students take a Computer Information Technology class for an introduction to computer applications. The individual departments then build computer skills through assigning various projects requiring Word Processing, Spreadsheet, PowerPoint, and Graphing. The Learning Center/Computer Labs provides class instruction on computer applications and research when needed. The students will be using English skills and Math/Computational skills as they complete work for the class, which will reinforce instruction in those departments and vice versa.

6. Describe how this course will integrate academic and vocational concepts, possibly through connecting activities. Describe how this course will address work-based learning/school to career concepts:

   Students will be exploring career pathways and employment requirements within the Biological Sciences, when opportunities arise in the curriculum, as the students proceed through lessons in the branches of the different biological sciences: cytology, evolution, genetics, ecology, microscopy, and zoology.

7. Materials of Instruction

   A. Textbook(s) and Core Reading(s):
   Title: Biology
   Publication Date: 2008
   Publisher: McDougal Littell, a division of Houghton Mifflin Company
   Author(s): Stephen Nowicki
   Usage: Read in entirety or near entirety

   B. Supplemental Materials and Resources: Supplementary material that came with the textbook, dictionaries for ELL.

C. Tools, Equipment, Technology, Manipulatives, Audio-Visual:

Visual presentations will be made using overhead transparencies, videos, models and/or presentations with a LCD projector. A variety of standard glassware, biological equipment and laboratory equipment including electronic scales, microscopes and chemicals, etc. will be used during the laboratories. Standard computer technologies including MS Office, web browsers and 3rd party software will be used as necessary.

8. Objectives of the Course

1) Students will learn laboratory skills and safety procedures as demonstrated by their use during practical laboratory activities and experiments.

2) Students will learn concepts in biochemistry, cell theory and processes, genetics, ecology, evolution, classification, and animal anatomy and physiology.

3) Students will collect, organize, and present data.

4) At the end of this course students will have a good understanding of the structure and processes within living organisms, the interactions, energy, and dynamics occurring within the environment, heredity and inheritance, and the unity and diversity occurring of living organisms.

9. Pacing Plan with California Science Standards and NGSS/CCSS

Fall Semester

NGSS: HS-LS1-1, HS-LS1-3, HS-LS1-6
CaSS: IE 1 a, b, c, d, f, k, n, Biology 1 b, h,
Scientific Method
Microscopy – safety and proper usage
Characteristics of Life
Chemistry of Life – atoms, molecules, bonds, macromolecules

NGSS: HS-LS1-1-7, HS-LS3-1, HS-LS3-2
CaSS: Biology 1a, c, d, e, f, g, 2 a, b, c, d, e, f, g, 3 a, b, 4 a, b, c, d, e, 5 a, b, c
Cell Structure, Function, and Processes – cell theory, organelles, cellular transport, cell cycle, photosynthesis, cellular respiration, fermentation, mitosis, and meiosis
Genetics: Mendelian through Genetic Expression – traits, genes, inheritance, DNA replication, transcription, translation, gene expression

NGSS: HS-LS2-1-8, HS-LS3-3, HS-LS4-1-6,
CaSS: Biology 6 a, b, c, d, e, f, 7 a, b, c, d, 8 a, b, c, d, e
Evolution: Natural Selection, Population Evolution, and Speciation
Ecology: Interactions, the Biosphere and Human Impact – ecosystems, biomes, resource cycling, interactions, threats to the environment

Spring Semester
NGSS: HS-LS4-1, HS-LS1-2
CaSS: Physiology 9 a
Classification: Linnaean and Cladistics
Domains and Kingdoms
Physiological Systems (Movement, respiration, sensitivity, growth, reproduction, excretion, nutrition)

NGSS: HS-LS1-2
CaSS: Biology 1 c, Physiology 9 a
Viruses and Prokaryotes
Protists and Fungi
Invertebrate Zoology (comparative anatomy and physiology) – (sponges, cnidarians, worms, mollusks, echinoderms, arthropods)

NGSS: HS-LS1-2
CaSS: Physiology 9 a
Vertebrate Zoology – (comparative anatomy and physiology) (fish, amphibians, reptiles, birds, mammals)
Animal Behavior

10. Laboratory Investigation and Experimentation

All students are expected to have an understanding of common laboratory safety procedures as demonstrated by their use during practical laboratory activities. Practical laboratory activities must consist of a minimum of 20% of the regular instructional time. (Ex. 2-3 days of a traditional schedule per 2-3 week period).

The following are some suggested labs, to be supplemented, by additional labs preferred by the instructor.

Unit: Investigative Skills

Manipulating Plant Growth – Students use inquiry skills to determine how the independent variable affects the dependent variable by using plants in various growing conditions.

Unit: Microscopy

Comparing Cells - Students will use a microscope to examine and compare cells from different organisms.

Unit: Characteristics of Life

Life Under a Microscope – Students will observe the diversity of life while examining samples from the surface of pond water.

Unit: Chemistry of Life

Testing pH – Students will use pH indicator paper to investigate the pH of several common household substances.

Unit: Cell Structure, Function, and Processes

Cellular Respiration – Students will compare respiration rates in dormant and germinated seeds to see that plant cells use cellular respiration to make ATP from the sugars that are produced during photosynthesis.

Mitosis in Onion Root Cells – Students will examine cells from onion root tissues under the microscope and identify the different stages of cell division

Unit: Genetics

Modeling Meiosis – Students will create and demonstrate meiosis of homologous chromosomes.

Pedigree Analysis – Students will create a pedigree for their family using a known trait and infer the genotype from the pedigree and predict the genotype of future offspring.

Allele Combinations and Punnett Squares – Students will calculate and analyze the probability of the inheritance of traits of a dihybrid cross using a Punnett square.

Design a Baby – Students will use Punnett squares to determine the probabilities of an offspring's inheritance of various traits with known and unknown genetic make up of the parents.

Unit: Evolution

Adaptation in Beaks – Students will model feeding behavior of various beaks (tools) to determine the efficiency of the "beak" to different food sources and relate this to natural selection, adaptation, and survival.

Investigating an Anole Lizard Population – Students will model the succession of genotypes and phenotypes through 4 generations and analyze the allele frequency through time.

Unit: Ecology

Random Sampling – Students will evaluate the parameters of random sampling and evaluate how to reduce error in field research.

Heating and Cooling Rates of Water and Soil – Students will compare the heating and cooling rates of water and soil and relate their findings to different biomes.

Survivorship Curves – Students will analyze the obituary section of a newspaper to create a survivorship curve.

Acid Rain – Students will determine the effects of acid rain on plant growth using different levels of acidity.

Unit: Classification

Creating a Dichotomous Key for Limpet Shells – Students will construct a dichotomous key based on external characteristics.

Unit: Domains and Kingdoms

Exploring Mushroom Anatomy – Students will identify the main parts of a mushroom and will make a spore print to determine the color of its spores.

Identifying Mold Growth – Students will grow mold on the surface of a slice of bread and gather quantitative and qualitative data to study the growth and structure of the mold.

Unit: Viruses and Prokaryotes

Examining Bacteria in Yogurt – Students will observe types of bacteria and bacteria in yogurt.

Modeling Viruses – Students will create a model to help them understand how a virus attacks a healthy cell.

Unit: Physiological Systems

Observing Physiological Systems – Students will investigate, research, and observe movement, respiration, sensitivity, excretion, and nutrition for 2 different animals.

Unit: Invertebrate Zoology

Comparing Arthropods – Students will collect, examine, and compare the structures of different arthropods.

Daphnia and Heart Rate – Students will observe the effects of various chemicals on the heart rate of Daphnia and infer the effects on the freshwater ecosystems.

Anatomy of an Annelid – Students will observe the worm's anatomy, behavior, and observe and measure blood flow.

Unit: Vertebrate Zoology

Anatomy of a Bony Fish – Students will dissect and explore the anatomy of a bony fish.

A Bird's Airframe – Students will investigate the similarities and differences between flying and flightless birds and compare them with mammals.

The Parts of An Egg – Students will dissect and identify the parts of an egg.

Human Behavior – Students will observe some aspect of human behavior and form a hypothesis that explains the behavior.

Pill Bug Behavior – Students will design an experiment to determine how manipulating a variable changes the behavior of pill bugs.

11. Student Performance Standards for Animal Biology 1P

Fall Semester
FIRST GRADING PERIOD
NGSS: HS-LS1-1, HS-LS1-3, HS-LS1-6
CaSS: IE 1 a, b, c, d, f, k, n, Biology 1 b, h,
Investigative Skills (The students will be able to …)
a) select and use appropriate tools and technology to perform experiments, collect data, analyze relationships, and display data.
b) identify and communicate experimental error and explain reasons for inconsistent results.
c) formulate explanations using logic and evidence.
d) analyze hypotheses, determine biological theories, and assess inaccuracies in observations.
e) investigate biological societal issues by researching the literature, analyzing data, and communicate findings.

Microscopy (The students will be able to …)
a) use a compound microscope effectively.
b) recognize the usefulness and limitations of biological imaging technology.

Characteristics of life (The students will be able to …)
a) explain that all organisms share certain characteristics.
b) discuss how all levels of life have systems of related parts.
c) recognize that all organisms must maintain homeostasis to survive in diverse environments.
d) conclude that evolution explains the unity and diversity of life.

Chemistry of Life (The students will be able to …)
a) demonstrate that all living things are based on atoms and their interactions.
b) identify water's unique properties that allow for life to exist on Earth.
c) explain that carbon-based molecules are the foundation of life.
d) relate that life depends on chemical reactions.
e) understand how enzymes are catalysts for chemical reactions and important to all living things.

SECOND GRADING PERIOD
NGSS: HS-LS1-1-7, HS-LS3-1, HS-LS3-2
CaSS: Biology 1a, c, d, e, f, g, 2 a, b, c, d, e, f, g, 3 a, b, 4 a, b, c, d, e, 5 a, b, c
Cell Structure, Function, and Processes (The students will be able to …)
a) conclude that cells are the basic unit of life.
b) discuss how eukaryotic cells share similarities and contrast those to prokaryotic cells.
c) identify the importance of the cell membrane and compare the processes of how materials enter and exit the cell.

d) describe why cells need chemical energy.
e) explain photosynthesis, cellular respiration, and fermentation.
f) sequence and explain the phases in a cell's life cycle (growth, reproduction, and normal functions).
g) illustrate mitosis and cytokinesis.
h) contrast mitosis with meiosis.

Genetics (The students will be able to …)
a) explain Mendel's research and how traits are inherited.
b) discuss how genes encode proteins that produce a diverse range of traits.
c) compare independent assortment and crossing over results in genetic diversity.
d) relate that genes on chromosomes have specific locations and can affect the expression of traits.
e) analyze genetics using pedigrees, karyotypes, and Punnett squares.
f) explain DNA replication, transcription, translation, and gene expression.
g) compare the different types of mutations that may or may not affect phenotype.

THIRD GRADING PERIOD
NGSS: HS-LS2-1-8, HS-LS3-3, HS-LS4-1-6,
CaSS: Biology 6 a, b, c, d, e, f, 7 a, b, c, d, 8 a, b, c, d, e

Evolution (The students will be able to …)
a) sequence the theories of evolution through and including Charles Darwin.
b) explain natural selection and how this process leads to evolution.
c) defend evolution using different types of evidence.
d) summarize using genetic variation and natural selection how populations evolve.
e) identify the patterns in evolution and speciation.

Ecology (The students will be able to …)
a) analyze an ecosystem including biotic and abiotic factors
b) explain the source and energy flow within an ecosystem including food chains, food webs, and energy pyramids.
c) demonstrate how matter cycles in and out of an ecosystem.
d) differentiate the relationships of an organism as an individual with others, member of a population, and as a population to its ecosystem.
e) show the succession after a disturbance in an ecosystem.
f) explain the biomes on Earth and their location.
g) investigate human impact on the Earth's resources and current issues facing our ecosystems.

Spring Semester
FIRST GRADING PERIOD
NGSS: HS-LS4-1, HS-LS1-2
CaSS: Physiology 9 a
Classification (The students will be able to …)
a) explain the Linnaean system of classification.
b) differentiate the Linnaean system from modern classification using cladistics, molecular evidence, and molecular clocks.

Domains and Kingdoms (The students will be able to …)
a) explain Woese's domain system in the tree of life.
b) differentiate between the five kingdoms and relate the organisms represented in each.

Viruses and Prokaryotes (The students will be able to …)
a) relate the structure and reproduction of viruses.
b) research that many diseases are caused by viruses and some can be prevented by vaccines.
c) explain the differences between archaea (bacteria) and bacteria.
d) describe the beneficial roles of prokaryotes for organisms and the environment.
e) identify bacterial diseases and the role of antibiotics in fighting disease.
f) recognize that Kingdom Protista is the most diverse of all of the kingdoms.
g) illustrate the alternation of generation for some organisms.
h) explain fungi's characteristics, reproduction, and role in the environment.

SECOND GRADING PERIOD
NGSS: HS-LS1-2
CaSS: Biology 1 c, Physiology 9 a
Physiological Systems (The students will be able to …)
a) recognize important physiological systems in organisms; these include: movement, respiration, sensitivity, growth, reproduction, excretion, and nutrition.
b) relate these physiological systems to humans to use as a basis for comparative anatomy/physiology for all organisms.
c) group invertebrates by phylum to include sponges, cnidarians, worms, mollusks, annelids, echinoderms, and arthropods.

THIRD GRADING PERIOD
NGSS: HS-LS1-2
CaSS: Physiology 9 a
Vertebrate Zoology (The students will be able to …)
a) distinguish common characteristics between vertebrates.
b) recognize the diversity within vertebrates.
c) classify vertebrates by subphylum to include fish, amphibians, reptiles, birds, and mammals.
d) observe animal behavior as an adaptive survival mechanism.
e) explain the evolution of behavior, social behavior, and animal cognition

12. Evaluation/ Assessment/ Rubrics including Attainment for Students to Pass Animal Biology 1P

**"A"-level work (90-100%):** (Excellence overall; no major weaknesses). This student demonstrates real achievement in grasping scientific thinking, along with development of specific biological science thinking skills and abilities. This student's work is clear, precise, and well reasoned.

**"B"-level work (80-89%):** (Moderate level of understanding and skill in scientific thinking with some distinctive weaknesses, showing more strengths than weaknesses). This student demonstrates a good level of achieving scientific thinking with occasional areas of weakness. This student's work is essentially clear and precise with occasional lapses into weak reasoning.

**"C"-level work (70-79%):** (More than a minimum level of understanding and skill in scientific thinking, but highly inconsistent with as many weaknesses as strengths.) This student demonstrates a mediocre level of achieving scientific thought with pronounced areas of weakness. This student's work is inconsistent, showing only modest skills and reasoning.

**"D"-level work (60-69%):** (Minimal level of understanding and skill in scientific thinking). This student demonstrates a lack of clarity and discipline. This student's work does not show good scientific reasoning and skills, only rarely showing any attempt to take charge of ideas.

**"F"=level work (<59%):** (Far below minimal level of understanding and skill in scientific thinking). This student does not display any discernible scientific reasoning. This student failed to do the required work of the course.

Assessment is an ongoing process that is used to check for understanding at the beginning, during and at the end of a unit. Some possible methods of assessment include:

1. Daily written (for vocabulary and concept understanding) and/or calculations for experiments/activities.

2. Student presentations using multimedia tools/ daily class participation/ cooperative group work.

3. Laboratory hands-on activities or lab reports for experiments for every unit that will include Title, Purpose, Materials, Procedures, Observation/Data, and Conclusion. There will be a clear statement of the problem, data representation and analysis, graphs and thoughtful discussions as it relates to the topic and current situations.

4. Weekly quizzes on material will be given.

5. Unit tests on material will be given.