EL DORADO UNION HIGH SCHOOL DISTRICT
EDUCATIONAL SERVICES

Course of Study Information Page

COURSE TITLE **Biology**	
DISTRICT COURSE NUMBER **#0311**	4-DIGIT STATE COURSE CODE (COMPLETED BY SILT) **2603**
Rationale:	Biology is a lab course in life science required for graduation in the El Dorado Union High School District. The Biology Course fullfills graduation requirements and (A-G).
Course Description that will be in the Course Directory:	Biology is the study of living systems. Those concepts fundamental to the understanding of all life include: biological molecules, energy transfer through photosynthesis, cell respiration, and fermentaion, cell structure and function, classification, DNA structure and function, protein synthesis, genetics, evolution, and ecology.
How Does this Course align with or meet State and District content standards?	This course meets district and state standards in the area of life science.
NCLB Core Subjects:	*Select up to two that apply:* ☐ Arts ☐ Civics and Government ☐ Not Core Subject ☐ Economics ☐ History ☐ English ☐ Mathematics ☐ Foreign Language ☐ Reading / Language Arts ☐ Geography ☒ Science
CDE CALPADS Course Descriptors: (See Page 2 for Definitions)	CTE TECH PREP COURSE INDICATORS ☐ Tech Prep (32) (Higher Ed) ☐ Tech Prep & ROP(33) (Higher Ed) ☐ ROP (30) ☒ N/A CTE COURSE CONTENT CODE ☐ CTE Introductory (01) ☐ CTE Concentrator (02) ☐ CTE Completer (03) ☐ Voc Subject ____ ☒ N/A INSTRUCTIONAL LEVEL CODE ☐ Remedial (35) ☐ Honors UC-Certified (39) ☐ Honors Non UC-Certified (34) ☐ College (40) ☒ N/A
Length of Course:	☒ Year ☐ Semester
Grade Level(s):	☒ 9 ☒ 10 ☒ 11 ☒ 12
Credit:	☒ Number of credits: **10** ☒ Meets graduation requirements (subject **Biological Science**) ☒ Request for UC "a–g" requirements CSU/UC requirement **"d"** ☒ College Prep
Prerequisites:	Successful completion of Physical and Earth Science 9th grade course and/or completion of Algebra I.
Department(s):	Science
District Sites:	All
Board of Trustees COS Adoption Date:	June 9, 2015
Textbooks / Instructional Materials:	Holt McDougal Biology, Stephen Nowicki, PH.D., Holt McDougal, 2012, 978-0-547-58666-3

Funding Source:	General Fund
Board of Trustees Textbook Adoption Date:	June 9, 2015

Definitions

CALPADS	California Longitudinal Pupil Achievement Data System
CTE Technical Prep	A course within a CTE technical career pathway or program that has been articulated with a postsecondary education or through an apprenticeship program of at least 2 years following secondary instruction.
Instructional Level Code	Represents a nonstandard instructional level at which the content of a specific course is either above or below a 'standard' course instructional level. These levels may be identified by the actual level of instruction or identified by equating the course content and level of instruction with a state or nationally recognized advanced course of study, such as IB or AP.
Instructional Level Honors, UC Certified	Includes all AP courses.
Instructional Level Honors, non UC Certified	Requires Board approval.
Instructional Level College	Includes ACE courses. Equivalent to college course and content, but not an AP course. Not related to section, but to course.

EL DORADO UNION HIGH SCHOOL DISTRICT

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Course Title: Biology (#0311)

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Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **I. Introdution to Biology**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS1 From Molecules to Organisms: Structures and Processes

Science and Engineering Practices Developing and Using Models

 Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly. (HS-LS1-3)

 Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-1)

 Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS1-6)

Disciplinary Core Idea(DCI) (LS1.C:) Organization for Matter and Energy Flow in Organisms
LS1.C: Organization for Matter and Energy Flow in Organisms:
As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. (HS-LS1-6),(HS-LS1-7)

Cross Cutting Concepts(CCC) Energy and Matter
 Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. (HS-LS1-5), (HS-LS1-6)
 Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems. (HS-LS1-7)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

1.A Law of Thermodynamics: The students will compare and contrast living and nonliving things with respect to the organization of matter and the use of energy.(HS-LS1-1) (HS-LS1-6), (HS-LS1-7)

1.B Characteristics of Life: The students will summarize the characteristics that define life.(HS-LS1-1)

1.C Levels of organization: The students will summarize the organizational structure of the biosphere and living systems.(HS-LS1-1)(HS-LS1-6),(HS-LS1-7)

1.D Scientific Method: The students will identify the different elements of scientific inquiry. In addition, they will differentiate between theoris and hypotheses.(HS-LS1-3) & (HS-LS1-6)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities

HS-LS1-1 & HS-LS1-5 & HS-LS1-6 & HS-LS1-7

Activity 1: The Law of Thermodynamics Enery Flow Puzzle: Organize an energy flow puzzle which illustrates the Law of Thermodynamics and illustrates entropy.(1.A)

HS-LS1-1: Activity 2:"Being Alive" The 6 Characteristics of Life Poster.
Create a personailized poster featuring a Homo Sapien demonstrating the characteristics that define life.(1.B)

HS-LS-1: Activity 3: Where Does All Life Exist?
Create a multimedia presentation which describes the interconnectedness between all principle parts of the biosphere. In addition, examples will be provided to demonstrate the connection amongst abiotic and biotic factors of the biosphere.(1.C)

HS-LS1-3 & HS-LS1-6) Activity 4: Unknown Sample Lab Investigation "Living or Nonliving"
By using the characteristics of life as a guide, determine whether an unknown sample is living or non-living. Design an experiment to determine whether an unknown sample is living or nonliving.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

***Refer to the Instructional Strategies listed above

***Multimedia Instructor presentations and guided lecture and discussion
***Websearches and scavenger hunts
***Clicker Review and Game Show Review
***Formal Lab Written Report emphasizing the process of the scientific method and demonstrating competency in scientific writing.
***Quizzes
***Tests

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

After -school Tutoring, Homework Club, Study Group, Online Resources such as teacher notes & worksheets posted online, Khan Academy and Crash Course.

EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **II. Homeostasis**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS1 From Molecules to Organisms: Structures and Processes

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Science and Engineering Practices
 Use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-4),(HS-LS1-5),(HS-LS1-7)

Disciplinary Core Idea(DCI)LS1.A: Structure and Function
 Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

Crosscutting Concepts (CCC) Stability and Change
 Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

2.A Levels of Organization: The students will describe cell specialization and levels of organization with the goal of identifying how the levels of organization work together in an organism.(HS-LS-2)

2,B Mechanisms of Homeostasis:
The students will.relate homeostasis to the internal environment of the body. (HS-LS-3) (HS-LS-4) (HS-LS-5) (HS-LS-7)

2.C Interactions Among Systems
The students will explain how negative and positive feedback mechanisms maintain homeostasis.(HS-LS-3)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities:

HS-LS-2: Activity 1: Human Organ Systems "What's Inside You?" The students will explore the 11 major body and diagram a concept map which illustrates the interconnectedness amongst the principle systems. HMDScience.com

HS-LS-3 & HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 2: Laboratory 1.3 Exercise Homeostasis and Negative Feedback. Using class heart rate as a model, the students will diagram the principle parts of the operational pieces of negative and positive feedback mechanisms.

HS-LS-3 & HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 3: QuickLab Negative Feedback Loop. The students will explain how the negative feedback control of effectors helps to maintain homeostasis. HMDScience.com

HS-LS-3 & HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 4: Hormones and Homeostasis. The students will explain and define specific hormones which act as chemical messagers and maintain homeostasis through negative feedback mechanisms. HMDScience.com

HS-LS-3 & HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 5: Negative and Positive Feedback The students will compare and contrast negative and positive feedback mechanisms. In addition, the students will discuss the goal of each mechanism and provide examples of each mechanism operating in the human body.

HS-LS-3 Activity 6: Virtual Investigation Plant Responses The students will test for plant responses to different stimuli. HMDScience.com

HS-LS-3 Activity 7: Virtual Lab Exploring Plant Responses The students will explore how plants can react to light, gravity and touch. HMDScience.com

HS-LS-3 Activity 8: Animated Biology Seed Dispersal The students will learn how different types of plants use many methods to get their seeds from one place to another.

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

***Multimedia Instructor presentations and guided lecture and discussion
***Websearches and scavenger hunts
***Clicker Review and Game Show Review
***Formal Lab Written Report emphasizing the process of the scientific method and demonstrating competency in scientific writing.
***Quizzes
***Tests

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

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EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **III. Ecology**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS2 Ecosystems: Interactions, Energy, and Dynamics

HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. [Clarification Statement: Emphasis is on quantitative analysis and comparison of the relationships among interdependent factors including boundaries, resources, climate, and competition. Examples of mathematical comparisons could include graphs, charts, histograms, and population changes gathered from simulations or historical data sets.]

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. [Clarification Statement: Examples of mathematical representations include finding the average, determining trends, and using graphical comparisons of multiple sets of data.] [Assessment Boundary: Assessment is limited to provided data.]

HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. [Clarification Statement: Emphasis is on using a mathematical model of stored energy in biomass to describe the transfer of energy from one trophic level to another and that matter and energy are conserved as matter cycles and energy flows through ecosystems. Emphasis is on atoms and molecules such as carbon, oxygen, hydrogen and nitrogen being conserved as they move through an ecosystem.] [Assessment Boundary: Assessment is limited to proportional reasoning to describe the cycling of matter and flow of energy.]

HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem. [Clarification Statement: Examples of changes in ecosystem conditions could include modest biological or physical changes, such as moderate hunting or a seasonal flood; and, extreme changes, such as volcanic eruption or sea level rise.]

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.* [Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]

Science and Engineering Practices Developing and Using Models

- Develop a model based on evidence to illustrate the relationships between systems or components of a system. (HS-LS2-5)

Disciplinary Core Ideas(DCI)

LS2.A: Interdependent Relationships in Ecosystems

- Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1),(HS-LS2-2)

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

 Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS-LS2-4)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

 A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. (HS-LS2-2),(HS-LS2-6)

LS4.D: Biodiversity and Humans

 Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7)

Cross Cutting Concepts(CCC) Stability and Change

 Much of science deals with constructing explanations of how things change and how they remain stable. (HS-LS2-6),(HS-LS2-7)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

3.A Linnean System of Classification:	The students will examine the scientific naming system developed by Linnaeus and identity the limitations of the system.(HS-LS-5)
3.B Biomes and their Characteristics;	The students will illustrate the predominant features of Earths six major biomes.(HS-LS-5)
3.C Biomes and Ecological Factors:	The students will investigate and consider the cause and effect relationship between ecological factors and the everchanging biome.(HS-LS-1) (HS-LS-2) (HS-LS-4) (HS-LS-6)
3.D Energy in Ecosystems;	The students will describe the roles of producers and consumers in ecosystems. In addition, the comparative and contrasting features of photosynthesis and chemosynthesis will be investigated. (HS-LS-1) (HS-LS-2) (HS-LS-4) (HS-LS-6)
3.E Food Chains and Food Webs:	The students will describe the structure of a food chain and explain how food chains and trophic levels are related. (HS-LS-1) (HS-LS-2) (HS-LS-4) (HS-LS-6)
3.F Cycling of Matter:	The students will summarize earth's hydrologic and biogeochemical cycles and relate the cycle of matter to ecosystems. (HS-LS-1) (HS-LS-2) (HS-LS-4) (HS-LS-6)
3.G Habitat Niche and Community Interaction	The students will differentiate between habitat and niche and describe how organisms interact as individuals and as populations. (HS-LS-1) (HS-LS-2) (HS-LS-4) (HS-LS-6)
3.H Threats to Biodiversity	The students will describe the consequences of loss of biodiversity and explain how loss of habitat and introduced species affect ecosystems and biodiversity.(HS-LS-1) (HS-LS-2) (HS-LS-4) (HS-LS-6) (HS-LS-7)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities:

HS-LS-5

Activity 1: Creating a dichotomous key for Limpet Shells. The students will practice scientific naming developed by Linnaeus by constructing a dichotomous key to scientifically name Limpet Shells.(3.A)

HS-LS-5 Activity 2: Biomes Research and Presentation Project The students will create a multimedia presentation which describes 1 of the 12 of earth's biomes and discuss the cause and effect of biotic and abiotic factors acting on that biome. In addition, students will provide evidence of natural selection and show proof of how organisms have adapted to these various biome regions.(3.B)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 3: Effects of Fire on Biomes. The students will investigate three different North American biomes and the changes that fire might cause in each.(3.C)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 4: Biomes Distribution of Life. The students will investigate what factors determine the kinds of organisms that live in different places in our biosphere.(3.C)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 5: Salt Tolerance and Germination Rate: The students will evaluate the relevance of salinity as an abiotic limiting factor and its effect on germination rate.(3.C)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 6: Carrying Capacity Simulation: The students will calculate the carrying capacity of a mock ecosystem.(3.D)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 7: What are some parts of a Food Chain and a Food Web? The students will determine what different animals eat in several food chains and build a food web that could exist in a forest ecosystem. (3.D) & (3.E)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 8: What's for Lunch? The students will examine how individual food chains become interconnected.(3.D) & (3.E)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 9: Oh, What a Tangled Web. The students will explore what organisms live in a specific environment and what role they play there.(3.D) & (3.E)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 10: Ecocolumn. The students will construct an ecocolumn which illustrates how elements essential for life cycle through ecosystems.(3.F)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 11: An Infinite Loop. The students will follow the flow of energy and diagram the essential elements which make up hydrologic and biogeochemical cycles.(3.F)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 12: Interdependence of Producers and Consumers: The students will analyze the interconnectedness between consumers and producers by measuring CO2 and O2 concentrations in an enclosed ecosystem.(3.F)Vernier Probeware.

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 13: Nature at Work. The students will investigate how natural selection can lead to changes in species over time.(3.G)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 14: Be Fruitful and Multiply. The students will explore human population dynamics, what a growth curve looks like and the factors that influence human population growth.(3.G)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6

Activity 15: Population Pressures. The students will examine predator prey relationships and a variety of other environmental factors that hinder unlimited population growth.(3.G)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6 HS-LS-7

Activity 16: The Lesson of the Kaibab. The students will examine how human interference with the natural interactions occurring in an ecosystem can have a positive or negative effect. In conclusion, the students will propose a management plan for the Kaibab deer population.(3.H)

HS-LS-1 HS-LS-2 HS-LS-4 HS-LS-6 HS-LS-7

Activity 17: Biodiversity and Ecosystems: The students will examine how biodiversity effects an environments temperature and determine how animal diversity changes in different ecosystems.(3.H) Vernier Probeware

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

***Multimedia Instructor presentations and guided lecture and discussion
***Websearches and scavenger hunts
***Clicker Review and Game Show Review
***Formal Lab Written Report emphasizing the process of the scientific method and demonstrating competency in scientific writing.
***Quizzes
***Tests

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

After -school Tutoring, Homework Club, Study Group, Online Resources such as teacher notes & worksheets posted online, Khan Academy and Crash Course.

EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **IV. Chemistry of Life**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS1 From Molecules to Organisms: Structures and Processes

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

Disciplinary Core Ideas(DCI) LS1.C: Organization for Matter and Energy Flow in Organisms

- The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. (HS-LS1-6)

- As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. (HS-LS1-6),(HS-LS1-7)

Crosscutting Concepts(CCC) Structure and Function

- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem. (HS-LS1-1)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

4.A. Atoms, Ions and Molecules: The students will identify the elements common to all living things and recogninze the significance of different bonding structures.(HS-LS-6)

4.B. Carbon Based Molecules: The students will understand that carbon based molecules are the basis for life, describe the bonding structure of carbon atoms, and compare carbohydrates, lipids, proteins and nucleic acids.(HS-LS-6)

4.C.Enzymes Act as Catalysts: The students will understand that enzymes are catalysts for chemical reactions in living things, explain the effect of a catalyst on activation energy and describe how enzymes regulate chemical reactions.(HS-LS-6) (HS-LS-7)

4.D Digestion The students will identify some of the components of food which are required to sustain life and summarize the difference between mechanical digestion and chemical digestion. (HS-LS-6) (HS-LS-7)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities:

HS-LS-6:

Activity 1: All Living Things are Based on Atoms. Draw a concept map which diagrams the relationship between atoms, elements, compounds, ions, ionic bonds, covalent bonds, and molecules.(4.A)

HS-LS-6: Activity 2: Building Models of Biological Molecules. Construct a series of models which represent the four main types of carbon-based molecules and the unique bonding structure of carbon atoms.(4.B)

HS-LS-6: Activity 3: Chemical Bonding Lab. Construct a series of models which represent the four main types of carbon-based molecules and the unique bonding structure of carbon, hydrogen, oxygen and nitrogen atoms.(4.B)

HS-LS-6: Activity 4: Laboratory: Investigating the Unique Properties of Water: Recognize the significance of hydrogen bonding and covalent bonding as it relates to the properties of water.(4.B)

HS-LS-6 Activity 5: LAB-AIDS 505: Chemistry of Carbohydrates, Proteins and Fats. Demonstrate the process of hydrolysis and dehydration synthesis by building models of carbohydrates, proteins and lipids.

HS-LS-6 Activity 6: Laboratory: Macromolecules: Testing for Organic Compounds. Test foods for the presence of carbohydrates, proteins and lipids to determine which of the major organic compounds are present in particular foods.(4.B)

HS-LS-6 Activity 7: Laboratory: "What Am I Eating Anyway.?" Using chemical indicators, identify the essential nutrients present in food.(4.B)

HS-LS-6 Activity 8: Energy in Food. Determine and compare the caloric content of different foods. Vernier Probeware(4.B)

HS-LS-6 & HS-LS-7:

Activity 8: Toothpick case: The students will model the factors effecting enzymatic rate.(4.C)

HS-LS-6 & HS-LS-7:

Activity 9: Laboratory: Investigating the Factors that affect Enzyme Function. Explore how temperature effects the rate of enzyme activity.(4.C)

HS-LS-6 & HS-LS-7:

Activity 10: Laboratory: Catalase Enzyme Lab. Investigate How Changes in pH and temperature affect the activity of an enzyme. Vernier Probeware(4.C)

HS-LS-6 & HS-LS-7

Activity 11: Getting into Shape. Demonstrate the first step in protein structure, the binding of protein to another molecule.(4.C)

HS-LS-6 & HS-LS-7

Activity 12: Laboratory: Turning Corn into Milk. Investigate how a dairy cow can change the biological molecules in corn into milk.(4.D)

HS-LS-6 & HS-LS-7

Activity 13: Respiration of Sugars by Yeast: Analyze the efficiency by which yeast metabolizes sugars. (4.D)Vernier Probeware

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

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EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **V. Cell Structure, Function, Growth and Division**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS1 From Molecules to Organisms: Structures and Processes
Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

Science and Engineering Practices Developing and Using Models
 Use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-4),(HS-LS1-5),(HS-LS1-7)

Disciplinary Core Idea(DCI) LS1.A: Structure and Function
 Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

 Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

Disciplinary Core Idea(DCI) LS1.B: Growth and Development of Organisms
 In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

5.A Cell Theory:	The students will describe developments that led to the cell theory and differentiate between eukaryotic and prokaryotic cells.(HS-LS-2)(HS-LS-4) (HS-LS-5)(HS-LS-7)
5.B Cell Organelles	The students will describe the internal structure of eukaryotic cells and and summarize the functions of organelles in plant and animal cells. (HS-LS-2) (HS-LS-4)(HS-LS-5)(HS-LS-7)
5.C Cell Membrane	The students will describe the structure of the cell membrane and summarize how chemical signals are transmitted across the cell membrane. (HS-LS-2) (HS-LS-4)(HS-LS-5)(HS-LS-7)
5.D Cell Transport	The students will describe passive transport and distinguish.between osmosis, diffusion, and facilitated transport and it pertains to the fluid mosaic model. (HS-LS-2)(HS-LS-4)(HS-LS-5)(HS-LS-7)
5.E The Cell Cycle	The students will describe the cell cycle and compare the rates of division in different cell types. In addition, the students will explain cancer in terms of the cell cycle. (HS-LS-4)(HS-LS-5)(HS-LS-7)

5.F Mitosis	The students will describe the structure of a chromosome and follow chromosomes through the processes of mitosis and cytokinesis. In addition, the students will identify factors that limit cell size. (HS-LS-2)(HS-LS-4) (HS-LS-5)(HS-LS-7)
5.G.Asexual Reproduction	The students will differentiate between binary fission and mitosis and explain how some eukaryotes reproduce through mitosis.(HS-LS-2)(HS-LS-4)(HS-LS-5) (HS-LS-7)
5.H Single and Multicellular Life	The students will describe specialization in multicellular organisms and identify different types of stem cells. (HS-LS-2)(HS-LS-4)(HS-LS-5)(HS-LS-7)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities

HS-LS-2 & HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 1: The Microscopic World: Using a microscope, compare, contrast and illustrate Prokaryote vs. Eukaryote, Autotrophic vs. Heterotrophic, and Unicellular vs. Multicellular.(5.A) & (5.G)

HS-LS-2 & HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 2: P.O.E.T.S. Potato Onion Elodea Tomato Squamous Microscope Lab: Identify the cellular organelles that can be observed using a compound microscope.(5.A) & (5.G)

HS-LS-2 & HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 3: Variation in Cell Structure Microscope Lab; Examine several kinds of cells and observe their similarities and differences.(5.A) & (5.G)

HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 4: Cellular Organelles Puzzle: Identify the names, structure and function of all major cellular organelles. In addition, create an analogy that defines the function of each organelle.(5.B)

HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 5: Cell Analogy Poster Project: Create a poster which illustrates how the cell's functions needed for survival are similar to those needed by any large organization.(5.B)

HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 6: Selective Permeability: Using dialysis tubing to model the properties of the cell membrane, cellular transport and the structure of the cellular membrane will be investigated.(5.C)

HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 7: Diffusion through Membranes: Study the effects of concentration gradients on the rate of diffusion.(5.C) Vernier Probeware

HS-LS-2 & HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 8: Starch and Iodine-Osmosis in Action: Using dialysis tubing to mimic the structure of the cell membrane, investigate the transport of starch and iodine across the selectively permeable membrane. (5.D)

HS-LS-2 & HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 9: What is the Solute Concentration in a Plant Cell? Investigate the process of osmosis with respect to hypertonic, hypotonic and isotonic solutions.(5.D)

HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 10: Onion Root Tip Mitosis: Using a microscope, identify and illustrate the phases of mitosis.(5.E)

HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 11: How Does Cell Size Determine Diffusion Rate? Investigate and observe how surface area to volume ratios effect cell size.(5.F)

HS-LS-4 & HS-LS-5 & HS-LS-7
Activity 12: Limitations on Cell Size: Analyze how surface area to volume ratios affect the rate of diffusion.(5.F)Vernier Probeware

HS-LS-7 Activity 13: Virtual Lab Investigating Bacterial Growth: Examine and describe the process of asexual reproduction in bacteria.(5.G)

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

***Multimedia Instructor presentations and guided lecture and discussion
***Websearches and scavenger hunts
***Clicker Review and Game Show Review
***Formal Lab Written Report emphasizing the process of the scientific method and demonstrating competency in scientific writing.
***Quizzes
***Tests

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

After -school Tutoring, Homework Club, Study Group, Online Resources such as teacher notes & worksheets posted online, Khan Academy and Crash Course.

EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **VI. Cells and Energy**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS1 From Molecules to Organisms: Structures and Processes

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. [Clarification Statement: Emphasis is on illustrating inputs and outputs of matter and the transfer and transformation of energy in photosynthesis by plants and other photosynthesizing organisms.

HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

Science and Engineering Practices

 Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

Disciplinary Core Ideas(DCI)(LS1.C:) Organization for Matter and Energy Flow in Organisms
 The process of photosynthesis converts light energy to stored chemical energy by converting carbon dioxide plus water into sugars plus released oxygen. (HS-LS1-5)

 As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products. (HS-LS1-6),(HS-LS1-7)

 As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another and release energy to the surrounding environment and to maintain body temperature. Cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. (HS-LS1-7)

Crosscutting Concepts(CCC) Energy and Matter
 Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system. (HS-LS1-5), (HS-LS1-6)

 Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems. (HS-LS1-7)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

6.A Chemical Energy and ATP:	The students will recognize the importance of ATP as an energy carrying molecule and identify energy sources used by organisms.(HS-LS-2) (HS-LS-5)(HS-LS-6)(HS-LS-7)
6.B Overview of Photosynthesis:	The students will examine the significance of producers and describe the process of photosynthesis.(HS-LS-2)(HS-LS-5)(HS-LS-6)(HS-LS-7)
6.C Overview of Cellular Respiration:	The students will describe, compare and contrast the process of cellular respiration to the process of photosynthesis.(HS-LS-2)(HS-LS-5)

(HS-LS-6)(HS-LS-7)

6.D Overview of Fermentation: The students will describe the process of fermentation and summarize the importance of this cycle.(HS-LS-2)(HS-LS-5)(HS-LS-6)(HS-LS-7)

6.E Leaf Adaptation and Photosynthesis: The students will describe the structures that are common to most leaves and identify adaptations that allow plant to photosynthesize.(HS-LS-2)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities:

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 1: ATP Energy Currency Concept Map: Construct a concept map which illustrates how the chemical energy required to sustain life is carried by the ATP molecule.(6.A)

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 2: Chromatography of Plant Pigments: Analyze the different types of pigments contained in leaves.(6.B)

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 3: Two Factors Affecting Photosynthesis: Examine how light and temperature affect the rate of photosynthesis.(6.B)

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 4: The Absorption of Chlorophyll: Examine the percentage of light energy reflected for the absorption spectrum for chlorophyll.(6.B)

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 5: Do You Understand Photosynthesis? Investigate the reactants required for the process of photosynthesis.(6.B)

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 6: Photosynthesis and Respiration. Determine the rate of respiration and photosynthesis in plants.(6.B) Vernier Probeware

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 7: How Does Exercise Effect the Process of Cellular Respiration? Investigate how exercise effects the rate of cellular respiration.(6.C)

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 8: What Goes In, Must Come Out? A Gas Exchange Experiment. Compare and contrast the process of photosynthesis and cell respiration by observing evidence of carbon dioxide release.(6.C)

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 9: The Matter of Life Yeast Population: investigate how pH levels can affect a population of yeast.(6.D)

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 10: Yeast Fermentation Lab: Analyze and demonstrate anaerobic metabolism in yeast.(6.D)

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 11: Microbial Fermentation and Rootbeer: Investigate how the process of fermentation is used to make rootbeer.(6.D)

HS-LS-2 & HS-LS-5 & HS-LS-6 & HS-LS-7
Activity 12: Sugar Fermentation in Yeast: Comparing and contrasting the rate of fermentation using monosacharides,disaccharides and polysacharrides.(6.D) Vernier Probeware

HS-LS-2 Activity 13: Connecting Form to Function: Examine how anatomical structure is directly related to function.HMDScience.com(6.E)

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

***Multimedia Instructor presentations and guided lecture and discussion
***Websearches and scavenger hunts
***Clicker Review and Game Show Review
***Formal Lab Written Report emphasizing the process of the scientific method and demonstrating competency in scientific writing.
***Quizzes
***Tests

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

After -school Tutoring, Homework Club, Study Group, Online Resources such as teacher notes & worksheets posted online, Khan Academy and Crash Course.

EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **VII. DNA and Biotechnology**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS1 From Molecules to Organisms: Structures and Processes

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

Disciplinary Core Ideas(DCI) LS1.A: Structure and Function
 All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (HS-LS1-1)

Disciplinary Core Ideas(DCI)LS1.B: Growth and Development of Organisms
 In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism. (HS-LS1-4)

Disciplinary Core Ideas(DCI)LS1.C: Organization for Matter and Energy Flow in Organisms
 The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells. (HS-LS1-6)

HS-LS-3 Heredity: Inheritance and Variation of Traits
Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Disciplinary Core Ideas(DCI)LS3.A: Inheritance of Traits
 Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)

Disciplinary Core Ideas(DCI)LS3.B: Variation of Traits
 In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)

 Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2),(HS-LS3-3)

Cross Cutting Concepts(CCC)Science is a Human Endeavor
 Technological advances have influenced the progress of science and science has influenced advances in technology. (HS-LS3-3)

 Science and engineering are influenced by society and society is influenced by science and engineering. (HS-LS3-3)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

7.A Identifying DNA as the Genetic Material:	The students will summarize the experiments of Griffith, Avery, Hershey and Chase that confirmed DNA as the genetic material. (HS-LS-1).
7.B Structure of DNA:	The students will describe the interaction of the 4 nucleotides that make up DNA and illustrate the double helix structure.(HS-LS-1)
7.C DNA Replication:	The students will summarize the process of DNA replication emphasizing the significant role of enzymes.(HS-LS-1) (HS-LS-3)
7.D Transcription & Translation:	The students will describe the relationship between DNA and RNA, identify the 3 kinds of RNA identifying their function and compare and contrast transcription and replication. In addition, the students will describe how messenger mRNA codons are translated into amino acids and summarize the process of translation. (HS-LS-3)
7.E Mutation:	The students will distinguish between different types of mutations and explain why mutations may or may not affect phenotype. In addition, the students will list factors that can cause mutation. (HS-LS-3)
7.F Manipulating & Cloning DNA:	The students will summarize how restriction enzymes cut DNA, illustrate a restriction map and explain the significance of RFLP's. In addition, the students will describe the role of polymerases and outline the 3-step PCR process.(HS-LS-3)
7.G DNA Fingerprinting:	The students will describe what a DNA fingerprint represents and summarize how DNA fingerprints are used in forensic science and paternity cases.(HS-LS-3)
7.H Genetic Engineering:	The students will describe how organisms are cloned and explain the significance of recombinant DNA technology.(HS-LS-3)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities

HS-LS-1 & HS-LS-6

Activity 1: Berry Full of DNA: Examine the molecular structure of DNA by extracting DNA from a strawberry.(7A)

HS-LS-1 & HS-LS-6

Activity 2: DNA Structure and Replication Model Building: Summarize the molecules that make up DNA by constructing models which emphasize structure and DNA replication.(7A)

HS-LS-1 & HS-LS-6

Activity 3: DNA and RNA Structure and Function: Summarize the structure of DNA and RNA by constructing models which emphasize structure, replication and transcription.(7B)

HS-LS-1 & HS-LS-6

Activity 4: DNA Structure and Replication: Summarize the subunits which make up the DNA molecule by constructing models which emphasize DNA replication.(7C)

HS-LS-1 & HS-LS-6
Activity 5: Transcription Making an RNA Copy of DNA: Examine the significance of transcription by comparing the process to the building of a clock.(7D)

HS-LS-1 & HS-LS-6
Activity 6: Simulating Protein Synthesis: Simulate the mechanism of protein synthesis and determine the traits of a fictitious organism.(7D)

HS-LS-1 & HS-LS-6:
Activity 7: Table Top Proteins: Model the significant role of DNA, mRNA, tRNA and rRNA in the process of protein synthesis.(7D)

HS-LS-1 & HS-LS-6
Activity 8: Cooking with DNA A Protein Synthesis Simulation: Simulate the role of DNA, mRNA and tRNA and demonstrate their relationship to gene function and mutation by decoding a recipe written in the language of transcription and translation.(7E)

HS-LS-1 & HS-LS-3 & HS-LS-6
Activity 9: Gene Splicing Lab: Simulate the gene splicing techniques used by genetic engineers to produce functional human growth hormone.(7F)

HS-LS-1 & HS-LS-3 & HS-LS-6
Activity 10: DNA Fingerprinting Activity: Simulate DNA fingerprinting to demonstrate how it can used to find similarities and differences within members of a species and between species.(7G)

HS-LS-1 & HS-LS-3 & HS-LS-6
Activity 11: DNA Profiling: Explore the unique properties of mitochondrial DNA and it's use in DNA profiling technology. This technology was used during the turmoil in Argentina from 1976 to 1983 to identify the children of abducted "disappeared" parents.(7G)

HS-LS-1 & HS-LS-3 & HS-LS-6
Activity 12: A Case of Abduction Mitochondrial DNA Identity Testing: Simulate DNA blood typing and DNA profiling techniques in order to demonstrate how this technology can be used to find missing children.(7G)

HS-LS-1 & HS-LS-3 & HS-LS-6
Activity 13: The Search for Ken's Kids: Simulate how basic genetics and DNA technology can be used to match a parent and child.(7G)

HS-LS-1 & HS-LS-3 & HS-LS-6
Activity 14: The Forensic DNA Fingerprinting Lab: Run a DNA Fingerprint to analyze data from a simulated crime scene.(7.G) Vernier Probeware

HS-LS-1 & HS-LS-3 & HS-LS-6
Activity 15: Paper Recombinant DNA Activity: Simulate recombinant DNA plasmid construction and evaluate whether the plasmid has been taken into the host cell.(7H)

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

***Multimedia Instructor presentations and guided lecture and discussion
***Websearches and scavenger hunts
***Clicker Review and Game Show Review
***Formal Lab Written Report emphasizing the process of the scientific method and demonstrating competency in scientific writing.
***Quizzes
***Tests

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

After -school Tutoring, Homework Club, Study Group, Online Resources such as teacher notes & worksheets posted online, Khan Academy and Crash Course.

EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **VIII. Meiosis and Mendel**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS3 Heredity: Inheritance and Variation of Traits

HS-LS3-1 Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Science and Engineering Practices

Analyzing and Interpreting Data
Analyzing data in 9-12 builds on K-8 experiences and progresses to introducing more detailed statistical analysis, the comparison of data sets for consistency, and the use of models to generate and analyze data.
 Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS-LS3-3)

Disciplinary Core Ideas(DCI) LS3.A: Inheritance of Traits
 Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)

Disciplinary Core Ideas(DCI) LS3.B: Variation of Traits
 In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

8.A Chromosomes and Meiosis: The students will differentiate between body cells and gametes. In addtion, autosomes and sex chromosomes will be compared and contrasted.(HS-LS3-1) (HS-LS3-2)(HS-LS3-3)

8.B Process of Meiosis: The students will compare and contrast the two rounds of meiosis and describe how haploid cells develop into mature gametes.(HS-LS3-1)(HS-LS3-2) (HS-LS3-3)

8.C Mendel and Heredity: The students will describe the patterns of inheritance that Mendel's data revealed

	and summarize Mendel's law of segregation.(HS-LS3-1)(HS-LS3-2)(HS-LS3-3)
8.D Traits, Genes, Alleles	The students will explain how there can be many versions of one gene and describe how genes influence the development of traits.(HS-LS3-1)(HS-LS3-2)
8.E Traits and Probability	The students will illustrate monohybrid and dihybrid crosses and explain how heredity can be represented mathematically.(HS-LS3-1)(HS-LS3-2)
8.F Meiosis and Genetic Variation:	The students will describe how sexual reproduction creates unique gene combinations and explain how crossing over during meiosis increases genetic diversity.(HS-LS3-1)(HS-LS3-2)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities:

HS-LS3-1 & HS-LS3-2 & HS-LS3-3
Activity 1: Create a Baby Lab: Simulate the concepts of dominance, phenotype, genotype, and incomplete dominance by examining an individual's genetics and creating a baby.(8A)

HS-LS3-1 & HS-LS3 2 & HS-LS3-3
Activity 2: Modeling Meiosis: Explore the process of meiosis by analyzing a computer simulation of the primary stages of meiosis.(8B)

HS-LS3-1 & HS-LS3-2 & HS-LS3-3
Activity 3: The Biological Reason for Sex: Examine what a baby would look like if both parents have a heterozygous genotype for a series of selected traits.(8C)

HS-LS3-1 & HS-LS3-2
Activity 4: Monohybrid and Dihybrid Genetic Problems: Solve a series of genetic problems which demonstrate how genes influence the development of traits and the probability of inheriting these traits.(8D)

HS-LS3-1 & HS-LS3-2
Activity 5: Tracking a High Cholesterol Gene: By tracking high cholesterol in a given family line, the significance of allele inheritance and influence will be investigated.(8D)

HS-LS3-1 & HS-LS3-2
Activity 6: Mendelian Genetics Problems: Solve monohybrid and dihybrid crosses and explain how heredity can be represented mathematically.(8E)

HS-LS3-1 & HS-LS3-2
Activity 7; Selecting for Better Food: Analyze data and determine which of the three different varieties of a grain crop will produce the highest yield.(8F)

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

***Multimedia Instructor presentations and guided lecture and discussion
***Websearches and scavenger hunts
***Clicker Review and Game Show Review
***Formal Lab Written Report emphasizing the process of the scientific method and demonstrating competency in scientific writing.
***Quizzes
***Tests

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

After -school Tutoring, Homework Club, Study Group, Online Resources such as teacher notes & worksheets posted online, Khan Academy and Crash Course.

EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **IX. Extending Mendelian Genetics**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS3 Heredity: Inheritance and Variation of Traits

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

Science and Engineering Practices Analyzing and Interpreting Data

 Apply concepts of statistics and probability (including determining function fits to data, slope, intercept, and correlation coefficient for linear fits) to scientific and engineering questions and problems, using digital tools when feasible. (HS-LS3-3)

Disciplinary Core Ideas(DCI) LS3.A: Inheritance of Traits

 Each chromosome consists of a single very long DNA molecule, and each gene on the chromosome is a particular segment of that DNA. The instructions for forming species' characteristics are carried in DNA. All cells in an organism have the same genetic content, but the genes used (expressed) by the cell may be regulated in different ways. Not all DNA codes for a protein; some segments of DNA are involved in regulatory or structural functions, and some have no as-yet known function. (HS-LS3-1)

Disciplinary Core Idea(DCI) LS3.B: Variation of Traits

 In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited. (HS-LS3-2)

 Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors. (HS-LS3-2),(HS-LS3-3)

Crosscutting Concepts Science is a Human Endeavor

 Science and engineering are influenced by society and society is influenced by science and engineering. (HS-LS3-3)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

9.A Chromosomes and Phenotype: The students will relate dominant-recessive inheritance patterns in autosomal chromosomes to genetic disorders.(HS-LS3-3)

9.B Sex-Linked Traits: The students will describe the patterns which control the inheritance of sex linked traits and identify how this type of heredity effects males and females differently.(HS-LS3-1) (HS-LS3-3)

9.C Complex Patterns of Inheritance:	The students will describe different types of allele interactions.(HS-LS3-1) (HS-LS3-3)
9.D Gene Linkage and Mapping:	The students wil describe the discovery of gene linkage and explain how linkage maps can be used to estimate the distance between gene loci. (HS-LS3-1) (HS-LS3-3)
9.E Human Genetics and Pedigree:	The students will examine patterns of inheritance in humans and describe how a pedigree is used.(HS-LS3-1) (HS-LS3-3)
9.F Karyotyping and Genetic Disorders:	The students will examine a karyotype in order to identify specific genetic disorders.(HS-LS3-1) (HS-LS3-2) (HS-LS3-3)
9.G Genetic Disorder Examination:	The students will create a brochure which describes and illustrates the inheritance pattern and traits which are true for specific genetic disorders. (HS-LS3-1) (HS-LS3-2) (HS-LS3-3)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities:

HS-LS3-3
Activity 1: The Biological Reason for Sex Mixing up the Genes! Examine the genetic concepts of dominance, segregation, genotype and phenotype.(9.A)

HS-LS3-3
Activity 2: Non-Mendelian Genetics Problems: Mathematically solve a series of genetic problems which emphasize dominance, incomplete dominance and sex-linkage.(9B) & (9C)

HS-LS3-3
Activity 3: Sex Linked Genetics: Mathematically solve a series of genetic problems which emphasize the inheritance of sex-linked traits.(9B)

HS-LS3-3
Activity 4: Blood Typing and Sex Linked Traits: Mathematically solve a series of genetic problems which emphasize blood typing and complex patterns of inheritance.(9.C)

HS-LS3-3 Activity 5: Blood Typing Lab: Analyzing inheritable antigens that determine blood type.(9.C)

HS-LS3-1 & HS-LS3-3
Activity 5: Examining Banding Patterns in Polytene Chromosomes:(Challenge Lab) Isolate the salivary glands of insect larva, fix and stain the salivary gland cells in order to visualize polytene chromosomes. (9.D)

HS-LS3-1 & HS-LS3-3
Activity 6: A Case of Abduction Mitochondrial DNA Identity Testing: Simulate the typing of human mitochondrial DNA and analyze the results by constructing a pedigree.(9.E)

HS-LS3-1 & HS-LS3-3
Activity 7: Who Killed Captain Relish? Create a series of pedigrees for each suspect and construct a flow chart which illustrates your rational for the identification of the guilty suspect.(9.E)

HS-LS3-1 & HS-LS3-3
Activity 8: Tracking a High Cholesterol Gene: Analyze the inheritance pattern of FH and learn how scientists track family history by constructing a pedigree in order to save lives(9.E)

HS-LS3-1 & HS-LS3-2 & HS-LS3-3
Activity 9: Karyotypes and Chromosomal Mutations: Construct a karyotype and analyze the specific inheritance pattern which is true for a particular identified chromosome disorder.(9.F)

HS-LS3-1 & HS-LS3-2 & HS-LS3-3
Activity 10: Genetic Disorder Brochure: Create a brochure which defines and illustrates the inheritance pattern, traits and treatment which exists for a specific genetic disorder.(9.G)

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

***Multimedia Instructor presentations and guided lecture and discussion
***Websearches and scavenger hunts
***Clicker Review and Game Show Review
***Formal Lab Written Report emphasizing the process of the scientific method and demonstrating competency in scientific writing.
***Quizzes
***Tests

Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

After -school Tutoring, Homework Club, Study Group, Online Resources such as teacher notes & worksheets posted online, Khan Academy and Crash Course.

EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **X. Evolution**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS4 Biological Evolution: Unity and Diversity

HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.*

Science and Engineering Practices Using Mathematics and Computational Thinking
- Create or revise a simulation of a phenomenon, designed device, process, or system. (HS-LS4-6)

Science and Engineering Practices Constructing Explanations and Designing Solutions
- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future. (HS-LS4-2),(HS-LS4-4)

Science and Engineering Practices Obtaining, Evaluating, and Communicating Information
- Communicate scientific information (e.g., about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically). (HS-LS4-1)

Disciplinary Core Ideas(DCI) LS4.A: Evidence of Common Ancestry and Diversity
- Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1)

Disciplinary Core Ideas(DCI) LS4.B: Natural Selection

 Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals. (HS-LS4-2),(HS-LS4-3)

 The traits that positively affect survival are more likely to be reproduced, and thus are more common in the population. (HS-LS4-3)

Disciplinary Core Ideas(DCI) LS4.C: Adaptation

 Evolution is a consequence of the interaction of four factors: (1) the potential for a species to increase in number, (2) the genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for an environment's limited supply of the resources that individuals need in order to survive and reproduce, and (4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment. (HS-LS4-2)

 Natural selection leads to adaptation, that is, to a population dominated by organisms that are anatomically, behaviorally, and physiologically well suited to survive and reproduce in a specific environment. That is, the differential survival and reproduction of organisms in a population that have an advantageous heritable trait leads to an increase in the proportion of individuals in future generations that have the trait and to a decrease in the proportion of individuals that do not. (HS-LS4-3),(HS-LS4-4)

 Adaptation also means that the distribution of traits in a population can change when conditions change. (HS-LS4-3)

 Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species. (HS-LS4-5),(HS-LS4-6)

 Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species' evolution is lost. (HS-LS4-5)

Disciplinary Core Ideas(DCI) LS4.D: Biodiversity and Humans

 Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (HS-LS4-6)

Cross Cutting Concepts(CCC)

Patterns

 Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena. (HS-LS4-1),(HS-LS4-3)

Cause and Effect

 Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS4-2),(HS-LS4-4),(HS-LS4-5),(HS-LS4-6)

Cross Cutting Concepts Connections to the Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

 Scientific knowledge is based on the assumption that natural laws operate today as they did in the past and they will continue to do so in the future. (HS-LS4-1),(HS-LS4-4)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

10.A Early Ideas About Evolution: The students will identify three geological theories that influenced scientific debate over evolution.(HS-LS4-1)(HS-LS4-2)(HS-LS4-4)(HS-LS4-5)

10.B. Darwin's Voyage: The students will be able to describe how Darwin arrived at his idea about species variation.(HS-LS4-1)(HS-LS4-2)(HS-LS4-3)(HS-LS4-4)(HS-LS4-5)

10.C Natural Selection:	The students will compare artificial selection to natural selection. Examine factors Darwin considered in forming his theory of natural selection and summarize the principles of natural selection.(HS-LS4-1)(HS-LS4-2)(HS-LS4-3)(HS-LS4-4)(HS-LS4-5)
10.D Evidence of Evolution:	The students will recognize the major sources of evidence for evolution and examine the pattern of features that reveal the history of a species. (HS-LS4-1)(HS-LS4-2)(HS-LS4-3)(HS-LS4-4)(HS-LS4-5)
10.E Evolution a Unifying Theme:	The students will recognize the importance of evolution in unifying all branches of biological study.(HS-LS4-1)(HS-LS4-2)(HS-LS4-4)(HS-LS4-5)
10.F The Fossil Record:	The students will describe the way that fossils can form and identity the use of relative dating and absolute dating techniques.(HS-LS4-1)(HS-LS4-3)(HS-LS4-4)(HS-LS4-5)
10.G. Geological Time:	The students will identify the major intervals of the geologic time scale. (HS-LS4-1)(HS-LS4-4)(HS-LS4-5)
10.H. Origin of Life:	The students will describe the conditions on earth billions of years ago and summarize the main hypotheses of the way life began.(HS-LS4-1)
10.I. Early Single Celled Organisms:	The students will recognize the role that microbes played in shaping the earth and summarize the theory of endosymbiosis.(HS-LS4-1)
10.J. Radiation of Multicellular Life:	The students will summarize the key events in the Paleozoic, Mezosoic, and Cenozoic eras. In addition, identification will be made which illustrates changes in environmental conditions which affected the evolution and radiation of animal groups.(HS-LS4-1)(HS-LS4-2)(HS-LS4-3)(HS-LS4-4)(HS-LS4-5)
10.K. Primate Evolution:	The students will examine the evolutionary relationships between humans and other primates. In addition, the names and relative ages of extinct hominids will be studied along with the events and forces which have shaped human evolution.(HS-LS4-1)(HS-LS4-2)(HS-LS4-3)(HS-LS4-4)(HS-LS4-5)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities:

HS-LS4-1 & HS-LS4-2 & HS-LS4-4 & HS-LS4-5

Activity 1: Early Naturalists: Write a research paper which outlines the evolutionary principles presented by early naturalists from 1735-1809; Linnaeus, Buffon, Darwin and Jean-Baptiste. Conclude with an examination of how the works of these scientist contributed important ideas prior to Darwin's theory.(10.A)

HS-LS4-1 & HS-LS4-2 & HS-LS4-4 & HS-LS4-5

Activity 2: Create a story board which illustrates the details of Darwin's voyage and summarizes the significance of the evidence that Darwin collected and categorized.(10.B)

HS-LS4-1 & HS-LS4-2 & HS-LS4-3 & HS-LS4-4 & HS-LS4-5

Activity 3: Salamander Speciation: Examine clues that help to determine how salamanders evolved in California and why the California salamander shows such a wide range of diversity.(10.C)

HS-LS4-1 & HS-LS4-2 & HS-LS4-3 & HS-LS4-4 & HS-LS4-5
Activity 4: Teddy Graham Selection: Examine how environmental factors can apply selective pressure on a population of fictitious organisms.(10.C)

HS-LS4-1 & HS-LS4-2 & HS-LS4-3 & HS-LS4-4 & HS-LS4-5
Activity 5: Piecing Together Evidence: Interact with an online virtual laboratory which examines a series of fossil specimens that illustrate embryology, homologous, analogous and vestigial structures. HMDScience.com Online Biology(10.D)

HS-LS4-1 & HS-LS4-2 & HS-LS4-4 & HS-LS4-5
Activity 6: Evolutionary Relationships, Phylogeny and Phylogenetic Tree's: Explore phylogeny and what forms of evidence are used to classify probable evolutionary relationships among species.(10.E)

HS-LS4-1 & HS-LS4-2 & HS-LS4-4 & HS-LS4-5
Activity 7: Introduction to Molecular Evolution: Create a cladogram which compares and contrasts the structural construction of inherited muscle proteins in fish.(10.E) Vernier Probeware

HS-LS4-1 &HS-LS4-3 & HS-LS4-4 & HS-LS4-5
Activity 8: Fossil Study: Determine the evolutionary relationship of fossils based on age and morphology.(10.F)

HS-LS4-1 & HS-LS4-3 & HS-LS4-4 & HS-LS4-5
Activity 9: Building a Vertebrate Fossil Tree: Examine fossils which illustrate the significance of extinct animals and plants which form many links in the evolutionary chain of life.(10.F)

HS-LS4-1 & HS-LS4-4 & HS-LS4-5
Activity 10: Geologic Time Line: Construct a geological time line which emphasizes living organisms that were true to that time period and summarizes how environmental pressures effected the success of the populations true for each time period.(10.G)

HS-LS4-1
Activity 10: The Origin of the Earth: Construct a story board which illustrates the conditions occurring in the solar system billions of years ago which defines Earths origins.(10.H)

HS-LS4-1
Activity 11: Invisible World: Using a microscope examine a series of single celled and multicellular organisms. Illustrate each organism with an emphasis on comparative structure.(10.I)

HS-LS4-1 & HS-LS4-2 & HS-LS4-3 & HS-LS4-4 & HS-LS4-5
Activity 12: Geologic Clock Quick Lab: Journey through geologic time and examine the significant events which occurred in the Paleozoic, Mesozoic and Cenozoic eras which effected the evolution and radiation of animal groups.(10.J)

HS-LS4-1 & HS-0LS4-2 & HS-LS4-3 & HS-LS3-4 & HS-LS4-5
Activity 13: Hominoid Skull Comparison Lab: Examine a series of hominoid skull fossils focusing on comparing and contrasting the prominent features of each. In addition, write a research paper which focuses on the geologic time period which each hominoid thrived in. Describe the plant and animal life that surrounded these early hominoids during this geological time period.(10.K)

Assessments: Describe the Formative and Summative assessments that will be used to demonstrate learning and mastery of the standards.

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Interventions: Describe methods used to support students who fail to master unit Formative and Summative assessments.

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EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Biology** Course Number: **#0311**

Unit Title: **XI. Immune System**

Content Area Standards (Please identify the source): List content standards students will master in this unit.

HS-LS1 From Molecules to Organisms: Structures and Processes

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis

Science and Engineering Practices

 Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)

Disciplinary Core Ideas(DCI) LS1.A: Structure and Function

 Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1)

 Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)

 Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system. (HS-LS1-3)

Unit Outline: A detailed descriptive summary of all topics covered in the unit. Explain what the students will learn, know and be able to do.

11.A Immune System: The students will identify the body systems that protect from infection of pathogens, describe cells and proteins that fight the bodies infections and compare the two types of immunity.(HS-LS1-1)(HS-LS1-2)

11.B Immune Responses: The students will identify nonspecific immune responses and summarize how the cells of the immune system respond to pathogens.(HS-SL1-1)(HS-LS1-2)

11C. Immunity and Technology:
The students will identify methods used to control pathogens and explain how vaccines artificially produce aquired immunity.(HS-LS1-1)(HS-LS1-2)

Instructional Strategies: Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Common Core State Standards.

Suggested Activities:

HS-LS1-1 & HS-LS1-2
Activity 1: Immune System Illustrated: Illustrate the principal parts of the human immune system. In addition, provide a detailed drawing which contrasts passive and active immunity.(11.A)

HS-LS1-1 & HS-LS1-2

Activity 2: Virus Model: Construct a model of a virus which emphasizes the complexity of the viral protein coat and it's structural design which aides in viral infection. In addition, write an essay which includes supporting evidence which answers this age old question, "Virus, Living or Nonliving.(11.B)

HS-LS1-1 & HS-LS1-2

Activity 3: Modeling T-Cell Activation: Interact with a computer simulation of T-Cell Activation. Online Biology HMDScience.com(11.B)

HS-LS1-1 & HS-LS1-2

Activity 4: Emerging and Reemerging Diseases Project: Construct a Brochure which illustrates the Epidemiology, Biology and Environmental Impact of an emerging or reemerging disease.(11C)

HS-LS1-1 & HS-LS1-2

Activity 5: Effectiveness of Antibiotics and Antimicrobial Products: Analyze the effectiveness of antibiotics and over the counter antimicrobials with respect to microbial growth.(11C)

HS-LS1-1 & HS-LS1-2

Activity 6: Disease and Human History Research Paper: Write a research paper which examines how disease has played a role in human history. Discuss the history, inheritance, occurrence, mortality, clinical symptoms, pathology, methods of control, cure and treatment.(11.C)

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