

**EL DORADO UNION HIGH SCHOOL DISTRICT  
EDUCATIONAL SERVICES  
Course of Study Information Page**

COURSE TITLE <p style="text-align: center;"><b>CA Natural Resources Biology</b></p>			
DISTRICT COURSE NUMBER <p style="text-align: center;">0339</p>		4-DIGIT STATE COURSE CODE (COMPLETED BY SILT) <p style="text-align: center;">9324</p>	
Rationale:	Natural Resources Biology is a lab course in life science offered at El Dorado High School as the first course in the 4-year, vertically aligned Natural Resources Pathway. This course fulfills graduation requirements and is a d lab science.		
Course Description that will be in the Course Directory:	Natural Resources Biology is a laboratory science focused on understanding life on Earth. This place-based curriculum utilizes EDHS's East Campus to study scientific skills, ecology, cellular structure and function, genetics, and evolution. The course is the first of a 4-year Natural Resources Pathway and will develop skills for student success in college and career. Application, teacher recommendation and interview are required to be considered for the Natural Resources Program.		
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.		
Core Subjects:	<i>Select up to two that apply:</i> <input type="checkbox"/> Arts <input type="checkbox"/> Economics <input type="checkbox"/> English <input type="checkbox"/> Foreign Language <input type="checkbox"/> Geography <input type="checkbox"/> Civics and Government <input type="checkbox"/> History <input type="checkbox"/> Mathematics <input type="checkbox"/> Reading / Language Arts <input checked="" type="checkbox"/> Science <input type="checkbox"/> Not Core Subject		
CDE CALPADS Course Descriptors:  (See Page 2 for Definitions)	CTE TECH PREP COURSE INDICATORS <input type="checkbox"/> Tech Prep (32) (Higher Ed) <input type="checkbox"/> Tech Prep & ROP(33) (Higher Ed) <input type="checkbox"/> ROP (30) <input checked="" type="checkbox"/> N/A	CTE COURSE CONTENT CODE <input checked="" type="checkbox"/> CTE Introductory (01) <input type="checkbox"/> CTE Concentrator (02) <input type="checkbox"/> CTE Completer (03) <input type="checkbox"/> Voc Subject _____ <input type="checkbox"/> N/A	INSTRUCTIONAL LEVEL CODE <input type="checkbox"/> Remedial (35) <input type="checkbox"/> Honors UC-Certified (39) <input type="checkbox"/> Honors Non UC-Certified (34) <input type="checkbox"/> College (40) <input checked="" type="checkbox"/> N/A
Length of Course:	<input checked="" type="checkbox"/> Year <input type="checkbox"/> Semester		
Grade Level(s):	<input checked="" type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12		
Credit:	X Number of credits: <b>10</b> X Meets graduation requirements (subject <b>Biological Science</b> ) X Request for UC "a-g" requirements CSU/UC requirement <b>d</b>		X College Prep
Prerequisites:	Concurrent enrollment or completion of Algebra 1		
Department(s):	Science		
District Sites:	El Dorado High School		
Board of Trustees			

COS Adoption Date:	05/09/2023
Textbooks / Instructional Materials:	Inspire Biology, Stephen Nowicki, McGraw Hill, Copyright 2020 978-0-07-683484-6
Funding Source:	General Fund
Board of Trustees Textbook Adoption Date:	06/13/2023

### 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.

**EDUCATIONAL SERVICES**

**Course Title:**

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## EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Natural Resources Biology**

Course Number: \_\_\_\_\_

Unit Title: **I. Scientific Methods, Measurement, & Communications**

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

Next Generation Science Standards: High School Life Science

HS-LS1 From Molecules to Organisms: Structures and Processes

- Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.HS-LS1-2.
- Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.HS-LS1-3.

California Career Technical Education Model Curriculum Standards

2.0 Communication

- 2.3 Interpret verbal and nonverbal communications and respond appropriately.
- 2.4 Demonstrate elements of written and electronic communication, such as accurate spelling, grammar, and format.
- 2.5 Communicate information and ideas effectively to multiple audiences using a variety of media and formats.
- 2.6 Advocate and practice safe, legal, and responsible use of digital media information and communications technologies.

3.0 Career Planning and Management

- 3.2 Evaluate personal character traits, such as trust, respect, and responsibility, and understand the impact they can have on career success.

4.0 Technology

- 4.3 Use information and communication technologies to synthesize, summarize, compare, and contrast information from multiple sources.
- 4.4 Discern the quality and value of information collected using digital technologies, and recognize bias and intent of the associated sources.

5.0 Problem Solving and Critical Thinking

- 5.1 Identify and ask significant questions that clarify various points of view to solve problems.
- 5.4 Interpret information and draw conclusions, based on the best analysis, to make informed decisions.

6.0 Health and Safety

- 6.3 Use health and safety practices for storing, cleaning, and maintaining tools, equipment, and supplies.

7.0 Responsibility and Flexibility

- 7.2 Explain the importance of accountability and responsibility in fulfilling personal, community, and workplace roles.
- 7.4 Practice time management and efficiency to fulfill responsibilities.
- 7.7 Demonstrate the qualities and behaviors that constitute a positive and professional work demeanor, including appropriate attire for the profession.

8.0 Ethics and Legal Responsibilities

- 8.6 Adhere to copyright and intellectual property laws and regulations, and use and appropriately cite proprietary information.

9.0 Leadership and Teamwork

- 9.1 Define leadership and identify the responsibilities, competencies, and behaviors of successful leaders
- 9.2 Identify the characteristics of successful teams, including leadership, cooperation, collaboration, and effective decision-making skills, as applied in groups, teams, and career technical student organization activities.
- 9.3 Understand the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace setting.

- 9.5 Understand that the modern world is an international community and requires an expanded global view.
- 9.6 Respect individual and cultural differences and recognize the importance of diversity in the workplace.
- 9.7 Participate in interactive teamwork to solve real Agriculture and Natural Resources sector issues and problems
- 9.8 Define the characteristics and benefits of teamwork, leadership, and citizenship in the school, community, and workplace settings.
- 9.10 Understand how to organize and structure work, individually and in teams, for effective performance and the attainment of goals
- 9.12 Demonstrate how to interact with others in ways that demonstrate respect for individual and cultural differences and for the attitudes and feelings of others."
- 9.13 Participate in group or team activities, including those offered by the student organization, that develop skills in leadership, cooperation, collaboration, and effective decision making.

**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.

- A. Scientific Method: The students will identify the different elements of scientific inquiry including variables, constants, and controls. In addition, they will differentiate between theories and hypotheses. These concepts are introduced during this unit and reinforced throughout the year.
- B. Characteristics of Life: The students will summarize the characteristics that define life, including homeostasis, compare and contrast living and nonliving things with respect to the organization of matter and the use of energy.
- C. Communicating Scientific Ideas: Students will communicate experimental results by creating graphs and figures. They will draw conclusions and share their findings in written form as well as through oral presentations. These concepts are introduced during this unit and reinforced throughout the year.

**Instructional Strategies:** Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Direct instruction of core curriculum will include guided note taking, class discussion questions, and connections to relevant current events.

Independent practice and enrichment in the form of scientific articles, podcasts, and textbook-based assignments will increase student understanding of core curriculum as well as build academic vocabulary and introduce students to the nature of scientific writing.

*Peer-reviewed scientific journal article- based on Natural Connections Day topic (NR Biology and Natural Resources 1 collaboration)*

Labs, activities, and projects engage students in the process of scientific inquiry and develop critical thinking and problem solving skills. Students will apply these skills with increasing depth and complexity in each successive course in the Natural Resources Pathway. Lab activities will include

- *Practice Using Metric Measurements Common in Biology and Natural Resources - at East Campus*
- *Homeostasis of Plants from Around the World- plants in East Campus greenhouses*
- *Living and Non-living - East Campus Scavenger Hunt*
- *Insect Classification Project- fall semester see Ecology unit*
- *Wildflower Herbarium- spring semester see Evolution and Classification unit*
- *Natural Connections Day Research and Presentation (NR Biology and Natural Resources 1 collaboration)*

\*Assessments that involve vertical alignment of curricula in the Natural Resources Pathway, collaboration between different classes in the pathway and place-based curriculum that requires resources available at East Campus are italicized.

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

Chapter Assignments—These formative assignments help to build the students foundation for the information they will learn during the unit. Weekly assignments serve to assess and give immediate feedback to the students as to how they are progressing in the acquisition of the content knowledge. These assignments inform the instructor as to the progress of the students and allow the instruction of the material to be adjusted, should students need remediation or if they require supplementary instruction.

Projects and Labs—these are the primary foundation for this program and indicate how well a student applies the information covered in the text and lecture with the processes and skills necessary for proper field research. As this is a science based class, it is imperative that students demonstrate application of their knowledge through inquiry and observation. Semester-long projects will incorporate the use of a detailed rubric. Students will receive a copy of the rubric prior to beginning each project, and it will be used in self- and peer-evaluations.

Quizzes—These short assignments are used as formative assessment to help the instructor understand whether or not the material covered in class is understood by the students. These are primarily used to assess what is understood by a majority of the students and what areas are in need of emphasis or reteaching.

Tests—These longer assessments are the summative portion of the units and will determine whether or not the overarching goals of the units are understood by the students. The information will also help the teacher to redesign learning objectives for the following year and make adjustments to curriculum.

**Interventions:** Describe methods used to support students who fail to master unit Formative and Summative assessments. Formative assessments, such as chapter review questions and quizzes, will be followed by immediate reteaching through large group discussion in class and small group review during Intervention..

Many labs will be conducted over the course of several class periods. At the end of each class period, the teacher will scan the parts students have completed to that point, and clarify or correct misconceptions at the opening of the following period.

Semester-long projects will include multiple checkpoints so that the teacher can track students' progress and correct misconceptions. These checkpoints will involve peer evaluation and small-group meetings with the teacher to correct errors and address any challenges that may arise.

Students who miss entire assignments will have the opportunity to make up work during Intervention with the teacher, where they can receive one-on-one or small group tutoring.

Natural Resources Program offers peer tutoring for students who consistently struggle with curriculum. The tutors have attended training sessions and commit to regular weekly tutoring sessions. Upperclassmen in the Program are mentors to younger students academically and socially.

## EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Natural Resources Biology**

Course Number: \_\_\_\_\_

Unit Title: **II. Ecology**

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

Next Generation Science Standards: High School Life Science

HS-LS2 Ecosystems: Interactions, Energy, and Dynamics

- Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. HS-LS2-1.
- Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. HS-LS2-2.
- Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. HS-LS2-4.
- Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. HS-LS2-5.
- Evaluate 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. HS-LS2-6.
- Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. HS-LS2-7.
- Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. HS-LS2-8.

HS-LS4 Biological Evolution: Unity and Diversity

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

California Career Technical Education Model Curriculum Standards

E. Forestry and Natural Resources Pathway

E1.0 Understand the importance of energy and energy cycles.

- E1.2 Differentiate between renewable and nonrenewable energy sources.
- E1.5 Analyze the way in which human activities influence energy cycles and natural resource management.

E5.0 Investigate wildlife management and habitat.

- E5.1 Describe the relationship between habitat and wildlife population.
- E5.2 List habitat requirements for different species and identify factors that influence population dynamics.
- E5.3 Determine existing wildlife species populations.

E8.0 Explore basic plant physiology, anatomy, and taxonomy

- E8.3 Identify local trees, shrubs, grasses, forbs, and wildlife species by common name.
- E8.4 Recognize and explain the factors that influence plant growth, such as respiration, temperature, nutrients, and photosynthesis.

E9.0 Explore the role of fire in natural resource management.

- E9.1 Differentiate between desirable and undesirable fire in forest and rangeland ecosystems.

E10.0 Implement forest management practices.

- E10.1 Describe how social, political, and economic factors can affect the use of forests.
- E10.6 Identify and diagnose damage from destructive insects, diseases, and weather and choose methods for their management.

**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.

- A. Levels of organization: Students will distinguish between populations, communities, ecosystems, and biomes.
- B. Community interactions: Students will illustrate and distinguish between competition, predation, and the types of symbiosis. They will generate examples of each.
- C. Energy flow: Students will diagram and describe food webs. They will apply the ten percent rule and predict its impact on various food chains. They will describe the roles of producers and consumers in ecosystems. In addition, the comparative and contrasting features of photosynthesis and chemosynthesis will be investigated. Students will explain how food chains and trophic levels are related.
- D. Succession: Students will generate examples of ecological succession.
- E. Population growth and carrying capacity: Students will graph exponential and logistic growth. They will evaluate the impacts of both types of growth on ecosystems. They will demonstrate the concept of carrying capacity in an ecosystem. The students will describe the consequences of loss of biodiversity and explain how loss of habitat and introduced species affect ecosystems and biodiversity.
- F. Population dynamics: Students will predict the impact of different age structures on population growth. They will infer how social factors influence age structures.

**Instructional Strategies:** Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Direct instruction of core curriculum will include guided note taking, class discussion questions, and connections to relevant current events.

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- *Ologies: "Fire Ecology" podcast jigsaw (NR Biology and Natural Resources 1 collaboration)*

Labs, activities, and projects engage students in the process of scientific inquiry and develop critical thinking and problem solving skills. Students will apply these skills with increasing depth and complexity in each successive course in the Natural Resources Pathway. Lab activities will include

- Mathematical Modelling of Bacterial Population Growth and the Relationship to the Human Population
- Effects of Salinity on Germination Rate of Seeds
- *Sierra Nevada Food Web (NR Biology and Natural Resources 1 collaboration)*
- *Carrying Capacity Lab- at East Campus*
- *Classification Practice of Conifers- at East Campus using dichotomous keys used at Forestry Challenge*
- *Trophic Levels Photo Scavenger Hunt- at East Campus*
- *Insect Classification Project- utilizing pitfall traps at East Campus*
- *Natural Connections Day Research and Presentation (NR Biology and Natural Resources 1 collaboration)*
- *Career exploration- Field trip to UC Berkeley's Blodgett Forest Research Station*

\*Assessments that involve vertical alignment of curricula in the Natural Resources Pathway, collaboration between different classes in the pathway and place-based curriculum that requires resources available at East Campus are italicized.

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

Chapter Assignments—These formative assignments help to build the students foundation for the information they will learn during the unit. Weekly assignments serve to assess and give immediate feedback to the students as to how they are progressing in the acquisition of the content knowledge. These assignments inform the instructor as to the progress of the students and allow the instruction of the material to be adjusted, should students need remediation or if they require supplementary instruction.

Projects and Labs—these are the primary foundation for this program and indicate how well a student applies the



information covered in the text and lecture with the processes and skills necessary for proper field research. As this is a science based class, it is imperative that students demonstrate application of their knowledge through inquiry and observation. Semester-long projects will incorporate the use of a detailed rubric. Students will receive a copy of the rubric prior to beginning each project, and it will be used in self- and peer-evaluations.

**Quizzes**—These short assignments are used as formative assessment to help the instructor understand whether or not the material covered in class is understood by the students. These are primarily used to assess what is understood by a majority of the students and what areas are in need of emphasis or reteaching.

**Tests**—These longer assessments are the summative portion of the units and will determine whether or not the overarching goals of the units are understood by the students. The information will also help the teacher to redesign learning objectives for the following year and make adjustments to curriculum.

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

Formative assessments, such as chapter review questions and quizzes, will be followed by immediate reteaching through large group discussion in class and small group review during Intervention..

Many labs will be conducted over the course of several class periods. At the end of each class period, the teacher will scan the parts students have completed to that point, and clarify or correct misconceptions at the opening of the following period.

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## EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Natural Resources Biology**

Course Number: \_\_\_\_\_

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

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

Next Generation Science Standards: High School Life Science

- HS-LS1 From Molecules to Organisms: Structures and Processes  
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-LS1-6.

**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.

- A. Organic macromolecules: The students will identify the elements common to all living things. Students will diagram and describe the four organic macromolecules. They will identify their sources, components, and functions.
- B. Chemical reactions: Students will identify the parts of a chemical reaction and some examples from living organisms. They predict the effects of various environmental factors on reaction rate.
- C. Enzyme structure and function: Students will demonstrate the steps of an enzyme-catalyzed reaction. They will compose a graph of reaction rate to compare the effects of environmental factors.

**Instructional Strategies:** Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Direct instruction of core curriculum will include guided note taking, class discussion questions, and connections to relevant current events.

Independent practice and enrichment in the form of scientific articles, podcasts, and textbook-based assignments will increase student understanding of core curriculum as well as build academic vocabulary and introduce students to the nature of scientific writing.

Labs, activities, and projects engage students in the process of scientific inquiry and develop critical thinking and problem solving skills. Students will apply these skills with increasing depth and complexity in each successive course in the Natural Resources Pathway. Lab activities will include

- Building Models of Biological Molecules
- Modeling Enzyme Activity and Investigating Factors Affecting Enzyme Function
- Protein Structure Demonstration - focus on specificity between enzyme and substrate

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## EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Natural Resources Biology**

Course Number: \_\_\_\_\_

Unit Title: **IV. Cell Structure and Function**

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

Next Generation Science Standards: High School Life Science

HS-LS1 From Molecules to Organisms: Structures and Processes

- Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.HS-LS1-3.
- Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.HS-LS1-5.
- 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-LS1-6.
- 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. HS-LS1-7.

HS-LS2 Ecosystems: Interactions, Energy, and Dynamics

- Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.HS-LS2-3.

California Career Technical Education Model Curriculum Standards

E. Forestry and Natural Resources Pathway

E8.0 Explore basic plant physiology, anatomy, and taxonomy.

- E8.4 Recognize and explain the factors that influence plant growth, such as respiration, temperature, nutrients, and photosynthesis.

**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.

- A. Cell theory: The students will describe developments that led to the cell theory.
- B. Prokaryotic vs. eukaryotic cells: Students will differentiate between eukaryotic and prokaryotic cells.
- C. Cell organelles: Students will describe the structure of eukaryotic cells and summarize the functions of organelles in plant and animal cells.
- D. Passive and active transport: The students will describe passive transport and distinguish between osmosis, diffusion, and facilitated transport and it pertains to the fluid mosaic model.
- E. Photosynthesis & Cellular respiration: The students will recognize the importance of ATP as an energy carrying molecule and identify energy sources used by organisms. They will describe the processes of photosynthesis and cellular respiration, including fermentation, and distinguish between them.

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- Investigating Structural Similarities & Differences in Different Types of Cells
- Investigating the Effects of Tonicity on Cells
- Chromatography of Plant Pigments
- Mathematical Modelling of the Absorption Spectra and Action Spectra of Plant Pigments
- *Observing Aquatic Microorganisms- using pond water from East Campus*
- *Plant Adaptations for Photosynthesis- at East Campus*
- *Elodea, Snails, and Water Chemistry- utilizing aquaponics system at East Campus (NR Biology and Natural Resources Chemistry collaboration)*

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## EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Natural Resources Biology**

Course Number: \_\_\_\_\_

Unit Title: **V. Molecular Genetics**

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

Next Generation Science Standards: High School Life Science

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-LS1-1.

HS-LS3 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. HS-LS3-1.

**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.

- Structure and function of DNA: The students will describe the interaction of the 4 nucleotides that make up DNA and illustrate the double helix structure. The students will summarize the process of DNA replication emphasizing the significant role of enzymes.
- Structure and function of RNA: 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.
- Protein synthesis: Students will describe how messenger mRNA codons are translated into amino acids and summarize the process of translation..The students will distinguish between different types of mutations and explain why mutations may or may not affect phenotype.

**Instructional Strategies:** Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Direct instruction of core curriculum will include guided note taking, class discussion questions, and connections to relevant current events.

Independent practice and enrichment in the form of scientific articles, podcasts, and textbook-based assignments will increase student understanding of core curriculum as well as build academic vocabulary and introduce students to the nature of scientific writing.

Labs, activities, and projects engage students in the process of scientific inquiry and develop critical thinking and problem solving skills. Students will apply these skills with increasing depth and complexity in each successive course in the Natural Resources Pathway. Lab activities will include

- DNA Structure and Replication Model
- DNA and RNA Structure Model
- Simulating Protein Synthesis
- *DNA Extraction- specimen collected at East Campus and DNA extracted using the USFS Institute of Forest Genetics protocol*

\*Assessments that involve vertical alignment of curricula in the Natural Resources Pathway, collaboration between different classes in the pathway and place-based curriculum that requires resources available at East Campus are italicized.

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

Chapter Assignments—These formative assignments help to build the students foundation for the information they will learn during the unit. Weekly assignments serve to assess and give immediate feedback to the students as to how they are progressing in the acquisition of the content knowledge. These assignments inform the instructor as to the progress of the students and allow the instruction of the material to be adjusted, should students need remediation or if they require supplementary instruction.

Projects and Labs—these are the primary foundation for this program and indicate how well a student applies the information covered in the text and lecture with the processes and skills necessary for proper field research. As this is a science based class, it is imperative that students demonstrate application of their knowledge through inquiry and observation. Semester-long projects will incorporate the use of a detailed rubric. Students will receive a copy of the rubric prior to beginning each project, and it will be used in self- and peer-evaluations.

Quizzes—These short assignments are used as formative assessment to help the instructor understand whether or not the material covered in class is understood by the students. These are primarily used to assess what is understood by a majority of the students and what areas are in need of emphasis or reteaching.

Tests—These longer assessments are the summative portion of the units and will determine whether or not the overarching goals of the units are understood by the students. The information will also helps the teacher to redesign learning objectives for the following year and make adjustments to curriculum.

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

Formative assessments, such as chapter review questions and quizzes, will be followed by immediate reteaching through large group discussion in class and small group review during Intervention..

Many labs will be conducted over the course of several class periods. At the end of each class period, the teacher will scan the parts students have completed to that point, and clarify or correct misconceptions at the opening of the following period.

Semester-long projects will include multiple checkpoints so that the teacher can track students' progress and correct misconceptions. These checkpoints will involve peer evaluation and small-group meetings with the teacher to correct errors and address any challenges that may arise.

Students who miss entire assignments will have the opportunity to make up work during Intervention with the teacher, where they can receive one-on-one or small group tutoring.

Natural Resources Program offers peer tutoring for students who consistently struggle with curriculum. The tutors have attended training sessions and commit to regular weekly tutoring sessions. Upperclassmen in the Program are mentors to younger students academically and socially.



## EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Natural Resources Biology**

Course Number: \_\_\_\_\_

Unit Title: **VI. Cell Cycle**

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

Next Generation Science Standards: High School Life Science

HS-LS1 From Molecules to Organisms: Structures and Processes

- Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.HS-LS1-4.

HS-LS3 Heredity: Inheritance and Variation of Traits

- 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-LS3-2.

**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.

- A. Chromosomes: Students will distinguish between chromatin and chromosomes and identify the phases of the cell cycle in which DNA is in either form. 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.
- B. Mitosis: The students will describe the cell cycle and compare the rates of division in different cell types.
- C. Meiosis: The students will differentiate between body cells and gametes. In addition, autosomes and sex chromosomes will be compared and contrasted. They will compare and contrast the two rounds of meiosis and describe how haploid cells develop into mature gametes.
- D. Genetic variation: The students will describe how sexual reproduction creates unique gene combinations and explain how crossing over during meiosis increases genetic diversity.
- E. Karyotyping: Students will apply their knowledge of chromosomes and meiosis to create a karyotypes and diagnose chromosomal mutations.

**Instructional Strategies:** Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Direct instruction of core curriculum will include guided note taking, class discussion questions, and connections to relevant current events.

Independent practice and enrichment in the form of scientific articles, podcasts, and textbook-based assignments will increase student understanding of core curriculum as well as build academic vocabulary and introduce students to the nature of scientific writing.

Labs, activities, and projects engage students in the process of scientific inquiry and develop critical thinking and problem solving skills. Students will apply these skills with increasing depth and complexity in each successive course in the Natural Resources Pathway. Lab activities will include

- Observing Stages of the Cell Cycle in Plant and Animal Cells
- Modeling the Stages of the Cell Cycle
- Creating and Interpreting a Human Karyotype

\*Assessments that involve vertical alignment of curricula in the Natural Resources Pathway, collaboration between different classes in the pathway and place-based curriculum that requires resources available at East Campus are italicized.

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

Chapter Assignments—These formative assignments help to build the students foundation for the information they will learn during the unit. Weekly assignments serve to assess and give immediate feedback to the students as to how they are progressing in the acquisition of the content knowledge. These assignments inform the instructor as to the progress of the students and allow the instruction of the material to be adjusted, should students need remediation or if they require supplementary instruction.

Projects and Labs—these are the primary foundation for this program and indicate how well a student applies the information covered in the text and lecture with the processes and skills necessary for proper field research. As this is a science based class, it is imperative that students demonstrate application of their knowledge through inquiry and observation. Semester-long projects will incorporate the use of a detailed rubric. Students will receive a copy of the rubric prior to beginning each project, and it will be used in self- and peer-evaluations.

Quizzes—These short assignments are used as formative assessment to help the instructor understand whether or not the material covered in class is understood by the students. These are primarily used to assess what is understood by a majority of the students and what areas are in need of emphasis or reteaching.

Tests—These longer assessments are the summative portion of the units and will determine whether or not the overarching goals of the units are understood by the students. The information will also help the teacher to redesign learning objectives for the following year and make adjustments to curriculum.

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

Formative assessments, such as chapter review questions and quizzes, will be followed by immediate reteaching through large group discussion in class and small group review during Intervention..

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## EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Natural Resources Biology**

Course Number: \_\_\_\_\_

Unit Title: **VII. Inheritance**

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

Next Generation Science Standards: High School Life Science

HS-LS3 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. HS-LS3-1.
- Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. 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.

- A. Alleles: Students will understand the discrete nature of alleles and how they are distributed into gametes through meiosis. The students will explain how there can be many versions of one gene and describe how genes influence the development of traits.
- B. Mendelian traits: The students will describe the patterns of inheritance that Mendel's data revealed and summarize Mendel's law of segregation. They will illustrate monohybrid and dihybrid crosses and explain how heredity can be represented mathematically.
- C. Non-Mendelian traits: The students will describe and demonstrate different types of allele interactions.
- D. Sex-linked traits: The students will describe the patterns which control the inheritance of sex linked traits and identify how this type of heredity affects males and females differently.

**Instructional Strategies:** Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

Direct instruction of core curriculum will include guided note taking, class discussion questions, and connections to relevant current events.

Independent practice and enrichment in the form of scientific articles, podcasts, and textbook-based assignments will increase student understanding of core curriculum as well as build academic vocabulary and introduce students to the nature of scientific writing.

Labs, activities, and projects engage students in the process of scientific inquiry and develop critical thinking and problem solving skills. Students will apply these skills with increasing depth and complexity in each successive course in the Natural Resources Pathway. Lab activities will include

- Mendelian Genetics, Non-Mendelian Genetics, and Sex-linked Problem Sets
- The Biological Reason for Sex
- Applying the Laws of Inheritance in Human Facial Traits - both Mendelian and non-Mendelian Traits
- *Real Life Plant Genetics- grown in East Campus greenhouse*

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

Chapter Assignments—These formative assignments help to build the students foundation for the information they will learn during the unit. Weekly assignments serve to assess and give immediate feedback to the students as to how they are progressing in the acquisition of the content knowledge. These assignments inform the instructor as to the progress of the students and allow the instruction of the material to be adjusted, should students need remediation or if they require supplementary instruction.

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Quizzes—These short assignments are used as formative assessment to help the instructor understand whether or not the material covered in class is understood by the students. These are primarily used to assess what is understood by a majority of the students and what areas are in need of emphasis or reteaching.

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## EDUCATIONAL SERVICES

Department: **Science**

Course Title: **Natural Resources Biology**

Course Number: \_\_\_\_\_

Unit Title: **VIII. Evolution and Classification**

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

Next Generation Science Standards: High School Life Science

HS-LS4 Biological Evolution: Unity and Diversity

- Communicate scientific information that common ancestry and biological evolution.HS-LS4-1.
- 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-LS4-2.
- 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-LS4-3.
- Construct an explanation based on evidence for how natural selection leads to adaptation of populations.HS-LS4-4.
- 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-LS4-5.

California Career Technical Education Model Curriculum Standards

E. Forestry and Natural Resources Pathway

E8.0 Explore basic plant physiology, anatomy, and taxonomy.

- E8.1 Use scientific method to classify animals, including order, family, genus, and species.
- E8.2 Use a dichotomous key to identify plants and animals.
- E8.3 Identify local trees, shrubs, grasses, forbs, and wildlife species by common name.

**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.

- A. Historical development of theory of evolution: The students will identify three geological theories that influenced scientific debate over evolution.
- B. 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.
- C. Natural selection & Artificial 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.
- D. Adaptation: students will infer how plants and insects have adapted to their specific habitats.
- E. Unity & diversity of life: The students will recognize the importance of evolution in unifying all branches of biological study.
- F. Taxonomy and Classification: The students will examine the scientific naming system developed by Linnaeus and identify the limitations of the system. They will use dichotomous keys and field guides to identify plants and animals at various levels of classification. They will distinguish between the domains of life.

**Instructional Strategies:** Indicate how the Instructional Strategies support the delivery of the curriculum and the course goals. Indicate how assignments support the Anchor Standards.

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- Analyzing Evidence for Evolution - using homologous and analogous traits to infer genetic relatedness
- Modeling Adaptations in the Bird Beaks and Analyzing the Effects on Fitness
- Salamander Speciation in California
- *Wildflower Herbarium Project- utilizing quadrats to determine relative density at East Campus*
- *Adaptation Walk- at East Campus*
- *Guest speaker- Presentation and petting zoo by entomologist and herpetologist regarding adaptations of reptiles, amphibians and insects (NR Biology and Natural Resources 1 collaboration)*

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