Date

Course descriptions

Davis Joint Unified School District

Secondary Course Description

COVER PAGE

1. Course Title: **Life Science**

2. Transcript Title / Abbreviation: **Life Science**

3. Transcript Course Code / Number (Office Use Only):

4. School: Davis High School

5. District: **Davis Joint Unified School District**

9. Subject Area:
- [ ] History/Social Science
- [ ] English
- [ ] Mathematics
- [x] Science
- [ ] Language other than English
- [ ] Visual & Performing Arts
- [ ] DJUSD Graduation Elective
- [ ] College Prep Elective (will seek UC/CSU approval)

6. Length of Course: 1 Year

10. Grade Level(s): 10-12

7. School / District Web Site:

11. Seeking "Honors" Distinction? [ ] Yes [x] No

8. School Contact

Name: **Linda Husmann**

Title/Position: Science Teacher/department chair

Phone: Ext.:

Fax:

E-mail: lhusmann@djusd.net

12. Credit Value:
- [ ] 0.5 (half year or semester equivalent)
- [x] 1.0 (one year equivalent)
- [ ] 2.0 (two year equivalent)
- [ ] Other: _____

13. Was this course previously approved by UC? [ ] Yes [x] No
If so, in what year? _____ Under what course title? _____

14. Pre-Requisites: none

Co-Requisites: none

15. Preliminary Approval - Secondary Site Principal Signature (Must be signed before proceeding to Step 16):

16. Date Course Proposal with Preliminary Approval (Step 15) sent to Associate Superintendent, Educational Services:

17. Review & Approval:

Date		Signature
2/04/16	Site Curriculum and Instruction Leadership Team	Signature/Title C&I facilitator
10/6/2014	Secondary Department Articulation/Collaboration	Signature/Title

Secondary Principal Signatures: _____

Date: _____

COURSE OUTLINE

Unit 1: Structure and Function—Driving Question: How do the structures of organisms enable life's functions? What do you need to live?

1. What is life?
    a. Characteristics
2. Cell Structure and function
    a. Major organelles
3. Cell processes
    a. Diffusion
    b. Osmosis
    c. Division-mitosis and differentiation
4. Organization
    a. Cell, tissue, organ, why specialization
    b. Systems
        i. Circulatory
            1. heart
        ii. Respiratory
            1. Carbon and oxygen cycle
        iii. Digestive
            1. Nutrition

Unit 2: Matter and Energy in Organisms and Ecosystems—Driving Question: How do organisms obtain and use energy they need to live and grow? How do matter and energy move through ecosystems?

1. Carbon and Oxygen Cycle
    a. Photosynthesis
    b. Cellular respiration
2. Macromolecules
    a. Nutrition and digestion
3. Food Chains

Unit 3: Interdependent relationships in Ecosystems—Driving Question: How do organisms interact with the living and non-living environment to obtain matter and energy?

1. Food Webs
2. Carrying capacity
    a. Limiting factors—living and non-living

3. Dynamic ecosystems
    a. Succession
    b. Resilience—climax community
4. Functioning—group behavior
5. Environmental problems/solutions

Unit 4: Natural Selection and Evolution—Driving Question: How can there be so many similarities among organisms and yet so many different plants, animals and microorganisms? How does biodiversity affect humans?

1. Natural variation exists
2. Adaptations
3. Differing variation may confer differing fitness
4. When environmental conditions change, fitness may change
    a. Extinction
    b. speciation

Unit 5: Inheritance and Variation of traits—Driving Question: How are the characteristics from one generation related to the previous generation?

1. Variation is the result of differences in DNA
2. DNA
    a. Structure and function
    b. Transcription and translation to proteins
3. Meiosis-sex cells
    a. Sexual reproduction
    b. Inheritance of traits
        i. Mutations
4. Environmental factors

DJUSD Life Science Unit Summaries

Unit 1: Structure and Function

In Unit 1, students will explore the driving question: "How do the structures of organisms enable life's functions?" Students will investigate explanations for the structure and function of cells as the basic units of life, the hierarchical systems of organisms, and the role of specialized cells for maintenance and growth. Life science topics covered in this unit include: cell theory, organelles, diffusion, osmosis, mitosis and differentiation, nutrients in food, calories, digestion and the anatomy of the digestive system, the process of circulation and the structure of the human heart, the role of respiration and the human respiratory system and feedback mechanisms. Student activities and labs for this unit may include: How to use a light microscope, identifying types of cells and organelles, mitosis with onion root tips, testing for nutrients (i.e. vitamin C, starch, proteins), and a heart dissection.

Unit 2: Matter and Energy in Organisms and Ecosystems

In Unit 2, students will explore the driving questions: "How do organisms obtain and use energy they need to live and grow, and how do matter and energy move through ecosystems?" Students construct explanations for the role of energy in the cycling of matter in organism and ecosystems as well as apply mathematical concepts to develop evidence to support explanations of the interactions of photosynthesis and cellular respiration and develop models to communicate these explanations. Life science topics covered in this unit include: photosynthesis, cellular respiration, hydrocarbons to macromolecules, matter and energy flow through different organization levels of living systems, food chains and webs, the conservation of matter and energy, and the carbon cycle. Student activities and

labs for this unit may include: modelling photosynthesis and cellular respiration, modeling macromolecules (i.e. carbohydrates), energy transfer in a food web, and exploring the carbon cycle.

Unit 3: Interdependent Relationships in Ecosystems

In Unit 3, students will explore the driving question: "How do organisms interact with the living and nonliving environment to obtain matter and energy?" Students investigate the role of biodiversity in ecosystems and the role of animal behavior on survival of individuals and species. Through inquiry, students can generate mathematical comparisons, conduct investigations, use models, and apply scientific reasoning to link evidence to explanations about interactions and changes within ecosystems. Life science topics covered in this unit include: food chains and webs, carrying capacity and limiting factors (living and nonliving) in an ecosystem, biodiversity via speciation and extinction, succession, resilience and climax community, Functioning (group behavior), anthropogenic changes induced by human activity in an ecosystem (i.e. global climate change), and environmental problems and solutions. Student activities and labs for this unit may include: Owl pellet dissection, predator-prey activity, the water holding capacity of soil, how biotic and abiotic affect living organisms in an ecosystem, and the effects of human activity on an ecosystem (i.e. pollution, climate change).

Unit 4: Natural Selection and Evolution

In Unit 4, students will explore the driving questions: "How can there be so many similarities among organisms yet so many different plants, animals and microorganisms, and how does biodiversity affect humans?" Students will investigate patterns to find the relationship between the environment and natural selection. They will understand the factors causing natural selection and the process of species changing over time. They can demonstrate an understanding of the processes that change the distribution of traits in a population and describe the multiple lines of evidence that range from the fossil record to genetic relationships. Students use models, apply statistics, and analyze data. Life science topics include: similarities and differences among individuals, natural selection via competition and differential survival, adaptation, speciation, and extinction. Student activities/labs may include: natural selection lab, adaptations lab (ie how is color an adaptation?), fossil evidence lab, cladogram lab.

Unit 5: Inheritance and Variation of Traits

In Unit 5, students will explore the driving question: "How are the characteristics from one generation related to the previous generation?" High school students demonstrate their understanding of the relationship of DNA and chromosomes in the process of cellular division that pass traits from one generation to the next. They develop conceptual understanding of the role of DNA in the unity of life on Earth and can use models to explain the importance of variation within populations for the survival and evolution of species and can explain the mechanisms of genetic inheritance and describe the environmental and genetic causes of gene mutation and changes in gene expression. In addition, ethical issues related to the nature of science can be explored. Life science topics covered in this unit include: The structure and function of DNA, mutations and their consequences, modern DNA technology, meiosis, introductory genetics, genes and chromosomes, introductory genetics including dominant and recessive traits, Punnett squares, probability, inheritance patterns. Student activities/labs may include: DNA extraction from strawberries, DNA to protein, how can a mutation affect an organism, modeling meiosis, Punnett squares, predicting the traits of offspring, natural selection lab (ie toothpick fish).

TEXTS AND SUPPLEMENTAL INSTRUCTIONAL MATERIALS

Title, Author, Publisher, Edition:

Previously Adopted? [X] **Yes** [ ] **No (If no, provide information directly below)**

Cost per book	Total Cost	Budget Source

Other:

This book was adopted for the previous Life Science course. It was written with the older State Standards in mind. There are not currently textbooks available that correspond with the Next Generation Science Standards, therefore it would not seem reasonable to buy new books for this course at this time. When updated books become available, this should be revisited.

DIFFERENTIATED INSTRUCTIONAL METHODS AND/OR STRATEGIES

A variety of instructional methods and strategies will be used. They include:
Introduction of phenomena
Student inquiry (asking questions and defining problems) and modeling
Planning and carrying out investigations
Analyzing and interpreting data
Using mathematics and computational thinking
Constructing explanations and designing solutions
Engaging in argument from evidence
Obtaining, evaluating and communicating information
Lectures and discussion
Demonstration
Group and individual work

ASSESSMENT METHODS AND/OR TOOLS

Test and quizzes
Laboratory experiments

Homework assignments
In class activities/Projects
Warm-ups
Student self-assessments

ASSESSMENT CRITERIA

Test and quizzes
Laboratory experiments
Homework assignments
In class activities/Projects
Warm-ups
Student self-assessments

HONORS COURSES ONLY

n/a

Sequence Participation

Post-Secondary Articulation