Big Idea 4

Content Area: **Template**
Course(s):
Time Period:
Length:
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Big Idea 4: Biological systems interact, and these systems and their interactions possess complex properties

Learning Objectives

- 4.A Interactions with biological systems lead to complex properties
- 4.B Competition and cooperation are important aspects of biological systems
- 4.C Naturally occurring diversity among and between components within biological systems affects interactions with the environment
- LO 4.1 The student is able to explain the connection between the sequence and the subcomponents of a biological polymer and its properties [SP 7]
- LO 4.10 The student is able to refine representations and models to illustrate bio complexity due to interactions of the constituent parts. [SP 1]
- LO 4.11 The student is able to justify the selection of the kind of data needed to answer scientific questions about the interaction of populations within communities. [SP 1, 4]
- LO 4.12 The student is able to apply mathematical routines to quantities that describe communities composed of populations of organisms that interact in complex ways [SP 2]
- LO 4.13 The student is able to predict the effects of a change in the community's populations on the community. [SP 6]
- LO 4.14 The student is able to apply mathematical routines to quantities that describe interactions among living systems and their environment, which result in the movement of matter and energy. [SP 2]
- LO 4.15 The student is able to use visual representations to analyze situations or solve problems qualitatively to illustrate how interactions among living systems and with their environment result in the movement of matter and energy [SP 1]
- LO 4.16 The student is able to predict the effects of a change of matter or energy availability on communities [SP 6]
- LO 4.17 The student is able to analyze data to identify how molecular interactions affect structure and function. [SP 5]
- LO 4.18 The student is able to use representations and models to analyze how cooperative interactions within organisms promote efficiency in the use of energy and matter [SP 1]

- LO 4.19 The student is able to use data analysis to refine observations and measurements regarding the effect of population interactions on patterns of species distribution and abundance. [SP 5]
- LO 4.2 The student is able to refine representations and models to explain how the subcomponents of a biological polymer and their sequence determine the properties of that polymer. [SP 1]
- LO 4.20 The student is able to explain how the distribution of ecosystems changes over time by identifying large-scale events that have resulted in these changes in the past. [SP 6]
- LO 4.21 The student is able to predict consequences of human actions on both local and global ecosystems [SP 6]
- LO 4.22 The student is able to construct explanations based on evidence of how variation in molecular units provides cells with a wider range of functions. [SP 6]
- LO 4.23 The student is able to construct explanations of the influence of environmental factors on the phenotype of an organism. [SP 6]
- LO 4.25 The student is able to use theories and models to make scientific claims and/ or predictions about the effects of variation within populations on survival and fitness [SP 6]
- LO 4.26 The student is able to use theories and models to make scientific claims and/ or predictions about the effects of variation within populations on survival and fitness. [SP 6]
- LO 4.27 The student is able to make scientific claims and predictions about how species diversity within an ecosystem influences ecosystem stability. [SP 6]
- LO 4.3 The student is able to use models to predict and justify that changes in the subcomponents of a biological polymer affect the functionality of the molecule [SP 6]
- LO 4.4 The student is able to make a prediction about the interactions of subcellular organelles. [SP 6]
- LO 4.5 The student is able to construct explanations based on scientific evidence as to how interactions of subcellular structures provide essential functions [SP 6]
- LO 4.6 The student is able to use representations and models to analyze situations qualitatively to describe how interactions of subcellular structures, which possess specialized functions, provide essential functions. [SP 1]
- LO 4.7 The student is able to refine representations to illustrate how interactions between external stimuli and gene expression result in specialization of cells, tissues and organs. [SP 1]
- LO 4.8 The student is able to evaluate scientific questions concerning organisms that exhibit complex properties due to the interaction of their constituent parts [SP3]
- LO 4.9 The student is able to predict the effects of a change in a component(s) of a biological system on the functionality of an organism(s). [SP 6]
- LO4.24 The student is able to predict the effects of a change in an environmental factor on the genotypic expression of the phenotype. [SP 6]

Essential Skills

- 4.A.1. The subcomponents of biological molecules and their sequence determine the properties of that molecule
- 4.A.2 The structure and function of subcellular components and their interactions provide essential cellular processes
- 4.A.3. Interactions between external stimuli and regulated gene expression result in specialization of cell, tissues, and organs
- 4.A.4 Organisms exhibit complex properties due to interactions between their constituent parts
- 4.A.5 Communities are composed of populations of organisms that interact in complex ways
- 4.A.6 Interactions among living systems and with their environment result in the movement of matter

and energy

- 4.B.1 Interactions between molecules affect their structure and function
- 4.B.3 Interactions between and within populations influence patterns of species distribution and abundance
- 4.B.4 Distribution of local and global ecosystems changes over time
- 4.B2. Cooperative interactions within organisms promote efficiency in the use of energy and matter
- 4.C. 3 The level of variation in a population affects population dynamics
- 4.C.1. Variation in molecular unites provides cells with a wider range of functions
- 4.C.2 Environmental factors influence the expression of the genotype in an organism
- 4.C.4 The diversity of species within an ecosystem may influence the stability of the ecosystem

Standards

Instructional Tasks/Activities

- Activity 1
- Activity 10
- Activity 2
- Activity 3
- Activity 4
- Activity 5
- Activity 6
- Activity 7
- Activity 8
- Activity 9

Assessment Procedure

- Classroom Total Participation Technique
- Classwork
- DBQ
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Journal / Student Reflection
- Kahoot
- Other named in lesson
- Peer Review

- Performance
- Problem Correction
- Project
- Quiz
- Rubric
- Teacher Collected Data
- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates

- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Modifications

Modifications:
1. Restructure lesson using UDL principals (http://www.cast.org/our-work/about-udl.html#.VXmoXcfD_UA)
2. Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community.
3. Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures,
illustrations, graphs, charts, data tables, multimedia, modeling).
4. Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple
representation and multimodal experiences).
5. Engage students with a variety of Scientific practices to provide students with multiple entry points and multiple ways to demonstrate their understandings.
6. Use project-based science learning to connect science with observable phenomena.
7. Structure the learning around explaining or solving a social or community-based issue.
8. Provide ELL students with multiple literacy strategies.
9. Collaborate with after-school programs or clubs to extend learning opportunities.

Resources

- Campbell Biology Chapters: 1, 2, 3, 4, 5, 8, 18, 20, 28, 35, 37, 40, 52, 53, 54, 55
- Campbell Biology Chapters: 1, 6, 18, 52, 53, 54, 56
- Campbell Biology Chapters: 4, 5, 8, 41, 42, 50, 52, 54