Joanne Yeager

Dr. Meister and Mr. Gampe

Unit Plan

December 1st, 2017

Unit 5 – Ecology

Objectives:

1. General
    a. After this unit, students will be able to
        i. Identify and explain the different organisms of an ecosystem and their roles in that ecosystem
        ii. Construct food webs/food chains to illustrate how energy is passed through the tropic levels
2. Specific
    a. Lesson 1: What is Ecology
        i. Create diagrams showing how matter cycles and energy flows through different levels of organization in living systems and between living systems
        ii. Explain how energy is stored in an ecosystem
        iii. Explain the differences between consumers, producers, and decomposers in an ecosystem
    b. Lesson 2: Food Webs and Food Chains
        i. Construct their own food webs
        ii. Explain how energy moves through the different tropic levels
        iii. Fill in a food pyramid
    c. Lesson 3: Ecological Interactions
        i. Explain the differences between commensalism, parasitism, mutualism, predators, and prey
        ii. Explain how living organisms interact with both the abiotic and biotic in their ecosystems
        iii. Simulate such interactions
    d. Lesson 4: Ecological Interactions – Lab
        i. Describe the difference between mutualism, parasitism, and competition

ii.Explain why no two species can occupy the same niche in a community

iii.Predict what could happen if an invasive species in introduced into an ecosystem

iv.Discuss some human impacts on ecosystems

Standards:

- **4.1.3.A.** Differentiate between the living and nonliving components in an environment.
- **4.1.3.C**. Identify sources of energy.
- **4.1.4.C**. Explain how most life on earth gets its energy from the sun.
- **4.1.5.A.** Describe the roles of producers, consumers, and decomposers within a local ecosystem.
- **4.1.5.C**. Describe different food webs including a food web containing humans.
- **3.1.12.A2.** Evaluate how organisms must derive energy from their environment or their food in order to survive.
- **4.1.7.A.** Describe the relationships between biotic and abiotic components of an ecosystem.
- **BIO.B.4.2.5:** Describe the effects of limiting factors on population dynamics and potential species extinction
- **4.1.12.E.** Research solutions addressing human impacts on ecosystems over time
- **BIO.B.4.2.2:** Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).
- **BIO.B.4.2.4:** Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).

Rationale of the unit:

The Pennsylvania State Standards place considerable emphasis on the student′s understanding of important scientific relationships, processes, and mechanisms, and the application of scientific concepts. The standards also stress the student's ability to explain, analyze, and interpret these things rather than the ability to simply recall specific scientific facts. This unit on ecology has been structured in a manner that will facilitate student discussions about topics in ecology through teacher-posed problems and questions. These discussions, and the activities that have been integrated into the unit, will require students to analyze and explain concepts and phenomena rather than simply recall memorized scientific knowledge. In addition, to make the topics more meaningful and relevant to students, "real world" problems, events, and examples will be incorporated into the lessons as often as possible.

Today our global environment is being stressed by many different factors, including habitat destruction, pollution, invasion of non-native species, global warming, and depletion of the ozone layer. The more students understand about the complex relationships that drive our natural ecosystems, and the degree to which humans depend upon these ecosystems for their very survival, the better prepared they will be to make environmentally sound decisions in their lifetimes. The content and activities included in this unit were carefully selected to help students develop the understandings and skills necessary to become an environmentally literate member of our society.

Outline of Content: See attached blocking

Sequence of Daily lessons: see attached lessons

Tuesday, February 13th	Wednesday, February 14th	Thursday, February 15th	Friday, February 16th	Monday, February 19th
• What is Ecology? • Lion King Worksheets • Discussion Questions • Exit ticket	• Introducing Food Webs and Chains • Pre-Assessment • Students construct their own food webs	• Introducing Ecological Interactions • Short Video • Discussion Questions • Paramecium Lab	• Ecological Interactions Lab Day • M&M Lab • Discussion Questions	• Unit test

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Date: February 13th, 2018

Day	Lesson Plan		
Tuesday	**Topic: What is Ecology**	**Period Taught: 5th period/ 10th grade**	**Materials/Resources: Lion King clip, worksheets, powerpoint, United Streaming Video**
	Objectives: The students will be able to **1. Create diagrams showing how matter cycles and energy flows through different levels of organization in living systems and between living systems** **2. Explain how energy is stored in an ecosystem** **Standards: (Please type out the standard)** **1.** 4.1.3.A. Differentiate between the living and nonliving components in an environment. 2. 4.1.3.C. Identify sources of energy. **3.** 4.1.4.C. Explain how most life on earth gets its energy from the sun. **4.** 4.1.5.A. Describe the roles of producers, consumers, and decomposers within a local ecosystem.		
	Procedure: **1. Students watch a short clip from *The Lion King* and answer some questions based on the clip** **2. Class discusses this together** **3. Teacher goes over some information from a PowerPoint that will be needed for the other activities** **4. Students get into groups and complete a worksheet based around *The Lion King***		
	Class Assignment: Worksheets	**Essential Questions:**	**Assessment:**
	Differentiated Instruction: **Flexible grouping** **Audiovisual presentations** **Students talk to discuss the questions.** **Student-led interactions** **Students have to write.**	**1. What is ecology?** **2. What is the difference between producers, consumers, and decomposers?** **3. How much energy is used between the different levels?**	Students complete a worksheet, *The Price of Butter Depends on the Number of Old Maids*

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Day	Lesson Plan		
Wednesday	**Topic: Food Chains and Food Webs**	**Period Taught: 5th period/ 10th grade**	**Materials/Resources: Pre-assessment worksheet, chromebooks, Galapagos Food Web worksheet, PowerPoint**
	Objectives: The students will be able to **1. Construct their own food webs** **2. Explain how energy moves through the different tropic levels** **3. Fill in a food pyramid**		
	Standards: (Please type out the standard) **1. 4.1.5.C. Describe different food webs including a food web containing humans.** **2. 3.1.12.A2. Evaluate how organisms must derive energy from their environment or their food in order to survive.**		
	Procedure: **1. Students start class with Food Chain Pre-assessment** **2. Teacher introduces some information** **3. Students get out their chromebooks and go to different websites to practice with Food Chains and Webs** **4. Next, students work on constructing their own food web by reading information from the Galapagos Food Web**		
	Class Assignment: Pre-assessment and food chain practice	**Essential Questions:**	**Assessment:**
	Differentiated Instruction: **Students work in groups and individually, regularly switching up their groups.** **Students get straight information, and then have to investigate on their own.** **Students work hands-on to create something.**	**1. How does energy move through the food chain/food web?** **2. What does the human food web look like?** **3. What would happen if an entire species went extinct? How would that impact the ecosystem?**	The Construction of the Galapagos Food Web

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Day	Lesson Plan
Thursday	**Topic: Ecological Interactions** **Period Taught: 5th period/ 10th grade** **Materials/Resources: Video clip, worksheets, PowerPoint, concept map** **Objectives: The students will be able to** **1. Explain the differences between commensalism, parasitism, mutualism, predators, and prey** **2. Explain how living organisms interact with both the abiotic and biotic in their ecosystems** **Standards: (Please type out the standard)** **1. 4.1.7.A. Describe the relationships between biotic and abiotic components of an ecosystem.** **2. BIO.B.4.2.5: Describe the effects of limiting factors on population dynamics and potential species extinction** **Procedure:** **1. Students watch a video clip on Hyenas and answer questions** **2. Teacher goes over notes to clarify any information** **3. Class goes through Far Side Gallery PowerPoint to identify different relationships in ecosystems** **4. Students start a Paramecium lab to simulate these interactions** **Class Assignment: Worksheets and the lab** **Essential Questions:** **Assessment:** **Differentiated Instruction:** **Students watch a video (visual).** **Students are presented with materials.** **Students get into diverse groups for the Paramecium lab.** **Students complete a fill-in-the-blank worksheet for information recall.** **Flexible grouping and Audiovisual presentations.** **1. What are some factors that affect the organisms in an ecosystem?** **2. How are organisms limited by food? Space?** **3. What can be done to address population density issues?** Paramecium lab Long-term Research paper

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Day	Lesson Plan
Friday	**Topic: Ecological Interactions Cont.** **Period Taught: 5th period/ 10th grade** **Materials/Resources: Spoons, bowls, M&Ms, cups, Note cards, and handouts** **Objectives: The students will be able to** **1. Describe the difference between mutualism, parasitism, and competition** **2. Explain why no two species can occupy the same niche in a community** **3. Predict what could happen if an invasive species in introduced into an ecosystem** **4. Discuss some human impacts on ecosystems** **Standards: (Please type out the standard)** **1. BIO.B.4.2.2: Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).** **2. BIO.B.4.2.4: Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).** **Procedure:** **1. Introduce topic by having students read the background information; assign different groups terms (mutualism, competition, parasitism, and commensalism) and have them fill in chart** **2. Discuss introduction questions** **3. Review Generalists and Specialists and then explain experiment** **4. Group Work: students get cards indicating what species they are and 'hunt' for food (M&Ms)** **5. Come back together and discuss the experiment and some broader questions like how we as humans affect other species** **Class Assignment: See above** **Differentiated Instruction: Flexible grouping and partnering up to be "species"** **Note: Students should not eat M&Ms from bowls and 'hunts' because of sanitary reasons. There will be extra M&Ms for consumption after the activity.** **Essential Questions:** **If the environment suddenly changed, which kinds of species would have a better chance of surviving?** **In what ways can one species affect another species?** **What human activities may be impacting other species? What are the risks in this?** *Assessment:* *Handouts and responses to discussion questions*