Black Horse Pike Regional School District Curriculum Template

ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY GLOBAL SKILLS

PART I: UNIT 1 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

<table>
<tr>
<td>Course/Unit Title:
Ecology/ Population Ecology
Grade Level(s):
11/ 12</td>
<td>Unit Summary:
This unit considers the structure and growth of populations. Students will analyze population demographics through population size, density and distribution. The effects on population size will be examined and assessed by rate variables and growth curves. This unit also focuses on environmental factors that limit populations such as, resources and predation. Finally, the history and future projection of the human population size will be discussed, as well as how this population change will affect the environment</td>
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<td>Essential Question(s):
• What are demographics and what factors affect them?
• What causes changes in population size?
• How do environmental factors affect population growth?
• How do we describe life history patterns?
• How does predation affect life history traits?
• What factors contribute to the increase in the human population size?
• What factors will affect future changes in the human population?</td>
<td>Enduring Understanding(s):
• Each population has characteristic demographics, such as its size, density, distribution pattern, and age structure. Environmental conditions and interactions among individuals can influence a population’s demographic which often change over time.
• The size of a population depends on its rate of births, deaths, immigration and emigration.
• Environmental factors give each population a carrying capacity which is a maximum number of individuals that can be sustained indefinitely by the resources in that given environment.
• Tracking a cohort from their birth until the last one ides reveals patterns of reproduction and mortality that can be summarized in a life table. This is represented in survivorship curves that reveal correlations between populations of the same species.
• When predators prefer large prey, prey individuals who reproduce when still small and young are at a selective advantage. When predators focus on small prey, fast- growing individuals have the selective advantage.
• Innovations such as use of fire and clothing allow early humans go expand into what would otherwise have been inhospitable habitats. The invention of agriculture created a stable food supply. More recently innovations such as chemical fertilizer help to boost crop yields.
• Fertility rates have been declining but remain above replacement level worldwide. Many young people are about to begin reproducing.</td>
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PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS AND NGSS**
1. Examine the threats that a growing population of Canada geese pose to humans. 2. Examine the different characteristics that are used to describe a population. 3. Discuss the factors that determine the size of a population and its growth rate. 4. Determine the environmental limits on population growth. 5. Discuss how ecologists study life history patterns of different species. 6. Discuss how predation affects life history traits. 7. Examine the factors responsible for the rapid increase in human population size. 8. Determine the factors that will affect future changes in the human population.	**1.** HS-LS2-6, HS-LS2-7, HS-LS4-6, RST.11-12.1 **2.** HS-LS2-6, HS-LS2-8, WHST.9-12.2 **3.** HS-LS2-1. HS-LS2-, 2, RST.9-10.8, HSN.Q.A.1 **4.** HS-LS2-1. HS-LS2-2, RST.9-10.8, HSN.Q.A.1, HSS-ID.A.1, HS-LS4-5**.** **5.** HS-LS2-6, HS-LS2-8, WHST.9-12.2 **6.** HS-LS2-6, RST.11-12.7, HS-LS4-5. **7.** HS-LS2-2, HS-LS2-7, HS-LS4-6, RST.11-12.1, HSN.Q.A.1, HSS-ID.A.1 **8.** HS-LS2-6, HS-LS2-7, HS-LS4-6, RST.11-12.7

Inter-Disciplinary Connections:

Material presented in this unit connects with social studies/ History as students will discuss the agricultural revolution and industrial revolution in regards to human population growth. This unit also connects with math as students will analyze data in tables and graphs, create graphs in labs and calculate growth rates and create demographic shift models.

Students will engage with the following text:

Biology The Unity and Diversity of Life Volume 6 Ecology and Behavior 14th edition by Starr, Taggart, Evers, and Starr

Students will write:

Students will write responses to warm-up questions, conclusion questions in labs, and create a biodiversity chart based off of an ecological assessment.

Students may be asked to write a lab report on population's lab.

Students may be asked to perform POGILs (Process-oriented Guided Inquiry Learning) exercises.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will:

- Engage in textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Conduct research using library and internet resources
- Complete write to learn activities

Teacher will :

- Utilize PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Use leading questions to spark classroom discussion
- Include media such as YouTube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks.

Examples: Gizmo Labs and Exploratory Labs Ap, An, E, C

Section Assessment Questions R,U,Ap

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Modifications: Fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Enrichment/Enhancement:

- Have a student choose a country and examine its population figures over different centuries. Can the changes in population be explained by the demographic transition model?
- Assume a per capita rate of 0.65 per animal per month in a prairie dog population. Project out what the population would be in two months, four months, six months, and one year. When you graph your figures, does a J-shaped curve result?
- Examine one well-studied natural disaster, such as the tsunami in 2004 or the western wildfires in 2008. Have students find any documentation of population changes that have resulted due to these disasters.

Summative Assessments:

Students will be required to take tests, quizzes, and perform laboratory activities to demonstrate proficiency on the material presented in this unit.

Examples:

Population's and the Environment Quiz R,U,Ap

Population Trends test R,U,Ap, An, E

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

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Modifications: Fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Enrichment/Enhancement:

- Locate current data on human population growth in several countries around the world. Which countries are growing faster than the world average? Which ones are slower? Are any countries experiencing a negative population growth?
- Investigate the population growth or decline for a particular species. Then discuss the specific dependent and independent factors that affect these populations.

Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports. Develop arguments supported by research and participate in debates, peer presentations, etc.

Examples: *Class Debate:* "For the sake of population control, should governments consider limiting family size?"

U,Ap, An, E, C

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments

as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

Enrichment/Enhancement:

- Research and List several resources humans depend on in our daily lives. How many of these resources are unlimited? For those that are not, what should be done to ensure that they are not depleted?

PART I: UNIT 2 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Ecology/Community Ecology **Grade Level(s):** **11-12**	**Unit Summary**: In this unit students will see how natural selection and coevolution shape communities. They will revisit plant-pollinator interactions, the role of fungi as partners and root nodules. The chapter will go into great depth on the multiple forms of symbiosis found in an environment. Both forms of ecological succession will be described in detail, as well as their role in habitat restoration. Students will discover many correlations between geography and biodiversity by learning about a species range of tolerance and how it determines their survival in an environment.
Essential Question(s): • What factors affect community structure? • What are the effects of participating in a mutualism? • What happens when species compete for resources? • How do predator and prey relationships change over time? • How do predation and herbivory influence community structure? • What are the effects of parasites, brood parasites and parasitoids? • What is ecological succession? • What types of changes alter a community structure?	**Enduring Understanding(s):** • The types of abundance of species in a community are affected by physical factors such as climate, as well as by species interactions. • Mutualism is a relationship where both participants benefit. • In some interactions, one species actively blocks another's access to a resource. In other words, once species is simply better than another at exploiting a shared resource. • Predator populations show three general patterns of response to changes in prey density. • In any community, predators and prey coevolve, as do plants and the herbivores that feed on them. • Parasites reduce the reproductive rate of host individuals by withdrawing nutrients from them. Brood parasites reduce the reproductive rate of hosts by tricking them to carry their young and note their own. Parasitoids reduce the number of host organism by preventing reproduction and eventually killing the host. • Succession is a process in which one array of species replaces another over tie. It can occur in a barren habitat (primary succession) or a region where a community previously existed (secondary succession). • Removing a keystone species can alter the diversity of a species in a community. • Species richness of communities is highest in tropics and lowest at the poles. Topical habitats have the longest growing season, and tropical communities are often older than temperate ones.

• What are some biogeographic patterns in species richness?	

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS AND NGSS**
1. Determine the negative impact the spread of Solenopsis invicta (the red imported fire ant) has on ecology. 2. Discuss the four types of two-species interactions. 3. Describe the benefits of mutualism using examples. 4. Examine the different outcomes of competition between two species for limited resources. 5. Determine the different factors that are responsible for the changing populations of the predator and prey. 6. Examine how predators and prey adapt to each other's evolutionary advantage. 7. Discuss the different ways in which parasites, brood parasites, and parasitoids affect the hosts using examples. 8. Describe the different factors that influence ecological succession. 9. Examine the different factors that can alter the diversity of species in a community. 10. Examine the biogeographic patterns that determine how species are distributed in the natural world.	**1.** HS-LS2-6, HS-LS2-7, HS-LS4-6, WHST.9-12.2 RST.11-12.1, HS-LS4-4. HS-LS2-8. **2.** HS-LS2-6, HS-LS2-8, WHST.9-12.2 **3.** HS-LS2-1. HS-LS2-, 2, WHST.9-12.2 RST.9-10.8, HSN.Q.A.1 **4.** HS-LS2-1. HS-LS2-2, RST.9-10.8, HSN.Q.A.1, HSS-ID.A.1, HS-LS4-5. **5.** HS-LS2-6, HS-LS2-8, WHST.9-12.2, HS-LS4-4. **6.** HS-LS2-6, RST.11-12.7, HS-LS4-5. **7.** HS-LS2-2, HS-LS2-7, HS-LS4-6, RST.11-12.1, HSN.Q.A.1, HSS-ID.A.1 **8.** HS-LS2-6, HS-LS2-7, HS-LS4-6, WHST.9-12.2 RST.11-12.7 **9.** HS-LS2-1. HS-LS2-6, HS-LS4-4. WHST.9-12.2, RST-

	11.12.8 **10.** HS-LS2-1. HS-LS2-6, HS-LS4-4. WHST.9-12.2, RST-11.12.8

Inter-Disciplinary Connections:

Material presented in this unit connects with social studies/ History as students will analyze how the establishment and movement of human civilization effected the distribution of species. This unit also connects with math as students will analyze data in tables and graphs, create graphs in labs and calculate growth rates and create demographic shift models.

Students will engage with the following text:

Biology The Unity and Diversity of Life Volume 6 Ecology and Behavior 14th edition by Starr, Taggart, Evers, and Starr

Students will write:

Students will write responses to warm-up questions, conclusion questions in labs, and debate rebuttals for or against *"Building of residential communities"*

Students may be asked to write a lab report on Predator Prey lab.

Students may be asked to perform POGILs (Process-oriented Guided Inquiry Learning) exercises.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will:

- Engage in textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects

· Conduct research using library and internet resources

· Complete write to learn activities

Teacher will :

· Utilize PowerPoint technologies to present definitions, concepts and any other pertinent materials

· Use leading questions to spark classroom discussion

· Include media such as YouTube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS. IDENTIFY BLOOM'S LEVELS.

Formative Assessments:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks.

Examples: Gizmo Labs and Exploratory Labs Ap, An, E, C

Section Assessment Questions R,U,Ap

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Modifications: Fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Enrichment/Enhancement:

- Have students will look in backyard or in areas that surround your school for examples of resource partitioning.
- Using the observation that grass quickly establishes itself in cracks in the pavement of a highway on which

traffic has been blocked for some time, describe what is happening using terms from the chapter.

- Discuss the biological control system that is used to combat infestation by gypsy moths.

Summative Assessments:

Students will be required to take tests, quizzes, and perform laboratory activities to demonstrate proficiency on the material presented in this unit.

Examples:

Symbiosis Quiz R,U,Ap

Community Ecology Test R,U,Ap, An, E

Accommodations/Modifications:

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Enrichment/Enhancement:

- Look into the chemical relationship between the nodules on legumes and their ability to alter nitrogen. When was this discovered? What particular chemical reactions are involved? Can you envision any way to artificially induce these changes in atmospheric nitrogen?
- Look at some preserved samples of human parasites. How do they enter the host's body? What can be done to prevent their introduction into the body?

Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports. Develop arguments supported by research and participate in debates, peer presentations, etc.

Examples: Organism Relationship poster *(depicting one form of symbiosis and their importance)* or Ecological Succession poster *(labelling differences in both forms of succession and a time line of events)*

U,Ap, An, E, C

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

Enrichment/Enhancement:

- Have the students name other examples of camouflage in nature. After they name a few, show some examples, such as the phasmids (walking sticks).

PART I: UNIT 3 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Ecology/Ecosystems **Grade Level:** 11th/12th	**Unit Summary:** In this unit the students will gain an understanding of how ecosystems are interdependent on their surrounding ecosystems and environments. The influence of the cycling of materials through biogeochemical cycles will be an important theme in the unit. In addition, students will study energy flow through ecosystems by outline relationships between organisms and constructing food webs.
Essential Questions:	**Enduring Understandings:**

1. What is the trophic structure of an ecosystem? 2. How does energy flow affect food chain and food webs? 3. How does energy flow through an ecosystem? 4. What is a biogeochemical cycle? 5. What is the water cycle and how do human activities affect it? 6. How does carbon cycle between its main reservoirs? 7. How does carbon dioxide affect climate? 8. How does nitrogen cycle in ecosystems? 9. How does phosphorus cycle in ecosystems?	1. In an ecosystem, energy and nutrients from the environment flow among a community of species in a hierarchy of feeding relationships called trophic levels. Autotrophs use inorganic materials in the environment to make their own organic compounds and are found at the first trophic level. 2. The cumulative energy losses from energy transfers between trophic levels limit the length of food chains. Even when an ecosystem has many species, trophic interactions link each species with many others. 3. Primary producers capture energy and convert it into biomass in a process called primary production. An energy pyramid depicts the amount of energy that enters each level. The efficiency of energy transfer tends to be the greatest in aquatic systems. 4. A biogeochemical cycle is the slow movement of a nutrient among its environmental reservoirs and into through, and out of food webs. 5. Water moves slowly from the world ocean, the main reservoir, through the atmosphere, onto land, then back to the ocean. Freshwater makes up only a tiny portion of the global water supply. Excessive water withdrawals threaten many sources of drinking water. 6. The largest carbon reservoir is in sedimentary rock but it is not available to organisms. Seawater is the largest reservoir of available carbon which is converted by marine producers into carbon dioxide. On land. carbon is stored in the soil and found in the atmosphere in small amounts. 7. Carbon dioxide is one of the atmospheric gases that absorb heat and emits it toward Earth's surface. The carbon dioxide level is increasing and so is the average global temperature. With a change in temperature there can be a change in climate factors. 8. Nitrogen stored in the atmosphere is used by nitrogen-fixing bacteria. Plants take up nitrates from the soil and the nitrogen is returned back to the atmosphere by denitrifying bacteria as nitrogen gas. 9. Phosphorus is stored in rocks and released into water during weathering. Producers take up phosphates and they cycle through ecosystems.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS and NGSS**
1. Explain the interactions of an ecosystem between the sun, primary producers and consumers. 2. Trace the flow of energy through trophic levels and determine which organisms belong at each trophic level. 3. Identify the relationship between food chains and food webs. 4. Construct a food web and map the energy flow from primary producers to the top consumer. 5. Compare and contrast a biomass and energy pyramid. 6. Define biogeochemical cycle and relate the importance to ecosystems. 7. List the events of the water cycle that enable water to be cycled throughout Earth's atmosphere and land. 8. Explain how carbon is cycled and its impact on the environment. 9. Identify major causes of the greenhouse effect and possible solutions to minimize the effect. 10. Discuss the advantages and disadvantages of human impacts to the nitrogen and phosphorus cycles.	**1.** HS-LS1-5; HS-LS2-4; HS-LS2-5; RST.11-12.1; **2.** HS-LS1-7; HS-LS2-4; RST.11-12.2; MP.2; **3.** HS-LS1-7; HS-LS2-3; HS-LS2-4; RST.11-12.2; MP.2; HSS-IC.B.6 **4.** HS-LS2-3; HS-LS2-4; HS-ESS2-7; MP.2; HSN.Q.A.1 **5.** HS-LS2-4; RST.11-12.2; WHST.9-12.2; MP.4; HSN.Q.A.1 **6.** HS-LS2-4; HS-ESS2-6; HS-ESS2-7 **7.** HS-ESS2-5; WHST.9-12.2; SL.11-12.5 **8.** HS-LS2-4;HS-LS2-5; HS-ESS2-6; SL.11-12.5

	9. HS-ESS2-6; HS-ESS3-4; HS-ESS3-6; RST.11-12.8; WHST.9-12.1; HSN.Q.A.1 **10.** HS-ESS3-4; HS-ESS3-6; RST.11-12.8; WHST.9-12.7

Interdisciplinary Connections:

Material presented in this unit will connect with math as the students use their knowledge of percentages to calculate energy and biomass in trophic levels. This unit also connects to social studies as the students will be expected to read and analyze maps of geographic areas and identify climate changes and trends.

Students will engage with the following text:

Biology: The Unity and Diversity of Life Volume 6: Ecology and Behavior 14th Edition by Starr, Taggart, Evers, Starr

Students will write:

- Daily responses to do now questions, note summaries and critical thinking questions
- A summary of the steps for each of the biogeochemical cycles.
- Responses to critical thinking assessment questions
- Detailed responses for GIZMO interactive activities. (Ex: Pond Ecosystem)
- Complete POGIL inquiry based assignments

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will:

- Engage in textbook and other supplemental reading materials
- Utilize Cornell Note taking strategies
- Participate in class discussions
- Participate in small group and large group activities
- Use technology resources to enhance learning and connect real life applications

Teacher will :

- Model and facilitate Cornell Note taking strategies
- Provide a variety of graphic organizers to assist students with organization
- Create activities that incorporate small group instruction and movement in the classroom
- Use supplemental articles to increase reading in the content area.
- Elicit student responses during discussions by asking probing questions
- Update the school website with supplemental resources, study aids and videos

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE

THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. {Note: Letters in red correspond to learning

levels indicated in pyramid on the right}

Formative Assessments:

Students will demonstrate understanding through a variety of informal and formal assessments. Some formal assignments will be daily assessments, quizzes, tests, labs, projects, and homework assignments.

Examples:

- Daily warm up questions (R, A, C)

- Food Web Lab (Ap, A, E, C)
- Pond Ecosystem GIZMO Assignment (R, U, Ap, A, E, C)

Accommodations/Modifications:

Accommodations and modifications will be made for each individual student's needs. Examples of some possible accommodations and modifications are:

- providing highlighters for students to identify important facts in notes
- allowing for extra time on major assessments
- allowing extra time on assignments requiring internet access
- providing students with a printed copy of notes or readings
- incorporating partnered activities as an alternative to independent work

Enrichment/Enhancement:

For an enrichment activity have students determine their ecological footprint. The students can access, "Global Footprint Network" and take a quiz to see how their actions are impacting their surrounding and the biosphere. This connects the information in this unit to the students' lives.

The following address can be used to access the ecological footprint activity.
http://www.footprintnetwork.org/en/index.php/GFN/page/personal_footprint

Summative Assessments:

The students will complete a formal summative assessment to demonstrate content mastery of the enduring understandings of this unit.

Examples:

- Trophic Levels and Food Webs Quiz (R, U, Ap, A, C)
- Biogeochemical Quiz (R, U, Ap, A)
- Ecosystem Test (R, U, Ap, A, E, A, C)

Accommodations/Modifications:

Accommodations and modifications will be made for each individual student's needs. Examples of some possible accommodations and modifications are:

- projecting any images, charts, graphs on the assessment in color for students to easily view
- allowing for extra time on major assessments

Enrichment/Enhancement:

- Providing additional study guides and resources on the teacher website for students to access outside of class.

Performance Assessments:

Complete laboratory assignments and activities. Students will be assessed on their performance on following safety procedures while conducting the lab as well as the written portion.

Example:

- Food Web Lab (R, U, Ap, A, E, C)

Accommodations/Modifications:

Accommodations and modifications will be made for each individual student's needs. Examples of some possible accommodations and modifications are:

- Allow students to work independently or in a small group
- Remove some organisms from the food web so students can focus on a smaller number of connections. As the students begin to make connections then add more organisms.

Enrichment/Enhancement:

After the students complete their food web lab have them remove a primary producer. They will then re-work the food web and outline the negative impact the change had. Have them next remove a consumer and compare which organism had a greater negative impact on the food web.

PART I: UNIT 4 RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Ecology/ The Biosphere **Grade Level:** 11th/12th	**Unit Summary:** In this unit the students will gain an understanding of how each part of the biosphere is an important component to the success of ecosystems. In addition, the students will study the contrasting climates of each of the biomes. Then they will determine how each biome plays a role in creating a natural habitat for ecosystems to thrive.
Essential Questions: 1. How does sunlight affect climate? 2. How do ocean currents arise and how do they affect climates? 3. What occurs during El Nino? 4. What are biomes? 5. What are deserts? 6. What are grasslands? 7. What are dry shrublands and woodlands? 8. What are broadleaf forests?	**Enduring Understandings:** 1. Sunlight intensity is greatest at equator regions which increases the moisture in the air. As the air cools the moisture moves north and south supporting climate characteristic of tropical forests. As air flows towards higher latitude, it cools and loses moisture as rain. At the poles, cold air sinks and moves toward lower latitudes. Deserts form where cool, dry air descends. 2. Surface ocean currents distribute heat which are affected by winds and the Earth's rotation. Collective effects of air masses, oceans, and landforms determine the regional temperature and annual precipitation. 3. The Pacific warms which alters weather patterns. This causes a shift in nutrient flow the the west of South America causing a decline in primary productivity. Rainfall patterns are altered which can have an impact of disease. 4. Biomes are areas of land with distinct plants that create characteristic communities. The global distribution of biomes is a result of topography, climate and evolutionary history. 5. A desert gets plenty of sunlight, very little rain and low humidity. Due to the little rain and extreme heat plants have adaptations to survive but are are limited in numbers and animals are inactive during the day. 6. Grasslands are filled with grasses and nonwoody plants that can withstand fire and grazing animals. 7. Dry shrublands and woodlands have a mild, rainy winter and a dry hot summer. They are filled with fire-adapted shrubs and low-growing trees that allow sunlight to reach the ground. 8. Broadleaf forests are in temperate areas of the northern hemisphere. Cold winters prevent year-round growth and trees remain dormant in the winter. This is the most productive,

9. What are coniferous forests? 10. What is tundra? 11. What factors affect life in a freshwater provinces? 12. What factors affect life in a coastal ecosystem?	structurally complex, and species rich biome. 9. Conifers are in temperate regions of the northern hemisphere in high elevations. Usually areas of nutrient poor soil. 10. There are two areas of tundra. Arctic tundra is at high latitudes with short cold summers and long cold winters. Alpine tundra is areas of high cold mountains. 11. Lakes have gradients in light, dissolved oxygen and nutrients which creates habitats for different organisms. Primary production varies with a lake's age and season. 12. Rivers deliver nutrients that foster high productivity. Rocky and sandy shores show zonation, with different zones exposed during different phases of the tidal cycle. Diversity is highest in the zone that is submerged most of the time.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NJCCCS or Common Core Standards that are applicable

Learning Target	**NJCCCS or CCS**
1. Define biosphere and explain how it is affected by climate. 2. Map Earth's rotation around the sun and explain the significant impact of sunlight on climate. 3. Explain the pattern of air circulation and their effect on climate. 4. Determine the correlation between ocean currents, landforms, air masses and climate. 5. Describe "El Nino" and "La Nina"and their impact on world-wide weather patterns. 6. Discuss the distinct characteristics that separate land masses into biomes. 7. Compare and contrast each of the land biomes and provide their general geographic location. 8. List the factors that affect life in freshwater provinces and coastal ecosystems.	**1.** HS-ESS2-2; HS-ESS2-4; HS-ESS3-6; WHST.9-12.2 **2.** HS-ESS2-2; HS-ESS2-4; HS-ESS3-5; HS-ESS3-6; RST.11-12.7; MP.4; HSS-IC.B.6 **3.** HS-ESS2-2; HS-ESS2-4; MP.2; HSS-IC.B.6 **4.** HS-ESS2-2; HS-ESS3-5; HS-ESS3-6 **5.** HS-LS2-4; HS-ESS3-1; HS-ESS3-5; RST.11-12.2; WHST.9-12.7;

	MP.4; HSN.Q.A.3 **6.** HS-LS2-4; HS-ESS2-6; HS-ESS3-5; MP.2; HSN.Q.A.1 **7.** HS-ESS2-7; WHST.9-12.2; WHST.9-12.7 **8.** HS-LS2-4;HS-LS2-5; HS-ESS2-6; HS-ESS3-5

Interdisciplinary Connections:

Material presented in this unit will connect with math as the students will interpret and draw conclusion from various sources of data represented in tables and graphs. This unit also connects to social studies as the students will be expected to identify surface currents, wind patterns and the distribution of major biomes and marine ecoregions on a global scale.

Students will engage with the following text:

Biology: The Unity and Diversity of Life Volume 6: Ecology and Behavior 14th Edition by Starr, Taggart, Evers, Starr

Students will write:

- Daily responses to do now questions, note summaries and critical thinking questions
- Short research based summaries for each of the biomes.
- Responses to critical thinking assessment questions
- Short analysis and predictions for graphical data
- Detailed responses for GIZMO interactive activities. (Ex: Water Pollution)
- Complete POGIL inquiry based assignments

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

<u>How</u> will students uncover content and build skills.

Students will:

- Engage in textbook and other supplemental reading materials
- Utilize Cornell Note taking strategies
- Participate in class discussions
- Participate in small group and large group activities
- Use technology resources to enhance learning and connect real life applications

Teacher will :

- Model and facilitate Cornell Note taking strategies
- Provide a variety of graphic organizers to assist students with organization
- Create activities that incorporate small group instruction and movement in the classroom
- Use supplemental articles to increase reading in the content area.
- Elicit student responses during discussions by asking probing questions
- Update the school website with supplemental resources, study aids and videos

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE

THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. {Note: Letters in red correspond to learning

levels indicated in pyramid on the right}

<u>Formative Assessments</u>:

Students will demonstrate understanding through a variety of informal and formal assessments. Some formal assignments will be daily assessments, quizzes, tests, labs, projects, and homework assignments.

Examples:

- Daily warm up questions (R, A, C)
- Biome Research Project (U, Ap, A, C)
- Water Pollution GIZMO Assignment (R, U, Ap, A, E, C)

Accommodations/Modifications:

Accommodations and modifications will be made for each individual student's needs. Examples of some possible accommodations and modifications are:

- providing highlighters for students to identify important facts in notes
- allowing for extra time on major assessments
- allowing extra time on assignments requiring internet access
- providing students with a printed copy of notes or readings
- incorporating partnered activities as an alternative to independent work

Enrichment/Enhancement:

For an enrichment activity have students complete the "Climate Change Expedition". The students will watch eight mini videos and answer questions about climate change all over the world. They will analyze graphical information, draw conclusions and make inferences based on the videos. This connects the information in this unit about climate change to the students' lives.

The following address can be used to access the climate change activity.
http://www3.epa.gov/climatechange/students/expeditions/index.html

Summative Assessments:

The students will complete a formal summative assessment to demonstrate content mastery of the enduring understandings of this unit.

Examples:

- Biome Quiz (R, U, Ap)
- Biosphere Test (R, U, Ap, A, E)

Accommodations/Modifications:

Accommodations and modifications will be made for each individual student's needs. Examples of some possible accommodations and modifications are:

- projecting any images, charts, graphs on the assessment in color for students to easily view
- allowing for extra time on major assessments

Enrichment/Enhancement:

- Providing additional study guides and resources on the teacher website for students to access outside of class.

Performance Assessments:

Complete laboratory assignments and activities. Students will be assessed on their performance on following safety procedures while conducting the lab as well as the written portion.

Example:

- Water Pollution GIZMO Assignment (R, U, Ap, A, E, C)

Accommodations/Modifications:

Accommodations and modifications will be made for each individual student's needs. Examples of some possible accommodations and modifications are:

- Allow students to work independently or in a pair
- Allow extra time on assignments requiring internet access
- Use chunking strategies to break up the assignment into parts

Enrichment/Enhancement:

After the students complete their Water Pollution GIZMO have them check the labels of household chemicals and check their suggested directions for disposal. Then they can write a short summary of their findings and three ways they can help minimize water pollution and enhance water

conservation.

PART I: UNIT 5 RATIONALE

<u>WHY</u> ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title: Ecology/Human Impact **Grade Level:** 11-12	**Unit Summary:** This is the fifth unit of the course. It focuses on how human activities have accelerated the rate of extinctions through habitat loss, degradation, species introductions, and overharvesting. Students will learn how plowing grasslands and deforestation can have long-term harmful effects. It covers human activities that produce pollutants causing global climate change, bioaccumulation, and acid rain. The value of biodiversity and conservation biology examples are examined, as well as, ecological restoration and preservation. Lastly, students will determine ways to reduce negative human impacts through reducing energy consumption.
Essential Questions: 1. How does the current mass extinction differ from previous ones? 2. How do human activities endanger existing species? 3. What are the effects of desertification and deforestation? 4. What are some ways that pollutants directly harm living organisms? 5. How do human activities affect ozone levels?	**Enduring Understandings:** 1. Previous mass extinctions occurred from asteroid impacts or volcanic eruptions. The current extinction is the result of human activity. 2. Species decline and become endangered from humans fragmenting, degrading, or deforesting habitats; overharvesting species; and introducing exotic species. 3. Desertification and deforestation not only destroy habitat, they allow increased erosion and can cause changes in local weather patterns. 4. Acid rain can make a lake or soil too acidic for life to thrive. Even small amounts of fat-soluble chemicals can accumulate in tissues and be magnified from one trophic level to the next. Animals can be harmed when they mistake indigestible trash that enters waterways and oceans for food. 5. Certain synthetic chemicals destroy ozone in the upper atmosphere's ozone layer, which protects against UV radiation. Evaporation and burning of fossil fuels increase the amount of ozone in the air near the ground, where ozone is considered a harmful pollutant. 6. Warming water, rising sea level, and changes in the composition

6. What are some biological effects of climate change? 7. How do we sustain biodiversity? 8. What can individuals do to reduce their harmful impact on biodiversity?	of seawater poses threats to aquatic species. On land, warming temperatures are altering the timing of flowering and migrations, and the distribution of some species. Increased warmth will also encourage the spread of human pathogens and increase the production of allergy-producing pollen. 7. Biodiversity is the genetic diversity of individuals of a species, the variety of species, and the variety of ecosystems. Conservation biologists identify threatened regions with high biodiversity and prioritize which should be first to receive protection. Through ecologically diverse ecosystem that has been destroyed or degraded. 8. Resource extraction and usage have side effects that threaten biodiversity. You can save energy and other resources by reducing energy consumption and recycling and reusing materials.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NGSS or Common Core Standards that are applicable

Learning Target	**NGSS or CCS**
1. Examine the role of humans in species extinction. 2. Discuss the current mass extinction crisis and the human role in it. 3. Examine the human role in endangering existing species. 4. Determine how human activities could potentially transform entire biomes. 5. Describe how pollutants are directly endangering living organisms using examples. 6. Determine some of the major contributors to ozone layer depletion. 7. Examine how climate change is threatening life on Earth. 8. Discuss the significance of conservation biology and ecological restoration. 9. Examine the measures that individuals can take to reduce their negative impact on biodiversity.	**1.** HS-LS2-7; HS-LS4.5; HS-LS4.6; RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3 **2**. HS-LS2-7; HS-LS4.5; HS-LS4.6; RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3 **3**. HS-LS2-7; HS-LS4.5; HS-LS4.6; RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-

	12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3 **4**. HS-LS2-6; HS-LS2-7; HS-LS4.5; HS-LS4.6; RST.9-10.8; RST.11-12.1; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3; HSS-IC.B.6 **5**. HS-LS2-7; HS-LS4.5; HS-LS4.6; RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3 **6**. HS-LS2-7; HS-LS4.5; HS-LS4.6; RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3 **7**. HS-LS2-7; HS-LS4.5; HS-LS4.6; RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3 **8**. HS-LS2-7; HS-LS4.6; RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3 **9**. HS-LS2-7; HS-LS4.6; RST.9-10.8; RST.11-12.7; RST.11-12.8; WHST.9-12.7; MP.2; HSN.Q.A.1; HSN.Q.A.2; HSN.Q.A.3

Interdisciplinary Connections:

Material presented in this unit connects with social studies as students will determine how human society affects the environment. This unit also connects with math as students will analyze data in tables and graphs. Literacy strategies will also be used as students read and analyze main ideas of case studies. Material in this unit may connect with art if students are assigned a poster project of various human impacts (global warming, ozone thinning, deforestation, etc.).

Students will engage with the following text:

Biology The Unity and Diversity of Life Volume 6 Ecology and Behavior 14th edition by Starr, Taggart, Evers, and Starr

Students will write:

Students will write responses to warm-up questions, review exercises in the textbook, and conclusion questions in labs.

Students may be asked to write a lab report on urban planning.

Students may be asked to perform POGILs (Process-oriented Guided Inquiry Learning) exercises.

Students may be asked to perform GIZMOS lab simulation exercises.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will:

- Engage in textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects

- Conduct research using library and internet resources
- Complete write to learn activities

Teacher will :

- Utilize PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Use leading questions to spark classroom discussion
- Include media such as YouTube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE

THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. {Note: Letters in red correspond to learning levels indicated in pyramid on the right}

<u>Formative Assessments</u>:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks.

Examples:

Gizmo Labs Ap, An, E, C

Section Assessment Questions R, U, Ap, An

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Modifications: Fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Enrichment/Enhancement:

- Assign each student an endangered or threatened species to investigate fully. What is the major reason for its decline? What could be done to save this species? Refer to http://www.iucnredlist.org/ for lists of endangered and threatened species.
- Research some animals that are extinct. Do you think the animal could have developed an adaptation that would have enabled it to survive?
- Many parts of Florida have been particularly vulnerable to the introduction of non-indigenous species. Is this making southern Florida a threatened ecosystem? What can be done about this?

Summative Assessments:

Students will be required to take tests, quizzes, and perform laboratory activities to demonstrate proficiency on the material presented in this unit.

Examples:

· Human Impact Quiz R, U, Ap, An, E, C

· Human Impact Test R, U, Ap, An, E

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Modifications: Fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Enrichment/Enhancement:

- Take a field trip to a local zoo. Do the animals seem to be in their natural habitat? What changes could be made to mimic their native surroundings? Why do you think caged animals do not always reproduce successfully? Could anything be done to improve this?
- When you observe the number of species on Table 48.1, the number of insect species really stands out. What features of insects make them so successful?
- Focus on one of the critical or vulnerable ecoregions in Figure 48.15. What circumstances have lead to the deterioration of these areas?

Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports. Develop arguments supported by research and participate in debates, peer presentations, etc.

Examples:

Ocean Acidification Lab Ap, An, E, C

· Dragonfly Pond Lab Ap, An, E, C

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

Enrichment/Enhancement:

- Divide the class into small groups and debate the pros and cons of different energy sources. Each section should be prepared to discuss the merits and drawbacks of one of the following energy sources: oil, coal, natural gas, hydropower, solar power, nuclear power, and other alternatives.
- Look at the website http://www.epa.gov/superfund/ to see if there are any superfund sites near your home or college. These sites are targeted by the EPA for clean up since they are considered to be uncontrolled hazardous waste sites.
- Look in your daily paper or weekly news magazine for an article about an environmental issue. Summarize the article for the class.

PART I: UNIT 6 RATIONALE

WHY ARE STUDENTS LEARNING THIS CONTENT AND THESE SKILLS?

Course/Unit Title:	**Unit Summary:**
Ecology/Animal Behavior **Grade Level:** 11-12	This unit is the last unit of the course. It will cover behavioral variations within or among species that have a genetic basis and behavior modified by learning. Students will be introduced to environmental influences that affect behavioral phenotypes, like migration. This unit also focuses on how animals communicate by chemical, acoustical, visual, and tactile signals. Students will be able to discuss how various mating and parental care patterns affect reproductive success and energy costs. Lastly, this chapter discusses the reproductive benefits and costs of living in social

	groups.
Essential Questions: 1. How do genes influence behavior? 2. How do instinct and learning shape behavior? 3. How does the environment affect behavior? 4. What factors influence animal movements? 5. What are the benefits and costs of communication signals? 6. What factors affect mating and parental care? 7. What are the benefits and costs of living in a social group? 8. How can altruistic behavior be selectively advantageous?	**Enduring Understandings:** 1. Behavioral differences within and between closely related species can have a genetic basis. 2. Instinctive behavior can be performed without any prior experience and is often elicited by a simple stimulus. 3. Learning alters voluntary and involuntary behaviors. 4. Innate responses to specific stimuli can influence rate or direction of animal movement. Some animals migrate between habitats. 5. A communication signal transfers information within species and has a potential cost. 6. Monogamy is often rare due to positive effects of genetic diversity. The amount of parental care depends on the benefits and costs of care to each parent. 7. Group living improves defenses, shares care of offspring, and allows greater access to food. Group living increases competition and vulnerability to infections. 8. Altruistic behavior may be favored when individuals pass on genes indirectly, by helping relatives survive and reproduce.

PART II: INSTRUCTIONAL STRATEGIES AND RESOURCES

DESCRIBE THE LEARNING TARGETS.

After each target, identify the NGSS, NJCCCS or Common Core Standards that are applicable

Learning Target	**NGSS, NJCCCS or CCS**
1. Identify behavioral genetic variations within and among species. 2. Identify examples of instinctive behavior. 3. Distinguish between types of learned behavior, such classical and operant conditioning, habituation, and observational learning. 4. Explain how environment influences behavioral phenotypes. 5. Describe how animals move and navigate over long distances. 6. Describe how pheromones play a role in communication. 7. Identify various types of communication signals within and between species. 8. Compare and contrast how mating systems and parental care strategies affect reproductive success. 9. Identify the benefits and costs of group living. 10. Describe how altruism evolved.	**1.** HS-LS3-1; HS-LS3-2; HS-LS3-3; RST.11-12.1; RST.11-12.9; WHST.9-12.1; SL.11-12.5 **2.** HS-LS4-3; RST.11-12.1; WHST.9-12.2; WHST.9-12.9; MP.2 **3.** HS-LS4-3; RST.11-12.1; WHST.9-12.2; WHST.9-12.9; MP.2 **4.** HS-LS2-6; RST.9-10.8; RST.11-12.1; RST.11-12.7; RST.11-12.8; WHST.9-12.5; WHST.9-12.7; HSS-IC.B.6 **5.** HS-LS4-3; RST.11-12.1; WHST.9-12.2; WHST.9-12.9; MP.2 **6.** HS-LS4-3; RST.11-12.1; WHST.9-12.2; WHST.9-12.9; MP.2 **7.** HS-LS4-3; RST.11-12.1; WHST.9-12.2; WHST.9-12.9; MP.2 **8.** HS-LS3-1; HSLS3-3; RST.11-12.1; RST.11-12.9; SL.11-12.5 **9.** HS-LS2-8; RST.9-10.8; RST.11-12.1; RST.11-12.7; RST.11-12.8 **10.** HS-LS2-D; RST.9-10.8; RST.11-12.1; RST.11-12.7; RST.11-12.8

Interdisciplinary Connections:

Material presented in this unit connects with social studies as students will determine human examples of specific animal behavior. This unit also connects with math as students will analyze data in tables and graphs and create graphs in labs.

Students will engage with the following text:

Biology The Unity and Diversity of Life Volume 6 Ecology and Behavior 14th edition by Starr, Taggart, Evers, and Starr

Students will write:

Students will write responses to warm-up questions, conclusion questions in labs, and create a behavior diary/analysis of a current or former pet.

Students may be asked to write a lab report on pillbug behavior.

Students may be asked to perform POGILs (Process-oriented Guided Inquiry Learning) exercises.

PART III: TRANSFER OF KNOWLEDGE AND SKILLS

DESCRIBE THE LEARNING EXPERIENCE.

How will students uncover content and build skills.

Students will:

- Engage in textbook and other reading materials as described above
- Actively participate in class discussions both teacher and peer initiated
- Work collaboratively with peers on various assignments, labs, and/or projects
- Conduct research using library and internet resources
- Complete write to learn activities

Teacher will :

- Utilize PowerPoint technologies to present definitions, concepts and any other pertinent materials
- Use leading questions to spark classroom discussion
- Include media such as YouTube and other animations to connect concepts to real life applications or to further appeal to audio-visual learners.

PART IV: EVIDENCE OF LEARNING

IDENTIFY THE METHODS BY WHICH STUDENTS WILL DEMONSTRATE

THEIR UNDERSTANDING OF CONTENT AND THEIR ABILITY TO APPLY SKILLS.

IDENTIFY BLOOM'S LEVELS. {Note: Letters in red correspond to learning levels indicated in pyramid on the right}

<u>Formative Assessments</u>:

Formative assessments will be in the form of periodic quizzes, lab exercises and extemporaneous teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks.

Examples:

Gizmo Labs Ap, An, E, C

Section Assessment Questions R,U,Ap

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Modifications: Fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Enrichment/Enhancement:

- Research what methods work best when training animals.
- Read Ivan Pavlov's original paper on classical conditioning from the 1890s. He originally set out to study the digestive enzymes of dogs from an anatomical standpoint. His research changed focus when he noticed a "psychic secretion" in the dogs' mouths. Do you think you could have derived his theory of classical conditioning if presented with the same laboratory results?

Summative Assessments:

Students will be required to take tests, quizzes, and perform laboratory activities to demonstrate proficiency on the material presented in this unit.

Examples:

· Animal Behavior Quiz R,U,Ap

· Animal Behavior Test R,U,Ap, An, E

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means

of accurately assessing these students may include but not be limited to:

Modifications: Fill-in worksheets, chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template, adjust length of assignments as needed, modify supplemental materials for readability.

Accommodations: pair up with a strong lab partner, 1:1 assistance as needed, restate or rephrase instructions, answer key provided for students after completion of assignment, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard, monitor assignment book, assist in binder/notebook organization, preferential seating, allow student to use notebook on assessments.

Enrichment/Enhancement:

- Look into Koko's World, a project where humans taught sign language to gorillas. There is evidence as part of this study that other gorillas began imitating Koko's use of sign language appropriately. What type of learned behavior does this represent?
- Human pheromones are for sale on the Internet. Can you find any studies that indicate their role in human mate selection?
- Perform additional research into Lorenz's studies on imprinting in geese. Can you find any studies with other species where imprinting occurs?

Performance Assessments:

Design and conduct laboratory experiments and present conclusions in laboratory reports. Develop arguments supported by research and participate in debates, peer presentations, etc.

Examples:

· Pill Bug Lab U,Ap, An, E, C

Accommodations/Modifications:

Accommodations and/or modifications will be made on a case by case basis in accordance with individual student's needs.

Examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students may include but not be limited to:

Modifications: Chunk material in groups for easier readability, reword directions for clarity and comprehension, modify laboratory reports by providing a template on on-course website or eBoard, adjust

length of assignments as needed, and modify supplemental materials for readability.

Accommodations: provide examples for projects, 1:1 assistance as needed, restate or rephrase instructions, extended time to complete assessment, provide alternate access to any material or media via on-course website or eBoard.

Enrichment/Enhancement:

- Devise an experiment that would test the internal compass of birds.
- For those students in the class with some animal experiences, have them name behavior that seems based on instinct. Does there seem to be any advantage to this behavior at one time? Is there any advantage to this behavior now? If not, why does the behavior persist?

Black Horse Pike Regional School District
Highland Timber Creek Triton
Science Department

Syllabus: Ecology

Course Content

This course provides students an in-depth understanding of organisms and their interactions with the environment in a lab-oriented setting, emphasizing scientific literacy, and an understanding and appreciation of their roles in the global community. Students will be learning ecological concepts through inquiry-based activities that unify the themes and objectives listed below:

January-February: Population Ecology

Describe the factors that determine and change demographics of a population

Identify factors that cause population change

Calculate growth rates within changing and stable communities.

Create population charts and interpret demographic shifts.

Define the life history timeline of the human population

Evaluate how human population growth differs from all other populations.

Predict environmental factors that will shape the future of the human population.

February: Community Ecology

Identify environmental factors that determine the characteristics of a community

List 4 types of symbiosis found in a community

Explain how competition for resources shape an organism?

Describe how predator and prey relationships experience coevolution

List the importance of predator and herbivory relationships in an ecosystem.

Understand the harm caused and benefits found in parasitic and mutualistic relationships.

Distinguish between primary and secondary ecological succession

List how natural and man-made disasters affect a community structure?

Explain some biogeographic patterns in species richness?

March: Ecosystems

Determine the relationship between the sun, primary producers, and consumers.

Trace the flow of energy and biomass through ecosystems using energy and biomass pyramids.

Describe ecosystems based on interrelationships and interdependence, such as food webs.

Practice mapping energy flow from primary producers to the top consumer by creating food chains and food webs.

Develop models for each of the biogeochemical cycles.

Evaluate the effects of increased greenhouse gases on global climate changes and propose solutions to lower greenhouse gases.

Discuss the effects of human activity on natural resources and Earth's biogeochemical cycles

April: The Biosphere

Define biosphere and explain how it is affected by climate.

Use models to map Earth's rotation around the sun and explain the significant impact of sunlight on climate.

Determine the correlation between ocean currents, landforms, air masses and climate.

Practice research methods such as observation, experimentation and modeling for El Nino.

Discuss the distinct characteristics that separate land masses into biomes.

Compare and contrast each of the land biomes and provide their general geographic location.

Discuss factors that impact freshwater and coastal ecosystems.

May: Human Impact

Examine the role of humans in species extinction.

Determine how human activities could potentially transform entire biomes.

Describe how pollutants are directly endangering living organisms using examples.

Examine how climate change is threatening life on Earth.

Discuss the significance of conservation biology and ecological restoration.

Examine the measures that individuals can take to reduce their negative impact on biodiversity.

June: Animal Behavior

Discuss the role of genes in determining animal behavior.

Discuss how the behavioral traits of animals are modified by environmental factors.

Examine the different factors that influence animal movements.

Discuss the different types of communication signals used by animals.

Examine the different animal mating systems.

Determine the pros and cons of living in social groups.

Describe the benefits of altruistic behavior in animals using an example.

Course Expectations & Skills

1. Create and maintain a class notebook..
2. Write lab reports and expository pieces such as opinion papers.
3. Describe the contributions of scientists who made major breakthroughs in the past as well as scientists who are making technological advances to solve today's problems.
4. Produce creative projects such as biome dioramas, community planning maps, invasive or endangered species posters, ecological assessments and creation of population graphs.
5. Work collaboratively on group presentations, debates and case studies in addition to empirical experiments.
6. Interpret the relationship between organisms and their environment, from the organism level to the biosphere level.
7. Understand the Human effects on the environment and identify future solutions.

Resources

Primary text: ***Biology The Unity and Diversity of Life Volume 6 Ecology and Behavior*** **14th edition** by Starr, Taggart, Evers, and Starr

Grading Scale

Grades are calculated according to the following proportions:

Major assessments: 40% Minor assessments: 10%

Labs: 30% Practice: 20%