Zoology Curriculum Map 2019

updated 9/1/2019

	Pacing Guide	
Unit	Topics	Time Frame
1. Introduction to Animals	Systems of Classifications, Binomial Nomenclature, Use of evolution, development, nutrition, motility and reproduction. Basic Anatomical Terminology, Intro to Phyla	2 Weeks
2. Protozoa, Porifera, Cnidaria, Ctenophora	Morphology, evolution, nutrition, motility, reproduction	1 Week
3. Platyhelminthes, Nematoda	Morphology, evolution, nutrition, motility, reproduction, behavior, ecological impact	2 Weeks
4. Mollusca, Annelida	Morphology, evolution, nutrition, motility, reproduction, behavior, ecological impact	2 Weeks
5. Arthropoda	Morphology, evolution, nutrition, motility, reproduction, behavior, ecological impact MP Invertebrate Project	3 Weeks
6. Echinodermata, Chordata	Morphology, evolution, nutrition, motility, reproduction, behavior, ecological impact of each Class Of Chordates. Echinoderms Invertebrate Chordates Fishes and Amphibians Reptiles Birds Mammals MP Vertebrate Project	1 Week 1 Week 2 Weeks 2 Weeks 2 Weeks 2 Weeks

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Unit 1 Summary: Introduction to Animals

This unit is designed to develop students' understanding of zoology. It will guide students through historical and Linnaean classification. Students will engage in interpreting and creating dichotomous keys. Students will be introduced to the concept of binomial nomenclature. Students will classify animals based on common traits. This unit identifies general characteristics and examples of each phylum. Animals traits based on evolution, development, nutrition, movement, and reproduction will be analyzed. Basic prefixes and anatomical terminology relating to zoology will be introduced to provide a basis for understanding future material. Students will participate in collaborative activities, discussions, and analysis of digital media to reinforce these concepts. Students will engage in the use of several manipulative models to demonstrate animal diversity and complexity.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

1. **Why do we study zoology?**
2. **How do we classify animals?**
3. **How is a dichotomous key used?**
4. **What is binomial nomenclature?**
5. **How is an animal different from other organisms?**
6. **How do animals develop?**
7. **How do animals reproduce?**
8. **How do animals obtain and utilize energy?**
9. **How do different animals move?**
10. **How do the trends of evolution explain animal diversity?**
11. **How can animals be studied safely?**

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 50%)
Test 1: Introductory material. Describe traits of several organisms, utilize classification systems, and use descriptive morphological vocabulary.

Minor Assessments: Quizzes (15%)

1. Animal Traits/Morphology Quiz
2. Levels of Classification

Labs (25%)

1. Grouping organisms by common traits
2. Create a Dichotomous Key Lab

Practice (Homework/Classwork =10 %)
Amphibian Dichotomous Key, Shark Dichotomous Key

Formative Assessments: Exit ticket

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Linnaean Classification Activity

Resources

Texts: *Zoology 10th ed*, Stephen A. Miller and John P. Harley, McGraw Hill, 2016
Integrated Principles of Zoology 17th ed., Hickman et. al., McGraw Hill 2017

Intro to Animals Resource Folder

Science Recommended Accommodations & Modifications for Curriculum Implementation

Accommodations and Modifications Document

STANDARDS for Learning Targets

NGSS	Literacy	Cross curricular	CTE(NJSLS 9) Technology(NJSL8)
HS-LS2-1 - [*Performance Expectation*] - Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. **HS-LS2-2** - [*Performance Expectation*] - Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. **HS-LS2-8** - [*Performance Expectation*] - Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. **HS-LS4-1** - [*Performance Expectation*] - Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical	**LA.11-12.CCSS.ELA-Literacy.RST.11-12.1** - [*Grade Level Standard*] - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 -** [*Grade Level Standard*] - Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.3** - [*Grade Level Standard*] - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.4** - [*Grade Level Standard*] - Determine the meaning of symbols, key terms, and other domain-specific words and	**MP.4** Model with mathematics. **(HS-LS2-1),(HS-LS2-2),(HS-LS2-4**) **HSS-IC.B/6** Evaluate reports based on data. **(HS-LS2-6)**	**8.1.12.A.1** Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources. **9.2.12.C.1** Review career goals and determine steps necessary for attainment.

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evidence. **HS-LS4-5** - [*Performance Expectation*] - Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.7** - [*Grade Level Standard*] - Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **LA.11-12.CCSS.ELA-Literacy.WHST.11-12.9** - [*Grade Level Standard*] - Draw evidence from informational texts to support analysis, reflection, and research.	

Sample Measurable Objectives for Lesson Planning

1. Define zoology.
2. Explain the difference between historical and modern classification systems.
3. Distinguish between scientific names and common names.
4. Organize animals based on observable traits.
5. Utilize a dichotomous key.
6. Create a dichotomous key.
7. Demonstrate use of binomial nomenclature.
8. Identify animal characteristics.
9. Organize animals into phyla.
10. Characterize animals based on behavior and/or development.
11. Describe organisms using morphological terminology.

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Unit 2 Summary: Phyla Protozoa, Porifera, Cnidaria, and Ctenophora

This unit is designed to develop students' understanding of the phyla Protozoa, Porifera, Cnidaria, and Ctenophora. It will guide students through taxonomy and general characteristics. Students will identify behavioral and developmental traits for each phyla. This unit describes morphology, engaging students with pictures and videos.. Animals traits based on evolution, nutrition, movement, and reproduction will be analyzed. It will also list general characteristics for the main classes of each phyla. Ecological importance will be emphasized for each phyla. Students will participate in collaborative activities, discussions, and analysis of digital media to reinforce these concepts. Students will engage in the use of several manipulative models to demonstrate animal diversity and complexity.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

1. **What characteristics of protozoans distinguish them from other animals?**
2. **How does body plan in Porifera differ from simpler animals?**
3. **By which methods are Porifera able to reproduce?**
4. **How do the three main classes of sponges differ from each other?**
5. **How can movement be used to classify cnidarians?**
6. **How do cnidarians reproduce?**
7. **How do cnidarians differ in development?**
8. **What adaptations have increased the fitness of cnidarians?**
9. **What is the ecological importance of the phylum Cnidaria?**
10. **What are the main classes of Cnidaria?**
11. **What characteristics of ctenophores distinguish them from other animals?**
12. **How does Ctenophora compare to Cnidaria in form and reproduction?**

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 50%)
Test 2: Describe similarities and differences between phyla Protozoa, Porifera, Cnidaria, and Ctenophora. Identify classes in Porifera and Cnidaria.

Minor Assessments: Quizzes (15%)
Quiz protozoa vs porifera
Quiz Cnidaria vs Ctenophora

Labs (25%)
Research Lab: Choose a specific organism within the four phyla to research specific traits and biological impacts.

Practice (Homework/Classwork =10 %)
Protozoa and Porifera coloring assignment

Formative Assessments:
Exit Ticket on each phyla

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Resources

Texts: *Zoology 10th ed*, Stephen A. Miller and John P. Harley, McGraw Hill, 2016
Integrated Principles of Zoology 17th ed., Hickman et. al., McGraw Hill 2017

Protozoa and Porifera Folder
Cnidarians and Ctenophora Folder

Science Recommended Accommodations & Modifications for Curriculum Implementation

Accommodations and Modification Document

STANDARDS for Learning Targets

NGSS	Literacy	Cross curricular	CTE(NJSLS 9) Technology(NJSL8)
HS-LS2-1 - [*Performance Expectation*] - Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. **HS-LS2-2** - [*Performance Expectation*] - Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. **HS-LS2-8** - [*Performance Expectation*] - Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. **HS-LS4-1** - [*Performance Expectation*] - Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. **HS-LS4-5** - [*Performance Expectation*] - Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	**LA.11-12.CCSS.ELA-Literacy.RST.11-12.1** - [*Grade Level Standard*] - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 -** [*Grade Level Standard*] - Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.4** - [*Grade Level Standard*] - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.7** - [*Grade Level Standard*] - Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **LA.11-12.CCSS.ELA-Literacy.WHST.11-12.9** - [*Grade Level Standard*] - Draw evidence from informational texts to support analysis, reflection, and research.	**MP.4** Model with mathematics. **(HS-LS2-1),(HS-LS2-2),(HS-LS2-4**) **HSS-IC.B/6** Evaluate reports based on data. **(HS-LS2-6)**	**8.1.12.A.3** Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.

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Sample Measurable Objectives for Lesson Planning

1. Describe the general characteristics of protozoans
2. Describe the body plan of a porifera
3. Explain adaptations of porifera that allow them to feed, reproduce, move etc.
4. Describe the two different body plans of Cnidarians
5. Explain the development of the three body layers of Cnidarians
6. Explain adaptations of Cnidarians that allow them to feed, reproduce, move etc.
7. Identify influences of Cnidaria on other species
8. Compare and contrast different classes of Cnidaria
9. List differences that distinguish Ctenophora from Cnidaria

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Unit 3 Summary: Phyla Platyhelminthes, Nematoda

This unit is designed to develop students' understanding of the phyla Platyhelminthes and Nematoda. It will guide students through taxonomy and general characteristics. Students will identify behavioral and developmental traits for each phyla. This unit describes morphology, engaging students with pictures and videos.. Animals traits based on evolution, nutrition, movement, and reproduction will be analyzed. It will also list general characteristics for the main classes of each phyla. Ecological importance will be emphasized for each phyla. Students will participate in collaborative activities, discussions, and analysis of digital media to reinforce these concepts. Students will engage in the use of several manipulative models to demonstrate animal diversity and complexity. Students will perform observational lab to gain first hand experience with body form and adaptive behaviors of flatworms. Students will read and write to expand knowledge of the phyla's impact on human activities.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

1. **How do the important characteristics of flatworms separate them from simpler animals?**
2. **How do acoelomate, pseudocoelomate, and coelomate body plans differ?**
3. **How does a worm's digestive and nervous system allow for more complex body structures?**
4. **What evolutionary adaptations have led to increased fitness for flatworms?**
5. **What are the positive ecological impacts of roundworms?**
6. **What are the common types of parasitic roundworms**
7. **How do people become infected with roundworms? How can this be prevented?**
8. **What evolutionary adaptations have led to increased fitness for roundworms?**
9. **Why is it important to avoid parasites?**

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 50%)

Test #3 Describe and compare phylum Nematoda, Platyhelminthes. Interpret Diagrams. Writing: Positive ecological influence vs. disease

Minor Assessments: Quizzes (15%)

Quiz: Interpreting Diagrams: Label, Explain, Compare body plans.

Labs (25%)
Flatworm observation/ investigation

Practice (Homework/Classwork =10 %)

Formative Assessments:

Compare and contrast anatomical drawings/diagrams
Writing assignment: Research diseases caused by roundworms. Who is affected, what medicines are used, risks, prognosis, complications.

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Resources

Texts: *Zoology 10th ed*, Stephen A. Miller and John P. Harley, McGraw Hill, 2016
Integrated Principles of Zoology 17th ed., Hickman et. al., McGraw Hill 2017

Platyhelminthes, Nematoda Resource Folder

Science Recommended Accommodations & Modifications for Curriculum Implementation

Accommodations and Modifications Document

STANDARDS for Learning Targets

NGSS	Literacy	Cross curricular	CTE(NJSLS 9) Technology(NJSL8)
HS-LS1-2 - [*Performance Expectation*] - Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. **HS-LS2-1** - [*Performance Expectation*] - Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. **HS-LS2-2** - [*Performance Expectation*] - Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. **HS-LS2-8** - [*Performance Expectation*] - Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. **HS-LS4-1** - [*Performance Expectation*] - Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical	**LA.11-12.CCSS.ELA-Literacy.RST.11-12.1** - [*Grade Level Standard*] - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 -** [*Grade Level Standard*] - Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.3** - [*Grade Level Standard*] - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.4** - [*Grade Level Standard*] - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.7** - [*Grade Level Standard*] - Integrate and evaluate multiple	**MP.4** Model with mathematics. **(HS-LS2-1),(HS-LS2-2),(HS-LS2-4**) **HSS-IC.B/6** Evaluate reports based on data. **(HS-LS2-6)** **HSN.Q.A.2** Define appropriate quantities for the purpose of descriptive modeling. **(HS-LS2-1)**	**8.1.12.A.3** Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue. **8.1.12.C.1** Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

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evidence. **HS-LS4-5** - [*Performance Expectation*] - Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **LA.11-12.CCSS.ELA-Literacy.WHST.11-12.9** - [*Grade Level Standard*] - Draw evidence from informational texts to support analysis, reflection, and research.

Sample Measurable Objectives for Lesson Planning

1. Identify differences between worms and simpler organisms
2. Explain flatworm body plan and anatomical changes
3. Diagram simple worm anatomy
4. Compare the three classes of flatworms
5. Explain the evolution of flatworm nervous and digestive systems
6. Summarize the life cycle of a flatworm
7. Explain differences between acoelomate, pseudocoelomate, and coelomate development
8. Explain the impact of flat/round worms on human society
9. Summarize the life cycle of a roundworm
10. Predict the outcome of a parasitic infection
11. Compare and Contrast flatworms vs roundworms

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Unit 4 Summary: Phyla Mollusca and Annelida

This unit is designed to develop students' understanding of the phyla Mollusca and Annelida. It will guide students through taxonomy and general characteristics. Students will identify behavioral and developmental traits for each phyla. This unit describes morphology, engaging students with pictures and videos.. Animals traits based on evolution, nutrition, movement, and reproduction will be analyzed. It will also list general characteristics for the main classes of each phyla. Ecological and economic importance will be emphasized for each phyla. Students will participate in collaborative activities, discussions, and analysis of digital media to reinforce these concepts. Students will engage in the use of manipulative models and animal dissection to demonstrate animal diversity and complexity.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

1. **What characteristics of mollusks distinguish them from other animals?**
2. **What is the economic and ecological importance of the phylum Mollusca?**
3. **What are the main parts of the mollusk body plan?**
4. **How does the internal anatomy differ among mollusks?**
5. **What are the main classes of Mollusca?**
6. **What characteristics of Annelida distinguish them from other animals?**
7. **What are the distinguishing characteristics of annelid organ systems?**
8. **How do the main classes of Annelida differ?**
9. **Why is the Class Oligochaeta important?**
10. **How is Mollusca related to Annelida?**

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 50%)
Test 4: Compare and contrast characteristics of Mollusca and Annelida. Identify classes of each phyla.

Minor Assessments: Quizzes (15%)
Quiz on Mollusca
Quiz on Annelida

Labs (25%)
Dissect an octopus and identify distinguishing characteristics.
Research Lab: Choose a specific species from Mollusca or Annelida to research specific traits and biological impacts.

Practice (Homework/Classwork =10 %)
Webquest on Mollusks

Formative Assessments:
Basic taxonomy activity on mollusks

Resources

Texts: *Zoology 10th ed*, Stephen A. Miller and John P. Harley, McGraw Hill, 2016

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Integrated Principles of Zoology 17th ed., Hickman et. al., McGraw Hill 2017

Mollusca Folder
Annelida Folder

Science Recommended Accommodations & Modifications for Curriculum Implementation
Accommodation and Modification Document

STANDARDS for Learning Targets			
NGSS	**Literacy**	**Cross curricular**	**CTE(NJSLS 9) Technology(NJSL8)**
HS-LS1-2 - [*Performance Expectation*] - Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. **HS-LS2-1** - [*Performance Expectation*] - Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. **HS-LS2-2** - [*Performance Expectation*] - Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. **HS-LS2-8** - [*Performance Expectation*] - Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. **HS-LS4-1** - [*Performance Expectation*] - Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. **HS-LS4-5** - [*Performance Expectation*] - Evaluate the evidence supporting claims that	**LA.11-12.CCSS.ELA-Literacy.RST.11-12.1** - [*Grade Level Standard*] - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 -** [*Grade Level Standard*] - Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.3** - [*Grade Level Standard*] - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.4** - [*Grade Level Standard*] - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.7** - [*Grade Level Standard*] - Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.	**MP.4** Model with mathematics. **(HS-LS2-1),(HS-LS2-2),(HS-LS2-4**) **HSS-IC.B/6** Evaluate reports based on data. **(HS-LS2-6)** **HSN.Q.A.2** Define appropriate quantities for the purpose of descriptive modeling. **(HS-LS2-1)**	**8.1.12.A.3** Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue. **8.1.12.C.1** Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.

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changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	**LA.11-12.CCSS.ELA-Literacy.WHST.11-12.9** - [*Grade Level Standard*] - Draw evidence from informational texts to support analysis, reflection, and research.

Sample Measurable Objectives for Lesson Planning

1. Describe identifying characteristics of mollusks.
2. Explain the economic and ecological importance of mollusks.
3. Identify the main parts of the mollusk body plan.
4. Distinguish between the internal anatomy of mollusks.
5. Compare and contrast the main classes of Mollusca.
6. Describe identifying characteristics of annelids.
7. Analyze the organ systems of annelids.
8. Compare and contrast the main classes of Annelida.
9. Describe the importance of earthworms.
10. Compare and contrast Mollusca and Annelida.

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Unit 5 Summary: Phylum Arthropoda

This unit is designed to develop students' understanding of the phylum Arthropoda. It will guide students through taxonomy and general characteristics. Students will identify behavioral and developmental traits for each subphyla. This unit describes morphology, engaging students with pictures and videos.. Animals traits based on evolution, nutrition, movement, and reproduction will be analyzed. It will also list general characteristics for some classes of each subphyla. Ecological importance will be emphasized for the phylum. Students will participate in collaborative activities, discussions, and analysis of digital media to reinforce these concepts. Students will engage in the use of several manipulative models to demonstrate animal diversity and complexity. Students will perform a dissection lab to gain first hand experience with body form.. Students will read and write to expand knowledge of the phyla's impact on human activities.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

1. **What characteristics of arthropods distinguish them from other animals?**
2. **What is the economic and ecological importance of the phylum Arthropoda?**
3. **How do insects develop?**
4. **What are the main subphlya of Arthorpoda?**
5. **How do arthropod subphyla differ from each other?**
6. **What are the distinguishing characteristics of Arthropod organ systems?**
7. **How does insect social behavior aid in survival?**
8. **What evolutionary adaptations have led to increased fitness for arthropods?**
9. **What defense mechanisms have evolved in Arthropoda?**
10. **What modes of motility are utilized by different arthropods?**

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 50%)

Test 5: Describe and identify general characteristics of the phylum and each subphyla.
Project MP1 - Invertebrate organisms
- Select organism
- Describe defining features
- Classify Organism through all levels using traits to describe how organism fits into each level of classification.
-Use Diagrams to show examples

Minor Assessments: Quizzes (15%)

Quiz: Arthropod Development and Body Plan

Labs (25%)

Dissection/Observation Various Arthropods (Scorpion, Grasshopper, Crayfish)
Insect Collection Lab - students will go outside, collect insects and study them using dissection microscopes.

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Practice (Homework/Classwork =10 %)

Sequence/Diagram Life Cycle

Formative Assessments:

Literacy: Research and write about diseases caused by various arthropods and their impact on human society.

Resources

Texts:

Zoology 10th ed, Stephen A. Miller and John P. Harley, McGraw Hill, 2016
Integrated Principles of Zoology 17th ed., Hickman et. al., McGraw Hill 2017

Arthropod Resource Folder

Science Recommended Accommodations & Modifications for Curriculum Implementation

Accommodation and Modification Document

STANDARDS for Learning Targets			
NGSS	**Literacy**	**Cross curricular**	**CTE(NJSLS 9) Technology(NJSL8)**
HS-LS1-2 - [*Performance Expectation*] - Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. **HS-LS2-1** - [*Performance Expectation*] - Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. **HS-LS2-2** - [*Performance Expectation*] - Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different	**LA.11-12.CCSS.ELA-Literacy.RST.11-12.1** - [*Grade Level Standard*] - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 -** [*Grade Level Standard*] - Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.3** - [*Grade Level Standard*] - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in	**MP.4** Model with mathematics. **(HS-LS2-1),(HS-LS2-2),(HS-LS2-4**) **HSS-IC.B/6** Evaluate reports based on data. **(HS-LS2-6)** **HSN.Q.A.2** Define appropriate quantities for the purpose of descriptive modeling. **(HS-LS2-1)**	**8.1.12.A.3** Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue. **8.1.12.D.5** Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

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scales. **HS-LS2-8** - [*Performance Expectation*] - Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. **HS-LS4-1** - [*Performance Expectation*] - Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. **HS-LS4-5** - [*Performance Expectation*] - Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	the text. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.4** - [*Grade Level Standard*] - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.7** - [*Grade Level Standard*] - Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **LA.11-12.CCSS.ELA-Literacy.WHST.11-12.9** - [*Grade Level Standard*] - Draw evidence from informational texts to support analysis, reflection, and research.

Sample Measurable Objectives for Lesson Planning

1. **Describe characteristics of the phylum Arthropoda.**
2. **Explain how arthropods impact human society both positively and negatively.**
3. **Explain insect metamorphosis and its function.**
4. **List and identify the main subphyla of arthropods.**
5. **Compare and contrast arthropod subphyla.**
6. **Explain the function and significance of arthropod organ systems as compared to other phyla**
7. **Identify features of insect social behavior.**
8. **Describe the main evolutionary adaptations of arthropods that have led to increased fitness.**
9. **Explain insect defense mechanisms.**
10. **Create a model of an arthropod and explain its body plan**
11. **Compare the different body structures that arthropods use for movement.**

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Unit 6 Summary: Phyla Echinodermata and Chordata

This unit is designed to develop students' understanding of the phylum Echinodermata and Chordata. It will guide students through taxonomy and general characteristics. Students will identify behavioral and developmental traits for each phyla. This unit describes morphology, engaging students with pictures and videos.. Animals traits based on evolution, nutrition, movement, and reproduction will be analyzed. It will also list general characteristics for classes of each subphyla. Ecological importance will be emphasized for each phylum. Students will participate in collaborative activities, discussions, and analysis of digital media to reinforce these concepts. Students will engage in the use of several manipulative models to demonstrate animal diversity and complexity. Students will perform a dissection lab to gain first hand experience with body form.. Students will read and write to expand knowledge of each phyla's impact on human activities.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

1. What characteristics distinguish Echinodermata from other animals?
2. What anatomical features do echinoderms have?
3. What are the classes of the phylum Echinodermata?
4. How do the echinoderm classes differ?
5. What characteristics distinguish Chordata from other animals?
6. What are the three main subphyla of Chordata?
7. What are the 2 main superclasses of Chordata?
8. How do Chondrichthyes and Osteichthyes differ?
9. How did tetrapods evolve from Osteichthyes?
10. What are the general characteristics of Class Amphibia?
11. What are the three main orders of amphibians?
12. What is the difference between a frog and a toad?
13. What are the general characteristics of Class Reptilia?
14. What are the three main orders of reptiles?
15. What is the difference between a turtle and a tortoise?
16. What is the difference between an alligator and a crocodile?
17. What are the distinguishing characteristics of Class Aves?
18. How are birds adapted for flight?
19. How are birds important to humans?
20. What are some of the major orders of birds?
21. What are the general characteristics of mammals?
22. What are the three main groups of mammals?
23. What behavioral adaptations do mammals share?
24. How are mammals anatomically different from other chordate classes?
25. What are examples of animals in the main orders of mammals?
26. What is the ecological and economic importance of mammals?

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Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 50%)
Test 6: Simple Chordates, and Fishes
Test 7: Amphibians and Reptiles
Test 8: Birds and Mammals
Project MP2 - Vertebrate organisms
- Select organism
- Describe defining features
- Classify Organism through all levels using traits to describe how organism fits into each level of classification.
-Use Diagrams to show examples
-Create informative materials

Minor Assessments: Quizzes (15%)

Quiz: Echinoderm Classification, Body Plans, Adaptations
Quiz: Amphibian Classification, Morphology, Adaptations, Major Orders
Quiz: Bird Classification, Morphology, Adaptations, Major Orders

Labs (25%)

Dissection/Observation Bony Fish (Stingray, Perch, Dogfish)
Dissection/Observation Reptiles (Turtle, Lizard, Snake)
Dissection/Observation Mammals (Rats, Rabbits)
Classification of specimens all types (Specimen Jars)

Practice (Homework/Classwork =10 %)

Birdwatching and classification using dichotomous keys and guidebooks
Track Molds, creation and classification of animals from tracks

Formative Assessments:
Classification game using pictures. Explain how you would classify organisms
Zoology Bingo for identifying different phyla and classes

Resources

Texts:
Zoology 10th ed, Stephen A. Miller and John P. Harley, McGraw Hill, 2016
Integrated Principles of Zoology 17th ed., Hickman et. al., McGraw Hill 2017

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Echinodermata Resource Folder

Chordata Resource Folder

Science Recommended Accommodations & Modifications for Curriculum Implementation

Accommodations and Modifications Document

STANDARDS for Learning Targets			
NGSS	**Literacy**	**Cross curricular**	**CTE(NJSLS 9) Technology(NJSL8)**
HS-LS1-2 - [*Performance Expectation*] - Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. **HS-LS2-1** - [*Performance Expectation*] - Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. **HS-LS2-2** - [*Performance Expectation*] - Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. **HS-LS2-8** - [*Performance Expectation*] - Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce. **HS-LS4-1** - [*Performance Expectation*] - Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. **HS-LS4-5** - [*Performance Expectation*] - Evaluate the evidence supporting claims that changes in environmental conditions may result in (1) increases in the number of	**LA.11-12.CCSS.ELA-Literacy.RST.11-12.1** - [*Grade Level Standard*] - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.2 -** [*Grade Level Standard*] - Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.3** - [*Grade Level Standard*] - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.4** - [*Grade Level Standard*] - Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics. **LA.11-12.CCSS.ELA-Literacy.RST.11-12.7** - [*Grade Level Standard*] - Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. **LA.11-12.CCSS.ELA-Literacy.WHST.11-12.9** - [*Grade Level Standard*] - Draw evidence from	**MP.4** Model with mathematics. **(HS-LS2-1),(HS-LS2-2),(HS-LS2-4**) **HSS-IC.B/6** Evaluate reports based on data. **(HS-LS2-6)** **HSN.Q.A.2** Define appropriate quantities for the purpose of descriptive modeling. **(HS-LS2-1)**	**8.1.12.A.3** Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue **8.1.12.E.1** Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources. **8.1.12.F.1** Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs. **9.2.12.C.1** Review career goals and determine steps necessary for attainment.

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individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	informational texts to support analysis, reflection, and research.

Sample Measurable Objectives for Lesson Planning

1. Describe the characteristics of the phylum Echinodermata.
2. Identify anatomical features of echinoderms.
3. Distinguish between the classes of echinoderms.
4. What are the characteristics of chordates.
5. List the subphyla of Chordata.
6. Distinguish between chordates with and without jaws.
7. Compare and contrast Chondrichthyes and Osteichthyes.
8. Analyze the evolution of tetrapods.
9. Describe the characteristics of Class Amphibia.
10. Identify the three main orders of amphibians.
11. Compare and contrast frogs and toads.
12. Identify characteristics of Class Reptilia.
13. Distinguish between the three main orders of reptiles.
14. Compare and contrast a turtle and a tortoise.
15. Compare and contrast an alligator and a crocodile.
16. Describe the characteristics of birds.
17. Identify and explain the adaptations of birds that allow flight.
18. Explain the importance of birds influence on human populations.
19. Describe traits of the major orders of birds.
20. Make a list of the characteristics of mammals vs. other chordates.
21. Classify organisms based on observable traits into phyla, class, order…
22. Explain the behavioral traits that mammals utilize to increase fitness.
23. Diagrams the anatomical features of mammals that differentiate them from other chordates.
24. List some of the main groups of mammals and describe their characteristics.
25. Give examples and explain the impact of mammalian life on human activities.

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