Winslow Township School District

Zoology CP (Semester Course)

Unit 5: Phyla Echinodermata and Chordata

Overview: 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.

Overview	Standards for Science	Unit Focus	Essential Questions
Unit 5 **Phyla Echinodermata and Chordata**	• **HS-LS2-1** • **HS-LS2-2** • **HS-LS2-8** • **HS-LS4-1** • **HS-LS4-5** • **WIDA 1, 4**	• Describe the characteristics of the phylum Echinodermata. • Identify anatomical features of echinoderms. • Distinguish between the classes of echinoderms. • List the subphyla of Chordata. • Distinguish between chordates with and without jaws. • Compare and contrast Chondrichthyes and Osteichthyes. • Analyze the evolution of tetrapods. • Describe the characteristics of Class Amphibia. • Identify the three main orders of amphibians. • Compare and contrast frogs and toads. • Identify characteristics of Class Reptilia. • Distinguish between the three main orders of reptiles. • Compare and contrast a turtle and a tortoise. • Compare and contrast an alligator and a crocodile. • Describe the characteristics of birds. • Identify and explain the adaptations of birds that allow flight. • Explain the importance of birds influence on human populations. • Describe traits of the major orders of birds. • Make a list of the characteristics of mammals vs. other chordates. • Classify organisms based on observable traits into phyla, class, order… • Explain the behavioral traits that mammals utilize to increase fitness. • Diagrams the anatomical features of mammals that differentiate them from other chordates. • List some of the main groups of mammals and describe their characteristics. • Give examples and explain the impact of mammalian life on human activities.	• What characteristics distinguish Echinodermata from other animals? • What anatomical features do echinoderms have? • What are the classes of the phylum Echinodermata? • How do the echinoderm classes differ? • What characteristics distinguish Chordata from other animals? • What are the three main subphyla of Chordata? • What are the 2 main superclasses of Chordata? • How do Chondrichthyes and Osteichthyes differ? • How did tetrapods evolve from Osteichthyes? • What are the general characteristics of Class Amphibia? • What are the three main orders of amphibians? • What is the difference between a frog and a toad? • What are the general characteristics of Class Reptilia? • What are the three main orders of reptiles? • What is the difference between a turtle and a tortoise? • What is the difference between an alligator and a crocodile? • What are the distinguishing characteristics of Class Aves?

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Unit 5: Enduring Understandings	• Members of the phylum Echinodermata are characterized by the presence of pentaradial symmetry, an internal calcium carbonate skeleton, a water-vascular system, and a hemal system. • The Echinodermata and the Hemichordata comprise the deuterostome clade Ambulacraria. Their relationship is supported by the presence of homologous larval stages and recent molecular evidence. Their closest relatives are members of the phylum Chordata. Relationships within the Echinodermata are controversial. The water-vascular system probably evolved for suspension feeding, similar to its use for that purpose by crinoids. The evolution of a more mobile lifestyle has resulted in the use of the water-vascular system for locomotion and in the assumption of a mouth-down position. • Chordates have five distinctive characteristics. A notochord is a supportive rod that extends most of the length of the animal. Pharyngeal slits are a series of openings between the digestive tract and the outside of the body. The tubular nerve cord lies just above the notochord and expands anteriorly into a brain. A postanal tail extends posteriorly to the anus and is supported by the notochord or the vertebral column. An endostyle functions in filter feeding or a thyroid gland functions as an endocrine organ. • Echinoderms, hemichordates, and chordates comprise Deuterostomia. Chordata is a monophyletic assemblage consisting of three subphyla: Urochordata, Cephalochordata, and Craniata. Urochordata is probably a sister-group to Craniata. The vertebrates are the largest and most successful craniates. • The origin of the deuterostome lineage is unresolved, but recent evidence is shedding light on lingering questions. Molecular data suggest that basal deuterostomes originated about 550 mya. The fossil record shows that by 502 mya all five extant deuterostome phyla were in existence. The common deuterostome ancestor may have been pterobranch-like or enteropneust-like. Developmental studies provide convincing evidence for the ambulacrarian clade. Fossils showing shared cephalochordate/chordate characters are dated to about 530 mya. • Terrestrial vertebrates are called tetrapods and arose from sarcopterygians. The exact relationship among living and extinct amphibian groups is tentative. However, the most widely accepted hypothesis is that the ancient amphibian group Temnospondyli gave rise to Lissamphibia. • Birds are members of the archosaur lineage. A growing fossil record of ancestral theropods is documenting the origin of ancient birds. These fossils also give clues to the origin of flight and the origin of modern bird lineages.	• How are birds adapted for flight? • How are birds important to humans? • What are some of the major orders of birds? • What are the general characteristics of mammals? • What are the three main groups of mammals? • What behavioral adaptations do mammals share? • How are mammals anatomically different from other chordate classes? • What are examples of animals in the main orders of mammals? • What is the ecological and economic importance of mammals?

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Curriculum Unit 5	Standards		Pacing	
			Days	Unit Days
Unit 5: **Phyla Echinodermata and Chordata**	**HS-LS2-1**	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	6	34
	HS-LS2-2	Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.	6	
	HS-LS2-8	Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.	6	
	HS-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	6	
	HS-LS4-5	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.	6	
	Assessment, Re-teach and Extension		2	
	Final Exam		2	

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Unit 5 - Zoology CP		
Disciplinary Core Ideas	**Indicator #**	**Indicator**
LS2.A: Interdependent Relationships in Ecosystems Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1), (HS-LS2-2) **LS2.C: Ecosystem Dynamics, Functioning, and Resilience** A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. (HS-LS2-2), (HS-LS2-6) **LS2.D: Social Interactions and Group Behavior** Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives. (HS-LS2-8) **LS4.A: Evidence of Common Ancestry and Diversity** Genetic information provides evidence of evolution. DNA sequences vary among species, but there are many overlaps; in fact, the ongoing branching that produces multiple lines of descent can be inferred by comparing the DNA sequences of different organisms. Such information is also derivable from the similarities and differences in amino acid sequences and from anatomical and embryological evidence. (HS-LS4-1) **LS4.C: Adaptation** Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline–and sometimes the extinction–of some species. (HS-LS4-5), (HS-LS4-6) Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species' evolution is lost. (HS-LS4-5)	**HS-LS2-1**	Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.
	HS-LS2-2	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	Evaluate evidence for the role of group behavior on individual and species' chances to survive and reproduce.
	HS-LS4-1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.
	HS-LS4-5	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.

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Unit 5 – Zoology CP	
Assessment Plan	
• Exploratory activities • Warm-up/Ticket Out activities • Class discussions • Student Participation • Teacher Observations • Virtual/Hands-On Labs • Self-Test Assessments • Scientist Timeline Activity	• Quizzes and Tests (Chapters 16,17,19,20,21, "Zoology (11th edition)" by Stephen Miller and Todd Tupper) • Authentic assessments and projects • Exploratory activities • Presentations • Lecture Notes • Think-Pair-Share • Graphic Organizers • Study Questions at the end of each chapter • Multiple Choice and Critical Thinking at the end of each chapter
Resources	**Activities**
•Chromebooks •Textbook ("Zooloy, 11th edition" Miller and Tupper) •www.My.mheducation.com •Web Quests •Virtual Field Trips •Video Streaming •BrainPOP •Puzzlemaker: Game Based Learning | Discovery Education Diversity, Equity & Inclusion Educational Resources https://www.nj.gov/education/standards/dei/	• Use various forms of expository writing-procedural writing, narrative writing, descriptive writing, labeling, as well as to create visuals, graphs, tables, diagrams and charts. • Use scientific argumentation with exercises on writing claims, using evidence to support your claim and explaining the reasoning behind their claim. • Mini-lessons • Independent reading • Films • Website exploration • Discussions, dialogues • Debates • Laboratory experiments • Partner or small group work • Student presentations, reports, journals, reflections • In-class assessments • Written reports, essays, research, and homework

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Instructional Best Practices and Exemplars	
1. Identifying similarities and differences 2. Summarizing and note taking 3. Reinforcing effort and providing recognition 4. Homework and practice 5. Nonlinguistic representations	6. Cooperative learning 7. Setting objectives and providing feedback 8. Generating and testing hypotheses 9. Cues, questions, and advance organizers 10. Manage response rates

9.1 Personal Financial Literacy, 9.2 Career Awareness, Exploration, Preparation and Training & 9.4 Life Literacies and Key Skills

The implementation of the 21st Century skills and standards for students of the Winslow Township District is infused in an interdisciplinary format in a variety of curriculum areas that include, English language Arts, Mathematics, School Guidance, Social Studies, Technology, Visual and Performing Arts, Science, Physical Education and Health, and World Language.

Additional opportunities to address 9.1, 9.2 & 9.4:

Philadelphia Mint

https://www.usmint.gov/learn/kids/resources/educational-standards

Different ways to teach Financial Literacy.

https://www.makeuseof.com/tag/10-interactive-financial-websites-teach-kids-money-management-skills/

- 9.4.12.IML.2: Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources (e.g., NJSLSA.W8, Social Studies Practice: Gathering and Evaluating Sources.
- 9.4.12.TL.1: Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).
- 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
- 9.4.12.GCA.1: Collaborate with individuals to analyze a variety of potential solutions to climate change effects and determine why some solutions (e.g., political. economic, cultural) may work better than others (e.g., SL.11-12.1., HS-ETS1-1, HS-ETS1-2, HS-ETS1-4, 6.3.12.GeoGI.1, 7.1.IH.IPERS.6, 7.1.IL.IPERS.7, 8.2.12.ETW.3).
- 9.4.12.DC.7: Evaluate the influence of digital communities on the nature, content and responsibilities of careers, and other aspects of society (e.g., 6.1.12.CivicsPD.16.a).
- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).
- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).
- 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).
- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

Modifications for Special Education/504

Students with special needs: The students' needs will be addressed on an individual and grade level using a variety of modalities. Accommodations will be made for those students who need extra time to complete assignment. Support staff will be available to aid students related to IEP specifications. 504 accommodations will also be attended to by all instructional leaders. Physical expectations and modifications, alternative assessments, and scaffolding strategies will be used to support this learning. The use of Universal Design for Learning (UDL) will be considered for all students as teaching strategies are considered.

- Small group instruction
- Audio books/ Text-to-speech platforms
- Leveled texts/Vocabulary Readers
- Leveled informational texts via online
- Modeling and guided practice
- Read directions aloud
- Repeat, rephrase and clarify directions
- Extended time as needed
- Break down assignments into smaller units
- Provide shortened assignments
- Modify testing format
- Repeat directions as needed
- Graphic organizers
- Study Guides, Study Aids and Re teaching as needed

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Modifications for At-Risk Students
Formative and summative data will be used to monitor student success. At first signs of failure, student work will be reviewed to determine support. This may include parent consultation, basic skills review and differentiation strategies. With considerations to UDL, time may be a factor in overcoming developmental considerations • Audio books and Text-to-speech platforms • Leveled texts/Vocabulary Readers • Leveled informational texts via online • Extended time as needed • Read directions aloud • Assist with organization • Use of computer • Emphasize/highlight key concepts • Recognize success • Provide timelines for work completion • Break down multi-step tasks into smaller chunks • Provide copy of class notes and graphic organizer

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English Language Learners	Modifications for Gifted Students

All WIDA Can Do Descriptors can be found at this link:
https://wida.wisc.edu/teach/can-do/descriptors
Grades 9-12 WIDA Can Do Descriptors...
Listening…
• Process recounts by…
  ○ Categorizing perspectives of multiple speakers
  ○ Identifying important information on specific event & concept from lecture/presentation
• Process explanations by…
  ○ Recognizing specific language used to enhance clarity and precision
  ○ Recognizing and following language related to the same event or phenomenon throughout presentations
• Process arguments by…
  ○ Identifying strengths, limitations, and potential biases from oral presentations
  ○ Organizing claims and counter claims presented in debates
Speaking…
• Recount by…
  ○ Adjusting presentation style, degree of formality, word choice, tone, and information to the context and audience
  ○ Presenting information that follows discipline specific organization (e.g., orientation to topic, sequence of events, conclusion)
• Explain by…
  ○ Providing precision and accuracy in classifications, procedures, processes, and accounts using abstraction, technical language, and a variety of active/passive verb forms
  ○ Following discipline-specific organization (e.g., orienting the reader, details, conclusion) and supporting presentations with graphs, formulas, quotes or other media
• Argue by…
  ○ Organizing claims and counter claims in debates with evidence from multiple sources
  ○ Negotiating differing cultural perspectives in pairs or small groups
Reading…
• Process recounts by…
  ○ Analyzing and comparing how authors use language for specific purposes and audiences
  ○ Identifying how authors develop and maintain cohesion by connecting ideas or events in extended texts
• Process explanations by…
  ○ Recognizing discipline-specific patterns (e.g., orienting the reader, part-whole classification, neutral/ authoritative tone)
	Students excelling in mastery of standards will be challenged with complex, high level challenges related to the topic.
	• Raise levels of intellectual demands
	• Require higher order thinking, communication, and leadership skills
	• Differentiate content, process, or product according to student's readiness, interests, and/or learning styles
	• Provide higher level texts
	• Expand use of open-ended, abstract questions
	• Critical and creative thinking activities that provide an emphasis on research and in-depth study
	• Enrichment Activities/Project-Based Learning/ Independent Study
	
	Additional Strategies may be located at the links:
	❖ Gifted Programming Standards
	❖ Webb's Depth of Knowledge Levels and/or Revised Bloom's Taxonomy
	❖ REVISED Bloom's Taxonomy Action Verbs

- Identifying authors' precision and accuracy in classifications, comparisons, accounts, or procedures as a result of clear language choices
- Process arguments by…
  - Evaluating word choice and nuance as tools for distinguishing facts, claims, reasoned judgment, and opinions
  - Identifying the logical connections among claims, counterclaims, reasons, and evidence

Writing…

- Recount by…
  - Summarizing content-related notes from lectures or readings
  - Producing research reports using multiple sources of information
- Explain by…
  - Developing ideas about phenomena with relevant and sufficient facts, extended descriptions, concrete details, or quotations
  - Maintaining discipline-specific patterns that bridge across key uses (e.g., explanation to argument in history, explanation to recount for information reports)
- Argue by…
  - Evaluating positive and negative implications associated with various positions (e.g., historical events, scientific discoveries, individuals)
  - Organizing information logically and coherently to represent contrasting views

Oral Language…

- Discuss by…
  - Identifying and reacting to subtle differences in speech and register (e.g., hyperbole, satire, comedy)
  - Producing coherent oral discourse appropriate to task, purpose, and audience
  - Synthesizing and sharing information from a variety of sources and perspectives

Students will be provided with accommodations and modifications that may include:

- Relate to and identify commonalities in Social Studies and science in student's home country
- Assist with organization
- Use of computer
- Emphasize/highlight key concepts
- Teacher Modeling
- Peer Modeling
- Label Classroom Materials - Word Walls

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Interdisciplinary Connections

English Language Arts/Literacy

1. 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. **RST.11-12.1** (HS-LS2-1),(HS-LS2-2),(HS-LS2-6)
2. 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. **RST.11-12.7** (HS-LS2-6)
3. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. **RST.11-12.8** (HS-LS2-6)
4. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **RST.11-12.9** (HS-ETS1-1),(HS-ETS1-3)
5. Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. **WHST.9-12.2** (HS-LS2-1),(HS-LS2-2)
6. Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. **WHST.9-12.7** (HS-LS1-3)
7. Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. **WHST.11-12.8** (HS-LS1-3)
8. Draw evidence from informational texts to support analysis, reflection, and research. **WHST.9-12.9** (HS-LS1-1)
9. **WIDA Standards 1** English language learners communicate for social and instructional purposes within the school setting
10. **WIDA Standards 4** English language learners communicate information, ideas, and concepts necessary for academic success in the content area of science
11. Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. **SL.11-12.5** (HS-LS1-2)

Mathematics

1. Reason abstractly and quantitatively. **MP.2** (HS-LS2-1),(HS-LS2-2),(HS-LS2-6)
2. Model with mathematics. **MP.4 (**HS-LS2-1),(HS-LS2-2)
3. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays**. HSN.Q.A.1** (HS-LS2-1),(HS-LS2-2)
4. Define appropriate quantities for the purpose of descriptive modeling. **HSN.Q.A.2** (HS-LS2-1),(HS-LS2-2)
5. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **HSN.Q.A.3** (HS-LS2-1),(HS-LS2-2)
6. Represent data with plots on the real number line. HSS-ID.A.1 (HS-LS2-6)
7. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. **HSS-IC.A.1** (HS-LS2-6)

Integration of Computer Science and Design Thinking NJSLS 8

- 8.2.12.EC.2: Assess the positive and negative impacts of emerging technologies on developing countries and evaluate how individuals, non-profit organizations, and governments have responded.
- 8.2.12.ETW.1: Evaluate ethical considerations regarding the sustainability of environmental resources that are used for the design, creation, and maintenance of a chosen product.
- 8.2.12.ETW.2: Synthesize and analyze data collected to monitor the effects of a technological product or system on the environment.
- 8.2.12.ETW.3: Identify a complex, global environmental or climate change issue, develop a systemic plan of investigation, and propose an innovative sustainable solution.
- 8.2.12.ED.5: Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).
- 8.2.12.ED.6: Analyze the effects of changing resources when designing a specific product or system (e.g., materials, energy, tools, capital, labor).
- 8.2.12.ED.4: Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.