

Zoology SEEd Standards DRAFT Content Outline

Introduction

The Zoology Science High School Elective SEEd Standards explore patterns, processes, structures, functions, and relationships of animals on Earth. Students model and explain the major structures, functions, and processes animals use to survive in their environment. Students construct explanations and arguments to classify animals into major animal taxa and determine their relationships, adaptations, and evolution. Students will analyze data and build models to explain comparative zoology principles and how animal phyla increase in complexity from the phylum porifera to chordata. Students investigate and explain the many ways that humans use and depend on animals and how humans have an impact on animal populations. Students evaluate plans to control invasive animal species in Utah and/or conserve native Utah animal species.

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ZOOL.1: Structures, Functions, and Processes in Animals

Animals share common life functions necessary for survival. They also have similar yet diverse structures that they use to fulfil these life functions. Some animals have a unique life cycle. Animals depend upon their environment for survival.

- 1.1 **Obtain, evaluate, and communicate information** to explain the life functions shared by most animals. Emphasize that most animals depend on and perform these functions in different ways. Examples of life functions could include the need to feed, respire, circulate, excrete, move, respond, or reproduce.
- 1.2 **Develop and use models** to explain the complexity and diversity of common animal structures (systems, organs, tissues, and cells) and their functions to fulfil life functions. Emphasize how different structures in different organisms perform similar functions.
- 1.3 **Develop a model** to explain the patterns in various life cycles and embryological development differences in animals. Emphasize the potential reasons and benefits for these differences. Examples of life cycles could include polyp and medusa in cnidarians; different hosts and stages in the platyhelminthes or nematode life cycle; arthropod metamorphosis; or chordata life cycles in fish and amphibians. Examples of embryological development differences could include oviparous, viviparous, ovoviviparous organisms.
- 1.4 **Construct an explanation** for how animals depend upon their environment for survival in their habitat (system). Examples of necessities provided by their environment could include food, weather, or shelter.

ZOOL.2: Comparative Zoology, Evolution and Phylogeny

Evolution by natural selection allows populations to adapt to environmental changes. Some animals have coevolved with plants or other animals. Animals are classified into major taxa and these classification can be used for phylogenetic context. Most animals show increased complexity in different ways when comparing them from phyla to phyla.

- 2.1 **Construct an explanation** for how evolution allows populations to adapt to environmental changes. Emphasize the mechanisms that drive evolution in animal populations. Examples of evolution drivers could include adaptation, natural selection, convergence, and speciation.
- 2.2 **Construct an argument from evidence** about the coevolution (change) of animals with plants and other animals. Examples of coevolution with plants could be due to pollination or seed dispersal. Examples of coevolution with other animals could be due to predator/prey relationships or symbiotic relationships.
- 2.3 **Construct an argument based on evidence** to classify animals into major taxa by observing patterns in physical, behavioral, or molecular/genetic characteristics. Emphasize placing taxa into phylogenetic context using different technologies. Examples of technologies could be a dichotomous key, field guide, or molecular analysis (genes or chemicals).
- 2.4 **Analyze and interpret data** to explain patterns in the increasing complexity in the morphology, biochemistry, and genetics of animals to compare taxa within and between phyla. Emphasize focusing the comparisons using the structures, functions, and processes identified in Strand 1 of these standards. Examples of phyla to compare could include Porifera, Cnidaria, Platyhelminthes, Nematoda, Annelida, Mollusca, Arthropoda, Echinodermata, and/or Chordata.

ZOOL.3: Human and Animal Interactions

Animal structures are used for different purposes by humans. Human activities may have an impact on natural habitats and populations of animals. Humans can also create management plans and legislation that can reduce or reverse the impacts humans have on animals in the wild. Management plans can be used to control invasive species and conserve native animal species.

- 3.1 **Obtain, evaluate, and communicate** how animal structures are used in different societies. Examples of structures could include muscle, blood, bones, or other tissues and organs. Examples of uses could include food, medicine, or biotechnology.
- 3.2 **Ask questions and define problems** to identify the cause and effect of human activities on natural habitats and populations of animals. Emphasize how individuals, state, and local management plans, and government legislation have identified and adjusted practice to reduce and/or reverse these impacts. Examples of human activities could include habitat destruction, overharvesting, water consumption, or pollution.
- 3.3 **Evaluate** current plans to manage the control of an invasive animal species in Utah or to manage the conservation of a native animal species in Utah focusing on the population's proportion and quantity. *Define the problem, identify criteria and constraints, analyze available data on proposed solutions, and determine if the plan is an optimal solution.* Emphasize the impact that the animal species has on its environment.

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