# Fairfax Collegiate
# 2026 Summer Program
# Animal Physiology Course Syllabus
# Rising Grades 7-9

## Course Description

*Look inside preserved specimens.*

Dissect earthworms, grasshoppers, crayfish, perch, frogs, sharks, and rats. Compare body systems and specialized structures.

Reconstruct skeletons and analyze tissues. Explore the musculoskeletal, digestive, respiratory, circulatory, and nervous systems. Investigate how environmental pressures shape physiology.

Students gain a greater fascination for how bodies work and understand how different species survive, move, and adapt. In this course, students get direct hands-on exploration, make detailed observations, and discover the connections between structure and function in living organisms.

Students compare body systems across many species and uncover how animals evolve specialized structures for their environments. Each dissection activity deepens their understanding of biodiversity and the science behind animal form and function.

Families receive photos and videos capturing students' lab work, dissections, and comparative anatomy projects. Students leave the course with stronger scientific skills, a clearer understanding of animal biology, and excitement about studying life sciences at a deeper level.

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## Learning Objectives

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| **Course Goals** | **Anatomical Names and Structures:** Students learn anatomical names and structures of different animals, including specialized structures unique to the earthworm, grasshopper, crayfish, perch, shark, frog, and rat, drawing conclusions about evolutionary adaptation.<br>**Characteristics of Living Things:** Students learn about the cellular nature of life, characteristics of living things, and physiological systems in different classes of animals.<br>**Adaptation and Response:** Students learn about specialized structures within different classes of animals and how response to environmental conditions affect structure. |

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| | **Physiological Systems:** Students learn through the systems approach of organ systems in mammals. They learn through in-depth study and dissection about the following systems: respiratory, circulatory, digestive, reproductive, nervous, and musculoskeletal. |
| **Course Topics** | **Introduction to Animal Physiology:** Students review what will be presented in the class over the session, including the principles of biology that will be highlighted during comparative dissections.<br><br>**Animal Diversity:** Students explore the diversity of animals and the adaptations present in different environments, in response to energy acquisition, reproduction, and habitat. In-depth discussions and research is conducted on cells, tissues, organs, and organ systems of animals.<br><br>**Musculoskeletal Systems:** Students learn about different structures of skeletal and muscular systems in different phyla. They explore endo and exoskeletons, chitinous, bony, non-bony, and animals that do not have support structures. Students draw conclusions about different adaptations to the environment which select for these different morphologies.<br><br>**Specialized Organs and Structures:** Students learn about specialized organs in different, non-human animals and their function. Students discuss different adaptations in response to environments.<br><br>**Comparative Anatomy:** Students investigate different structures and forms used by animals to accomplish the same function. They explore how analogous and homologous structures arise over time in response to environmental conditions.<br><br>**Cardiovascular and Respiratory Systems:** Students learn about the structure and physiology of cardiovascular and respiratory systems in different animals, both in terrestrial and aquatic environments.<br><br>**Digestive System:** Students learn about the structure and physiology of digestive systems in different animals, both in terrestrial and aquatic environments. Students explore how metabolism and energy play a crucial role in evolution.<br><br>**Nervous System:** Students explore the development of nervous systems in different animals and the adaptations present in their structures. |

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## Course Schedule

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| **Class Meeting 1** | **Introduction to Animal Physiology/Icebreakers:** Students are introduced to basic principles in animal physiology and the rules for the class.<br><br>**Animal Diversity:** Students learn about the nature of natural selection, adaptation to environmental conditions, and diversity through a creative thinking exercise.<br><br>**Introductory Physiology Discussion:** Students learn about the definitions of life, animal, and physiology. Through an instructor-led discussion, students derive the essential components of |

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| | each of these definitions.<br>**Discussion on Animal Ethics:** Students discuss salient topics of animal ethics with their classmates, generating conclusions about their specimens.<br>**Wrap Up:** Students review what they have learned over the class.<br>**Cells, Tissues, and Organs:** Students apply their knowledge about the organization structure of life in exploring cells, tissues, and organs within representative organisms. |
| **Class Meeting 2** | **Animal Diversity Research:** Students learn about the adaptations present at the cellular, tissue, and organ level for an animal in response to its environment.<br>**Owl Pellet Dissection:** Students learn about the skeletal system, digestion, and adaptation to food sources through a dissection of barn owl pellets. In pairs, they recreate the skeleton of a mouse or shrew, using the bones collected from their specimen.<br>**Wrap Up:** Students review what they have learned over the class.<br>**Cells, Tissues, and Organs:** Students apply their knowledge about the organization structure of life in exploring cells, tissues, and organs within representative organisms. |
| **Class Meeting 3** | **Animal Diversity Research:** Students learn about the adaptations present at the cellular, tissue, and organ level for an animal in response to its environment.<br>**Wrap Up:** Students review what they have learned over the class.<br>**Earthworm Dissection:** Students learn about the physiology of an earthworm, are introduced to circulatory systems, and the concept of a coelom.<br>**Grasshopper Dissection:** Students learn about the anatomical structures of a model insect, the grasshopper, through a guided dissection in pairs. |
| **Class Meeting 4** | **Animal Diversity Research:** Students learn about the adaptations present at the cellular, tissue, and organ level for an animal in response to its environment.<br>**Crayfish Dissection:** Students learn about specialized structures within a model crustacean, the crayfish, through a guided dissection in pairs.<br>**Environment and Physiology Discussion:** Students have an in-depth discussion on the effect of major environmental changes on physiological adaptation.<br>**Wrap Up:** Students review what they have learned over the class. |
| **Class Meeting 5** | **Animal Diversity Research:** Students learn about the adaptations present at the cellular, tissue, and organ level for an animal in response to its environment.<br>**Frog Dissection Activity:** Students work in pairs to learn about amphibian organ systems and adaptations through a directed dissection of a frog.<br>**Wrap Up:** Students review what they have learned over the class. |
| **Class Meeting 6** | **Animal Diversity Research:** Students learn about the adaptations present at the cellular, tissue, and organ level for an animal in response to its environment. |

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| | **Animal Diversity Comparison Lab:** Students create deeper connections about comparative anatomical structure and physiological differences across classes through observation of preserved specimens.<br><br>**Comparative Vertebrate Anatomy Lab:** Students begin to explore advanced comparative anatomy principles in a guided lab about the rat, pig, frog, and dogfish shark. This will be in preparation for the guided dissections on the rat and dogfish shark, and in review of the frog dissection.<br><br>**Wrap Up:** Students review what they have learned over the class. |
| **Class Meeting 7** | **Animal Diversity Research:** Students learn about the adaptations present at the cellular, tissue, and organ level for an animal in response to its environment.<br><br>**Perch Dissection:** Students learn about specialized structures within a model bony fish, the perch, through a guided dissection in pairs.<br><br>**Advanced Dogfish Shark Dissection:** Students work in groups of four in guided dissections of large dogfish sharks to learn about the anatomy and physiology of cartilaginous fish.<br><br>**Wrap Up:** Students review what they have learned over the class. |
| **Class Meeting 8** | **Animal Diversity Research:** Students learn about the adaptations present at the cellular, tissue, and organ level for an animal in response to its environment.<br><br>**Advanced Dogfish Shark Dissection:** Students work in groups of four in guided dissections of large dogfish sharks to learn about the anatomy and physiology of cartilaginous fish.<br><br>**Wrap Up:** Students review what they have learned over the class. |
| **Class Meeting 9** | **Animal Diversity Research:** Students learn about the adaptations present at the cellular, tissue, and organ level for an animal in response to its environment.<br><br>**Advanced Rat Dissection:** Students work in groups of four in guided dissections of rats to learn about the anatomy and physiology of mammals.<br><br>**Wrap Up:** Students review what they have learned over the class. |
| **Class Meeting 10** | **Animal Diversity Research:** Students learn about the adaptations present at the cellular, tissue, and organ level for an animal in response to its environment.<br><br>**Advanced Rat Dissection:** Students work in groups of four in guided dissections of rats to learn about the anatomy and physiology of mammals.<br><br>**Sheep Brain Dissection:** Students explore in-depth a representative mammalian brain through a guided dissection of a sheep brain. They learn about specialized structures and tissue within the central nervous system.<br><br>**Wrap Up:** Students review what they have learned over the class. |