

Human Body Systems Course Description

Students examine the interactions of body systems as they explore identity, communication, power, movement, protection, and homeostasis. Students design experiments, investigate the structures and functions of the human body, and use data acquisition software to monitor body functions such as muscle movement, reflex and voluntary action, and respiration. Exploring science in action, students build organs and tissues on a skeletal manikin, work through interesting real world cases and often play the role of biomedical professionals to solve medical mysteries.

Human Body Systems Unit Summaries

The Human Body Systems (HBS) course is divided into six units designed to introduce students to the way in which body systems work together to maintain homeostasis and good health. The following is a description of each unit in the HBS course.

Unit One – Identity

Unit one engages students in a discussion of what it means to be human. Students investigate the body systems and functions that all humans have in common, and then look at differences in tissues, such as bone and muscle, and in molecules, such as DNA, to pinpoint unique identity. Students play the role of forensic anthropologists as they unlock the clues of identity found in bone and use restriction analysis and gel electrophoresis to analyze differences in DNA. Students begin to study histology and build upon their knowledge of human tissue.

Unit Two – Communication

In unit two, students investigate modes of communication within the human body as well as the ways humans communicate with the outside world. Students create a model of the human brain and design a brain map that pinpoints specific areas of function. Students investigate the roles of electrical and chemical signals in communication and response in the human body. They explore the ways in which hormones and the endocrine system control body function in order to solve a medical mystery. Students compare response time to reflex and voluntary actions using data acquisition software, and design experiments to test factors that can impact this response. By investigating the anatomy and physiology of the human eye, students learn how the body receives and interprets stimuli from the outside world.

Unit Three – Power

In this unit, students investigate the human body systems that work to obtain, distribute, or process the body's primary resources for energy and power—food, oxygen, and water. Students make a working model of the digestive system and design experiments to test the optimal conditions for chemical digestion. Students use probes and data acquisition software to monitor their own lung function and oxygen intake. Students investigate the anatomy and physiology of the urinary system and do a simulated urinalysis to identify health conditions and diagnosis disease.

Unit Four – Movement

In unit four, students investigate the movement of the human body as well as of substances within the body. Students dissect a joint to visualize the connection between skeletal muscle and bone. By building muscle groups on a skeletal model, students learn how a muscle's structure is directly related to its function and to the

actions it can produce. Students design experiments to test the requirements for muscle contraction and create models to show relaxation and contraction of the sarcomere. A study of blood flow illustrates the roles smooth and cardiac muscles play in the transport of substances around the body. At the end of the unit, students combine information about power and movement to describe how the body fuels and responds to exercise. Playing the role of biomedical professionals in a combined medical practice that caters to athletes, the students design a comprehensive training plan for an athlete. The plan includes all aspects of training, from diet and exercise to hydration and injury prevention.

Unit Five – Protection

In this unit, students explore ways in which the human body protects itself from injury and disease. Before students investigate specific defense mechanisms and the immune system, they explore the protective functions of skin, bone and the feeling of pain. Antigen-antibody interactions are introduced as well as the structure of the lymphatic and immune system. Students analyze data from a fictional illness and relate antibody response to the action of specific white blood cells. Students design a game or a children's book that illustrates the many ways in which body structures function in protection.

Unit Six – Homeostasis

This final unit focuses on the connection between all of the human body systems and examines how these systems work together to maintain health and homeostasis. Students explore how the body deals with extreme external environments as well as how the body reacts to and defends against injury and illness. Students begin to discuss and design medical interventions; the activities in this lesson are an engagement for the subsequent course, Medical Interventions.