

## Bemidji Area Schools

### Grades 9-12 Human Anatomy and Physiology Science Outcomes

Strand	Substrand	Standard "Understand that ..."	Code	Benchmark	Activities
1. The Nature of Science and Engineering	1. The Practice of Science	1. Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	9.1.1.1.3	Explain how the traditions and norms of science define the bounds of professional scientific practice and reveal instances of scientific error or misconduct. <i>For example:</i> The use of peer review, publications and presentations.	Cat Dissection Lab Lecture Topics: Various discussions on medical ethics
		1. Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	9.1.1.1.4	Explain how societal and scientific ethics impact research practices. <i>For example:</i> Research involving human subjects may be conducted only with the informed consent of the subjects.	Dissections Use of human cadavers in medical schools Use of human subjects in medical research
	2. The Practice of Engineering	1. Engineering is a way of addressing human needs by applying science concepts and mathematical techniques to develop new products, tools, processes and systems.	9.1.2.1.2	Recognize that risk analysis is used to determine the potential positive and negative consequences of using a new technology or design, including the evaluation of causes and effects of failures. <i>For example:</i> Risks and benefits associated with using lithium batteries.	Lecture Topics: Various discussions on prosthetics, artificial pace-makers, etc.
		2. Engineering design is an analytical and creative process of devising a solution to meet a need or solve a specific problem.	9.1.2.2.1	Identify a problem and the associated constraints on possible design solutions. <i>For example:</i> Constraints can include time, money, scientific knowledge and available technology.	Lecture Topics: Various discussions on prosthetics, artificial pace-makers, etc.

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1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics, and Society	1. Natural and designed systems are made up of components that act within a system and interact with other systems.	9.1.3.1.1	Describe a system, including specifications of boundaries and subsystems, relationships to other systems, and identification of inputs and expected outputs. <i>For example:</i> A power plant or ecosystem.	Cat Dissection Lab Lecture Topics: Various human systems		
			9.1.3.1.2	Identify properties of a system that are different from those of its parts but appear because of the interaction of those parts.			
			9.1.3.1.3	Describe how positive and/or negative feedback occur in systems. <i>For example:</i> The greenhouse effect			
				2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	9.1.3.2.2	Analyze possible careers in science and engineering in terms of education requirements, working practices and rewards.	Cat Dissection Lab Lecture Topics: Various human systems
				3. Science and engineering operate in the context of society and both influence and are influenced by this context.	9.1.3.3.1	Describe how values and constraints affect science and engineering. <i>For example:</i> Economic, environmental, social, political, ethical, health, safety, and sustainability issues.	Lecture topics: Discussion of medical procedures, testing and medication approval use

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4. Life Science	1. Structure and Function of Living Systems	1. Organisms use the interaction of cellular processes to as well as tissues and organ systems to maintain homeostasis.	9.4.1.1.1	Explain how cell processes are influenced by internal and external factors, such as pH and temperature, and how cells and organisms respond to changes in their environment to maintain homeostasis.	Tissue Lab Cat Dissection Lab
			9.4.1.1.2	Describe how the functions of individual organ systems are integrated to maintain homeostasis in an organism.	
	4. Human Interactions with Living Systems	2. Personal and community health can be affected by the environment, body functions and human behavior.	9.4.4.2.2	Explain how the body produces antibodies to fight disease and how vaccines assist this process.	Lecture Topics: Human Blood Terms: Vaccine, Antibody, Antigen, Immune System, Disease, Pathogen, Allergy
			9.4.4.2.3	Describe how the immune system sometimes attacks some of the body's own cells and how some allergic reactions are caused by the body's immune responses to usually harmless environmental substances.	
			9.4.4.2.4	Explain how environmental factors and personal decisions, such as water quality, air quality and smoking affect personal and community health.	