

SCIENCE DEPARTMENT

Contact Information

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HUMAN BIOLOGY (SP): COURSE #462

(Alternate Year Offering; See the Program of Studies)

The Department's Educational Philosophy

We believe that students should be exposed to the process of scientific inquiry so they can acquire and interpret scientific knowledge, and begin to realize the wider applicability of scientific problem-solving methods. By making the laboratory the focal point of learning, we seek to foster students' appreciation for the experience of doing science.

Guiding Principles

- Students must be able to collect and analyze data and formulate hypotheses.
- Inductive and deductive problem-solving skills are central to science education.
- An effective program in science addresses the limitations of data and conclusions.
- Students should be able to use or design a strategy for testing scientific concepts.
- A comprehensive science program will emphasize the delicate checks and balances in man's abiotic and biotic environments and the stresses upon these ecosystems, which could affect the destiny of the world.
- Science is integrally related to mathematics.
- An effective science program builds students' ability to communicate accurately and precisely.
- An effective science program stresses both cooperative and independent learning.

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Course Frequency: Semester course, 5 times per week, 6 times in a 6-day cycle

Credits Offered: 2.5 credits

Prerequisites: By recommendation of the Department

Background to the Curriculum

Human Biology SP is a new course that was developed for the 2001-2002 school year in accordance with the recommendations of the NEASC. It was felt that there were not enough science electives for juniors and seniors who do not take advanced placement courses, or chemistry and physics. This semester course may be supported by a special educator and is designed to be accessible to special education students with minimal or no curriculum modifications. This course is designed to reinforce scientific inquiry, problem solving, and application of terms and concepts. It was designed to target the anatomy and physiology of the human body (both healthy and diseased) through a series of topics that relate to the students' everyday life.

Core Topics/Questions/Concepts/Skills

Core Topics	Questions	Concepts	Skills
I. Exercise	What are aerobic and anaerobic exercise? Why does your body need oxygen? How are the respiratory and cardiovascular systems important during exercise? How does resistance training prevent disease? What are some of the debilitating affects of inactivity? How can you include exercise in your life?	<ul style="list-style-type: none">• Aerobic exercise• Muscular system anatomy and physiology• Breathing and heart rates during exercise• Respiratory and cardiovascular system anatomy and physiology• Glycolysis• Resistance training and joints• Cardiovascular disease, atherosclerosis, obesity, and osteoporosis	<ul style="list-style-type: none">• Trace a drop of blood through cardiovascular system/ trace a molecule of oxygen through the respiratory system• Measure heart rate and breathing rate• Measure lung volumes• Dissection of sheep heart• Measure % body fat• Work in cooperative groups• Measure blood pressure

<p>II. Nutrition</p>	<p>Why do we need to eat? What is digestion? What is the role of the urinary system? What is the function of the kidney? What can your doctor learn about your health from a sample of urine? What are nutrients and how they related to energy? What are vitamins and minerals and why are they important in the body? What is a diet and what should a healthy diet contain? How can you modify your diet to be more healthy?</p>	<ul style="list-style-type: none"> • Digestion and its components • Digestive anatomy and physiology • Urinary anatomy and physiology • Filtration, re-absorption, and secretion • Nutrients • Nutrients and the body • Vitamins and minerals and their functions • Diet (healthy/unhealthy) 	<ul style="list-style-type: none"> • Trace the path of food through the digestive system • Build a model of digestive system • Urine analysis • Diet recall • Direct caloric measurement of nutrients (marshmallow) • Caloric and dietary calculations • Dietary analysis • Build a healthy diet • Cooperative groups
<p>III. Substances and Your Body</p>	<p>What are the structures and functions of the respiratory system and cardiovascular system? How are these affected by smoking? What is gas exchange? How is this affected by smoking? What is cancer, and why does smoking put you at risk for cancer? What are the functions of the liver and heart, and how are these affected by chronic alcohol consumption? What are the structures and functions of the nervous system, and how are these affected by use of drugs such as marijuana and cocaine?</p>	<ul style="list-style-type: none"> • Respiratory, cardiovascular, and muscular system structures and functions. • The affects of smoking on these body systems. • Digestive and muscular system structures and functions. • The affects of alcohol on these body systems. • Nervous system structures and functions. • The affects of marijuana and cocaine on these body systems. 	<ul style="list-style-type: none"> • Benign vs. malignant tumors • Rate of alcohol absorption and digestion • Drug testing from chemical samples kit • Nervous system organization • Action potential along a neuron • Power point presentation on pathology • Work in cooperative groups

IV. Communicable Diseases	What type of threats does your body need to resist? What is the immune system and what are its components? What are specific immune responses? What are the steps of humoral and cell-mediated immune responses? What is AIDS and how does it affect your immune system? What is reproduction?	<ul style="list-style-type: none"> • Body defenses and pathogens • Non-specific and specific immunity • Inflammatory response • Cells of the immune system and their functions • Humoral and cell-mediated responses • AIDS and immunodeficiency diseases • Reproductive system structures and functions 	<ul style="list-style-type: none"> • Act out the body's immune response • Differentiate between specific and non-specific immunity. • How to protect oneself from communicable diseases. • Work in cooperative groups.
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Course-End Learning Objectives

Please note that this is an elective course that focuses on one of the many broad topics included in the biology curriculum. Many of the learning objectives for this course are very specific to the topics of human anatomy and physiology and therefore do not have applicable corresponding state standards.

<u>Learning objectives</u>	<u>Corresponding state standards, where applicable</u>
<u>Exercise</u> 1] Identify main structures and functions of respiratory, cardiovascular, and muscle systems. 2] Differentiate between aerobic and anaerobic respiration. 3] Describe resistance training and differentiate between isometric and dynamic exercise. 4] Describe function and structure of joints. 5] Identify major diseases that are, in part, caused by inactivity.	Biology.4.1 Biology.2.8 Biology.4.2

<p><u>Nutrition</u></p> <ol style="list-style-type: none"> 1] Identify main structures and functions of digestive and urinary systems. 2] Describe the major events of digestion and urine production. 3] Describe how changes in kidney function affect urine output and the characteristics of urine. 4] Identify the major nutrients that are essential for the body’s growth and repair. 5] Analyze dietary components and calculate caloric contents of daily and weekly food intake. 6] Identify important vitamins and minerals and their role in cellular processes. 	<p>Biology.4.1</p> <p>Biology.4.2</p> <p>Biology.1.3</p> <p>Biology.1.5</p>
<p><u>Substance and Your Body</u></p> <ol style="list-style-type: none"> 1] Identify important structures and functions of the respiratory and cardiovascular systems and describe how they are affected by smoking. 2] Describe cancer, and differentiate between benign and malignant tumors. 3] Describe how smoking causes cancer and can lead to changes in DNA. 4] Identify important structures and functions of the digestive and muscular systems and describe how they are affected by alcohol use. 5] Describe how enzymes and calcium ion are important in muscular function. 6] Identify the location of cellular respiration in your cells and how these complex chemical reactions are affected by alcohol use. 7] Identify the conduction pathway of electrical impulses in the myocardium and describe how this is affected by alcohol use. 8] Identify important structures and functions of the nervous system and describe how they are affected by marijuana and cocaine use. 9] Describe how the nervous system is organized and the functions of each division. 	<p>Biology.4.1, 4.2</p> <p>Biology.2.10, 4.4</p> <p>Biology.3.4</p> <p>Biology.4.1, 4.2</p> <p>Biology.1.5</p> <p>Biology.1.5, 2.1, 2.8, 4.2</p> <p>Biology.4.2</p> <p>Biology.4.1, 4.2</p> <p>Biology.4.1</p>
<p><u>Communicable Diseases</u></p> <ol style="list-style-type: none"> 1] Identify the major structures and functions of the immune and reproductive systems and describe how they are affected by AIDS or other sexually-transmitted diseases. 2] Differentiate between specific and non-specific defenses. 3] Describe the major events of the humoral and cell-mediated immune responses. 4] Identify the immune system cells and their functions. 5] Describe AIDS, what type of immune disease it is, and how it affects the body. 	<p>Biology.4.1,4.2</p> <p>Biology.4.1</p>

Assessment

- Tests: written based on curriculum covered; focus on terms, concepts, and application
- Quizzes: vocabulary in matching format; identify and label
- Laboratory activities and reports: some formal typed with hypotheses, procedure, materials, data, discussion and conclusion; some informal with questions
- Projects: often in cooperative groups; presented to the class
- Homework: questions from the chapter review, anatomical coloring pages, and identification sheets

Technology and Health Learning Objectives Addressed in this Course

(This section is for faculty and administrative reference; students and parents may disregard.)

<u>Course activity: skills &/or topics taught</u>	<u>Standard(s) addressed through this activity</u>
<ol style="list-style-type: none">1] Students utilize computers for word processing, graphing, research, and website activities to facilitate the learning of concepts in this course.2] Students use a variety of testing equipment for variables such as body fat, lung volumes, and urinalysis – all of which support the focused concepts in the course.	
<hr/> <ol style="list-style-type: none">1] Students learn about various conditions of the human body as a result of inactivity, improper nutrition, drug and alcohol abuse, and unprotected sex.2] Students learn about ways of protecting themselves from developing these conditions as they learn about the anatomy and physiology of the human body.	

Materials and Resources

- Student text: Chartier, Kerri L. The Human Body: The Structure and Function of Major Systems, 2nd edition (2002).
- Numerous audio-visual, websites, and lab materials to supplement the material taught in this course.