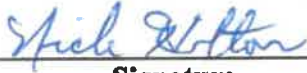
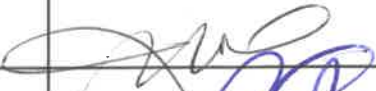



Perris Union High School District

Course of Study

A. COURSE INFORMATION

Course Title: <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">PLTW Honors Human Body Systems</div> <input type="checkbox"/> New <input type="checkbox"/> Revised	Subject Area: <input type="checkbox"/> Social Science <input type="checkbox"/> English <input type="checkbox"/> Mathematics <input checked="" type="checkbox"/> Laboratory Science <input type="checkbox"/> World Languages <input type="checkbox"/> Visual or Performing Arts <input type="checkbox"/> College Prep Elective <input type="checkbox"/> Other	Grade Level <input type="checkbox"/> MS <input type="checkbox"/> HS <input type="checkbox"/> 5 <input type="checkbox"/> 6 <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input checked="" type="checkbox"/> 10 <input checked="" type="checkbox"/> 11 <input checked="" type="checkbox"/> 12
If revised previous course name if changed <div style="border: 1px solid black; padding: 2px; margin-top: 5px;">PLTW Human Body Systems</div>	Is this classified as a Career Technical Education course? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Transcript Course Code/Number: <div style="border: 1px solid black; height: 20px; margin-top: 5px;"></div> (To be assigned by Educational Services)	Required for Graduation: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Meets UC/CSU Requirements? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Was this course <u>previously approved by UC</u> for PUHSD? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Will be verified by Ed Services)	Credential Required to teach this course: <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> Single Subject: Biological Sciences <u>To be completed by Human Resources only.</u> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 10px; display: flex; justify-content: space-between;"> <div style="text-align: center;">  Signature </div> <div style="text-align: center;"> 6-2-21 Date </div> </div>	
Meets "AP" Requirements? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Meets "Honors" Requirements? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Submitted by: Jennifer West Site: PVHS Science Date: 5/21/21	Unit Value/Length of Course: <input type="checkbox"/> 0.5 (half year or semester equivalent) <input checked="" type="checkbox"/> 1.0 (one year equivalent) <input type="checkbox"/> 2.0 (two year equivalent) <input type="checkbox"/> Other:	
Approvals	Name/Signature	Date
Director of Curriculum & Instruction		6/4/21
Asst. Superintendent of Educational Services		6/7/21
Governing Board		

Prerequisite(s) (REQUIRED):
<p>Required (prerequisite OR corequisite):</p> <p>Chemistry or AP Chemistry Biology or AP Biology Algebra 1</p> <p>Recommended (prerequisite):</p> <p>PLTW Principles of Biomedical Science</p>
Corequisite(s) (REQUIRED):
See above.
Brief Course Description (REQUIRED):
<p>In the Human Body Systems course, 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. Students practice problem solving with structured activities and progress to open-ended projects and problems that require them to develop planning, documentation, communication, and other professional skills.</p>

B. COURSE CONTENT

<p>Course Purpose (REQUIRED): <i>What is the purpose of this course? Please provide a brief description of the goals and expected outcomes. Note: More specificity than a simple recitation of the State Standards is needed.</i></p>
<p>Unit 1: Identity</p> <p>The goal of Unit 1 is to engage 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.</p> <p>In the HBS course, students will be working with an Anatomy in Clay™ two foot skeletal model. Students will work</p>

in pairs on an assigned Maniken® model and will use clay to build various organs, tissues, and vessels on the skeletal frame. Over the year each Maniken model will take on a unique identity. Even though students are technically building the same structures on their model, students will notice that the Manikens do not all look the same. Faces will look different. Muscles may be more defined. Blood vessel placement may vary slightly. The Maniken may manifest a disease or illness. The core remains the same, but the specific details will lead to the individual.

Unit 1 Lessons

- Lesson 1.1 Identity – Human
- Lesson 1.2 Identity – Tissues
- Lesson 1.3 Identity – Molecules and Cells

Unit 2: Communication

The goal of Unit 2 is for students to investigate modes of communication within the human body as well as the ways the human body communicates with the outside world. Students map the function of key regions of the brain and explore how the body detects, processes, and responds to internal and external stimuli. 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 they 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 2 Lessons

- Lesson 2.1 The Brain
- Lesson 2.2 Electrical Communication
- Lesson 2.3 Chemical Communication
- Lesson 2.4 Communication with the Outside World

Unit 3: Power

The goal of Unit 3 is for students to 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 model of the digestive system and design experiments to test the optimal conditions for enzymatic digestion. They explore lung function by diagnosing and treating a patient with breathing problems and use probes and data acquisition software to monitor their own lung function. Students investigate the anatomy and physiology of the urinary system and run simulated urinalysis to identify health conditions and diagnose disease.

Unit 3 Lessons

- Lesson 3.1 Introduction to Power (Optional)
- Lesson 3.2 Food
- Lesson 3.3 Oxygen
- Lesson 3.4 Water

Unit 4: Movement

In Unit 4 students investigate movement of the human body as well as the movement of substances within the body. 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 that smooth & 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, 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 4 Lessons

- Lesson 4.1 Joints and Motion
- Lesson 4.2 Muscles
- Lesson 4.3 Blood Flow
- Lesson 4.4 Energy and Motion – Exercise Physiology

Unit 5: 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.

Unit 5 Lessons

- Lesson 5.1 The Skin
- Lesson 5.2 Bones
- Lesson 5.3 Lymph and Blood Cells

Unit 6: 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 for a fictional case study. The activities in this lesson are an engagement for the subsequent course, entitled Medical Interventions (MI).

Unit 6 Lessons

- Lesson 6.1 Surviving the Extremes

Course Outline (REQUIRED):

Detailed description of topics covered. All historical knowledge is expected to be empirically based, give examples. Show examples of how the text is incorporated into the topics covered.

Unit 1: Identity

Lesson 1.1 - Being Human

- Identify the systems and structures involved in basic body processes.
- Explain the functions of different human body systems, and list the major organs within each system.
- Describe how multiple body systems are interconnected and how those interconnections and interactions are necessary for life.
- Explain how directional terms and regional terms can be used to pinpoint a location on the body.
- Show the relationship between multiple human body systems.
- Demonstrate the correct use of directional and regional terms.
- Illustrate key directional term pairs on a model of the human body.

Lesson 1.2 - Tissues

- Identify characteristics of the four categories of human tissue.
- Describe the functions of the human skeletal system.
- Recognize that differences in bone structure contribute to a person's unique identity.
- Recognize that there is a relationship between the length of long bones and the overall height of an individual.
- Analyze the structure of various human tissue types to infer function.
- Identify and locate bones of the human skeletal system.
- Interpret bone markings, bone landmarks, and bone measurements to determine a person's gender, age, stature, and ethnicity.
- Derive and analyze a linear equation.

Lesson 1.3 - Molecules & Cells

- Explain how restriction enzymes cut DNA.
- Describe how gel electrophoresis separates DNA fragments.
- Recognize that gel electrophoresis can be used to examine DNA differences between individuals.
- Outline current biometrics technology.
- Digest DNA samples using restriction enzymes.
- Demonstrate the steps of gel electrophoresis and analyze the resulting restriction fragment length polymorphisms (RFLPs).

Unit 2: Communication

Lesson 2.1 - The Brain

- Describe the structure and function of the central nervous system and the peripheral nervous system.
- Identify major regions of the human brain.
- Match regions of the brain with their primary function in the human body.
- Apply knowledge of brain structure and function to determine the parts of the brain related to specific human actions, emotions, and/or dysfunctions.
- Interpret how a breakdown in communication in the CNS would impact the function of the human body.

Lesson 2.2 - Electrical Communication

- Recognize that the nervous system relies on specialized cells called neurons to pass signals to and from the brain and spinal cord.
- Describe how the movement of ions across the cell membrane of a neuron generates an action potential and propagates electrical signals.
- Explain how neurons communicate at the synapse.
- Describe how brain processing differs in reflex and voluntary responses.
- Outline what goes on in the human body from an initial stimulus to a response.
- Analyze experimental data to explore reaction time and reflexes in the human body.
- Design an experiment to test factors that impact reaction time.
- Analyze case studies to determine the effects of a communication breakdown in the nervous system on the human body.

Lesson 2.3 - Chemical Communication

- Describe the way in which hormones interact with target cells.
- Recognize that the human body uses feedback mechanisms to maintain proper hormone levels.
- Model a feedback loop that shows how the body maintains homeostasis.
- Analyze physical symptoms of a patient and relate these symptoms to errors in chemical communication.

Lesson 2.4 - Communication with the Outside World

- Identify the key structures of the eye.
- Demonstrate how light is processed in the eye in a person with normal vision, as well as a person with myopia or hyperopia.
- Explain the tests and procedures in a typical eye exam.
- Diagram the path of light as it enters the eyes and travels to the brain for processing.
- Evaluate visual perception by testing depth perception, peripheral vision, color vision, and visual acuity.
- Experiment with lenses to refocus light and correct problems with vision.

Unit 3: Power

3.1 - Intro to Power

- List and describe the human body systems that create, process, and distribute food, water, and oxygen.
- Recognize that factors unique to the person, such as age, weight, and overall health affect the body's ability to utilize biological resources and maintain homeostasis.
- Recognize that factors in the environment, such as climate or temperature, affect the body's ability to utilize biological resources and maintain homeostasis.
- Estimate how long the human body can last without food, without water, and without oxygen.

3.2 - Food

- Recognize that enzymes are designed to be highly specific, and the structure of the enzyme's active site determines the substrate it acts upon.
- Recognize that factors such as temperature, pH, and enzyme and substrate concentration affect the rate of an enzyme-catalyzed reaction.
- List specific enzymes that digest carbohydrates, fats, and proteins at sites along the digestive tract.

- Describe the structure and function of the organs in the digestive system.
- Explain how energy is stored in ATP.
- Model the interaction between enzymes and their corresponding substrates.
- Outline what happens to a bite of food as it travels down the digestive tract.
- Design a laboratory experiment investigating the impact that environmental changes can have on enzyme function and analyze the results.
- Analyze energy inputs and outputs in the body to assess overall health.

3.3 - Oxygen

- Describe the structure of the respiratory system, especially the lungs, and the basic mechanics of breathing.
- Explain how the structure of the lungs facilitates the exchange of oxygen and carbon dioxide between air and the body.
- Use sensors to measure lung capacity.
- Analyze data collected using a spirometer to determine tidal volume, vital capacity, and minute volume.
- Describe the action of specific medications on the body and investigate how this action helps treat and control disease.

3.4 - Water

- Describe the structure and function of the human urinary system.
- Describe how the structure of the kidney relates to its function in the body.
- Recognize that the nephron is the structural and functional unit of the kidney
- Describe the connections between urine and blood and the exchange of ions and fluids that occurs across the nephron.
- Illustrate the path of urine formation through the kidney.
- Estimate the filtration rate of the glomerulus and relate mathematical estimates to the function of the human kidney.
- Analyze urinalysis results to diagnose disease and dysfunction in human body systems.

Unit 4: Movement

4.1 - Joints and Motion

- Recognize that a joint is the location at which two or more bones connect, allowing movement and providing support to the human skeleton.
- Describe the motion at joints, such as flexion and extension.
- Demonstrate the types of movement possible at a joint and match range of motion photographs to specific actions.
- Measure range of motion of human joints using a goniometer.

4.2 - Muscles

- Describe how the three types of muscle tissue differ in structure and function.
- Explain the sliding filament mechanism of muscle contraction.
- Recognize the connection between nerves and muscle.
- Analyze muscle tissue structure using a microscope.
- Interpret muscle function by examining its structure and its attachment to bones.

- Test the effect of varying solutions of ATP on the contraction of muscle tissue.
- Demonstrate the process of muscle contraction as well as the phenomenon of rigor mortis.

4.3 - Blood Flow

- Explain the relationship between the heart and the lungs.
- Identify the body's major arteries and veins and name the body region supplied by each.
- Recognize that unlike arteries, veins contain valves that prevent the backflow of blood.
- Describe pulse and blood pressure as they relate to cardiovascular health.
- Recognize that lifestyle choices, such as poor diet and smoking, can lead to the development of blood flow disorders.
- Trace blood flow in pulmonary and systemic circulation.
- Calculate and interpret cardiac output values and relate the amount of blood pumped by the heart to the health of other body systems and organs.
- Measure peripheral pulses using Doppler ultrasound and calculate an ankle brachial index (ABI).
- Interpret the ankle brachial index (ABI) to determine possible blockages in blood vessels.

4.4 - Exercise Physiology

- Recognize that the body uses high energy molecules such as creatine phosphate, glycogen, and glucose to supply ATP to working muscle.
- Recognize that muscle fatigue occurs with prolonged or repetitive use of a muscle group.
- Describe ways in which an athlete can prepare his or her body for the stress of an athletic event.
- Illustrate the body's response to the stages of exercise.
- Design an experiment to test the effect of feedback, coaching, or competition on muscle fatigue.
- Interpret EMG and grip strength data to assess muscle fatigue.
- Apply knowledge of power and movement in the body to design a comprehensive training plan for an athlete.

Unit 5: Protection

5.1 - The Skin

- Describe the structure and function of the two main layers and the accessory organs of the skin.
- Explain how different degrees of burns damage layers of the skin.
- Explain how the human body senses and processes signals of pain.
- Interpret how burn damage to the skin will affect the function of the organ and overall homeostasis in the body.
- Outline what happens inside the body when a person feels pain.

5.2 - Bone

- Recall the four main types of bone.
- Recognize that bone is a living connective tissue composed of cells and protein fibers wrapped in hard mineral salts that can adapt and change to fit the needs of the person.
- Describe the structure and function of compact and spongy bone. U1
- Describe the types of bone fractures.
- Analyze bone structure using a microscope.
- Interpret X-rays to determine specific types of bone fractures.

- Apply knowledge of hormones and of bone remodeling to explain calcium balance in the body.
- Diagram the stages of bone healing after injury.

5.3 - Lymph and Blood

- Describe the structure and function of the lymphatic and immune system.
- Recognize that a type of white blood cell called B lymphocyte is responsible for the production of antibodies and has the ability to remember invaders once they have entered the body.
- Recognize that blood type is determined by the antigens present on red blood cells.
- Describe the genetics of blood type.
- Describe the interaction between antigens and antibodies.
- Use information presented in a computer animation to create a flow chart of immune response to a common cold.
- Analyze simulated blood samples to determine blood type.
- Produce and analyze a family pedigree for blood type and determine potential donors for a transfusion.
- Graph and interpret antibody data collected after an infection and relate this data to the response of body cells.
- Diagram an immune response to a common cold.
- Apply knowledge of specific immunity to deduce how vaccines function.

Unit 6: Homeostasis

6.1 - Surviving the Extremes

- Describe how the body systems respond to extreme external environments.
- Explain how the systems work together to maintain homeostasis in the body and to complete basic functions such as movement and communication.
- Illustrate disease in the human body, from its initial symptoms to eventual diagnosis and treatment.
- Interpret knowledge of homeostasis in the body to design an innovative medical intervention or invention.
- Trace disease in human systems by generating a fictional case study and compiling a patient case file.

Writing Assignments (REQUIRED):

Give examples of the writing assignments and the use of critical analysis within the writing assignments.

- Students will maintain a formal laboratory notebook.
- Students will maintain a career journal.
- Technical writing will consist of formal lab reports and case reports. Reports will include background research with properly cited primary sources, analyzed experimental data, discussion, and a conclusion.

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INSTRUCTIONAL MATERIALS (REQUIRED)

STACK:

Textbook #1 - None
(!)

Title:

Edition:

Author:

ISBN:

Publisher:

Publication Date:

Usage:

- Primary Text
- Read in entirety or near

Textbook #2 - None

Title:

Edition:

Author:

ISBN:

Publisher:

Publication Date:

Usage:

- Primary Text
- Read in entirety or near

Supplemental Instructional Materials