Chino Valley Unified School District
High School Course Description

CONTACTS	
1. School District Information:	**District:** Chino Valley Unified School District **Street Address:** 5130 Riverside Dr., Chino, CA 91710 **Phone:** (909) 628-1201 **Web Site:** chino.k12.ca.us
2. Course Contact:	**Teacher Contact:** Chirichan Tasanont **Position/Title:** Science Teacher **Phone:** (909) 606-7540 x5244 **E-mail:** Chirichan_tasanont@chino.k12.ca.us
A. COVER PAGE - COURSE ID	
1. Course Title:	Human Body Systems (PLTW)
2. Transcript Title/Abbreviation:	Human Body Sys/HBS
3. Transcript Course Code/Number:	5P04
4. Seeking Honors Distinction:	No
5. Subject Area/Category:	(d) Laboratory Science
6. Grade level(s):	10
7. Unit Value:	5 units per semester/10 credits total – life science
8. Was this course previously approved by UC?	Yes
9. Is this course classified as a Career Technical Education course:	Yes
10. Is this course modeled after an UC-approved course?	Yes
11. Is this course repeatable?	Yes
12. Date of Board Approval:	July 17, 2014
13. Brief Course Description: This course will engage students in the study of the processes, structures and interactions of human body systems. Important biomedical concepts in the course include: communication, transport of substances, locomotion, metabolic processes, identity, and protection. The central theme will focus on how the body systems work together to maintain homeostasis and good health. The systems will be studied as "parts of a whole," working together to keep the amazing human machine functioning at an optimal level. Exploring science in action, students will work through interesting real world cases and often play the role of biomedical professionals to solve medical mysteries.	
14. Prerequisites:	Biomedical (PLTW)
15. Context for Course: This will be a lab science course to enhance the STEM science skills of student pursuing medical pathways.	
16. History of Course Development: Currently, Chino Hills high school is implementing the Project Lead the Way (PLTW) Biomedical Science curriculum to support the Health Science Academy. This course is the second level of progression in the PLTW Biomedical Pathway.	
17. Textbooks:	To be given in accordance with Project Lead The Way curriculum.
18. Supplemental Instructional Materials:	To be given in accordance with Project Lead The Way curriculum.
B. COURSE CONTENT	
Course Purpose: The purpose of this course is for Health Science Academy students to build upon their knowledge learned from PLTW Biomedical Science and other health related coursework. In completing this course students will have received comprehensive education and training in biomedical science skills and procedures that will help them with future internship and volunteer medical opportunities. This class will also allow students to gain perspective in future careers and opportunities within the biomedical science field.	

Course Outline:

Unit One - Identity

Lesson 1: Identity: Human

1. The human body is made up of complex system functioning together to maintain homeostasis.
2. Directional terms describe the position of anatomical structures in relation to other structures or locations in the body, and regional terms specify distinct anatomical landmarks on the body.

Lesson 2: Identity: Tissues

1. A tissue is a group of similar cells designed to carry out a specific function.
2. The bones of the human skeletal system protect the body's internal organs while allowing for movement and great range of mobility.
3. The specific structure of bone reveals information about a person's gender, stature, age, and ethnicity.
4. The length of long bones in the human body can be used to mathematically predict the overall height of an individual.

Lesson 3: Identity: Molecules and Cells

1. Human DNA is a unique code of over three billion base pairs that provides a genetic blueprint of an individual.
2. Restriction enzymes recognize and cut specific sequences in DNA.
3. Gel electrophoresis separates DNA fragments based on size and is used in Restriction Fragment Length Polymorphism (RFLP) analysis.
4. Physicalcharacteristicscanbeusedtoconfirmorauthenticateidentity.

Unit Two – Communication

Lesson 1: The Brain

1. Communicationbetweenbodysystemsiscrucialtomaintaininghomeostasis.
2. The brain receives stimuli from the outside world, interprets this information, and generates an appropriate response.
3. Each region with in the brain helps control and regulates specific functions in the body.

Lesson 2: Electrical Communication

1. Neurons convey information using electrical and chemical signals.
2. The body's reaction time to reflex and voluntary actions is related to the degree of processing in the nervous system.
3. Errorsinelectricalcommunicationcanimpacthomeostasisinthehumanbody.

Lesson 3: Chemical Communication

1. The endocrine system helps the body communicate through the use of chemical signals called hormones.
2. Hormones help maintain homeostasis through feedback loops.
3. A hormone imbalance can lead to disease or dysfunction.

Lesson 4: Communication with the Outside World

1. The structures with in the human eye work to focus and process light.
2. They allow perception of color, depth, brightness, and optical illusions.
3. Errors in the structure and function of the eye can lead to problems in acuity or dysfunction.
4. Problems with focusing light in the eye can be corrected with lenses.

Unit Three - Power

Lesson 1: Introduction to Power

1. Many human body systems work to create, process, and distribute the body's main resources – food, water, and oxygen.

Lesson 2: Food

1. Enzymes are usually proteins and act as catalysts which speed up chemical reactions in the human body. (Optional)
2. The digestive system consists of the gastrointestinal tract and the accessory digestive organs which function together too chemically and mechanically digest food, absorb water and nutrients, and remove waste.
3. Metabolism, the sum of all the chemical reactions that occur within the body is required to maintain homeostasis.
4. When a process in the body requires energy, ATP is broken down to liberate energy stored in its chemical bonds.

Lesson 3: Oxygen

1. The structure of the lungs and the close association between the lungs and the vessels of the cardiovascular system facilitate the transport of oxygen to all cells in the body.
2. During normal breathing, a healthy individual is using only a small percentage of the total capacity of his or her lungs.
3. The amount of oxygen required by the cells in a body depends on the activity level of the cells.

Lesson 4: Water

1. The urinary system helps maintain homeostasis in the body by filtering the blood, regulating water and electrolyte concentration, maintaining the pH balance of the blood, and ridding the body of liquid waste called urine.
2. Through filtration, reabsorption, and secretion, the nephron assists in maintaining normal values of water, electrolytes, pH, and blood pressure in the body.
3. The hormones aldosterone and antidiuretic hormone (ADH) both help regulate the amount of water in the body.
4. Malfunctions in the body can be identified through notice able changes in the composition of urine, and these changes can be detected through urinalysis.

Unit Four - Movement

Lesson 1: Joints and Motion

1. The skeletal system works with the muscular system to move the human body.
2. The types of joints found in the human body differ in both structure and function and are classified as such.
3. Range of motion describes a joint's possible movements as well as provides a measure of overall flexibility at a joint.

Lesson 2: Muscles

1. Through contraction and relaxation, the three different types of muscle tissue- skeletal, cardiac, and smooth - produce body movements, stabilize body position, move substances within the body, and regulate heat.
2. The structure of the muscle and attachment of this muscle to bone directly relates to the function of each skeletal muscle.
3. Muscles are composed of units called sarcomeres, which contract and shorten when exposed to electrical stimuli.
4. Calciumions and ATP play a role in the contraction of muscle fibers.
5. Neurons are packed together in wiring called nerves, and these nerves take electrical messages from the brain to muscle.

Lesson 3: Blood Flow

1. The heart pumps blood to the lungs to pick up oxygen and to the body to deliver this oxygen.
2. The structure of arteries, veins, and capillaries relates directly to the function of each vessel and to the amount of pressure exerted on the vessel walls.
3. Changes in cardiac output, the amount of blood that is pumped out by the ventricles per minute, often signal diseases of the heart, and these changes can impact the function of other body systems.
4. Increased blood pressure in vessels can indicate possible blockages, and these blockages can interrupt blood flow to an organ or limb.

Lesson 4: Energy and Motion: Exercise Physiology

1. Exercise requires the coordinated effort of many human body systems, including the nervous system, the muscular system, the skeletal system, the cardiovascular system, and the respiratory system.
2. An athlete training for an intense physical event needs to consider diet, exercise, hydration, and injury prevention as well as track his or her progress and modify the plan to meet the demands of exercise.

Unit Five – Protection

Lesson 1: The Skin

1. The skin is a dynamic organ that functions in protection, temperature regulation, sensation, excretion, and absorption in the human body.
2. Burn damage to skin can impact numerous body functions and body systems.
3. Both the body's ability to sense pain and to suppress pain help protect the human body from injury and death.

Lesson 2: Bones

1. Bones assist muscles with movement of the body and protect the internal organs from damage and injury.
2. Damage to bone, through a sprain or a fracture, can impact the function of other body organs and systems.
3. Osteoclasts and osteoblasts are specialized bone cells that function to break down old bone tissue and replace it with new.
4. Bone is constantly being broken down and reformed through the process of bone remodeling.

Lesson 3: Lymph and Blood Cells

1. The lymphatic and immune system functions to drain and distribute fluid in the body as well as protect the human body against specific invaders.
2. Antibodies are proteins found in the blood or lymph that seek out and bind to specific antigens.
3. Only certain blood types are compatible with one another and can be safely transferred from person to person in a transfusion.
4. Antibodies are produced in response to specific pathogens.

Unit Six – Homeostasis

Lesson 1: Health and Wellness

1. Factors in the external environment affect the body's internal environment and overall ability to maintain homeostasis.
2. Human body systems work together to defend against disease and injury and to maintain health and wellness.
3. Medical interventions, measures that improve health or alter the course of a disease, include preventative measures, diagnostic tests, treatments, and rehabilitation.

Key Assignments:

Students will:

1. Demonstrate the correct use of directional and regional terms and illustrate key directional term pairs on a model of the human body.
2. Interpret bone markings, bone landmarks, and bone measurements to determine a person's gender, age stature and ethnicity.
3. Outline current biometrics technology and demonstrate the steps of gel electrophoresis and analyze the restriction fragment length polymorphisms.
4. Match regions of the brain with their primary functions apply the knowledge of brain structure and function to determine the parts of the brain related to specific human actions.
5. Analyze experimental data to explore reaction time and reflexes in the human body.
6. Design an experiment to test factors that impact reaction time.
7. Analyze case studies to determine the effects of a communication breakdown in the nervous system.
8. Model a feedback loop that shows how the body maintains homeostasis.

9. Diagram the path of light as it enters the eyes and travels to the brain for processing and evaluate visual perception by testing depth perception, peripheral vision, color, vision and visual acuity.
10. Design a laboratory experiment investigating the impact that environmental changes can have on enzyme function and analyze the results.
11. Use sensors to measure lung capacity and oxygen capture and analyze data.
12. Estimate the filtration rate of the glomerulus and relate mathematical estimates to the function of the human kidney.
13. Measure range of motion of human joints using a goniometer.
14. Calculate and interpret cardiac output values and relate the amount of blood pumped by the heart to the health of the other body systems and organs.
15. Interpret EMG and grip strength data to assess muscle fatigue and apply knowledge in this unit to design a comprehensive training plan for an athlete.
16. Analyze simulated blood samples to determine blood type, and produce a family pedigree for blood type and determine donors for a transfusion.
17. Trace a disease in human systems by generating a fictional case study and compiling a patient case file.

Instructional Methods and/or Strategies:

The course will use various instructional strategies and methods to guide the curriculum. These will include direct instruction of terms, landmarks and anatomical ideas, guided practice in identification, recognition and use of anatomical assessment tools along with a direct focus on student directed group collaboration on projects, analysis of laboratory measures and presentation skills.

Assessment Including Methods and/or Tools:

Students will be assessed in various methods and tools to identify their understanding of key anatomical points within the curriculum. This assessment will be done through direct testing of anatomical landmarks, observation in use of diagnostic tools, and collaboration within student groups in presenting their analysis of problems and solutions as it relates to the Human Body System curriculum.