Course Title: Anatomy & Physiology Honors

Course #: 1537-1538

Course Description:
Students in grades 11-12 who have a strong interest in human physiology and are planning to pursue a career in the life sciences or health related professions will benefit from this accelerated, in-depth study of the human body. Students will explore the structural and functional relationships of all the organ systems and how they dynamically work together to sustain life. In addition, how the human body responds to pathophysiological imbalances and ultimately maintains homeostasis will be studied

UC/CSU Approval: “d” approved

Grade Level: 10-12

Estimated Homework Per Week: 5 hours per week

Prerequisite:
A grade of "B" or higher in Biology & Chemistry, both semesters.

Honors Anatomy is NOT intended as a second year anatomy course. Completion of the college prep Anatomy & Physiology precludes you from taking the honors course.

Recommended Prerequisite Skills:
College level reading skill
Self-directed learner
Willing to study even when there is not assigned homework due for next class
Good rote memorization

Course Grade Scale:
Grades each semester will be determined by the possible points you were able to earn in each category as weighted in the following way:

10% - Class Assignments & Homework
10% - Quizzes
15% - Labs & Projects
45% - Unit Tests
20% - Semester Exam

Major Assessments/Units/Topics:
Each unit will encompass hands-on laboratory activities and will culminate in a summative unit
Units of Study:

Overview of Human Body - An introduction to regional and directional terminology, homeostasis, and conditions necessary for life.

Chemistry Review - Chemistry concepts essential to understanding the biochemistry of the human body will be reviewed briefly.

Biology Review - The semipermeable cell membrane, cellular transport topics, intercellular junctions, and structure of major biomolecules will be reviewed.

Body Tissues - Learning the structural and functional characteristics of the four tissue types that make up the human body.

Integumentary System - The skin, its accessories and the complex functions the integumentary system performs to protect the body while allowing it to interact with/respond to its environment.

Digestive System - Essential to the functioning of all cells is the acquisition and absorption of nutrients necessary for cellular processes. The mechanical and chemical digestion of nutrients, plus the importance of absorption in the intestines, is a key focus of this chapter. Also included is the role that various vitamins and minerals play in various, vital human body functions is included, as well as a review of cellular respiration and the role it plays in converting ingested nutrients into chemical energy and waste products. The endocrine system is inserted in terms of how digestive activities are regulated.

Organization of the Nervous System - The anatomy of the brain, plus an overview of how sensory input is translated into appropriate responses by the body is discussed. The chemical conditions involved in an action potential are discussed, in addition to the role played in myelination of a neuron and importance of synapses in nervous system integration.

Muscular System - This unit not only studies the major muscles and the actions they produce, but also investigates neuromuscular junctions, the structures and chemistry of the sliding filament theory, and the relationship between the nervous system and the muscles it commands.

Neurochemical Investigation - Students will be assigned to research and present information on one of a variety of neurochemicals (natural or synthetic) that affect neurotransmitter activity. The investigation will include an explanation of the symptoms that result.

Skeletal System - In addition to learning the arrangement of the bones and connective tissue that holds them together, this unit also explores the many dynamic functions that the human
skeletal system performs to support other body systems. The endocrine system is inserted into this unit by studying the regulation of blood calcium levels.

Blood - Students will learn about how this dynamic fluid performs many functions in support of all cells in the body. Also included will be the delicate balance in the chemical composition of blood plasma. The endocrine system is inserted in terms of the regulation red blood cell production.

Immune System - Both the innate and adaptive immune systems will be investigated, as well as cellular communication involved in an immune response. This unit culminates with students exploring epidemiology by preparing a presentation on various emerging infectious diseases and the conditions, whether social, political, or economic, that contribute to outbreaks and epidemics.

Biotechnology Unit - Students will conduct an infectious disease simulation that exposes them to the ELISA technique and how medical diagnostics are generated and used. This unit also allows students to conduct a protein purification process, including isolating bacterial colonies with favorable traits, culminating with chromatography column isolation of the desired protein.

Cardiovascular System - This unit begins with the structure of the heart and blood vessels, then progresses to show how the cardiovascular system supports the needs of cells in every tissue of the body. The endocrine system is inserted in terms of its role in regulating blood pressure.

Respiratory System - In addition to the structures of the respiratory system, this unit looks at the respiratory zones where gas exchange happens both in the lungs and at the cellular level.