

### **§121.13. Anatomy and Physiology of Human Systems (One Science Credit).**

(a) General requirements. The prerequisites for this course are Biology and Chemistry. To receive credit in science, students must meet the 40% laboratory and fieldwork requirement identified in §74.3(b)(2)(C) of this title (relating to Description of a Required Secondary Curriculum). This course is recommended for students in Grade 11 or 12.

(b) Introduction.

(1) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and increasing knowledge described by physical, mathematical, and conceptual models, and that science may not answer all questions.

(2) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.

(3) Investigations are used to learn about the natural world through questioning, observing and drawing conclusions. Students should understand that certain types of questions can be answered by investigations, and that conclusions and models built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and, based on new discoveries, are constantly being changed to more closely reflect the physical world.

(c) Knowledge and skills.

(1) The student conducts laboratory investigations and fieldwork using safe, environmentally appropriate, and ethical practices. The student is expected to:

(A) demonstrate safe practices during laboratory investigations and in fieldwork; and

(B) make wise choices in the conservation and use of resources and the disposal of materials.

(2) The student uses scientific methods during fieldwork and laboratory investigations. The student is expected to:

(A) plan and implement investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology;

(B) make observations and measurements in collecting data in various ways;

(C) organize, analyze, evaluate, make inferences, and predict trends from data; and

(D) communicate valid conclusions.

(3) The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(A) analyze, review, and critique hypotheses and theories as to their strengths and weaknesses using scientific evidence and information;

(B) make choices in selecting everyday products using scientific research findings;

(C) evaluate the impact of research on scientific thought, society, and the environment;

(D) gather information about future careers using a variety of sources; and

(E) research and describe the history of science and contributions of scientists.

(4) The student knows the energy needs of the human body and the processes through which these needs are fulfilled. The student is expected to:

(A) analyze and explain the chemical reactions that provide energy for the body;

(B) identify the means, including the structure and function of the digestive system, by which energy is processed and stored within the body; and

(C) analyze the effects of energy deficiencies in malabsorption disorders such as diabetes, hypothyroidism, and Crohn's disease.

(5) The student knows the responses of the human body to internal and external forces. The student is expected to:

(A) interpret normal and abnormal contractility conditions such as in edema, glaucoma, aneurysms, and hemorrhage;

(B) analyze and describe the effects of pressure, movement, torque, tension, and elasticity on the human body;

(C) conduct an investigation to determine causes and effects of force variance, and communicate findings;

(D) survey and report the uses of various diagnostic and therapeutic technologies; and

(E) explain how coordination of muscles, bones, and joints allows movement of the body.

(6) The student knows the body processes that maintain homeostasis. The student is expected to:

(A) investigate and describe the integration of the chemical and physical processes, including equilibrium, temperature, pH balance, chemical reactions, passive and active transport, and biofeedback, that contribute to homeostasis; and

(B) predict the consequences of the failure to maintain homeostasis.

(7) The student knows the electrical conduction processes and interactions. The student is expected to:

(A) illustrate conduction systems such as nerve transmission or muscle stimulation;

(B) research and describe the therapeutic uses and effects of external sources of electricity on the body system; and

(C) evaluate the application of advanced technologies such as electroencephalogram (EEG), electrocardiogram (ECG), bionics, transcutaneous electrical nerve stimulation (TENS), and cardioversion.

(8) The student knows the body's transport systems. The student is expected to:

(A) analyze the physical, chemical, and biological properties of transport systems including circulatory, respiratory, and excretory;

(B) identify and describe the factors that alter the normal functions of transport systems; and

(C) compare the interactions among the transport systems.

(9) The student knows environmental factors that affect the human body. The student is expected to:

(A) identify the effects of environmental factors, such as climate, pollution, radioactivity, chemicals, electromagnetic fields, pathogens, carcinogens, and drugs on body systems; and

(B) research and evaluate measures to minimize harmful environmental factors on body systems.

(10) The student knows how to compare anatomical structures to physiological functions. The student is expected to:

(A) analyze the relationships between the anatomical structures and physiological functions of systems such as integumentary, reproductive, nervous, and digestive;

(B) evaluate the cause and effect of disease, trauma and congenital defects on the structure and function of cells, tissues, organs, and systems;

(C) research and evaluate technological advances and limitations in the treatment of system disorders; and

(D) identify characteristics of the aging process on body systems.

(11) The student knows the process of reproduction, growth, and development. The student is expected to:

(A) research and describe embryological development of tissues, organs, and systems;

(B) identify the functions of the male and female reproductive systems; and

(C) summarize the human development cycle.

*Source: The provisions of this §121.13 adopted to be effective September 1, 1998, 22 TexReg 5014.*