

# Health Science Career Field (2021): Human Anatomy and Physiology (072040)

**Human Body System:** Learners will describe the various anatomy, physiology, and pathophysiology associated with body systems and alterations related to the normal developmental process, obtain a health history, perform an evaluation of the body systems, and document using medical terminology. 2

**Outcome 2.1 Human Anatomy, Physiology, and Pathophysiology:** Describe the various human body systems, alterations related to the normal developmental process and possible dysfunctions. 2.1

- 1 Identify body planes, directions, cavities, quadrants and regions. 2.1.1
- 2 Describe the physical characteristics, components and function of blood (e.g., ABO, Rh, blood cells, precursors and respiratory) 2.1.2
- 3 Describe the structures and functions of the cardiovascular system and trace the path of blood and identify factors affecting blood flow. 2.1.3
- 4 Describe how blood pressure is controlled and identify factors influencing changes in blood pressure. 2.1.4
- 5 Describe the structures and functions of the respiratory system. 2.1.5
- 6 Describe function of nerve tissue, nervous system, including regions of the brain. 2.1.6
- 7 Describe the structures and functions of the musculoskeletal system. 2.1.7
- 8 Describe the structures and functions of the digestive/excretory system. 2.1.8
- 9 Describe the structures and functions of the renal/urinary system. 2.1.9
- 10 Describe the structures and functions of the immune system. 2.1.10
- 11 Describe the structures and functions of the endocrine system. 2.1.11
- 12 Differentiate between the structures and functions of the male and female reproductive systems. 2.1.12
- 13 Describe the structures and functions of the integumentary system. 2.1.13
- 14 Describe the difference between pathology and physiology and the conditions typically observed during a disease state. 2.1.14

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**Outcome 2.2 Evaluate Body Systems:** Assess the biopsychosocial state of the patient and document using medical terminology. 2.2

- 1 Provide privacy and demonstrate sensitivity for diverse populations. 2.2.1
- 2 Contact interpretive services for non-English speaking and English Language Learners (ELL). 2.2.2
- 3 Use developmentally appropriate language to systematically review disease processes related to each body system. 2.2.3
- 4 Obtain and document vital signs. 2.2.4
- 5 Identify and categorize level of consciousness and cognition. 2.2.5
- 6 Identify and measure pupil reactivity and accommodation. 2.2.6
- 7 Identify site, onset, type, quality and degree of pain. 2.2.7
- 8 Identify factors affecting degree and quality of pain. 2.2.8
- 9 Auscultate lungs for abnormal breath sounds. 2.2.9
- 10 Describe pulmonary function testing (e.g., vital capacity, tidal volumes, total lung capacity). 2.2.10
- 11 Auscultate bowel sounds and palpate abdomen for distention and tautness. 2.2.11
- 12 Measure range of motion and determine joint mobility. 2.2.12
- 13 Measure muscle strength. 2.2.13
- 14 Identify various wounds and skin conditions. 2.2.14
- 15 Measure and document excessive body fluid loss. 2.2.15
- 16 Identify symptoms of substance abuse. 2.2.16

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**Outcome 2.3 Medical Terminology: Decipher medical terms through word origin and structure with an emphasis on derivation, meaning, pronunciation, and spelling. 2.3**

- 1 Build and decipher medical term meanings by identifying and using word elements (e.g., word roots, prefixes, suffixes, and combining forms). 2.3.1
- 2 Apply the rules used to build singular and plural forms of medical terminology derived from the Greek and Latin language. 2.3.2
- 3 Use diagnostic, symptomatic, and procedural terms to read and interpret various medical reports. 2.3.3
- 4 Use abbreviations and symbols to identify anatomical, physiological and pathological classifications and the associated medical specialties and procedures. 2.3.4
- 5 Communicate medical instructions and prepare medical documents using medical terminology. 2.3.5

**will demonstrate the skills and knowledge of interpreting laboratory requests, using personal protective equipment and hazardous material containment, specimen collection procedures, a variety of laboratory testing and techniques and maintenance of laboratory equipment and supplies.** 5

**disease and biotechnology applications and perform assays as a diagnostic tool to detect the presence of a pathogen when handling and storing specimens and preservatives for biologicals.** 5.3

- 1 Explain microbial taxonomy and classification systems and use them to identify microbial organisms. 5.3.1
- 2 Compare and contrast cellular structure and functions of prokaryotic and eukaryotic cells. 5.3.2
- 3 Differentiate between bacterial metabolism, reproduction, cell structures, and their functions. 5.3.3
- 4 Identify aerobic bacteria through morphological, physical and biochemical properties. 5.3.4
- 5 Describe the structure of viruses and differentiate between types. 5.3.5
- 6 Explain virulence, pathogenicity and the factors that contribute to pathogenicity. 5.3.6
- 7 Describe types and features of passive and active transport systems. 5.3.7
- 8 Describe molecular behavior of large molecules, including carbohydrates, lipids, proteins and nucleotides. 5.3.8
- 9 Explain how chemical energy operates major cell processes (e.g., biosynthesis, movement, transport, growth). 5.3.9
- 10 Explain factors that affect and optimize rates of enzyme assay reactions. 5.3.10

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**Outcome 5.4 Molecular and Genetic Technology: Perform molecular and genetic applications using knowledge of nucleic acid structure and function, DNA replication, transcription, translation, chromosome structure and remodeling and regulation of gene expression in prokaryotes and eukaryotes.** 5.4

- 1 Predict and explain offspring genotypes and phenotypes using basic mode of genetics. 5.4.1
- 2 Identify complex gene expression and transmission patterns. 5.4.2
- 5 Describe the processes involved in gene regulation. 5.4.5
- 6 Identify and isolate peptides and proteins. 5.4.6
- 7 Summarize the steps in creating a recombinant DNA molecule. 5.4.7
- 6 Isolate and purify nucleic acids, including chromosomal and extra-chromosomal DNA molecules. 5.4.8
- 9 Compare nucleic acids and chromosomal DNA molecules using a sequence database. 5.4.9

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**Outcome 5.5 Laboratory Standard Operational Procedures: Perform methods and techniques using protocols in order to conduct an experiment.** 5.5

- 1 Follow standard operating procedure (SOP) to aseptically collect and prepare dry and wet samples for analysis. 5.5.1
  - 2 Prepare and dispense stock reagents, buffers, media and solutions by calculating concentrations, adjusting factors such as pH and selecting purification techniques and containers. 5.5.2
  - 3 Test and maintain the integrity of stains, reagents, chemicals and mounts. 5.5.3
  - 4 Select and apply sterilization methods for reagents, buffers, media and solutions. 5.5.4
  - 9 Transfer gases, liquids and solids from storage containers to equipment used in the laboratory. 5.5.9
  - 10 Use aseptic laboratory techniques while working. 5.5.10
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**Outcome 5.6 Culturing: Perform experimental techniques used in cell biology to study cell growth, manipulation and evaluation. 5.6**

- 1 Identify the structure of cells and the functions of their components. 5.6.1
- 2 Explain classification, composition and preparation of culture media and prepare media for propagation. 5.6.2
- 3 Identify bacteriologic methods necessary for isolation and identification of organisms. 5.6.3
- 4 Operate basic microbiology and analytical equipment and examine biological specimens. 5.6.4
- 5 Isolate, propagate, maintain and harvest pure cell lines following standard operating procedure (SOP). 5.6.5
- 6 Verify culture cell lines and determine the cause or causes of culture failures following standard operating procedure (SOP). 5.6.6
- 7 Explain the collection and handling of fungal, mycobacterial and viral specimens following standard operating procedure (SOP). 5.6.7
- 8 Explain the collection and handling of fungal, mycobacterial and viral specimens following standard operating procedure (SOP). 5.6.8
- 9 Describe how vectors are used to transform host and microorganisms. 5.6.9
- 10 Correlate bacterial binary fission with generation time 5.6.10
- 11 Describe physical factors that affect microbial growth and identify a normal bacteria population growth curve. 5.6.11
- 12 Calculate values of cell concentration for both batch and continuous cultivation 5.6.12
- 13 Identify hormones used to stimulate cell growth. 5.6.13
- 14 Test for antibiotic susceptibility. 5.6.14

- 15 Explain how cell cultures can be used to assay viability and cytotoxicity. 5.6.15
- 16 Demonstrate cryopreservation techniques by freezing and thawing cells. 5.6.16