Ohio CTE

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

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

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

Bioscience Research and Development: Learners 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

Outcome 5.3 **Microbiology Testing &Technology: Describe the morphology and process of reproduction of microorganisms important in clinical 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

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

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

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