**Course Description:**

In this course, students will demonstrate knowledge of body systems with emphasis on the interrelationships between structure and physical function. Students will analyze and evaluate how the body systems respond to physical activity, disease, and aging. Students will use data acquisition software to monitor abnormal physiology and body functions (e.g., muscle movement, reflex, respiratory, and voluntary actions). Further, students will analyze descriptive results of abnormal physiology and evaluate clinical consequences.

**Strand 2. Human Body System**

Learners will discuss the various forms, functions and pathophysiology associated with body systems and alterations related to the normal aging process, obtain a health history, perform an evaluation of body systems and document using medical terminology.

**Outcome: 2.1. Human Body Form, Function and Pathophysiology**

Discuss the various human body systems, alterations related to the normal aging process and possible dysfunctions.

**Competencies**

2.1.1. Describe the physical characteristics, components and function of blood (e.g., ABO, Rh, blood cells, precursors and respiratory).

2.1.2. Describe the cardiovascular system and trace the path of blood and factors affecting blood flow.

2.1.3. Describe how blood pressure is controlled and factors influencing changes in blood pressure.

2.1.4. Describe the function and components of the respiratory system and pulmonary ventilation and factors influencing respiratory rates.

2.1.5. Describe nerve tissue and the nervous system including regions of the brain and their function, the spinal nerves, signal transmission at synapses, and the sympathetic and parasympathetic system.

2.1.6. Describe the musculoskeletal system including skeletal, cardiac and smooth muscle, various bone structures and the role of bone marrow, and joints and injuries.

2.1.7. Describe the gastrointestinal system including structures of chewing, swallowing, digestion, and elimination and the role of accessory organs including the liver, pancreas and gallbladder.

2.1.8. Describe the urinary system structures and principles of glomerular filtration, electrolyte exchanges, role in the production of red blood cells and control of blood pressure.

2.1.9. Describe the immune system and the lymphatic system's role in immunity.

2.1.10. Describe the sensory system, related structures and functions.

2.1.11. Describe the endocrine system , structures and the role of hormones.

2.1.12. Differentiate between the male and female reproductive system, structures, and function.

2.1.13. Describe the integumentary system, related structures, and functions.

2.1.14. Describe the difference between pathology and physiology and the conditions typically observed during a disease state.

2.1.15. Explain the pathophysiology changes associated with or resulting from disease or injury.

*An “X” indicates that the pathway applies to the outcome.*

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| **Pathways** | X | Health Information Management |  | Medical Bioscience | X | Allied Health and Nursing | | | X | Exercise Science and Sports Medicine |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |

**Outcome: 2.2. Evaluate Body Systems**

Use interviewing techniques, observation, auscultation, palpation and percussion to perform a systematic head‐to‐toe evaluation of the body systems and document using medical terminology.

**Competencies**

2.2.1. Provide privacy and demonstrate cultural sensitivity.

2.2.2. Contact interpretive services for non‐English speaking and English as a Second Language (ESL)

individuals.

2.2.3. Use age‐appropriate language to systematically review disease processes related to each body

system (e.g., vaccinations, allergies, reactions, history of abuse, history of suicidal ideation,

alcohol use, risk behaviors, stressors, sleep patterns, nutritional patterns, occupation, living

conditions, current medications, over‐the‐counter medications, herbals).

2.2.4. Perform vital signs.

2.2.5. Determine level of consciousness and cognition.

2.2.6. Determine pupil reactivity and accommodation.

2.2.7. Determine site, onset, type, quality and level of pain.

2.2.8. Determine what decreases and increases the pain experience.

2.2.9. Auscultate lungs for abnormal breath sounds.

2.2.10. Perform pulmonary function testing (e.g., vital capacity, tidal volumes, total lung capacity).

2.2.11. Auscultate bowel sounds and palpate abdomen for distention and tautness.

2.2.12. Determine joint mobility and muscle strength (e.g., range‐of‐motion).

2.2.13. Identify open wounds, skin abrasions, decubitus and rashes.

2.2.14. Observe for excessive body fluid loss (i.e., blood loss, diarrhea, vomiting, profuse diaphoresis).

2.2.15. Identify symptoms of substance abuse.

2.2.16. Identify patterns of behavior to determine risk to self and others.

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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.

**Competencies**

2.3.1. Build and decipher medical term meanings by identifying and using word elements (e.g., word roots, prefixes, suffixes, and combining forms).

2.3.2. Apply the rules used to build singular and plural forms of medical terminology derived from the Greek and Latin language.

2.3.3 Use diagnostic, symptomatic, and procedural terms to read and interpret various medical reports.

2.3.4. Use the appropriate abbreviations and symbols to identify anatomical, physiological and pathological classifications and the associated medical specialties and procedures.

2.3.5. Use proper spelling and pronunciation of medical terms when communicating medical instructions and preparing medical documentations.

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**Strand 5. Bioscience Research and Development**

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

**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.

**Competencies**

5.3.1. Explain microbial taxonomy and classification systems and use them to identify microbial

organisms.

5.3.2. Compare and contrast cellular structure and functions of prokaryotic and eukaryotic cells.

5.3.3. Explain bacterial metabolism, reproduction, cell structures and their functions.

5.3.4. Identify aerobic bacteria through morphological, physical and biochemical properties.

5.3.5. Describe the structure of viruses and differentiate between types.

5.3.6. Identify the components of a nucleotide and differentiate from nucleosides.

5.3.7. Explain virulence, pathogenicity and the factors that contribute to pathogenicity.

5.3.8. Describe types and features of passive and active transport systems.

5.3.9. Describe molecular behavior of large molecules, including carbohydrates, lipids and proteins.

5.3.10. Explain how chemical energy operates major cell processes (e.g., biosynthesis, movement,

transport, growth).

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**Outcome: 5.4. Bio‐Molecular Technology**

Perform bio‐molecular 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.

**Competencies**

5.4.1. Predict and explain offspring genotypes and phenotypes using Mendel’s Laws and a Punnett

square.

5.4.2. Explain alternative forms of transmission (e.g., non‐Mendelian inheritance).

5.4.5. Describe the processes involved in gene regulation (e.g., histone acetylation, RNA stability, cotranslational and post‐translational modifications).

5.4.6. Discuss alternative types of gene expression (e.g., sex‐limited, sex‐linked, partial dominance,

epistatic, pleiotropic).

5.4.7. Identify, isolate and manipulate peptides and proteins (i.e., primary, secondary, tertiary,

quaternary).

5.4.8. Describe and perform the steps in creating a recombinant DNA molecule.

5.4.9. Isolate and purify nucleic acids, including chromosomal and extra‐chromosomal DNA

molecules.

5.4.18. Explain results from the Human Genome project and other sequencing projects and explain

how gene sequencing is performed.

5.4.19. Perform gene analysis to determine the source of an isolated pathogen.

5.4.20. Explain the growing knowledge base regarding RNA and its role in gene expression.

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**Outcome: 5.5. Laboratory Standard Operational Procedures**

Perform methods and techniques using protocols in order to conduct an experiment.

**Competencies**

5.5.1. Aseptically collect and prepare dry and wet samples for analysis, considering safety protocols.

5.5.2. Prepare and dispense stock reagents, buffers, media and solutions by calculating concentrations, adjusting factors such as pH and selecting purification techniques and containers.

5.5.3. Test and maintain the integrity of stains, reagents, chemicals and mounts.

5.5.4. Select and apply sterilization methods for reagents, buffers, media and solutions.

5.5.9. Transfer gases, liquids and solids from storage containers to equipment used in the

laboratory.

5.5.10. Use aseptic laboratory techniques while working.

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**Outcome: 5.6. Culturing**

Perform experimental techniques used in cell biology to study cell growth, manipulation and evaluation.

**Competencies**

5.6.1. Identify the structure of cells and the functions of their components.

5.6.2. Explain classification, composition and preparation of culture media and prepare media for

propagation.

5.6.3. Identify bacteriologic methods necessary for isolation and identification of organisms.

5.6.4. Operate centrifuge, microscope, compound microscope, spectrophotometer, incubator,

colony counter, pipets and other basic microbiology and analytical equipment and using

microscopes, examine biological specimens.

5.6.5. Explain the principles of microscopy and process a specimen for light microscopy.

5.6.6. Prepare, incubate and identify colonies microscopically and macroscopically (e.g., colonial

morphology, staining procedures, biochemical).

5.6.7. Isolate, propagate, maintain and harvest pure cell lines.

5.6.8. Verify culture cell lines and determine the cause or causes of culture failures.

5.6.9. Explain the collection and handling of fungal, mycobacterial and viral specimens.

5.6.10. Explain Koch’s Postulates and their use in determining primary and secondary pathogens.

5.6.11. Describe how vectors (e.g., plasmids, transposons, viruses) are used to transform host and

microorganisms.

5.6.12. Correlate bacterial binary fission with generation time.

5.6.13. Describe physical factors that affect microbial growth and identify a normal bacteria

population growth curve.

5.6.14. Conduct a shelf‐life study to determine physical change and biological growth.

5.6.15. Conduct a thermal death time study on an organism.

5.6.16. Calculate values of cell concentration for both batch and continuous cultivation.

5.6.17. Identify hormones used to stimulate cell growth and test for antibiotic susceptibility.

5.6.18. Explain how cell cultures can be used to assay viability and cytotoxicity.

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| **Pathways** |  | Health Information Management | X | Medical Bioscience | X | Allied Health and Nursing | | |  | Exercise Science and Sports Medicine |
| **Green Practices** |  | Green-specific |  | Context-dependent | | |  | Does not apply | | |