



Lakeshore Technical College

10-806-179 Adv Anatomy & Physiology

Course Outcome Summary

Course Information

Alternate Title Advanced Anatomy and Physiology

Description Advanced Anatomy and Physiology is the second semester in a two-semester sequence in which normal human anatomy and physiology are studied using a body systems approach with emphasis on the interrelationships between form and function at the gross and microscopic levels of organization. Instructional delivery within a classroom and laboratory setting. Experimentation within a science lab will include analysis of cellular metabolism, the individual components of body systems such as the nervous, neuro-muscular, cardiovascular, and urinary. Continued examination of homeostatic mechanisms and their relationship to fluid, electrolyte, acid-base balance and blood. Integration of genetics to human reproduction and development are also included in this course.

Total Credits 4

Pre/Corequisites

Prerequisite Each Wisconsin Technical College determines the General Education course prerequisites used by their academic institution. If prerequisites for a course are determined to be appropriate, the final Course Outcome Summary must identify the prerequisites approved for use by the individual Technical College.

Course Competencies

1. Analyze how the individual components of the nervous system work as an integrated whole

Assessment Strategies

- 1.1. through a written, graphic or oral product or process
- 1.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 1.1. written, graphic or oral product or process examines sensory function
- 1.2. written, graphic or oral product or process examines motor and sensory neural pathways
- 1.3. written, graphic or oral product or process describes the role of the autonomic nervous system in maintaining homeostasis
- 1.4. written, graphic or oral product or process describes neuro-physiology including potential generation, impulse conduction and synaptic transmission
- 1.5. written, graphic or oral product or process evaluates the actions of neurotransmitters

Learning Objectives

- 1.a. Examine sensory function
- 1.b. Examine motor neural pathways

- 1.c. Describe the role of the autonomic nervous system
- 1.d. Describe the generation of neuron action potentials
- 1.e. Describe neuro-physiology including potentials, impulse conduction and synaptic transmission
- 1.f. Identify the role of neurotransmitters
- 1.g. Correlate cranial nerves to their respective physiological functions
- 1.h. Relate higher order brain functions to brain anatomy
- 1.i. Relate various types of pain to homeostatic mechanism

2. Analyze how the individual components of the endocrine system work as an integrated whole

Assessment Strategies

- 2.1. through a written, graphic or oral product or process
- 2.2. in a laboratory or classroom setting

Criteria

Your performance will be successful when:

- 2.1. written, graphic or oral product or process relates endocrine function to homeostasis, including hypo- and hypersecretion
- 2.2. written, graphic or oral product or process identifies the advanced mechanisms of hormone actions
- 2.3. written, graphic or oral product or process identifies the mechanism of hormone transport
- 2.4. written, graphic or oral product or process correlates the relationship of neural function and hormonal secretion
- 2.5. written, graphic or oral product or process correlates the major hormones to the tissues and organs that secrete them
- 2.6. written, graphic or oral product or process correlates the major hormones to their respective target tissues
- 2.7. written, graphic or oral product or process explains control of hormone secretion
- 2.8. written, graphic or oral product or process describes hormonal response to stress

3. Analyze the processes of cellular metabolism

Assessment Strategies

- 3.1. through a written, graphic or oral product or process
- 3.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 3.1. written, graphic or oral product or process compares the processes of aerobic and anaerobic respiration
- 3.2. written, graphic or oral product or process distinguishes between anabolism and catabolism
- 3.3. written, graphic or oral product or process compares the mechanism of carbohydrate, lipid and protein metabolism
- 3.4. written, graphic or oral product or process correlates appropriate cellular organelles and transport mechanisms with their roles in cellular metabolism

Learning Objectives

- 3.a. Describe the process of protein synthesis
- 3.b. Compare the processes of aerobic and anaerobic respiration
- 3.c. Distinguish between anabolism and catabolism
- 3.d. Compare the mechanism of carbohydrate, lipid and protein metabolism
- 3.e. Correlate appropriate cellular organelles with their cellular metabolism role
- 3.f. Diagram includes description of membrane transports and receptor sites

4. Correlate muscle physiology to normal body function

Assessment Strategies

- 4.1. through a written, graphic or oral product or process
- 4.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 4.1. written, graphic or oral product or process identifies the microscopic anatomy of the muscle fiber
- 4.2. written, graphic or oral product or process identifies the physiology of muscle contraction

- 4.3. written, graphic or oral product or process explains the physiology involved in myoneural junctions
- 4.4. written, graphic or oral product or process explains energy production, storage and consumption in the muscle cell

Learning Objectives

- 4.a. Examine sensory function
- 4.b. Contrasts neuro-excitatory and -inhibitory neurotransmitters
- 4.c. Examine sensory function
- 4.d. Correlate neurotransmitters with receptor sites
- 4.e. Relate synaptic activity to neural control
- 4.f. Identify the microscopic anatomy of the muscle fiber
- 4.g. Identify the physiology of muscle cell contraction
- 4.h. Explain the physiology involved in myoneural junctions
- 4.i. Explain energy production, storage and consumption in the muscle cell

5. Analyze the roles of DNA and RNA in controlling cell function and genetics

Assessment Strategies

- 5.1. through a written, graphic or oral product or process
- 5.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 5.1. written, graphic or oral product or process describes DNA replication
- 5.2. written, graphic or oral product or process shows relationship to enzyme production
- 5.3. written, graphic or oral product or process describes effect of mutations on cell function
- 5.4. written, graphic or oral product or process describes gene regulation
- 5.5. written, graphic or oral product or process contrasts DNA and RNA structures and functions
- 5.6. written, graphic or oral product or process distinguishes among the three types of RNA
- 5.7. written, graphic or oral product or process describes the processes involved in protein synthesis

Learning Objectives

- 5.a. Describe DNA replication
- 5.b. Show relationship to enzyme
- 5.c. Describe effect of mutations on cell function
- 5.d. Contrast DNA and RNA structures and functions
- 5.e. Distinguish among the three types of RNA

6. Evaluate the components of defense and immunity that support homeostasis

Assessment Strategies

- 6.1. through a written, graphic or oral product or process
- 6.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 6.1. written, graphic or oral product or process correlates blood components and composition to homeostasis
- 6.2. written, graphic or oral product or process distinguishes among active and passive immunity
- 6.3. written, graphic or oral product or process describes the components of the immune system
- 6.4. written, graphic or oral product or process describes specific and nonspecific immunity

Learning Objectives

- 6.a. Distinguish among active and passive immunity
- 6.b. Describe the components of the immune system
- 6.c. Describe nonspecific immunity
- 6.d. Describe specific immunity
- 6.e. Describe cellular immunity
- 6.f. Describe humoral immunity
- 6.g. Describe immune disorders

7. Analyze cardiovascular physiology to normal body function

Assessment Strategies

- 7.1. through a written, graphic or oral product or process
- 7.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 7.1. written, graphic or oral product or process examines the conduction system of the heart
- 7.2. written, graphic or oral product or process examines the coronary circulation system
- 7.3. written, graphic or oral product or process examines blood flow dynamics
- 7.4. written, graphic or oral product or process analyzes factors affecting blood pressure
- 7.5. written, graphic or oral product or process relates extrinsic and intrinsic factors that influence cardiac function
- 7.6. written, graphic or oral product or process correlates the cardiac cycle with EKG and blood flow dynamics

Learning Objectives

- 7.a. Examine the conductive system of the heart
- 7.b. Examine the coronary circulation system
- 7.c. Examine blood flow dynamics
- 7.d. Examine factors affecting blood pressure
- 7.e. Relate extrinsic and intrinsic factors that influence cardiac function
- 7.f. Correlate the cardiac cycle with EKG and blood flow dynamics

8. Analyze renal physiology

Assessment Strategies

- 8.1. through a written, graphic or oral product or process
- 8.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 8.1. written, graphic or oral product or process correlates nephron structure to filtration, re-absorption and secretion
- 8.2. written, graphic or oral product or process analyzes factors affecting urine formation
- 8.3. written, graphic or oral product or process explains the role of the juxtaglomerular apparatus
- 8.4. written, graphic or oral product or process explains the role of the kidney's vascular system in urine formation
- 8.5. written, graphic or oral product or process explains the normal and abnormal constituents of urine and their significance

Learning Objectives

- 8.a. Correlate nephron structure to urine formation
- 8.b. Describe urine formation
- 8.c. Examine the role of hormonal control in kidney function
- 8.d. Explain the role of the juxtaglomerular apparatus
- 8.e. Explain the role of the kidney's vascular system in urine formation
- 8.f. Explain the normal and abnormal constituents of urine and their significance

9. Evaluate the roles of different organ systems in maintaining adequate tissue perfusion and oxygenation

Assessment Strategies

- 9.1. through a written, graphic or oral product or process
- 9.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 9.1. written, graphic or oral product or process explains the mechanisms that influence hemodynamics
- 9.2. written, graphic or oral product or process includes mechanisms responsible for controlled blood flow through tissues
- 9.3. written, graphic or oral product or process includes compensatory mechanisms

- 9.4. written, graphic or oral product or process explains how alterations in blood, pCO₂, pH, and pO₂ influence ventilation
- 9.5. written, graphic or oral product or process includes the exchange of oxygen and carbon dioxide in the tissues and lungs
- 9.6. written, graphic or oral product or process explains the mechanisms of gas transport

Learning Objectives

- 9.a. Explain the mechanisms that influence hemodynamics
- 9.b. Examine the mechanisms responsible for controlled blood flow through tissues
- 9.c. Describe the compensatory mechanisms operative during shock
- 9.d. Explain how alterations in blood, pCO₂, pH, and pO₂ influence ventilation
- 9.e. Explain the exchange of oxygen and carbon dioxide in the tissues and lungs
- 9.f. Explain the hormonal mechanism influencing hemodynamics
- 9.g. Recognize the neurological mechanisms influencing hemodynamics
- 9.h. Explain the mechanisms of gas transport

10. Distinguish among the processes of digestion, absorption, and assimilation

Assessment Strategies

- 10.1. through a written, graphic or oral product or process
- 10.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 10.1. written, graphic or oral product or process examines absorption of nutrients
- 10.2. written, graphic or oral product or process examines transport and storage of nutrients
- 10.3. written, graphic or oral product or process examines regulations of digestive processes
- 10.4. written, graphic or oral product or process examines the role of the liver, gall bladder and pancreas in digestive and related metabolic functions

Learning Objectives

- 10.a. Examine the absorption of nutrients
- 10.b. Describe the transport of nutrients
- 10.c. Examine the storage of nutrients
- 10.d. Relate enzymes to digestion
- 10.e. Relate hormones to digestion
- 10.f. Examine the role of the liver, gall bladder and pancreas in digestive and related metabolic functions

11. Correlate fluid, electrolyte and acid-base balance to the homeostatic mechanisms responsible for their control

Assessment Strategies

- 11.1. through a written, graphic or oral product or process
- 11.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 11.1. written, graphic or oral product or process identifies fluid compartments and the water and solute movement between them
- 11.2. written, graphic or oral product or process describes the mechanisms by which the water and electrolyte content of the body fluid is regulated
- 11.3. written, graphic or oral product or process compares the composition of intracellular and extracellular fluids
- 11.4. written, graphic or oral product or process describes mechanisms for regulating pH
- 11.5. written, graphic or oral product or process describes acidosis, alkalosis, and compensatory mechanisms

Learning Objectives

- 11.a. Identify fluid compartments and the water and solute movement between them
- 11.b. Diagram the mechanisms by which the water content of the body fluid is regulated
- 11.c. Compare the composition of intracellular and extracellular fluids
- 11.d. Describe mechanisms for regulating pH
- 11.e. Describe respiratory acidosis, alkalosis, and compensatory mechanisms

12. Integrate genetics, development and human reproductive physiology

Assessment Strategies

- 12.1. through a written, graphic or oral product or process
- 12.2. in a laboratory or classroom setting

Criteria

Performance will be successful when:

- 12.1. written, graphic or oral product or process compares mitosis with meiosis
- 12.2. written, graphic or oral product or process distinguishes between spermatogenesis and oogenesis
- 12.3. written, graphic or oral product or process describes the events of fertilization/fetal development
- 12.4. written, graphic or oral product or process recognizes fetal circulation
- 12.5. written, graphic or oral product or process describes the hormonal control of reproductive cycles
- 12.6. written, graphic or oral product or process evaluates the patterns of human inheritance

Learning Objectives

- 12.a. Compare mitosis with meiosis
- 12.b. Distinguish between spermatogenesis and oogenesis
- 12.c. Identify chromosomal abnormalities
- 12.d. Describe the events of fertilization/fetal development
- 12.e. Recognize fetal circulation
- 12.f. Describe the hormonal changes during and after pregnancy
- 12.g. Recognize patterns of human inheritance

13. Use appropriate scientific laboratory methods and safety precautions

Assessment Strategies

- 13.1. in the laboratory

Criteria

Performance will be successful when:

- 13.1. you identify hazards and safety equipment in the lab
- 13.2. you select appropriate personal protective equipment
- 13.3. you follow all laboratory practice expectations of the college