



Lakeshore Technical College

## 10806179 Advanced Anatomy and Physiology

### Course Outcome Summary

#### Course Information

**Alternate Title** Adv Anatomy & 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

**Total Hours** 90

#### Pre/Corequisites

Prerequisite General Anatomy and Physiology with a C or better

#### Course Competencies

##### 1. Integrate genetics, development and human reproductive physiology

###### Assessment Strategies

- 1.1. through an analysis (Format may be written, graphic or oral)
- 1.2. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course

###### Criteria

*Performance will be successful when:*

- 1.1. analysis compares mitosis with meiosis
- 1.2. analysis distinguishes between spermatogenesis and oogenesis
- 1.3. analysis identifies chromosomal abnormalities
- 1.4. analysis describes the events of fertilization/fetal development
- 1.5. analysis recognizes fetal circulation
- 1.6. analysis describes the hormonal changes during and after pregnancy
- 1.7. analysis recognizes patterns of human inheritance

###### Learning Objectives

- 1.a. Compare mitosis with meiosis

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

## **2. Illustrate the role of DNA in controlling cell function and genetics**

### **Assessment Strategies**

- 2.1. through an illustration (Format may be written, graphic or oral )
- 2.2. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course

### **Criteria**

*Performance will be successful when:*

- 2.1. illustration describes DNA replication
- 2.2. illustration shows relationship to enzyme production
- 2.3. illustration describes effect of mutations on cell function
- 2.4. illustration contrasts DNA and RNA structures and functions
- 2.5. illustration distinguishes among the three types of RNA

### **Learning Objectives**

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

## **3. Analyze urinary anatomy and physiology**

### **Assessment Strategies**

- 3.1. through an oral or written analysis
- 3.2. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course
- 3.3. in the lab

### **Criteria**

*Performance will be successful when:*

- 3.1. analysis correlates nephron structure to urine formation
- 3.2. analysis describes urine formation
- 3.3. analysis examines the role of hormonal control in kidney function
- 3.4. analysis explains the role of the juxtaglomerular apparatus
- 3.5. analysis explains the role of the kidney's vascular system in urine formation
- 3.6. analysis explains the normal and abnormal constituents of urine and their significance
- 3.7. you use college-wide laboratory safety, practices and procedure rules

### **Learning Objectives**

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

## **4. Correlate blood components and composition to homeostatic mechanisms**

### **Assessment Strategies**

- 4.1. through a written or oral analysis
- 4.2. given a case study
- 4.3. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course
- 4.4. in the lab

## Criteria

*Performance will be successful when:*

- 4.1. analysis relates hematology lab reports to human health
- 4.2. analysis identifies the steps of hemostasis
- 4.3. analysis identifies the major lipid constituents in blood
- 4.4. analysis discusses the blood's mechanism of transport
- 4.5. analysis correlates ABO/RH compatibility
- 4.6. you use college-wide laboratory safety, practices and procedure rules

## Learning Objectives

- 4.a. Relate hematology lab reports to human health
- 4.b. Identify the steps of hemostasis
- 4.c. Identify the major lipid constituents in blood
- 4.d. Discuss the blood's mechanism of transport
- 4.e. Correlate ABO/RH compatibility

## 5. Correlate cardiovascular physiology to human health

### Assessment Strategies

- 5.1. by interpreting case studies
- 5.2. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course
- 5.3. through lab and clinical activities
- 5.4. in the lab
- 5.5. in the clinical setting

## Criteria

*Performance will be successful when:*

- 5.1. you examine the conductive system of the heart
- 5.2. you examine the coronary circulation system
- 5.3. you examine blood flow dynamics
- 5.4. you examine factors affecting blood pressure
- 5.5. you relate extrinsic and intrinsic factors that influence cardiac function
- 5.6. you correlate the cardiac cycle with EKG and blood flow dynamics
- 5.7. you use college-wide laboratory safety, practices and procedure rules

## Learning Objectives

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

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

### Assessment Strategies

- 6.1. through a written or oral analysis
- 6.2. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course

## Criteria

*Performance will be successful when:*

- 6.1. analysis identifies fluid compartments and the water and solute movement between them
- 6.2. analysis diagrams the mechanisms by which the water content of the body fluid is regulated
- 6.3. analysis compares the composition of intracellular and extracellular fluids
- 6.4. analysis describes mechanisms for regulating pH
- 6.5. analysis describes respiratory acidosis, alkalosis, and compensatory mechanisms

## Learning Objectives

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

## 7. Explain the mechanisms maintaining adequate tissue perfusion and oxygenation

### Assessment Strategies

- 7.1. through an analysis (Format may be written, oral or graphic)
- 7.2. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course
- 7.3. in the lab

### Criteria

*Performance will be successful when:*

- 7.1. analysis explains the mechanisms that influence hemodynamics
- 7.2. analysis includes mechanisms responsible for controlled blood flow through tissues
- 7.3. analysis includes compensatory mechanisms operative during shock
- 7.4. analysis explains how alterations in blood, pCO<sub>2</sub>, pH, and pO<sub>2</sub> influence ventilation
- 7.5. analysis includes the exchange of oxygen and carbon dioxide in the tissues and lungs
- 7.6. analysis explains the hormonal mechanism influencing hemodynamics
- 7.7. analysis explains the neurological mechanisms influencing hemodynamics
- 7.8. analysis explains the mechanisms of gas transport
- 7.9. you use college-wide laboratory safety, practices and procedure rules

### Learning Objectives

- 7.a. Explain the mechanisms that influence hemodynamics
- 7.b. Examine the mechanisms responsible for controlled blood flow through tissues
- 7.c. Describe the compensatory mechanisms operative during shock
- 7.d. Explain how alterations in blood, pCO<sub>2</sub>, pH, and pO<sub>2</sub> influence ventilation
- 7.e. Explain the exchange of oxygen and carbon dioxide in the tissues and lungs
- 7.f. Explain the hormonal mechanism influencing hemodynamics
- 7.g. Recognize the neurological mechanisms influencing hemodynamics
- 7.h. Explain the mechanisms of gas transport

## 8. Identify the processes of cellular metabolism

### Assessment Strategies

- 8.1. through a diagram
- 8.2. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course
- 8.3. in the lab

### Criteria

*Performance will be successful when:*

- 8.1. diagram describes the process of protein synthesis
- 8.2. diagram compares the processes of aerobic and anaerobic respiration
- 8.3. diagram distinguishes between anabolism and catabolism
- 8.4. diagram compares the mechanism of carbohydrate, lipid and protein metabolism
- 8.5. diagram correlates appropriate cellular organelles with their cellular metabolism role
- 8.6. diagram includes description membrane transports and receptor sites
- 8.7. you use college-wide laboratory safety, practice and procedure rules

### Learning Objectives

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

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

### Assessment Strategies

- 9.1. in the lab
- 9.2. through case study analysis
- 9.3. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course

### Criteria

*Performance will be successful when:*

- 9.1. analysis examines sensory function
- 9.2. analysis examines motor neural pathways
- 9.3. analysis describes the role of the autonomic nervous system
- 9.4. analysis describes the generation of neuron action potentials
- 9.5. analysis describe neuro-physiology including potentials, impulse conduction and synaptic transmission
- 9.6. analysis identifies the role of neurotransmitters
- 9.7. analysis correlates cranial nerves to their respective physiological functions
- 9.8. analysis relates higher order brain functions to brain anatomy
- 9.9. analysis relates various types of pain to homeostatic mechanism
- 9.10. you use college-wide laboratory safety, practice and procedures rules

### Learning Objectives

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

## 10. Correlate neuro-muscular physiology to normal body function

### Assessment Strategies

- 10.1. through a diagram
- 10.2. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course
- 10.3. in the lab

### Criteria

*Performance will be successful when:*

- 10.1. diagram contrasts neuro-excitatory and -inhibitory neurotransmitters
- 10.2. analysis examines sensory function
- 10.3. diagram correlates neurotransmitters with receptor sites
- 10.4. diagram relates synaptic activity to neural control
- 10.5. diagram identifies the microscopic anatomy of the muscle fiber
- 10.6. diagram identifies the physiology of muscle cell contraction
- 10.7. diagram explains the physiology involved in myoneural junctions
- 10.8. diagram explains energy production, storage and consumption in the muscle cell
- 10.9. you use college-wide laboratory safety, practice, and procedure rule

### Learning Objectives

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

- 10.i. Explain energy production, storage and consumption in the muscle cell

## 11. Correlate the components of the immune system to their functions

### Assessment Strategies

- 11.1. through an analysis (Format may be written, graphic or oral)
- 11.2. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course
- 11.3. in the lab

### Criteria

*Performance will be successful when:*

- 11.1. analysis distinguishes among active and passive immunity
- 11.2. analysis describes the components of the immune system
- 11.3. analysis describes nonspecific immunity
- 11.4. analysis describes specific immunity
- 11.5. analysis describes cellular immunity
- 11.6. analysis describes humoral immunity
- 11.7. analysis describes immune disorders
- 11.8. you use college-wide laboratory safety, practice and procedure rules

### Learning Objectives

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

## 12. Distinguish among the processes of digestion, absorption, and assimilation

### Assessment Strategies

- 12.1. through a written analysis
- 12.2. given a case study
- 12.3. by accurately answering questions about the concepts that support this competency in one or more written exams to be scheduled by your instructor at various points throughout the course
- 12.4. in the lab

### Criteria

*Performance will be successful when:*

- 12.1. analysis examines absorption of nutrients
- 12.2. analysis examines transport of nutrients
- 12.3. analysis examines storage of nutrients
- 12.4. analysis relates enzymes to digestion
- 12.5. analysis relates hormones to digestion
- 12.6. analysis examines the role of the liver, gall bladder and pancreas in digestive and related metabolic functions
- 12.7. you use college-wide laboratory safety, practices and procedure rules

### Learning Objectives

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

## 13. Use appropriate scientific equipment, 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 wear personal protective equipment
- 13.3. you use appropriate pipetting devices
- 13.4. you never eat or drink in the laboratory
- 13.5. you routinely wash hands
- 13.6. you disinfects lab surfaces and work areas before and after use
- 13.7. you use approved techniques for cleaning up spills
- 13.8. you report or correct unsafe conditions observed in the classroom
- 13.9. you report or correct unsafe conditions observed in the lab
- 13.10. you use universal precautions with blood and other body fluids
- 13.11. you follow the requirements of the O.S.H.A. Bloodborne Pathogen Standard
- 13.12. you locate appropriate safety equipment
- 13.13. you properly dispose of waste
- 13.14. you report all injuries to instructor
- 13.15. you acknowledges or use proper steps for emergency steps
- 13.16. you follow good laboratory practice expectations of the college