Western Technical College

10806179  Advanced Anatomy & Physiology (A&P)

Course Outcome Summary

Course Information

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.

Instructional Level
Associate Degree Courses

Total Credits
4

Total Hours
90

Textbooks


*806-179 Lab Objectives/Supplement.* Western. Publisher: Western. Required.

Learner Supplies

Webcam and microphone. **Vendor:** To be discussed in class. Required. (Online section only)

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

You will know you are successful when
1.1. you explain sensory function.
1.2. you examine motor and sensory neural pathways.
1.3. you describe the role of the autonomic nervous system in maintaining homeostasis.
1.4. you describe neuro-physiology including potential generation, impulse conduction, and synaptic transmission.
1.5. you evaluate 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

You will know you are successful when
2.1. you relate endocrine function to homeostasis, including hypo- and hyper-secretion.
2.2. you identify the advanced mechanisms of hormone actions.
2.3. you identify the mechanism of hormone transport.
2.4. you correlate the relationship of neural function and hormonal secretion.
2.5. you correlate the major hormones to the tissues and organs that secrete them.
2.6. you correlate the major hormones to their respective target tissues.
2.7. you explain control of hormone secretion.
2.8. you describe 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

You will know you are successful when
3.1. you compare the processes of aerobic and anaerobic respiration.
3.2. you distinguish between anabolism and catabolism.
3.3. you compare the mechanism of carbohydrate, lipid, and protein metabolism.
3.4. you correlate 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

You will know you are successful when
4.1. you identify the microscopic anatomy of the muscle fiber.
4.2. you identify the physiology of muscle contraction.
4.3. you explain the physiology involved in myoneural junctions.
4.4. you explain energy production, storage, and consumption in the muscle cell.

Learning Objectives
4.a. Examine sensory function.
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

You will know you are successful when
5.1. you describe DNA replication.
5.2. you demonstrate its relationship to enzyme production.
5.3. you describe effect of mutations on cell function.
5.4. you describe gene regulation.
5.5. you contrast DNA and RNA structures and functions.
5.6. you distinguish among the three types of RNA.
5.7. you describe 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

You will know you are successful when
6.1. you correlate blood components and composition to homeostasis.
6.2. you distinguish among active and passive immunity.
6.3. you describe the components of the immune system.
6.4. you describe 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**
You will know you are successful when
7.1. you examine the conduction system of the heart.
7.2. you examine the coronary circulation system.
7.3. you examine blood flow dynamics.
7.4. you analyze factors affecting blood pressure.
7.5. you relate extrinsic and intrinsic factors that influence cardiac function.
7.6. you correlate 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**
You will know you are successful when
8.1. you correlate nephron structure to filtration, re-absorption, and secretion.
8.2. you analyze factors affecting urine formation.
8.3. you explain the role of the juxtaglomerular apparatus.
8.4. you explain the role of the kidney’s vascular system in urine formation.
8.5. you explain 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**
You will know you are successful when
9.1. you explain the mechanisms that influence hemodynamics.
9.2. you describe mechanisms responsible for controlled blood flow through tissues.
9.3. you explain compensatory mechanisms.
9.4. you explain how alterations in blood, pCO2, pH, and pO2 influence ventilation.
9.5. you include the exchange of oxygen and carbon dioxide in the tissues and lungs.
9.6. you explain 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 operatory during shock.
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
You will know you are successful when
10.1. you examine absorption of nutrients.
10.2. you examine transport and storage of nutrients.
10.3. you examine regulations of digestive processes.
10.4. you describe 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, gallbladder, 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
You will know you are successful when
11.1. you identify fluid compartments and the water and solute movement between them.
11.2. you describe the mechanisms by which the water and electrolyte content of the body fluid is regulated.
11.3. you compare the composition of intracellular and extracellular fluids.
11.4. you describe mechanisms for regulating pH.
11.5. you describe 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
12. **Criteria**

You will know you are successful when

12.1. you compare mitosis with meiosis.
12.2. you distinguish between spermatogenesis and oogenesis.
12.3. you describe the events of fertilization/fetal development.
12.4. you explain fetal circulation.
12.5. you describe the hormonal control of reproductive cycles.
12.6. you evaluate the patterns of human inheritance.

12. **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. **Apply appropriate scientific laboratory methods and safety precautions.**

13. **Assessment Strategies**

13.1. in the laboratory

13. **Criteria**

You will know you are 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.