



Western Technical College

10515174 Respiratory/Cardiac Physiology

Course Outcome Summary

Course Information

Description	Provides the student with an indepth knowledge of the structure and function of the respiratory and circulatory systems necessary to function as a competent Respiratory Therapist. Emphasis is placed on promotion of evidence-based practice using established clinical practice guidelines and published research for its relevance to patient care.
Career Cluster	Health Science
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	72

Pre/Corequisites

Prerequisite	10806177 General Anatomy and Physiology
Prerequisite	10515170 Respiratory Therapy Survey OR 10515111 Respiratory Survey

Textbooks

Egan's Fundamentals of Respiratory Care. 12th Edition. Copyright 2021. Kacmarek, Robert M., James K. Stoller and Albert J. Heuer. Publisher: Elsevier Science. **ISBN-13:** 978-0-323-51112-4. Required.

Program Outcomes

1. Apply respiratory therapy concepts to patient care situations.
2. Demonstrate technical proficiency required to fulfill the role of a Respiratory Therapist.
3. Practice respiratory therapy according to established professional and ethical standards.

Course Competencies

1. **Analyze how components of the pulmonary system function in the body**
Assessment Strategies

- 1.1. by developing an analysis (format may be written, oral, graphic, or three-dimensional model)
- 1.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria

Criteria: Your performance will be successful when:

- 1.1. analysis addresses major gross and microscopic anatomical components of the respiratory system
- 1.2. analysis includes respiratory defense mechanisms and immune response
- 1.3. analysis identifies the major structural components of the respiratory system
- 1.4. analysis illustrates the relationships among the components of the respiratory system
- 1.5. analysis summarizes the functions of the respiratory system and its components
- 1.6. you use appropriate scientific equipment, methods, and safety precautions

Learning Objectives

- 1.a. Describe the locations, structures, and functions of the organs of the respiratory system.
- 1.b. Describe the mechanics of breathing.
- 1.c. Define respiratory air volumes and capacities.
- 1.d. Explain the mechanism of respiratory control and factors that may influence it.
- 1.e. Investigate components of the respiratory immune response

2. Analyze control of breathing

Assessment Strategies

- 2.1. by creating an oral, written or graphic representation of control of breathing.
- 2.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria

Your performance will be successful when:

- 2.1. you describe the organization of the central controller
- 2.2. you describe the normal role of peripheral and central chemo receptors
- 2.3. you relate the reflexes affecting breathing to the respiratory pattern
- 2.4. you describe the neurologic adaptations in specific situations (i.e. exercise, metabolic acidosis, hypoxemia, CO₂ retention)

Learning Objectives

- 2.a. Identify the location of the structures that regulate breathing.
- 2.b. Describe how the peripheral and central chemo receptors differ in the way they regulate breathing.
- 2.c. Identify the effect of various reflexes on the respiratory pattern.
- 2.d. Describe how the regulation of breathing in individuals with hypercapnia differs from regulation of breathing in healthy individuals.

3. Apply principles of gas transport

Assessment Strategies

- 3.1. by collecting, organizing and reporting data related to gas transport
- 3.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria

Your performance will be successful when:

- 3.1. application includes principles of gas transport
- 3.2. you generate and label a oxy-hemoglobin dissociation curve and list factors that shift the curve
- 3.3. application includes how oxygen and carbon dioxide are transported in the blood
- 3.4. application includes factors affecting gas transport
- 3.5. you calculate oxygen content of arterial and venous blood
- 3.6. application includes identification of abnormalities
- 3.7. application includes a description of the Bohr and Haldane effects

Learning Objectives

- 3.a. Diagram and label the oxy-hemoglobin dissociation curve and list factors that shift the curve.
- 3.b. Explain how oxygen and carbon dioxide are transported in the blood.

- 3.c. Give examples of factors affecting gas transport.
- 3.d. Calculate oxygen content of arterial and venous blood.

4. Apply principles of ventilatory mechanics

Assessment Strategies

- 4.1. by preparing a written response to a case study
- 4.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria

Your performance will be successful when:

- 4.1. application includes pressure/volume relationships of the lung and thorax
- 4.2. application includes pulmonary mechanics (e.g. volumes, pressures, and flows)
- 4.3. application includes respiratory monitoring (e.g. rate, tidal volume, minute volume, I:E)
- 4.4. application includes ventilation/perfusion ratios and respiratory quotient pulmonary compliance, elastance, airways resistance, work of breathing
- 4.5. application includes lung volumes and capacities with obstructive and restrictive patterns

Learning Objectives

- 4.a. Identify the forces that oppose gas movement into and out of the lungs including pulmonary compliance, elastance, and airways resistance.
- 4.b. Describe how the lung and chest wall affect pressure/volume relationships of ventilation,
- 4.c. Perform measurement of pulmonary mechanics including lung volumes, pressures, and flows.
- 4.d. Investigate data related to respiratory monitoring such as rate, tidal volume, minute volume, and I:E ratio.
- 4.e. Compare lung volumes and capacities of patients with obstructive and restrictive patterns.

5. Analyze how components of the cardiovascular system function in the body

Assessment Strategies

- 5.1. by developing an analysis (format may be written, oral, graphic, or three-dimensional model)
- 5.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria

Criteria: Your performance will be successful when:

- 5.1. analysis addresses major gross and microscopic anatomical components of the cardiovascular system
- 5.2. analysis identifies the major structural components of the cardiovascular system
- 5.3. analysis illustrates the relationships among the cardiovascular system
- 5.4. analysis summarizes the functions of the cardiovascular system

Learning Objectives

- 5.a. Identify the names and locations of the major parts of the heart.
- 5.b. Explain the function(s) of each of the major parts of the heart.
- 5.c. Trace the pathway of the blood through the heart and lungs.
- 5.d. Compare the structures and functions of the major types of blood vessels.
- 5.e. Describe the mechanisms that aid in returning venous blood to the heart.

6. Interpret blood gas data

Assessment Strategies

- 6.1. by analyzing data (format may be oral or written)
- 6.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria

Your performance will be successful when:

- 6.1. you interpret the oxygenation status
- 6.2. you interpret the ventilation status
- 6.3. you interpret the acid-base balance
- 6.4. you identify primary and compensatory mechanisms

- 6.5. you differentiate between acute and chronic acid-base disturbances
- 6.6. you differentiate arterial and venous results

Learning Objectives

- 6.a. Interpret the oxygenation status.
- 6.b. Interpret the ventilation status.
- 6.c. Interpret the acid-base balance.
- 6.d. Identify primary and compensatory mechanisms.
- 6.e. Differentiate between acute and chronic acid-base disturbances.
- 6.f. Differentiate arterial and venous results.

7. Identify normal hemodynamic values of the cardiopulmonary system

Assessment Strategies

- 7.1. by preparing a written response to a case study
- 7.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria

Your performance will be successful when:

- 7.1. identification includes cardiac output
- 7.2. identification includes stroke volume
- 7.3. identification includes SVR, PVR, CVP, PCWP, and PAP
- 7.4. identification includes factors that affect blood pressure

Learning Objectives

- 7.a. Define hemodynamic monitoring.
- 7.b. Calculate cardiac output when given heart rate and stroke volume.
- 7.c. Identify the factors that affect blood pressure.
- 7.d. Calculate systemic vascular resistance when given MAP, CVP, and cardiac output.
- 7.e. Calculate pulmonary vascular resistance when given PAP, PCWP and cardiac output.

8. Identify normal fluid and electrolyte balance values

Assessment Strategies

- 8.1. by preparing a written response to a case study
- 8.2. by answering questions about the concepts that support this competency (format may be oral, written, or graphic)

Criteria

Your performance will be successful when:

- 8.1. identification includes the effects of imbalances in water, sodium, potassium, calcium, chloride, bicarbonate
- 8.2. identification includes the major fluid compartments of the body
- 8.3. identification includes how the kidney and lung regulate pH
- 8.4. identification includes differentiation between cations and anions
- 8.5. identification includes calculation of the anion gap
- 8.6. identification includes intakes and outputs
- 8.7. identification includes relating concepts to cardiopulmonary status

Learning Objectives

- 8.a. Identify clinical findings associate with excess of deficiencies in water, sodium, potassium, calcium, chloride, or bicarbonate.
- 8.b. Identify fluid compartments in the body and their volumes.
- 8.c. Describe how water loss and replacement occur.
- 8.d. Explain how the kidney and lung regulate pH.
- 8.e. Differentiate cations and anions.
- 8.f. Calculate the anion gap.
- 8.g. Relate electrolyte imbalances to alterations in cardiopulmonary status.

9. Recognize basic single lead rhythm strips

Assessment Strategies

- 9.1. by preparing a written or oral response to a case study
- 9.2. answering questions related to the learning objectives

Criteria

Your performance will be successful when:

- 9.1. you identify components of an ECG
- 9.2. you analyze rate and rhythm
- 9.3. you recognize major dysrhythmias (i.e. asystole, bradycardia, tachycardia, PVC's, VT/VF)

Learning Objectives

- 9.a. Identify the components of an ECG.
- 9.b. Analyze rate and rhythm of a rhythm strip.
- 9.c. Recognize major dysrhythmias (i.e. asystole, bradycardia, tachycardia, PVC's, VT/VF).