



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 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.

Success Abilities

1. Cultivate Passion: Expand a Growth-Mindset
2. Live Responsibly: Develop Resilience
3. Live Responsibly: Foster Accountability
4. Refine Professionalism: Participate Collaboratively

Program Outcomes

1. Apply respiratory therapy concepts to patient care situations

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).