

**J. Sargeant Reynolds Community College
Course Content Summary**

Course Prefix and Number: RTH 121

Credits: 3

Course Title: Cardiopulmonary Science I

Course Description: Focuses on pathophysiology, assessment, treatment, and evaluation of patients with cardiopulmonary disease. Explores cardiopulmonary and neuromuscular physiology and pathophysiology. Prerequisite: Completion of the Health Science Career Studies Certificate Respiratory Therapy pathway and acceptance into pre-clinical courses. Lecture 3 hours per week.

General Course Purpose: Provide students with the background and understanding of human anatomy and physiology required to understand and appreciate the changes that take place within the body in disease.

Course Prerequisites and Co-requisites:

Prerequisite: Completion of the Health Science Career Studies Certificate Respiratory Therapy pathway and acceptance into pre-clinical courses.

Student Learning Outcomes:

Upon completing the course, the student will be able to

- a. Relate anatomical structures of the respiratory and renal systems to their functions;
- b. Discuss the processes of ventilation, diffusion of pulmonary gases, and measurements made to determine the effectiveness of ventilation;
- c. Explain the process of circulation and measurements made to determine the effectiveness of the heart as a pump;
- d. Discuss oxygen and carbon dioxide transport and analyze acid-base balance;
- e. Describe how ventilation/perfusion relationships affect gas exchange;
- f. Describe how ventilation is controlled;
- g. Describe the effects of aging, exercise, and altitude on the cardiopulmonary system;
- h. Apply anatomic and physiologic principles to common clinical situations; and
- i. Use graphs and nomograms in the description of physiology literature.

Major Topics to Be Included:

The Anatomy of the Respiratory System

- a. The Upper Airway
- b. The Lower Airways
- c. The Sites of Gas Exchange
- d. Pulmonary Vascular System
- e. The Lymphatic System
- f. Neural Control of the Lungs
- g. The Lungs, Mediastinum, Pleural Membranes, and Thorax

Ventilation and Diffusion of Pulmonary Gases

- a. Muscles of Ventilation
- b. Pressure Differences Across the Lungs
- c. Role of the Diaphragm in Ventilation
- d. Static Characteristics of the Lungs

- e. Dynamic Characteristics of the Lungs
- f. Ventilatory Patterns
- g. Gas Laws and Equations
- h. Lung Volumes and Capacities and Pulmonary Function
- i. Perfusion and Diffusion of Limited Gases

The Circulatory System

- a. Blood
- b. The Heart
- c. The Pulmonary and Systemic Vascular Systems
- d. The Cardiac Cycle
- e. The Distribution of Pulmonary Blood Flow
- f. Determinants of Cardiac Output

Oxygen and Carbon Dioxide Transport

- a. Oxygen Transport and Studies
- b. Oxygen Dissociation Curve
- c. Tissue Hypoxia, Cyanosis, and Polycythemia
- d. Carbon Dioxide Transport
- e. Acid-Base Balance

Control of Ventilation

- a. Ventilation – Perfusion Relationships
- b. The Respiratory Components of the Medulla
- c. Monitoring Systems that Influence the Respiratory Components of the Medulla
- d. Reflexes that Influence Ventilation

Renal Failure and Its Effects on the Cardiopulmonary System

- a. The Kidneys
- b. Urine
- c. Regulation of the Electrolyte Concentration
- d. Renal Failure and Cardiopulmonary Problems

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