

SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: RSPC 306 Department: Respiratory Care

Course Title: Applied Clinical Science 1 Semester: Spring Year: 1999

Objectives/Competencies

Course Objective	Competencies
1.This course is designed to teach the student about respiratory physiology. The student will be able to have an understanding of function and structure of the respiratory system.	1.Describes the exchange of oxygen and carbon dioxide with the atmosphere and relates gas exchange to the metabolism of the tissues of the body. 2.Defines the role of the respiratory system in acid-base balance. 3.Lists the nonrespiratory functions of the lungs. 4.Defines and describes the alveolar-capillary unit, the site of gas exchange in the lungs. 5.Describes the transport of gas through the conducting airways to and from the alveoli. 6.Describes the structural characteristics of the airways. 7.Lists the components of the chest wall and relates the functions of the muscles of respiration to the movement of air into and out of the alveoli. 8.Describes the central nervous system initiation of breathing and the innervation of the respiratory muscles.
2.The student will be able to have an understanding of the	1.Describes the generation of a pressure gradient between

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<p>4.The student will be able to have an understanding of blood flow to the lung.</p>	<p>3.Predicts the effects of alterations in lung and chest wall mechanics, due to normal or pathologic processes, on the lung volumes.</p> <p>4.Defines anatomic dead space, and relates the anatomic dead space and the tidal volume to alveolar ventilation.</p> <p>5.Understands the measurement of the anatomic dead space and the determination of alveolar ventilation.</p> <p>6.Defines physiologic and alveolar dead space, and understands their determination.</p> <p>7.Predicts the effects of alterations of alveolar ventilation on alveolar carbon dioxide and oxygen levels.</p> <p>8.Describes the regional differences in alveolar ventilation found in the normal lung, and explains these differences.</p> <p>9.Predicts the effects of changes in lung volume, aging, and disease processes on the regional distribution of alveolar ventilation.</p> <p>10.Defines the closing volume, and explains how it can be demonstrated.</p> <p>11.Predicts the effects of changes in pulmonary mechanics on the closing volume.</p> <p>1.Compares and contrasts the bronchial circulation and the pulmonary circulation.</p> <p>2.Describes the anatomy of the pulmonary circulation, and explains its physiologic consequences.</p> <p>3.Compares and contrasts the pulmonary circulation and the systemic circulation.</p> <p>4.Describes and explains the effects of lung volume on</p>

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<p>5.The student will be able to have an understanding of ventilation-perfusion relationships.</p>	<p>pulmonary vascular resistance.</p> <p>5.Describes and explains the effects of elevated intravascular pressures on pulmonary vascular resistance.</p> <p>6.Lists the neural and humoral factors that influence pulmonary vascular resistance.</p> <p>7.Describes the effect of gravity on pulmonary blood flow.</p> <p>8.Describes the interrelationships of alveolar pressure, pulmonary arterial pressure, and pulmonary venous pressure and their effects on the regional distribution of pulmonary blood flow.</p> <p>9.Predicts the effects of alterations in alveolar pressure, pulmonary arterial and venous pressure, and body position on the regional distribution of pulmonary blood flow.</p> <p>10.Describes hypoxic pulmonary vasoconstriction and discusses its role in localized and widespread alveolar hypoxia.</p> <p>11.Describes the causes and consequences of pulmonary edema.</p> <p>1.Predicts the consequences of mismatched ventilation and perfusion.</p> <p>2.Describes the methods used to assess the matching of ventilation and perfusion.</p> <p>3.Describes the methods used to determine the uniformity of the distribution of the inspired gas and pulmonary blood flow.</p> <p>4.Explains the regional differences in the matching of</p>

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<p>6.The student will be able to have an understanding of diffusion of gases.</p>	<p>ventilation and perfusion of the normal upright lung. 5.Predicts the consequences of the regional differences in the ventilation and perfusion of the normal upright lung.</p> <p>1.Defines diffusion, and distinguishes it from "bulk flow." 2.States Fick's law for diffusion. 3.Distinguishes between perfusion limitation and diffusion limitation of gas transfer in the lung. 4.Describes the diffusion of oxygen from the alveoli into the blood. 5.Describes the diffusion of carbon dioxide from the blood to the alveoli. 6.Defines the diffusion capacity and discusses its measurement.</p>
<p>7.The student will be able to have an understanding of the transport of oxygen and carbon dioxide in the blood.</p>	<p>1.States the relationship between the partial pressure of oxygen in the blood and the amount of oxygen physically dissolved in the blood. 2.Describes the chemical combination of oxygen with hemoglobin and the "oxygen dissociation curve." 3.Defines hemoglobin saturation, the oxygen-carrying capacity, and the oxygen content of blood. 4.States the physiologic consequences of the shape of the oxygen dissociation curve. 5.Lists the physiologic factors that can influence the oxygen dissociation curve, and predicts their effects on oxygen transport by the blood. 6.States the relationship between the partial pressure of</p>

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<p>8.The student will be able to have an understanding of the regulation of acid-base status.</p>	<p>carbon dioxide in the blood and the amount of carbon dioxide physically dissolved in the blood.</p> <p>7.Describes the transport of carbon dioxide as carbamino compounds with blood proteins.</p> <p>8.Explains how most of the carbon dioxide in the blood is transported as bicarbonate.</p> <p>9.Describes the carbon dioxide dissociation curve for whole blood.</p> <p>10.Explains the Bohr and Haldane effects.</p> <p>1.Define acids, bases, and buffers.</p> <p>2.Lists the buffer systems available in the human body.</p> <p>3.Describes the interrelationships of the pH, the PCO₂ of the blood, and the plasma bicarbonate concentration, and states the Henderson-Hasselbalch equation.</p> <p>4.States the normal ranges of arterial pH, PCO₂ and bicarbonate concentration, and defines alkalosis and acidosis.</p> <p>5.Lists the potential causes of respiratory acidosis and alkalosis and metabolic acidosis and alkalosis.</p> <p>6.Discusses the respiratory and renal mechanisms that help to compensate for acidosis and alkalosis.</p> <p>7.Evaluates blood gas data to determine a subject's acid-base status.</p> <p>8.Classifies and explains the causes of tissue hypoxia.</p>
<p>9.The student will be able to have an understanding of the control of breathing.</p>	<p>1.Describes the general organization of the respiratory control system.</p>

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<p>10.The student will be able to have an understanding of the nonrespiratory functions of the lung.</p>	<ol style="list-style-type: none"> 2.Localizes the centers that generate the spontaneous rhythmicity of breathing. 3.Describes the groups of neurons that effect inspiration and expiration. 4.Describes the other centers in the brainstem that may influence the spontaneous rhythmicity of breathing. 5.Lists the cardiopulmonary and other reflexes that influence the breathing pattern. 6.States the ability of the brain cortex to override the normal pattern of inspiration and expiration temporarily. 7.Describes the effects of alterations in body oxygen, carbon dioxide, and hydrogen ion levels on the control of breathing. 8.Describes the sensors of the respiratory system for oxygen, carbon dioxide, and hydrogen ion concentration. <ol style="list-style-type: none"> 1.Lists and describes the mechanisms by which the lung is protected from the contaminants in inspired air. 2.Describes the "air-conditioning" function of the upper airways. 3.Describes the filtration and removal of particles from the inspired air. 4.Describes the removal of biologically active material from the inspired air. 5.Describes the reservoir and filtration functions of the pulmonary circulation. 6.Lists the metabolic functions of the lung, including the handling of vasoactive materials in the blood.

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11.The student will be able to have an understanding of the respiratory system under stress.	<ol style="list-style-type: none">1. Identifies the physiologic stresses involved in exercise.2. Predicts the responses of the respiratory system to acute exercise.3. Describes the effects of long-term exercise programs (training) on the respiratory system.4. Identifies the physiologic stresses involved in the ascent to altitude.5. Predicts the initial responses of the respiratory system to the ascent to altitude.6. Describes the acclimatization of the cardiovascular and respiratory systems to residence at high altitudes.7. Identifies the physiologic stresses involved in diving.8. Predicts the responses of the respiratory system to various types of diving.