

**Course Description****RET2414 | Pulmonary Studies | 2.00 credits**

In-depth study of diagnostic techniques in the field of pulmonary medicine which includes lung volumes, static and dynamic mechanics of breathing, ventilation, distribution of gases, diffusion and arterial blood gas sampling and handling. Corequisite: RET2414L.

**Course Competencies**

**Competency 1:** The student will describe and categorize indications for Pulmonary Function Testing by:

1. Categorizing pulmonary function tests according to specific purposes
2. Listing indications for spirometry, lung volumes, and diffusing capacity
3. Listing one obstructive and one restrictive pulmonary disorder
4. Relate pulmonary history to indication for performing pulmonary function tests
5. Identifying three indications for exercise testing
6. Naming at least two diseases in which air trapping may occur

**Competency 2:** The student will describe and categorize outcomes for spirometry and spirometry related tests by:

1. Identifying airway obstruction using forced vital capacity (FVC) and forced expiratory volume
2. Differentiating between obstruction and restriction as causes of reduced vital capacity
3. Determining whether there is a significant response to bronchodilators
4. Selecting the appropriate FVC and FEV1 for reporting from a series of spirometry maneuvers
5. Identifying at least two pathophysiologic conditions in which maximal inspiratory or expiratory pressures might be abnormal
6. Recognizing abnormal values for airway resistance and specific conductance
7. Describing how serial Peak Flow measurements are used to monitor asthma
8. Determining whether spirometry is acceptable and repeatable

**Competency 3:** The student will describe lung volumes and gas distribution by:

1. Describing the measurement of lung volume gas dilution/ washout methods
2. Explaining two advantages of measuring lung volumes using the body plethysmograph
3. Calculating residual volume and total lung capacity from FRC and the subdivisions of VC
4. Identifying a restricted disease process from measured lung volumes
5. Describing the correct technique for measuring thoracic gas volumes
6. Identifying air trapping and hyperinflation using measured lung volumes
7. Identifying the uneven distribution of gas in the lungs by either single or multiple breath techniques

**Competency 4:** The student will describe the test and identify the outcomes related to diffusing capacity by:

1. Identifying the steps for performing the single-breath DLCO test
2. Listing at least two criteria for an acceptable single-breath DLCO test
3. Describing why DLCO is often reduced in emphysema
4. Describing at least two non-pulmonary causes for a reduced DLCO
5. Explaining the significance of a reduced DL/VA

**Competency 5:** The student will describe the test and identify and calculate the outcomes related to ventilation and ventilatory control by:

1. Describing the measurement of tidal volume and minute ventilation
2. Identifying at least two causes of decreased minute ventilation
3. Calculating the VD/VT ratio using PaCO<sub>2</sub> and PETCO<sub>2</sub>
4. Listing at least two causes for an increased VD/VT ratio

5. Explaining the function of a variable CO<sub>2</sub> scrubber in a circuit for measuring ventilatory response to hypoxia
6. Identifying the normal ventilatory response to carbon dioxide

**Competency 6:** The student will describe the tests and identify the outcomes related to blood gases and related assessments by:

1. Describing how pH and PCO<sub>2</sub> are used to demonstrate the assessment of acid-base status
2. Interpreting PO<sub>2</sub> and oxygen saturation to demonstrate the assessment of oxygenation
3. Identifying the appropriate procedure for obtaining an arterial blood gas specimen
4. Listing situations in which pulse oximetry can be used to evaluate a patient's oxygenation
5. Describing at least two limitations of pulse oximetry
6. Describing the use of capnography to demonstrate the assessment of changes in ventilatory-perfusion patterns of the lung
7. Demonstrating the assessment of oxygenation using arterial oxygen content
8. Describing the importance of using co-oximetry to demonstrate the assessment of a patient's Hb, HbCO<sub>2</sub>, HbMet; and SaO<sub>2</sub>

**Competency 7:** The student will describe the tests and identify the outcomes related to cardiopulmonary exercise assessment by:

1. Describing and selecting an appropriate exercise protocol based on the reason for performing the test
2. Describing the performing of field tests
3. Identifying the ventilator/anaerobic threshold
4. Describing two methods for measuring ventilation, oxygen consumption, and carbon dioxide production during exercise
5. Identifying indication for terminating a cardiopulmonary stress test

**Learning Outcomes:**

1. Communication
2. Computer / Technology Usage
3. Critical Thinking
4. Information Literacy
5. Numbers / Data