

Cardiopulmonary Disease (RSPT 2210)



Credit: 2 semester credit hour (1 hour lecture: 3 hour lab)

Prerequisite: RSPT 1201

Co-requisite: RSPT 1113, RSPT 1329, RSPT 1207, RSPT 1325

Course Description

Etiology, pathogenesis, pathology, diagnosis, history, prognosis, manifestations, treatment, and detection of cardiopulmonary diseases.

Required Textbook and Materials

1. *Respiratory Disease: A case Study Approach to Patient Care*, by Wilkins, Dexter, and Gold
 - a. ISBN number 978-0-8036-1374-4
2. *Workbook for Respiratory Disease: A case Study Approach to Patient Care* by Chang
 - a. ISBN number 978-0-8036-0156-7
3. Package of #882 scantrons, #2 pencils, and flash drive.

Course Objectives

Upon completion of his course, the student will be able to:

1. Describe the role of the respiratory therapist in patient assessment.
2. Describe the most common symptoms associated with cardiopulmonary disease and the common causes of each.
3. Describe the common physical examination procedures performed to evaluate patients with cardiopulmonary disease and the implications of abnormalities.
4. Identify and interpret the laboratory tests done to evaluate patients with diseases of the chest and common causes of abnormalities.

Course Outline

- A. Introduction to patient assessment.
 1. Medical history and the interview
 - a. basic questions to ask the patient
 - b. symptoms
 2. Outline for the medical history
 3. Physical examination
 - a. Vital signs and Sensorium
 4. Examination of other parts of the body
 5. Interpretation of Clinical Lab Data
 - a. Common blood and fluid tests
 - b. Arterial blood gases

RSPT 2210
Course Syllabi

- c. Pulmonary function tests and mechanics
 - d. Chest radiograph
 - e. Electrocardiography
 - 6. Case Scenario
- B. Introduction to Respiratory Failure**
- 1. Etiology
 - a. Oxygenation failure
 - b. Ventilatory failure
 - 2. Pathophysiology
 - a. Oxygenation failure
 - b. Ventilatory failure
 - 3. Clinical features
 - a. Oxygenation failure
 - b. Ventilatory failure
 - 4. Treatment
 - a. Oxygenation failure
 - b. Ventilatory failure
 - 5. Case Scenario
- C. Asthma**
- 1. Definition of asthma.
 - 2. Etiology
 - a. triggers
 - 3. Pathophysiology
 - a. increased airway resistance
 - 1. bronchospasm
 - 2. mucus plugging
 - 3. mucosal edema
 - 4. Clinical features
 - a. history
 - b. Physical Examination
 - c. Chest Radiograph
 - d. Pulmonary Function Studies
 - e. arterial blood gases
 - f. exhaled nitric oxide
 - 6. Treatment
 - a. Pharmacological agents
 - b. Anti-IgE antibodies
 - c. Mechanical Ventilation
 - d. Prevention
 - 7. Prognosis
 - 8. Case scenario
- D. Chronic Obstructive Pulmonary Disease**
- 1.. Definition

RSPT 2210
Course Syllabi

2. Etiology
 - a. exposure to noxious particles
 - b. fumes
 - c. host factors
 3. Clinical Features
 - a. History
 - b. Physical examination
 - c. clinical lab data
 - d. arterial blood gases
 - e. chest radiograph
 - f. pulmonary function studies
 - g. electrocardiography
 4. Treatment
 - a. Depends on stage of disease
 - b. Remove the offending agent from the environment
 - c. Pharmacological agents
 - d. Pulmonary rehabilitation programs
 - e. Surgery
 5. Management of the acute exacerbation
 - a. pharmacological agents
 - b. mechanical ventilation
 6. Case scenario
- E. Cystic Fibrosis
1. Etiology
 - a. inherited disease
 2. Pathophysiology
 - a. generalized exocrinopathy
 1. exocrine abnormalities
 2. recurrent pulmonary infections
 3. elevated sweat electrolyte concentration
 3. Clinical features
 - a. History
 - b. Physical Examination
 - c. laboratory Evaluation
 - d. Chest radiograph
 - e. Pulmonary Function studies
 4. Diagnosis
 - a. Sweat chloride measurement
 - b. Discovery of cystic fibrosis gene
 5. Treatment
 - a. Reversal of the defect
 - b. Removal of respiratory secretions
 - c. antibiotics
 - d. Bronchial hyperactivity
 1. agents used to treat asthma

RSPT 2210
Course Syllabi

- e. Airway inflammation
 - 1. ibuprofen
 - 2. macrolides
 - f. Pancreatic insufficiency
 - 1. pancreatic enzyme replacement
 - 6. Prognosis
 - 7. Case Scenario
- F. Hemodynamic Monitoring and Shock
- 1. Definition
 - 2. Cardiac output
 - a. definition
 - b. what determines cardiac output
 - 1. preload
 - 2. afterload
 - 3. contractility
 - 3. Etiology
 - a. circulatory shock
 - b. distributive shock
 - c. bleeding from trauma
 - d. role of metabolism
 - 4. Clinical features
 - a. hypotension
 - b. tachypnea
 - c. tachycardia
 - d. weak peripheral pulses
 - e. cool and clammy skin
 - d. septic shock extremities warm and dry
 - e. organ dysfunction
 - 1. oliguria
 - 2. altered sensorium
 - 3. hypoxemia
 - f. laboratory evaluation
 - g. physical examination/hemodynamic monitoring
 - h. electrocardiography
 - 5. Treatment
 - a. Oxygen therapy
 - b. endotracheal intubation
 - c. mechanical ventilation
 - d. close monitoring
 - e. hypovolemic shock
 - 1. rapid replacement of blood volume
 - f. septic shock
 - 1. antibiotics
 - 2. volume expanders
 - 3. vasopressors

RSPT 2210
Course Syllabi

4. Recombinant human activated protein C
 5. insulin for hyperglycemia
 - g. Cardiogenic shock
 1. positive inotropics
 2. vasopressors
 3. diuretics
 6. Case scenario
- G. Pulmonary Thromboembolic Disease
1. Definition
 2. Etiology and Pathology
 - a. Virchow's triad
 1. hypercoagulability
 2. fractures
 3. surgical procedures
 4. venous stasis
 5. Risk factors
 6. compromised blood flow
 3. Pathophysiology
 - a. respiratory
 1. alveolar deadspace
 2. ventilation perfusion mismatch
 3. increase pulmonary vascular resistance
 4. Severe hemodynamic compromise
 - a. greater pulmonary hypertension
 5. pulmonary infarction
 6. fibrinolysis
 4. Clinical Features
 - a. History
 - b. Physical Examination
 - c. Hemodynamic and Lab evaluation
 - c. Radiography
 5. Treatment
 - a. Pharmacological agents
 - b. surgery
 - c. supportive care
 - d. prevention
 6. Case scenario
- H. Heart Failure
1. Definition
 2. Pathophysiology
 - a. measurement of cardiac output
 - b. stroke volume
 - c. myocardial performance

RSPT 2210
Course Syllabi

- d. circulatory changes
- e. fluid and electrolyte balance imbalance
- f. pulmonary dysfunction
- 3. Clinical features
 - a. fluid retention and peripheral edema
 - b. pulmonary vascular congestion
 - c. dyspnea
 - d. cough
 - e. reduced exercise tolerance
 - f. abnormal breath sounds
 - g. tachycardia
 - h. decreased sensorium
- 4. Physical Examination
 - a. tachycardia
 - b. sympathetic vasoconstriction
 - c. inspiratory crackles
 - d. polyphonic wheezes
 - e. Presence of heart sounds S3 and S4
 - g. murmurs
 - h. Right heart failure
 - 1. peripheral edema
 - 2. abdominal distention
 - 3. superficial abdominal vein distention
 - 4. hepatomegaly
 - 5. ascites
 - 6. hepatojugular reflux
 - 7. pedal edema
 - 8. jugular vein distention
 - i. Left ventricular failure
 - 1. dyspnea
 - 2. cough
 - 3. reduced exercise tolerance
 - 4. delirium
 - 5. anxiety
 - 6. adventitious breath sounds
 - 7. cognitive impairment
 - 8. poor peripheral circulation
 - j. Chest radiography
 - 1. mild failure
 - 2. moderate failure
 - 3. severe failure
 - k. Electrocardiography
 - l. Arterial blood gases
 - m. Laboratory findings
 - n. Routine lab studies
 - o. Hemodynamic monitoring

RSPT 2210
Course Syllabi

5. Treatment
 - a. Reduction of Cardiac workload
 - b. Improvement of cardiac Pump Performance
 - c. Prevention of dysrhythmia
 - d. Control of sodium and fluid retention
 - e. prevention of thromboembolism
 - f. respiratory care for cardiogenic pulmonary edema
 6. Case scenario
- I. Smoke Inhalation Injury and Burns
1. Definition
 2. Etiology
 3. Pathophysiology
 - a. Early pulmonary and systemic changes within 24 hours post-burn
 - b. carbon monoxide
 - c. hydrogen cyanide
 - d. other considerations
 - b. Intermediate pulmonary and systemic changes 2to 7 days post burn
 - c. Late pulmonary and systemic changes beyond 7 days post burn
 4. Clinical Features
 - a. airway
 - b. breathing
 - c. circulation
 - d. cervical spine
 - e. chest radiograph
 - f. Pulmonary function studies
 - g. arterial blood gases
 - h. electrocardiography
 - i. Hemodynamic monitoring
 5. Treatment
 - a. airway
 - b. clearance of secretions
 - c. carbon monoxide poisoning
 - d. mechanical ventilation
 - e. fluid balance
 - f. Escharatomy
 - g. Feeding
 - h. Pain control
 - i. Prevention of burn complications
 6. Case scenario
- J. Near Drowning
1. Definitions
 2. Epidemiology
 3. Etiology
 - a. Factors that are associated with drowning and near drowning

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Course Syllabi

1. sociodemographic factors
 2. temporal and geographic variables
 3. location and circumstances
 4. lapses in adult supervision
 5. alcohol
 6. swimming ability
 7. underlying medical conditions
4. Pathophysiology
 - a. neurological insult
 - b. pulmonary insult
 - c. hemodynamic and electrolyte effects
 5. Prehospital Care
 6. Clinical features
 - a. History
 - b. Physical examination
 - c. arterial blood gases
 7. Clinical Outcomes
 - a. Glasgow Coma Scale
 - b. Orlofski Score
 - c. Postsubmersion Neurological Classification System
 8. Treatment
 - a. Basic Life Support
 - b. based on initial assessment and categorization
 1. Category A: Awake
 2. Category B: Blunted
 3. Category C: Comatose
 - c. Hyperhydration
 - d. Hyperventilation
 - e. Hyperpyrexia
 - f. Hyperexcitability
 - g. Hyperrigidity
 9. Prognosis
 - a. Good prognostic signs
 - b. Poor prognostic signs
 10. Prevention
 - a. Human factors
 - b. Site factors
 11. Case Scenario
- K. Acute Respiratory Syndrome
1. Definition
 2. Etiology
 - a. sepsis
 - b. severe trauma
 - c. multiple transfusions
 - d. aspiration

RSPT 2210
Course Syllabi

- e. severe pneumonia
- f. smoke inhalation
- 3. Pathophysiology
 - a. lung mechanics
 - b. gas exchange
 - c. pulmonary vasculature
- 4. Clinical Features
 - a. Respiratory deterioration with dyspnea
 - b. increase work in breathing
 - c. tachypnea
 - d. tachycardia
 - e. possible cough
 - f. rapid and shallow breathing
 - g. inspiratory crackles
 - h. bilateral fluffy infiltrates with air bronchograms
 - i. next 12 hours continue to deteriorate
 - j. refractory hypoxemia
 - k. leukocytosis with infection
 - l. low or normal pulmonary capillary wedge pressure
- 5. Treatment
 - a. treat the precipitating factor
 - b. mechanical ventilation
 - c. Oxygenate
 - d. experimental strategies
 - e. weaning from mechanical ventilation
 - g. monitoring
- 6. Case scenario

L. Chest Trauma

- 1. Definition
- 2. Etiology
 - a. penetrating
 - b. blunt
 - c. primary blast injury
- 3. Pathophysiology
 - a. chest wall injuries
 - b. lung parenchymal injuries
 - c. airway injuries
 - d. heart and great vessel injuries
 - e. delayed and long term complications of chest wall trauma
- 4. Clinical features
 - a. varies widely by category and cause
 - b. systematic focused assessment
 - c. signs of flail chest
 - d. presence of subcutaneous emphysema

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Course Syllabi

- e. symmetry
 - f. quality of breath sounds
 - 5. Treatment
 - a. airway management
 - b. ventilatory support
 - c. management of secretions
 - d. Chest tube
 - 6. Outcome Prediction
 - a. base deficit
 - 7. Case scenario
- M. Postoperative Atelectasis
- 1. Definition
 - 2. Etiology
 - a. inadequate lung distention
 - b. obstruction and absorption of alveolar air
 - c. surfactant depletion
 - 3. Pathophysiology
 - a. ventilation/perfusion mismatch
 - b. increased surface tension
 - c. increase work of breathing
 - 4. Clinical features
 - a. history
 - b. physical examination
 - c. chest radiograph
 - d. arterial blood gases
 - e. pulmonary function studies
 - 5. Treatment
 - a. lung inflation techniques
 - b. secretion removal
 - 6. Case scenario
- N. Interstitial lung diseases
- 1. Etiology
 - 2. Definition
 - a. classified according to type of agent that caused the lung injury
 - b. inorganic dust
 - 1. asbestos
 - 2. silica
 - 3. coal
 - 4. talc
 - c. organic dust
 - 1. actinomyces
 - 2. thermophilic actinomyces
 - 3. actinomycetes
 - d. drugs

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Course Syllabi

1. antibiotics
 2. anti-inflammatory agents
 3. cancer chemotherapy
 4. cardiovascular drugs
 5. illicit drugs
3. Pathophysiology
 - a. inflammation
 - b. fibrosis and cysts
 4. Clinical Features
 - a. history
 - b. physical examination
 - c. arterial blood gases
 - d. pulmonary function studies
 - e. chest radiograph
 - f. lung biopsy
 - g. bronchoalveolar lavage
 5. Treatment
 - a. specific therapy
 - b. supportive therapy
 - c. transplantation
 6. Prognosis
 - a. variable
 7. Case Scenario
- O. Neuromuscular diseases
1. Definition
 2. Normal neuromuscular function in breathing
 - a. chemoreceptors
 - b. respiratory centers
 - c. peripheral nerves
 - d. respiratory muscles
 3. Pathophysiology
 - a. respiratory centers
 - b. nerve interruption
 - c. neuromuscular junction
 - d. muscle diseases
 4. Clinical features
 - a. rapid and shallow breathing pattern
 - b. poor cough
 - c. dyspnea
 - d. retention of sputum
 - e. abnormal arterial blood gases
 - f. reduced vital capacity
 - g. decreased maximal inspiratory pressure
 - h. spinal cord injury varies according to location

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Course Syllabi

5. Treatment
 - a. ventilator failure
 - b. specific treatments
 6. Case Scenario
- P. Bacterial pneumonia
1. Definition
 2. Etiology
 - a. distal airways contaminated with pathogenic organisms
 3. Pathophysiology
 - a. outpouring of fluid
 - b. inflammatory proteins
 - c. white blood cells
 - d. inflammatory exudates
 - e. ventilation/perfusion mismatch
 - f. reduced lung compliance
 4. Clinical features
 - a. history
 - b. laboratory findings
 - c. chest radiograph
 - d. arterial blood gases
 - e. sputum analysis
 5. Treatment
 - a. antibiotics
 - b. supportive care
 - c. hospitalization for severe cases
 6. Clinical scenario
- Q. Pneumonia in the Immunocompromised
1. Definition
 2. Etiology
 - a. Basic function of the immune system
 - b. the immune system
 3. Pathophysiology
 - a. immunosuppression and disease
 - b. defects in cellular immunity
 - c. defects in phagocyte function
 4. Clinical features
 - a. history
 - b. physical examination
 - c. laboratory findings
 - d. chest radiograph
 - e. microbiology
 5. Specific Immune syndromes
 - a. Acquired Immunodeficiency Syndrome
 - b. transplantation

RSPT 2210
Course Syllabi

- c. neutropenia
 - d. immunosuppressive drugs
 - 6. Treatment
 - a. empiric therapy
 - b. specific therapy
 - c. prophylactic therapy
 - 7. Case scenario
- R. Sleep Disordered Breathing
 - 1. Definition
 - 2. Sleep and breathing
 - a. rapid eye movement
 - b. non- rapid eye movement
 - 1. stage 1
 - 2. stage 2
 - 3. stage 3
 - 4. stage 4
 - 3. Pathophysiology
 - a. narrowed airway
 - b. changes in hemodynamic system due to hypoxemia
 - c. bradycardia
 - d. tachycardia
 - e. pulmonary hypertension
 - f. cor pulmonale
 - g. central sleep apnea
 - 1. Hyperventilation
 - 2. apnea
 - 4. Clinical features
 - a. history
 - b. physical assessment
 - 5. Evaluation for sleep apnea
 - a. sleepiness scale
 - b. sleep studies
 - 6. Treatment
 - a. obstructive sleep apnea
 - b. Continuous positive airway pressure
 - c. dental appliances
 - d. surgery
 - e. central apnea
 - 7. Case scenario
- S. Tuberculosis
 - 1. Definition
 - 2. Etiology and transmission
 - a. Mycobacterium tuberculosis
 - b. acid-fast bacillus
 - c. aerosolized into the environment

RSPT 2210
Course Syllabi

1. coughing
 2. sneezing
 3. talking
 4. ingestion
 3. Pathology and pathogenesis
 - a. primary infection
 - b. postprimary or reactivation infection
 4. Pathophysiology
 - a. scarring of the lungs
 - b. loss of lung volume
 - c. destruction of blood vessels
 - d. ventilation/perfusion mismatch
 - e. hypoxemia
 - f. hypercapnia
 - g. hemoptysis
 - h. bronchiectasis
 5. Clinical features
 - a. history
 - b. physical examination
 - c. laboratory findings
 - d. arterial blood gases
 - e. chest radiograph
 - f. microbiology
 - g. skin testing
 6. Treatment
 - a. Pharmacological agents
 - b. direct observed treatment
 - c. prophylactic therapy
 7. Case scenario
- T. Lung Cancer
1. Definition
 2. Etiology
 - a. cigarette smoking
 - b. certain irritant fibers
 - c. ionizing radiation
 - d. fumes from chemicals
 - e. air pollution
 - f. cigar or pipe se
 - g. lung scars
 - h. family history
 - i. Sarcoidosis
 3. Pathophysiology
 - a. squamous cell carcinoma
 1. obstruct air passages
 - b. adenocarcinoma

RSPT 2210
Course Syllabi

1. grows primarily along the walls of air sacs
2. metastasize from other areas
- c. large - cell carcinomas
 1. gland like structures
 2. produce mucin
- d. small - cell carcinoma
 1. resemble oats
 2. rapidly growing
 3. metastasize to distant tissue
- e. affected lung region
 1. depends on size
 2. location
4. Clinical Presentation
 - a. history
 - b. physical examination
 - c. metastatic disease
5. Diagnosis
 - a. early detection and screening
 - b. diagnostic studies
 - c. diagnostic procedures
 - d. diagnosis and clinical staging
 - e. staging and classification
6. Treatment
 - a. small cell lung cancer (SCLC)
 1. chemotherapy
 - b. non - small cell lung cancer (NSCLC)
 1. stage IA and IB
 2. stage IIA and IIB
 3. stage IIIA
 4. stage IIIB
 5. stage IV
 - c. Preoperative pulmonary evaluation
 - a. Pulmonary Function studies
 - d. radiation Therapy
 - e. chemotherapy
7. Case scenario

Grade Scale

93 – 100	A
85 – 92	B
77 – 74	C
68 – 76	D
0 – 68	F

RSPT 2210
Course Syllabi

Course Evaluation

Final grades will be calculated according to the following criteria:

4-5 exams	60%
Final	29%
Homework/Attendance	11%

Course Requirements

1. Attend all classes and labs.
2. Complete all assignments.

Course Policies

Attendance – If you do not attend class you are missing some very valuable information. Test will include both textbook material and anything mentioned in class.

Homework Assignments –Please turn in homework assignments at the start of the next class meeting. **NO LATE WORK ACCEPTED!!!!** If you have an excused absence you may e-mail your work to me before the class starts. If the absence is not excused you will receive a zero.

Absences – According to LIT policy students with approved absences shall be allowed to make up examinations and written assignments without penalty. This privilege does not extend to unapproved absences. The determination of whether an absence is excused or approved is the responsibility of the instructor, except in the case of approved absence for an Institute-sponsored activity. If absences seriously interfere with performance the instructor may recommend to the Department Chair that the student be dropped from the course. You may be asked to present documentation to the instructor as to why the absence was necessary for the next class meeting that you attend, (i.e. doctor excuse, funeral pamphlet, note from child’s doctor, etc.).

Make-up Exam - You may make-up an exam only if the absence is excused by the instructor. The make-up exam will be taken on the next class day that you return.

Class Roll – will be taken on the first and fourth class days. If your name is not on the class roster on the fourth class day, you will be asked to leave class until this matter is taken care of.

NO EATING, NO DRINKING, TURN OFF BEEPERS, TURN OFF CELL PHONES, NO DISRUPTIVE BEHAVIOUR, AND NO CHILDREN ALLOWED IN CLASS PLEASE!

Remediation – Refer to the Respiratory Care Student Handbook

RSPT 2210
Course Syllabi

Technical Requirements (for courses using Blackboard)

The latest technical requirements, including hardware, compatible browsers, operating systems, software, Java, etc. can be found online at:

[https://help.blackboard.com/en-](https://help.blackboard.com/en-us/Learn/9.1)

[us/Learn/9.1](https://help.blackboard.com/en-us/Learn/9.1) [2014 04/Student/015 Browser Support/015 Browser Support Policy](#) A

functional broadband internet connection, such as DSL, cable, or WiFi is necessary to maximize the use of the online technology and resources.

Disabilities Statement

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the office in Student Services, Cecil Beeson Building. You may also visit the online resource at <http://www.lit.edu/depts/stuserv/special/defaults.aspx>

Student Code of Conduct Statement

It is the responsibility of all registered Lamar Institute of Technology students to access, read, understand and abide by all published policies, regulations, and procedures listed in the *LIT Catalog and Student Handbook*. The *LIT Catalog and Student Handbook* may be accessed at www.lit.edu or obtained in print upon request at the Student Services Office. Please note that the online version of the *LIT Catalog and Student Handbook* supersedes all other versions of the same document.