

# RSPT 1240 Advanced Cardiopulmonary Anatomy and Physiology



**LAMAR INSTITUTE  
OF TECHNOLOGY**

## **INSTRUCTOR CONTACT INFORMATION**

Instructor: Cynthia McKinley  
Email: camckinley@lit.edu  
Office Phone: 409-247-5067  
Office Location: Gateway ( 3871 Stagg Drive) Office # 107  
Office Hours: Posted within Starfish

## **CREDIT**

2 Semester Credit Hours (2 hours lecture, 1 hours lab)

## **MODE OF INSTRUCTION**

Face to Face

## **PREREQUISITE/CO-REQUISITE:**

Prerequisite: RSPT 1201, RSPT 1213  
Co-Requisite: RSPT 1310, RSPT 1325, RSPT 1160,

## **COURSE DESCRIPTION**

Provides an advanced presentation of anatomy and physiology of the cardiovascular and pulmonary system.

## **COURSE OBJECTIVES**

Upon completion of this course, the student will be able to

- Explain advanced concepts of cardiopulmonary anatomy and physiology;
- Describe the neurological control of breathing
- Differentiate ventilation/perfusion concepts, concepts, to include acid-base balance with classification
- Summarize principles of gas

## **COURSE OUTLINE**

- A. Anatomy and physiology of the respiratory system
  1. Upper airway

- a. Structure
  - b. Function
- 2. Lower airway
  - a. Tracheobronchial tree ( cartilaginous and non-cartilaginous)
    - 1. Structure
    - 2. Function
  - 3. Lung segments
  - 4. Bronchial blood supply
  - 5. Sites of gas exchange
  - 6. Pulmonary vascular system
  - 7. Lymphatic system
  - 8. Neural control
  - 9. The thorax
  - 10. Muscles of ventilation
  - 11. Accessory muscles of ventilation
- B. Ventilation
  - 1. Pressure differences
  - 2. Diaphragm
  - 3. Compliance
  - 4. Hooks law
  - 5. Surface tension
  - 6. Poiseuille's Law
  - 7. Airway resistance
  - 8. Ventilatory Patterns
  - 9. Alveolar ventilation
  - 10. Deadspace ventilation
- C. Diffusion of Pulmonary gases
  - 1. Gas Laws
  - 2. Atmospheric gases
  - 3. Partial Pressure
  - 4. PAO<sub>2</sub>
  - 5. Movement across the alveolar-capillary membrane
  - 6. Perfusion limited
  - 7. Diffusion limited
  - 8. Conditions that decrease the rate of gas diffusion
- D. Anatomy and physiology of the circulatory system
  - 1. The blood
  - 2. The heart
    - a. Structure
    - b. Function
    - c. Blood supply
    - d. Blood flow thru
    - e. Cardiac output
  - 3. Pulmonary and systemic vascular system

- a. Neural control
- b. Receptors
- c. Blood pressure
- d. Mean arterial blood pressure
- e. Vascular resistance
- 4. Distribution of blood flow
- E. Oxygen transport
  - 1. Oxygen dissolved in blood
    - a. Calculation
    - b. Normal/abnormal value
  - 2. Oxygen bound to hemoglobin
    - a. Calculation
    - b. Normal/abnormal value
  - 3. Total oxygen content
    - a. arterial
    - b. venous
  - 4. Content difference
    - a. Normal
    - b. Abnormal
    - c. Factors that increase and decrease  $C(a-v)O_2$
  - 5. Oxyhemoglobin dissociation curve
    - a. Factors affecting affinity
    - b. P50
  - 6. Oxygen consumption
    - a. Calculation
    - b. Factors affecting
  - 7. Oxygen extraction ratio
    - a. Calculation
    - b. Factors affecting
  - 8. Saturation
    - a. Arterial
    - b. Venous
      - 1. Factors increasing SvO<sub>2</sub>
      - 2. Factors decreasing SvO<sub>2</sub>
  - 9. Shunting
    - a. Anatomic shunts
    - b. Capillary shunts
    - c. Calculation of shunts
  - 10. Hypoxia
    - a. Types of hypoxia
    - b. Causes of hypoxia
  - 11. Cyanosis
  - 12. Polycythemia

- F. Ventilation/ perfusion relationships
  - 1. Normal pulmonary capillary blood flow
  - 2. Normal alveolar ventilation
  - 3. Ventilation perfusion ratio
    - a. Increased ratio
    - b. Decreased ratio
  - 4. How the V/Q ratio affects capillary gases
  - 5. How respiratory disorders affect the V/Q ratio
- G. Control of Ventilation
  - 1. The medulla oblongata
    - a. Dorsal respiratory groups
    - b. Ventral respiratory groups
  - 2. The pontine respiratory centers on the medulla oblongata
  - 3. Central Chemoreceptors
    - a. Location
    - b. Stimulation
  - 4. Peripheral Chemoreceptors
    - a. Location
    - b. Stimulation
  - 5. Reflexes
    - a. Hering-breuer
    - b. Deflation
    - c. Irritant
    - d. Juxtapulmonary-capillary receptors
    - e. Peripheral proprioceptor reflexes
    - f. Hypothalamic control
    - g. Cortical control
    - h. Aortic and carotid sinus baroreceptors
- H. Carbon dioxide transport and acid- base balance
  - 1. Carbon dioxide transport in the plasma
  - 2. Carbon dioxide transport in the red blood cell
  - 3. Carbon dioxide elimination at the lungs
  - 4. Carbon dioxide dissociation curve
  - 5. Acid base balance
  - 6. Buffer systems
  - 7. The respiratory system effects on acid base balance
    - a. Respiratory acidosis
      - 1. Interpretation
      - 2. Causes
      - 3. Compensation
    - b. Respiratory alkalosis
      - 1. Interpretation
      - 2. Causes
      - 3. Compensation

8. The renal system effects on the acid base balance
  - a. Metabolic acidosis
    1. Interpretation
    2. Causes
    3. Compensation
  - b. Metabolic alkalosis
    1. Interpretation
    2. Causes
    3. Compensation
- I. Renal failure and it's effects of the cardiopulmonary system
  1. The kidneys
    - a. Function
    - b. Structure
    - c. Urine formation
  2. Regulation of electrolytes
  3. Renal failure
    - a. Causes
    - b. Classification
    - c. Cardiopulmonary disorders caused by renal failure

#### **REQUIRED TEXTBOOK AND MATERIALS**

9. Cardiopulmonary Anatomy and Physiology by Des Jardine – 7<sup>th</sup> Edition ( ISBN # 978-13-37794909)
  1. #2 Pencils
  2. Package of # 882 scantrons
  3. Calculator- not one within your phone or other electronic device

#### **ATTENDANCE POLICY**

Be familiar with the LIT student handbook and the Respiratory Care student handbook. Violation of policies will result in appropriate action being taken.

Attendance: Attendance is expected. If you do not attend class you are missing some very valuable information. Test will include both textbook material and anything mentioned in class. According to LIT policy, if absences seriously interfere with performance the instructor may recommend to the Department Chair that the student be dropped from the course. Attendance is taken in both classroom and lab. You will be dropped from the course for absences above 3/semester. (includes both classroom and lab). Absences in lab will result in a 0.

Tardiness: Punctuality is expected. 3 tardies in a semester will be considered an absence.

Homework assignments are expected to be turned at the start of the day it is due. (no late work accepted)

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.

**Excused absence:**

Things that may be considered excused absences:

Doctor visits with a written excuse from a doctor/ hospital.

Death of immediate family member. Provide memorial pamphlet

Summons for court appearance. Provide court ordered appearance papers.

**You must call prior to missing an exam.** Calling prior to the missed exam does not automatically excuse you from missing an exam. If you fail to call or fail to present requested documentation upon the first class day return No food or drink, or use of tobacco products in class

**DROP POLICY**

If you wish to drop a course, you are responsible for initiating and completing the drop process by the specified drop date as listed on the [Academic Calendar](#). If you stop coming to class and fail to drop the course, you will earn an “F” in the course.

**STUDENT EXPECTED TIME REQUIREMENT**

For every hour in class (or unit of credit), students should expect to spend at least two to three hours per week studying and completing assignments. For a 3-credit-hour class, students should prepare to allocate approximately six to nine hours per week outside of class in a 16-week session OR approximately twelve to eighteen hours in an 8-week session. Online/Hybrid students should expect to spend at least as much time in this course as in the traditional, face-to-face class.

**COURSE CALENDAR**

DATE	TOPIC	READINGS (Due on this Date)	ASSIGNMENTS (Due on this Date)
#1	Anatomy and Physiology of the Respiratory System	DesJardin Chapter 1 Egan Chapter 9	

	LAB: Round table discussion of upper airway problems. PP over upper airway		
#2	Anatomy and physiology of the Respiratory System LAB: Identifying the lobes and segments of the lungs	DesJardin Chapter 1 Egan Chapter 9	
#3	Ventilation LAB: Calculation of PAo <sub>2</sub> , P(A-a) O <sub>2</sub>	DesJardin Chapter 2 Egan Chapter 11	
#4	Test #1- LAB: Calculate Cao <sub>2</sub> , Cvo <sub>2</sub> , C(a-v) O <sub>2</sub>	DesJardin Chapter 4 Egan Chapter 12	
#5	Diffusion / Oxygen transport LAB: Calculate compliance (Cs, Cd)	DesJardin Chapter 6 Egan Chapter 12	
#6	Oxygen transport LAB: Calculate RAW	DesJardin Chapter 6 Reference book of Egan Chapter 12	
#7	Oxygen transport /Test #2— LAB: Calculate Qt, Qs/Qt	DesJardin Chapter 6 Reference book Egan Chapter 12	
#8	Ventilation and perfusion LAB: Calculate V/Q <sub>ve</sub> ,	DesJardin Chapter 8 Reference book Egan Chapter 15	
#9	Control of ventilation LAB: Calculate Ve, Vd/Vt	DesJardin Chapter 9 Reference book Egan Chapter 15	
#10	Anatomy and physiology of the circulatory system LAB: Identifying blood flow and coronary vessels	DesJardin Chapter 5 Reference book Egan Chapter 10	
#11	Test #3- LAB: Calculate Qt,MAP,PVR,SVR	DesJardin Chapter 16 Reference book Egan Chapter Egan Chapter 10	
#12	Renal failure LAB: Calculate aniongap	DesJardin Chapter 16 Reference book Egan Chapter 14	
#13	Carbon Dioxide transport LAB: PH balance	DesJardin Chapter 16 Reference book Egan Chapter 14	
#14	Acid base Balance LAB: ABG interpretation	DesJardin Chapter 7	

		Reference book Egan Chapter 14	
#15	Acid base Balance LAB: ABG interpretation	DesJardin Chapter 7 Reference book Egan Chapter 14	
#16	Review and Final ( Test #4)- LAB: ABG interpretation		

### **COURSE EVALUATION**

Final grades will be calculated according to the following criteria:

- b. 4- 6 Exams 85%
- c. Assignments/pop quiz/Homework 15%

### **GRADING SCALE**

- 90-100 A
- 80-89 B
- 77-79 C
- 68-76 D
- 0-67 F

LIT does not use +/- grading scales

### **ACADEMIC DISHONESTY**

Students found to be committing academic dishonesty (cheating, plagiarism, or collusion) may receive disciplinary action. Students need to familiarize themselves with the institution's Academic Dishonesty Policy available in the Student Catalog & Handbook at <http://catalog.lit.edu/content.php?catoid=3&navoid=80#academic-dishonesty>.

### **TECHNICAL REQUIREMENTS**

The latest technical requirements, including hardware, compatible browsers, operating systems, etc. can be online at <https://lit.edu/online-learning/online-learning-minimum-computer-requirements>. A functional broadband internet connection, such as DSL, cable, or WiFi is necessary to maximize the use of online technology and resources.

### **DISABILITIES STATEMENT**

The Americans with Disabilities Act of 1990 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. LIT provides reasonable accommodations as defined in the Rehabilitation Act of 1973, Section 504 and the Americans with Disabilities Act of 1990, to students with a diagnosed disability. The Special Populations Office is located in the Eagles' Nest Room 129 and helps foster a supportive and inclusive educational environment by maintaining partnerships with faculty and staff, as well as promoting awareness among all members of the Lamar Institute of Technology community. If you believe you have a disability requiring an accommodation, please



contact the Special Populations Coordinator at (409)-951-5708 or email [specialpopulations@lit.edu](mailto:specialpopulations@lit.edu). You may also visit the online resource at [Special Populations - Lamar Institute of Technology \(lit.edu\)](http://Special Populations - Lamar Institute of Technology (lit.edu)).

### **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](http://www.lit.edu). Please note that the online version of the *LIT Catalog and Student Handbook* supersedes all other versions of the same document.

### **STARFISH**

LIT utilizes an early alert system called Starfish. Throughout the semester, you may receive emails from Starfish regarding your course grades, attendance, or academic performance. Faculty members record student attendance, raise flags and kudos to express concern or give praise, and you can make an appointment with faculty and staff all through the Starfish home page. You can also login to Blackboard or MyLIT and click on the Starfish link to view academic alerts and detailed information. It is the responsibility of the student to pay attention to these emails and information in Starfish and consider taking the recommended actions. Starfish is used to help you be a successful student at LIT.

### **ADDITIONAL COURSE POLICIES/INFORMATION**

1. Beepers, telephones, headphones, and other electronic devices must be turned off while in class. No cell phones or electronic devices are to be out during an exam. This will result in a Zero for that exam and the Respiratory Care Handbook will be utilized for disciplinary action. All personal items will be placed at the front of the classroom and cell phones will be placed on presentation desk.
2. No children allowed in the classroom
3. No late assignments will be accepted
4. Abide by LIT policies
5. Abide by policies within the Respiratory Care Handbook
6. Abide by instructor specific policies; this will be distributed on the first class day.
7. Exam dates will be distributed the first class day.
8. Electronic communication will be thru your LIT e-mail.
9. Homework and assignments will be handed out in class. They are due at the beginning of class on the date they are due.
10. If you have to miss an exam. You must call/or email the instructor prior to missing the exam. You will be allowed to make up the exam if you provide documentation of a doctor's note. It is the instructor decision to accept or decline the document. The exam must be taken the first class day return. ( unless otherwise directed by the instructor)