

Syllabus

Course Code: RESP 161

Title: Cardiopulmonary Anatomy & Physiology

Institute: Health Science

Department: Respiratory Care

Course Description: This course is one of two courses offered in the first term of the Respiratory Care Program. The student will utilize principles and methods of scientific inquiry to explore the structure and function of the physiology related to the cardiopulmonary system. In addition, the students will use appropriate mathematical concepts and operations to interpret data applied to static and dynamic characteristics of the lungs and vascular systems, oxygen and carbon dioxide transport, acid-base balance, ventilation-perfusion relationships as well as regulation and control of respiration.

Prerequisites: Admission to the program.

Corequisites: RESP 162, BIOL 111

Prerequisites or corequisites: Completion of Medical Terminology

Credits: 3

Lecture Hours: 3

Lab/Studio Hours: 0

Required Textbook/Materials: Required

1. Kacmarek, Stoller, Heuer. *Egan's Fundamentals of Respiratory Care*, 12th edition. Mosby, an imprint of Elsevier Inc. 2021.
2. Wehrman, Stephen. *Work Book for Egan's Fundamentals of Respiratory Care*, 12th edition. Mosby, Inc. 2021.
3. Mosby's Respiratory Care Online, Online at www.elsevierhealth.com.

Reference

Oakes, Dana F. *Oakes' Clinical Practitioner's Pocket Guide to Respiratory Care*, 6th edition. Health Educator Publications, Inc., Orono, Maine 04473. 2010.

Additional Time Requirements: For information on Brookdale's policy on credit hour requirements and outside class student work refer to [Academic Credit Hour Policy](#).

Additional Support/Labs:

See <https://www.brookdalecc.edu/academic-tutoring/>

Course Learning Outcomes:

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

1. Assess the clinical significance of the anatomic and physiologic functions of the cardiopulmonary system.

2. Differentiate between the mechanical and physiologic factors influencing the internal and external process of respiration.
3. Apply ventilation/perfusion relationships to clinical data.
4. Apply age-related changes to clinical data.
5. Interpret blood gases.
6. Assess the clinical significance of neurological control of ventilation.

Course Content:

COURSE NUMBER: RESP 161

UNIT 1 of 7

CREDITS: 3

Cardiopulmonary Anatomy & Physiology
TITLE

NAME OF UNIT: The Respiratory System

UNIT OBJECTIVE: Describe the various anatomic and physiological functions of the respiratory system and its clinical significance.

METHOD OF EVALUATION: Multiple choice examination, quizzes, and class assignments.

ESTIMATED TIME TO ACHIEVE: 2 weeks.

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>Chapter 9 The student will:</p> <ol style="list-style-type: none"> 1. State the major developmental events of the respiratory system. 2. Describe how genes control lung development. 3. Describe the key elements of normal fetal circulation. 4. State what happens to the respiratory system at birth. 5. Describe the developmental events in the respiratory system that continue after birth 6. Identify the main structures in the thorax and describe their functions. 	<ol style="list-style-type: none"> A. Lecture/discussion. B. A/V materials utilized in class: <ol style="list-style-type: none"> 1. Canvas 2. Videotapes 3. DVDs C. Class preparation, required reading, textbooks: <ol style="list-style-type: none"> 1. Egan, Chapter 9. 2. Workbook Chapter 9. D. Health Sciences Computer Lab: <ol style="list-style-type: none"> 1. http://evolve.elsevier.com/egans 2. Tutorials available. E. Handout. 	

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>7. Identify and describe the primary and accessory muscles of respiration.</p> <p>8. Describe the pulmonary and bronchial circulations structure and functions.</p> <p>9. Describe how somatic and autonomic nervous systems connect to and control the lungs and respiratory muscles functions.</p> <p>10. Identify the major structures of the upper respiratory tract and how they function.</p> <p>11. Describe how the lungs are organized into lobes and segments and the airways participate in gas exchange.</p> <p>12. Describe mucus production and their role in the respiratory system.</p> <p>13. Describe the structures and organization of the respiratory bronchioles and alveoli.</p> <p>14. Describe the blood-gas barrier and how gas exchange occurs.</p>		

CREDITS: 3

Cardiopulmonary Anatomy & Physiology
TITLE

NAME OF UNIT: The Cardiovascular System

UNIT OBJECTIVE: Describe the various anatomic and physiological functions of the cardiovascular system and its clinical significance.

METHOD OF EVALUATION: Multiple choice examination, quizzes, and class assignments.

ESTIMATED TIME TO ACHIEVE: Two weeks.

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>Chapter 10</p> <p>The student will:</p> <ol style="list-style-type: none"> 1. Describe the anatomy of the heart and vascular systems. 2. State the key characteristics of cardiac tissue. 3. Describe local and central control mechanisms of the heart and vascular systems. 4. Describe how the cardiovascular system functions under normal and abnormal conditions. 5. Calculate cardiac output given stroke volume and heart rate. 6. Calculate ejection fraction given stroke volume and end-diastolic volume. 8. Identify the electrical and mechanical events related to the normal cardiac cycle. 	<ol style="list-style-type: none"> A. Lecture/discussion. B. A/V materials utilized in class: <ol style="list-style-type: none"> 1. Canvas Web 2. Videotapes 3. DVDs C. Class preparation, required reading, textbooks: <ol style="list-style-type: none"> 1. Egan, Chapter 10. 2. Workbook Chapter 10. D. Health Sciences Computer Lab: <ol style="list-style-type: none"> 1. http://evolve.elsevier.com/egans 2. Tutorials available. E. Handout. 	

CREDITS: 3

Cardiopulmonary Anatomy & Physiology
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NAME OF UNIT: Ventilation

UNIT OBJECTIVE: Distinguish between ventilation from respiration.

METHOD OF EVALUATION: Multiple choice examination, quizzes, and class assignments.

ESTIMATED TIME TO ACHIEVE: Two weeks.

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>Chapter 11</p> <p>The student will:</p> <ol style="list-style-type: none"> 1. Describe the physiologic functions provided by ventilation. 2. Describe the pressure gradients responsible for gas flow, diffusion, and lung inflation. 3. Identify the forces that oppose gas movement into and out of the lungs. 4. Describe how surface tension contributes to lung recoil. 5. Describe how lung, chest wall, and total compliance are related. 6. State the factors that affect resistance to breathing. 7. Describe how various lung diseases affect the work of breathing. 8. State why ventilation is not evenly distributed throughout the lung. 9. Describe how the time constants affect alveolar filling and emptying. 	<ol style="list-style-type: none"> A. Lecture/discussion. B. A/V materials utilized in class: <ol style="list-style-type: none"> 1. Canvas Web 2. Videotapes 3. DVDs C. Class preparation, required reading, textbooks: <ol style="list-style-type: none"> 1. Egan, Chapter 11. 2. Workbook Chapter 11. D. Health Sciences Computer Lab: <ol style="list-style-type: none"> 1. http://evolve.elsevier.com/egans 2. Tutorials available. E. Handout. 	

<p>10. Identify the factors that affect alveolar ventilation.</p> <p>11. State how to calculate alveolar ventilation, dead space, and V_D/V_T.</p>		
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CREDITS: 3

Cardiopulmonary Anatomy & Physiology
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NAME OF UNIT: Gas Exchange and Transport

UNIT OBJECTIVE: Discuss normal gas exchange between air and blood as it occurs if pulmonary blood flow perfuses ventilated alveoli.

METHOD OF EVALUATION: Multiple choice examination, quizzes, and class assignments.

ESTIMATED TIME TO ACHIEVE: Two weeks.

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>Chapter 12</p> <p>The student will:</p> <ol style="list-style-type: none"> 1. Describe how oxygen and carbon dioxide move between the atmosphere and tissues. 2. Identify what determines alveolar oxygen and carbon dioxide pressure. 3. Calculate the alveolar partial pressure of oxygen. 4. State the effects that normal regional variations in ventilation and perfusion have on gas exchange. 5. Describe how to compute total oxygen content for arterial blood. 6. State the factors that cause the arteriovenous oxygen content difference to change. 7. Identify the factors that affect oxygen loading and unloading from hemoglobin. 8. Describe how carbon dioxide is carried in the blood. 	<ol style="list-style-type: none"> A. Lecture/discussion. B. A/V materials utilized in class: <ol style="list-style-type: none"> 1. Canvas Web 2. Videotapes 3. DVDs C. Class preparation, required reading, textbooks: <ol style="list-style-type: none"> 1. Egan, Chapter 12. 2. Workbook Chapter 12. D. Health Sciences Computer Lab: <ol style="list-style-type: none"> 1. http://evolve.elsevier.com/egans 2. Tutorials available. E. Handout. 	

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>9. Describe how oxygen and carbon dioxide transport are interrelated.</p> <p>10. Describe the factors that impair oxygen delivery to the tissues and how to distinguish among them.</p> <p>11. State the factors that impair carbon dioxide removal.</p>		

CREDITS: 3

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NAME OF UNIT: Solutions, Body Fluids, and Electrolytes

UNIT OBJECTIVE: Describe how body water and various chemicals are regulated to maintain an environment in which biochemical processes can continue.

METHOD OF EVALUATION: Multiple choice examinations, quizzes, and class assignment.

ESTIMATED TIME TO ACHIEVE: Three weeks.

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>Chapter 13</p> <p>The student will:</p> <ol style="list-style-type: none"> 1. Describe the characteristics of and key terms associated with solutions, colloids, and suspensions. 2. Describe the five factors that influence the solubility of a substance in a solution. 3. Describe how osmotic pressure functions and what its action is in relation to cell membranes. 4. Describe how to calculate the solute content of a solution using ratio, weight/volume, and percent methods. 5. State the ionic characteristics of acids, bases, and salts. 6. Describe how proteins can function as bases. 7. Describe how to calculate the pH of a solution when given the [H⁺] in nanomoles per liter. 8. Identify where fluid compartments are located in the body and their volumes. 	<ol style="list-style-type: none"> A. Lecture/discussion. B. A/V materials utilized in class: <ol style="list-style-type: none"> 1. Canvas Web 2. Videotapes 3. DVDs C. Class preparation, required reading, textbooks: <ol style="list-style-type: none"> 1. Egan, Chapter 13. 2. Workbook Chapter 13. D. Health Sciences Computer Lab: <ol style="list-style-type: none"> 1. http://evolve.elsevier.com/egans 2. Tutorials available. E. Handout. 	

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>9. Describe how water loss and replacement occur.</p> <p>10. Define the roles played by osmotic and hydrostatic pressure in edema.</p> <p>11. Identify clinical findings associated with excess or deficiency of the seven basic electrolytes.</p>		

CREDITS: 3

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NAME OF UNIT: Acid-Base Balance

UNIT OBJECTIVE: Explain the effects of small hydrogen ion concentration [H⁺] changes and how they can cause vital metabolic processes in the body to fail.

METHOD OF EVALUATION: Multiple choice examinations, quizzes, and class assignment.

ESTIMATED TIME TO ACHIEVE: Two weeks.

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>Chapter 14</p> <p>The student will:</p> <ol style="list-style-type: none"> 1. Describe how the lungs and kidneys regulate volatile and fixed acids. 2. Describe how equilibrium constant of an acid is related to its ionization and strength. 3. Define open and closed buffer systems. 4. Explain why open and closed buffer systems differ in their ability to buffer fixed and volatile acids. 5. Explain how to use the Henderson-Hasselbalch equation in hypothetical clinical situations. 6. Describe how the kidneys and lungs compensate for each other when the function of one is abnormal. 7. Explain how renal absorption and excretion of electrolytes affect acid-base balance. 8. Classify and interpret arterial blood acid-base results. 	<ol style="list-style-type: none"> A. Lecture/discussion. B. A/V materials utilized in class: <ol style="list-style-type: none"> 1. Canvas Web 2. Videotapes 3. DVDs C. Class preparation, required reading, textbooks: <ol style="list-style-type: none"> 1. Egan, Chapter 14. 2. Workbook Chapter 14. D. Health Sciences Computer Lab: <ol style="list-style-type: none"> 1. http://evolve.elsevier.com/egans 2. Tutorials available. E. Handout. 	

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>9. Explain how to use arterial acid-base information to decide on a clinical course of action.</p> <p>10. Explain why acute changes in the blood's carbon dioxide levels the blood affect plasma bicarbonate ion concentration.</p> <p>11. Calculate the anion gap and use it to determine the cause of metabolic acidosis.</p> <p>12. Describe how standard bicarbonate and base excess measurements are used to identify the non-respiratory component of acid-base imbalances.</p>		

CREDITS: 3

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NAME OF UNIT: Regulation of Breathing

UNIT OBJECTIVE: Describe how the higher brain centers and many systemic receptors and reflexes modify the medulla’s output.

METHOD OF EVALUATION: Multiple choice examinations, quizzes, and class assignment.

ESTIMATED TIME TO ACHIEVE: Two weeks.

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>Chapter 15</p> <p>The student will:</p> <ol style="list-style-type: none"> 1. Identify where the structures that regulate breathing are located. 2. Explain how the inspiratory and expiratory neurons in the medulla establish the basic pattern of breathing. 3. Describe the effect that impulses from the pneumotaxic and apneustic centers in the pons have on the medullary centers of breathing. 4. Describe the effect of various reflexes on breathing. 5. Explain how the central and peripheral chemoreceptors differ in the way they regulate breathing. 6. Compare and contrast central chemoreceptors response to respiratory and non-respiratory acid-base disorders. 7. Contrast the regulation of breathing in individuals with chronic hypercapnia with the regulation of breathing in healthy individuals. 	<ol style="list-style-type: none"> A. Lecture/discussion. B. A/V materials utilized in class: <ol style="list-style-type: none"> 1. Canvas Web 2. Videotapes 3. DVDs C. Class preparation, required reading, textbooks: <ol style="list-style-type: none"> 1. Egan, Chapters 15. 2. Workbook Chapter 15 D. Health Sciences Computer Lab: <ol style="list-style-type: none"> 1. http://evolve.elsevier.com/egans 2. Tutorials available. E. Handout. 	

LEARNING OBJECTIVES	LEARNING EXPERIENCES	COLLEGE LAB/CLINICAL LEARNING EXPERIENCES
<p>8. Explain why administering high concentrations of oxygen to patients with chronic hypercapnia poses a special risk that is not present in healthy individuals.</p> <p>9. Describe why ascending to a high altitude has different immediate and long-term effects on ventilation.</p> <p>10. Explain why mechanically ventilated patients with head injuries may benefit from deliberate hyperventilation.</p>		

Department Policies: See Respiratory Care Student Handbook.

Grading Standard:

In addition to the Academic Progress Policy in the Brookdale Respiratory Care Student Handbook, the following policies apply to RESP 161.

1. Upon completion of the units, students will be given a written test based on the unit objectives. Final grades will be determined as follows:

A	94-100
A-	90-93
B+	87-89
B	84-86
B-	81-83
C+	78-80
C	74-77
D	65-73
F	64 or below

2. The course grade will be derived as follows:

Unit exams	70%
Quizzes, Class and Homework Assignments	10%
Final exam	20%

3. All students are required to meet examination schedule requirements as stated on the course calendar. (Unit examinations will be administered in the Testing Center on a secured browser.) Any student who is unable to take the exam as scheduled must speak personally to the instructor prior to the exam.
4. Students have the opportunity to review completed exams by contacting the instructor.
5. All assignments must be completed on time and prior to taking the final examination.
6. The final examination is a comprehensive test covering all course competencies.
7. A grade of 74% is required to pass this course.
8. Students may review the final examination by appointment.
9. Extra Credit is available for activities outside of class. Examples are volunteering at Open House.

College Policies:

As an academic institution, Brookdale facilitates the free exchange of ideas, upholds the virtues of civil discourse, and honors diverse perspectives informed by credible sources. Our College values all students and strives for inclusion and safety regardless of a student's disability, age, sex, gender identity, sexual orientation, race, ethnicity, country of origin, immigration status, religious affiliation, political orientation, socioeconomic standing, and veteran status. For additional information, support services, and engagement opportunities, please visit www.brookdalecc.edu/support.

For information regarding:

- Academic Integrity Code
- Student Conduct Code
- Student Grade Appeal Process

Please refer to the [Student Handbook](#) and [Catalog](#).

Notification for Students with Disabilities:

Brookdale Community College offers reasonable accommodations and/or services to persons with disabilities. Students with disabilities who wish to self-identify must contact the Accessibility Services Office at 732-224-2730 (voice) or 732-842-4211 (TTY) to provide appropriate documentation of the disability and request specific accommodations or services. If a student qualifies, reasonable accommodations and/or services, which are appropriate for the college level and are recommended in the documentation, can be approved.

Mental Health:

24/7/365 Resources:

- Monmouth Medical Center Psychiatric Emergency Services at **(732) 923-6999**
- 2nd Floor Youth Helpline – Available to talk with you about any problem, distress, or hardship you are experiencing. Call or text at **888-222-2228** or visit the website at <https://www.2ndfloor.org/>

Faculty Counselors:

- Students who need to make an appointment with a faculty counselor can do so by calling 732-224-1822 (non-emergency line) during business hours. Faculty counselors are licensed mental health professionals who can assist students and refer them to other mental health resources.

Diversity Statement:

Brookdale Community College fosters an environment of inclusion and belonging. We promote a safe and open culture, encourage dialogue respecting diverse perspectives informed by credible sources, and uphold the virtues of civil discourse. We celebrate all identities with the understanding that ultimately, diversity, equity, and inclusion cultivate belonging and make us a stronger Brookdale community.

**The syllabus is intended to give student guidance in what may be covered during the semester and will be followed as closely as possible. However, the faculty member reserves the right to modify, supplement, and make changes as the need arise.*