Course Information Form (CIF)

Course Code: RTT 135

Course Title: Respiratory Therapy IV

Department: Allied Health
PCS Code: 1.2 - Occupational/Technical Instruction
CIP Code: 51.0908
Repeatability: 0

Effective Date: Summer 2026

Credit Hours

Catalog Notation: 4-0-4
Credit Hour Distribution:

Lecture: 4	Lab: 0	Clinical: 0	**Total: 4**

General Course Information

Catalog Description

General principles of pharmacology, specific medications for acute and chronic pulmonary illness including bronchodilators, mucokinetics, inhaled antibiotics, inhaled anti-inflammatories; medications to treat cardiopulmonary conditions. Interpretation and clinical application of arterial, venous and capillary blood gases.

General Course Objectives

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

- Discuss the general principles of pharmacology across all disciplines of health care.
- Demonstrate knowledge of medications appropriate for respiratory illness through application to specific patient presentation.
- Apply the GINA and GOLD recommendations to care plan suggestions for asthma and COPD.
- Interpret blood gases and determine appropriate clinical interventions as indicated to correct abnormal clinical status.

Minimum Placement Levels

English	Reading	Math
Placement out of ENG 099	Placement out of CCS 099	None

Prerequisites

Credit in RTT 117, RTT 130, RTT 131, RTT 132, and BIO 121
Credit or concurrent enrollment in RTT 133, RTT 134, RTT 151, BIO 122, and ENG 101
Admission into the Respiratory Care program

Methods of Evaluation

3-5 exams including objective and essay questions, patient case studies, 5-7 essay and objective quizzes, 12-16 weekly homework assignments, and 4-6 discussion posts.

Instructional Materials and Additional Supplies

Respiratory Care Pharmacology, Gardenshire, D.S., current edition, Elsevier.
Workbook for Respiratory Care Pharmacology, Gardenshire, D.S., current edition, Elsevier.
Egan's Fundamentals of Respiratory Care, Students will have this text from previous semester.
Respiratory Care Anatomy and Physiology: Foundations for Clinical Practice, Beachy, W., current edition, Elsevier. Students will have this text from the previous semester.
Internet access to complete online course components.

Course Content

General Learning Outcomes (GLOs)

- Critical Thinking and Information Literacy: Students will demonstrate the ability to evaluate perspectives, evidence, and implications, and to locate, assess, and use information effectively.
- Reasoning and Inquiry: Students will demonstrate the ability to solve problems using deductive reasoning and logic, quantitative reasoning, or the scientific method.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Introduction to Pharmacology	1. Identify the specific legislative acts that govern the manufacture, distribution, and administration of drugs. Discuss the role of federal drug legislative acts. 2. Describe the process of drug approval and of naming new drugs. 3. List the potential sources of drug components. 4. Identify safe medication administration practices (the 5 Rights). 5. Identify reliable sources of pharmaceutical information. 6. Define key terms associated with the administration of medications.	2	0	0
Medication Formulations and Administration Routes	1. Define the three stages of drug actions. 2. Describe each of the methods of drug administration: oral, intramuscular, intravenous, inhaled, and topical (for example). 3. Discuss the advantages and disadvantages of each of the drug administration methods. 4. Discuss the role of the respiratory therapist in maximizing the benefits of inhaled aerosol medication administration techniques.	2	0	0
Calculation of Medication Doses	1. Identify and define essential terms used in drug dosage calculations. 2. Determine the strength of solutions in percentage and ratio forms using mathematical techniques. 3. Determine the appropriate dosage for administering volume-to-volume solutions using mathematical techniques. 4. Determine the appropriate dosage for administering weight-to-volume solutions using mathematical techniques. 5. Determine the appropriate dosage for administering % of strength-to-volume solutions using mathematical techniques. 6. Identify and define key terms used in medication calculations.	4	0	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
The Autonomic Nervous System	1. Identify and describe the anatomy, neurotransmitters, and receptors of the autonomic nervous system. 2. Discuss how the autonomic nervous system impacts the effectiveness of medications in clinical practice. 3. Identify and define key terms associated with the pharmacology of the autonomic nervous system. 4. Explain the general and specific effects of the sympathetic nervous system, including the roles of alpha, beta1, and beta2 receptor sites. 5. Identify and describe the general and specific effects of parasympathetic stimulation. 6. Identify and describe the mechanisms that lead to airway constriction. 7. Identify and describe the four classifications of autonomic nervous system drugs according to their effects and sites of action.	4	0	0
Sympathomimetic Bronchodilators	1. Explain how the nervous system controls bronchial smooth muscles and how the sympathetic and parasympathetic nervous systems balance each other in this regulation. 2. Describe how sympathetic agonist (adrenergic) bronchodilators work to relax bronchial smooth muscles and improve airflow. 3. Identify the side effects associated with sympathetic agonist bronchodilators. 4. Identify the trade name, receptor response, method of administration, onset of action, duration of effect, and dosage of the following sympathetic agonist bronchodilators: a) Ultra-Short Acting, including but not limited to epinephrine, racemic epinephrine, isoproterenol. b) Short-to-Intermediate Acting, including but not limited to Metaproterenol, Terbutaline, Pirbuterol, Albuterol, Bitolterol, Levalbuterol. c) Long Acting Agents, including but not limited to Salmeterol, Formoterol, Arformoterol, Indacterol. 5. Discuss the methods used to evaluate the effectiveness of bronchodilator therapy in a clinical setting. 6. Integrate knowledge of sympathetic agonist medications, disease processes, and patient assessment findings to formulate and recommend appropriate therapies for specific clinical presentations.	6	0	0
Anticholinergic and Xanthine Bronchodilators	1. Describe the mechanism of action of anticholinergic (parasympatholytic) bronchodilators. 2. Identify the trade name, dosage, frequency, onset, peak, and duration of the parasympatholytic agents, including but not limited to: a) Atropine, b) Ipratropium bromide, c) Ipratropium bromide + albuterol, d) Tiotropium bromide. 3. Describe the mechanism of action of xanthine bronchodilators. 4. Identify common xanthine bronchodilators. 5. List the potential side effects of xanthine bronchodilators. 6. Combine knowledge of anticholinergic and xanthine medications, disease processes, and patient assessment data to formulate and propose targeted medication therapy plans for individual patient cases.	6	0	0
Mucoactive Medications	1. Describe the role of mucociliary transport mechanisms in airway clearance. 2. Identify medications that are used to improve mucus clearance. 3. Identify the indications for using mucoactive medications. 4. Combine knowledge of mucoactive medications, disease processes, and patient assessment findings to develop and recommend specific medication therapies for a given patient presentation.	4	0	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Anti-inflammatory Medications, Anti-asthmatic Medications, and GOLD and GINA Guidelines for Management of COPD and Asthma	1. Discuss the indications for inhaled corticosteroid use. 2. Discuss the physiological properties of corticosteroids, including the Hypothalmic-Pituitary-Adrenal mechanism and the Diurnal Steroid Cycle. 3. Identify the generic and trade names of commonly available inhaled corticosteroids. 4. Describe the pharmacological properties of corticosteroids, including their anti-inflammatory action and their effect on Beta receptors. 5. List the hazards and side effects of aerosolized corticosteroids. 6. Identify common oral and IV corticosteroid preparations. 7. Compare the risks of aerosolized corticosteroids with systemic administration. 8. Identify the common manifestations of Cushing's Syndrome. 9. Discuss the indications for nonsteroidal anti-asthma medications. 10. Describe the therapeutic uses and potential side effects of the mast cell inhibitors, and identify examples. 11. Discuss the therapeutic uses of the leukotriene inhibitor formulations, and identify examples. 12. Discuss the criteria of the GOLD and GINA guidelines for managing chronic lung disease. 13. Combine knowledge of GOLD and GINA guidelines, anti-inflammatory and anti-asthmatic medications, disease processes, and patient assessment findings to develop and recommend a comprehensive respiratory care plan for a specific patient case.	4	0	0
Neuromuscular Agents, Sedation, and Pain Relief in Respiratory Care	1. Identify the indications for using neuromuscular blocking agents, anxiolytics, narcotics, opioids, and sedatives in the care of respiratory-compromised patients. 2. Identify the indications for using neuromuscular blocking agents, anxiolytics, narcotics, opioids, and sedatives in the care of respiratory-compromised patients. 3. Identify the risks associated with the use of sedatives, opioids, and anxiolytics. 4. Describe the mechanisms of action of depolarizing and non-depolarizing neuromuscular paralytics. 5. Explain the potential complications associated with the long-term use of paralytics, opioids, and narcotics in critical care patients. 6. Assess patient care scenarios to determine the appropriate application of neuromuscular agents, analgesics, sedatives, and anxiolytic medications.	4	0	0
Diuretics, Thrombolytics, and Vasoactive Medications	1. Identify the indications and potential complications associated with diuretic agents. 2. Identify commonly used diuretic agents. 3. Identify the indications for use and potential complications associated with vasoactive agents. 4. List common vasoactive agents administered to patients with pulmonary conditions. 5. Assess patient care scenarios to determine the appropriate use of diuretics, thrombolytics, and vasoactive medications.	4	0	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Blood Gas Sampling and Analysis	1. Identify and compare various methods for measuring PO2, PCO2, pH, and oxygen saturation. 2. Explain the procedure for collecting blood samples via arterial puncture and list the potential risks involved. 3. Identify the preferred anatomical sites for blood gas puncture and explain the rationale and risks for each site. 4. Describe pre-analytic, analytic, and post-analytic errors that can occur in blood gas analysis. 5. Explain the issues associated with temperature correction in blood gas analysis. 6. Describe methods used for quality control and proficiency testing in blood gas analysis. 7. Discuss the Clinical Laboratory Improvement Act (CLIA) and its impact on ensuring patient safety and the accuracy of test results through laboratory standards.	4	0	0
Acid-Base Balance in Blood Gas Assessment	1. Describe how hydrogen ions and bicarbonate ions regulate and maintain acid-base balance in the body. 2. Define the differences between strong and weak acids, and strong and weak bases, and describe how each influences blood pH. 3. Define the term pH as it relates to acid-base concentration, and explain how the pH scale is used to determine the acidity or alkalinity of a solution. 4. Identify the physiological systems that regulate acid-base balance in the body. 5. Describe how chemical buffer systems including the carbonic acid-bicarbonate buffer system, phosphate buffer system, and protein buffer system function to regulate acid-base balance. 6. Explain how the Henderson-Hasselbalch equation is applied clinically to evaluate blood gases and guide treatment decisions. 7. Explain the role of the respiratory system in maintaining acid-base balance in the body. 8. Explain the role of the renal system in regulating and maintaining acid-base balance in the body.	4	0	0
Oxygenation and Ventilation in Blood Gas Assessment	1. List the measured and calculated parameters in blood gas analysis related to oxygenation and ventilation. 2. Describe the non-invasive techniques available for assessing oxygenation. 3. Identify the normal ranges for arterial oxygen (PaO2), recognize the effect of age on these ranges, and classify oxygen values as normal, mild, moderate, or severe. 4. Apply oxygenation values to calculate shunt and differentiate between true shunt and shunt-like effects in clinical scenarios. 5. Identify the normal range for the arterial, venous, and capillary PO2. 6. List the common clinically acceptable ranges for blood gases and explain the rationale for any expanded ranges. 7. Identify the primary changes associated with respiratory acid-base disturbances. 8. Identify the potential causes of respiratory acid-base disturbances. 9. Identify the primary changes associated with metabolic acid-base disturbances.	4	0	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Oxygenation and Ventilation in Blood Gas Assessment (cont'd)	10. Identify the potential causes of metabolic acid-base disturbances. 11. Explain the similarities and differences between true shunt and shunt-like effects, providing examples of causes for each. 12. Identify the normal ranges for arterial carbon dioxide ($PaCO_2$) and recognize the conditions of hyperventilation and hypoventilation. 13. Integrate blood gas results to develop and propose appropriate modifications in oxygen therapy and ventilatory support. 14. Integrate and analyze blood gas results to develop recommendations for modifying patient care and suggest appropriate interventions.			
Blood Gas Interpretation: Single Disorders	1. Identify metabolic acid-base disturbances and classify them using appropriate technical and clinical terms. 2. Recognize and categorize respiratory acid-base disturbances using accurate technical and clinical terminology. 3. Identify and describe the potential causes of respiratory acid-base disturbances. 4. Identify and describe the potential causes of metabolic acid-base disturbances. 5. Integrate blood gas results to develop and recommend appropriate changes in oxygen therapy and ventilatory support.	4	0	0
Blood Gas: Compensation and Double Disorders	1. Identify the respiratory and metabolic compensation mechanisms involved in maintaining acid-base balance. 2. Apply the general rules of compensation to differentiate between compensated states and double or triple acid-base disorders in clinical scenarios. 3. Apply the relationships between pH, CO_2, and HCO_3 to accurately interpret and validate blood gas results. 4. Integrate blood gas analysis with patient case scenarios to determine the underlying issues and propose appropriate respiratory interventions to resolve them.	4	0	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
60	0	0