# Course Information Form (CIF)

**Course Code:** RTT 137

**Course Title:** Advanced Ventilation

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

**Effective Date:** Summer 2026

## Credit Hours

**Catalog Notation:** 3-0-3
**Credit Hour Distribution:**

| Lecture: 3 | Lab: 0 | Clinical: 0 | **Total: 3** |
|---|---|---|---|

## General Course Information

### Catalog Description

Recognition of respiratory failure; initiation, monitoring, management, and discontinuation of mechanical ventilation. Application of respiratory protocols to specific patient simulated cases. Application of disease-specific ventilator management strategies including mode selection and settings. Indications and management of unconventional ventilation modes and specialty medical gases.

### General Course Objectives

Upon completion of this course, the student will be able to identify respiratory failure and the signs and symptoms of impending failure. The student will be able to apply the concepts of mechanical ventilation to initiate, monitor, and manage the patient requiring mechanical ventilation, and recommend modes including HFOV, HFJV, NAVA, and APRV and specific ventilator settings based on patient diagnosis and clinical presentation. The student will be able to demonstrate application of respiratory therapy protocols to recommend disease-specific ventilation strategies.

### Minimum Placement Levels

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

### Prerequisites

Credit in RTT 133, RTT 134, RTT 135, RTT 151, and BIO 122
Concurrent enrollment in RTT 136
Admission into the Respiratory Care program

### Methods of Evaluation

2-4 exams including objective and essay items; 6-8 objective and essay quizzes, 3-4 discussion posts, 6-8 homework assignments, and in-class skills demonstration.

### Instructional Materials and Additional Supplies

Mechanical Ventilation, Physiological and Clinical Applications, Pilbeam, S.M. and Cairo, J. M., current edition, Elsevier.
Workbook for Mechanical Ventilation, Physiological and Clinical Applications, Pilbeam, S,M, and Cairo, J. M. current edition, Elsevier.
Internet access for course resources.

## 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.
- Technology: Students will demonstrate the ability to evaluate, select, and appropriately use current and emerging tools.

### Course Segments and Student Learning Outcomes

| Course Segment | Learning Outcomes | Lecture Hours | Lab Hours | Clinical Hours |
|---|---|---|---|---|
| Initiation of Mechanical Ventilation | 1. Examine patient clinical assessment data, including physical and neurological evaluations and lab results, to apply the indications for mechanical ventilation.<br>2. Examine patient assessment information to select and recommend appropriate modes and initial settings for mechanical ventilation based on common respiratory illnesses and specific disease processes.<br>3. Identify pathophysiologic conditions that affect a patient's transairway pressure (PTA), peak pressure, and plateau pressure.<br>4. Discuss the importance of plateau pressure and how to interpret pressure-time and flow-time curves during continuous mandatory ventilation to measure plateau pressures.<br>5. Examine a ventilator flow sheet to assess and identify changes in lung compliance and airway resistance. | 3 | 0 | 0 |
| Pharmacology for Mechanical Ventilation | 1. Identify common sedatives, analgesics, and neuromuscular blocking agents used in mechanically ventilated patients, along with their specific indications and associated risks.<br>2. Identify and describe methods for assessing the level of sedation or paralysis.<br>3. Assess patient clinical signs and symptoms to select the appropriate medication and distinguish whether an analgesic, sedative, or neuromuscular blocker is needed.<br>4. Explain the risks and complications associated with excessive dosing or long-term use of analgesics, sedatives, and neuromuscular blockers. | 3 | 0 | 0 |
| Monitoring Mechanical Ventilation | 1. Examine ventilator scalar and loop graphics to determine the set ventilator mode and variable values.<br>2. Examine ventilator graphics to identify changes in compliance and resistance, as well as issues such as inadequate flow, sensitivity, and ventilator system leaks.<br>3. Analyze ventilator graphics to determine the opening and closing volumes of the alveoli and evaluate the data to set the optimal PEEP.<br>4. Identify conditions that can affect the accuracy of pulse oximeter readings.<br>5. Explain the components of a normal capnogram, and identify and describe how different conditions can alter its contour.<br>6. Compare and contrast quantitative and qualitative capnography in clinical medicine, highlighting their differences and similarities. | 3 | 0 | 0 |

| Course Segment | Learning Outcomes | Lecture Hours | Lab Hours | Clinical Hours |
|---|---|---|---|---|
| Therapeutic Interventions: Managing Ventilation | 1. Examine the relationship between arterial carbon dioxide levels and ventilatory parameters to calculate the rate or tidal volume change needed to achieve the desired CO2 level.<br>2. Examine patient diagnosis, arterial blood gas (ABG) results, and ventilator parameters to recommend adjustments that reduce the work of breathing, enhance patient-ventilator synchrony, and optimize ventilation.<br>3. Identify and explain the modes of ventilation that enhance carbon dioxide removal and reduce the risk of lung injury. | 3 | 0 | 0 |
| Therapeutic Interventions: Managing Oxygenation | 1. Examine ventilator settings and blood gas measurements to determine the FiO2 needed to reach the desired PaO2.<br>2. Discuss the advantages and disadvantages of using MDIs, SVNs, closed suction systems, and saline instillation in order to minimize the impact on oxygenation.<br>3. Discuss the indications, contraindications, and potential risks associated with initiating PEEP (Positive End-Expiratory Pressure).<br>4. Examine blood gases, ventilator graphics, and hemodynamic data to determine the optimal PEEP level for a ventilated patient.<br>5. Examine the patient's physical assessment, arterial blood gas values, and ventilator parameters to determine necessary adjustments in PEEP, oxygen concentration, and ventilator settings to help manage oxygenation.<br>6. Explain the procedure for prone positioning in ARDS and identify the benefits and possible complications of using this technique to enhance oxygenation and improve the ventilation-perfusion relationship. | 4 | 0 | 0 |
| Complications of Positive Pressure Mechanical Ventilation: Non-pulmonary Complications | 1. Explain the effects of positive-pressure ventilation (PPV) on cardiac output, venous return to the heart, and systemic blood pressure.<br>2. Explain how positive pressure ventilation (PPV) affects gas distribution and pulmonary blood flow in the lungs.<br>3. Describe the mechanism by which positive pressure ventilation (PPV) increases intracranial pressure.<br>4. Describe the impact of positive pressure ventilation (PPV) on renal, gastrointestinal, and endocrine functions.<br>5. Discuss strategies to reduce the negative effects of positive pressure ventilation on non-pulmonary systems.<br>6. Implement theories of positive pressure ventilation to assess and manage patient case scenarios. | 3 | 0 | 0 |
| Complications of Positive Pressure Mechanical Ventilation: Pulmonary Complications | 1. Identify the signs and symptoms of barotrauma and describe interventions to minimize the associated risks.<br>2. Distinguish between ventilator-induced injuries and ventilator-associated injuries.<br>3. Explain why increasing mean airway pressure can help stabilize alveoli and reduce the risk of injury.<br>4. Identify ventilator adjustments that can be made to increase or decrease mean airway pressure.<br>5. Explain how positive-pressure ventilation (PPV) affects pulmonary gas distribution and pulmonary perfusion compared to normal spontaneous breathing.<br>6. Discuss strategies to prevent ventilator-associated pneumonia.<br>7. Examine case studies to identify potential pulmonary complications and determine necessary ventilator adjustments. | 3 | 0 | 0 |

| Course Segment | Learning Outcomes | Lecture Hours | Lab Hours | Clinical Hours |
|---|---|---|---|---|
| Troubleshooting Equipment Failure | 1. Identify common technical problems encountered during mechanical ventilation of critically ill patients, such as 'vent in-op' codes, high or low pressure alarms, high and low volume alarms, high and low rate alarms, and gas supply alarms.<br>2. Identify potential causes for high and low pressure alarms, high and low volume alarms, high and low rate alarms, 'vent in-op' codes, and gas supply alarms. Suggest corrective actions for each of these alarm conditions.<br>3. Determine the steps a respiratory therapist should follow to safeguard a patient during equipment malfunctions, identifying potential risks and determining appropriate responses. | 3 | 0 | 0 |
| Troubleshooting: Inappropriate Settings, Patient Clinical Changes | 1. Describe the signs and symptoms associated with ventilator-patient asynchrony.<br>2. Identify abnormalities in ventilator graphics that indicate improper settings. Explain how flow and volume scalars and loops can help determine the cause of asynchrony and recommend appropriate corrections.<br>3. Identify and discuss physical assessment findings indicative of improper tube placement and describe how physical assessment, capnography, and radiography can be used to verify endotracheal tube placement.<br>4. Identify and discuss physical assessment findings that suggest a pneumothorax and determine the clinical intervention required to treat it.<br>5. Identify and discuss physical assessment findings that may indicate the development of pulmonary infections.<br>6. Assess patient case scenarios to troubleshoot problems related to improper settings and clinical changes in patients on mechanical ventilation. | 3 | 0 | 0 |
| Discontinuation of Mechanical Ventilation | 1. Identify the weaning parameters used for ventilator discontinuation and their acceptable values.<br>2. Identify and differentiate the three standard modes of weaning, and evaluate statistical data regarding the success rates for each mode.<br>3. Identify and describe the criteria used to determine whether to initiate or discontinue a spontaneous breathing trial, and discuss their importance.<br>4. Identify and describe the criteria used to assess patient readiness for extubation.<br>5. Identify the signs and symptoms of post-extubation difficulties or impending respiratory failure and recommend appropriate interventions.<br>6. Explain strategies for managing a patient who has failed a spontaneous breathing trial or extubation.<br>7. Explain the role of protocols in ventilator management and describe the impact of protocol application on patient outcomes.<br>8. Examine ventilator patient case studies to assess weaning readiness, select suitable weaning strategies, and evaluate the success of the weaning process. | 4 | 0 | 0 |

| Course Segment | Learning Outcomes | Lecture Hours | Lab Hours | Clinical Hours |
|---|---|---|---|---|
| Long-Term Ventilation | 1. Explain the role of long-term care facilities in managing patients who are difficult to wean from mechanical ventilation.<br>2. Discuss the objectives of mechanical ventilation when used in a home care setting.<br>3. List the equipment and respiratory supplies needed for mechanical ventilation in long-term care or home settings, and identify the key characteristics of a home-use ventilator.<br>4. Explain the education required for families or caregivers before discharge home, including patient assessment, equipment operation and troubleshooting, and airway care.<br>5. Develop a discharge respiratory care plan for a patient who will be sent home with mechanical ventilator support. | 4 | 0 | 0 |
| Advanced Techniques in Mechanical Ventilation | 1. Discuss Airway Pressure Release Ventilation (APRV) characteristics, benefits, disadvantages, and initial settings for ARDS; identify similar trademark modes and ventilator settings for oxygenation and ventilation.<br>2. Discuss high frequency oscillatory ventilation (HFOV) indications and describe the Sensormedics 3100B oscillator controls for manipulating ventilation and oxygenation.<br>3. Identify and discuss the indications for heliox therapy in mechanical ventilation, the necessary equipment, and potential limitations and complications.<br>4. Identify and discuss the indications, equipment, and complications of independent lung ventilation.<br>5. Identify and discuss the principles, indications, and equipment for neuro-adjusted ventilation (NAVA), including its physiological benefits and potential complications.<br>6. Integrate disease process knowledge to suggest a ventilation strategy that optimizes carbon dioxide clearance and oxygenation while minimizing lung damage and organ system impairment. | 6 | 0 | 0 |
| Ethical Considerations | 1. Discuss the psychosocial and financial challenges faced by families caring for a ventilator-dependent loved one.<br>2. Discuss the ethical considerations in managing patients with chronic end-stage lung disease, focusing on the importance of patient and family education and the role of advance directives.<br>3. Discuss the ethical challenges in allocating medical resources, such as mechanical ventilators and critical care staff for medically complex patients.<br>4. Utilize ethical and AARC professional standards to address patient scenarios, ensuring that respiratory therapists make decisions that align with their scope of practice and prioritize patient well-being. | 3 | 0 | 0 |

**Total Contact Hours**

| Lecture Hours | Lab Hours | Clinical Hours |
|---|---|---|
| 45 | 0 | 0 |