

Midland College
Master Syllabus
RSPT 2414
Mechanical Ventilation
**Core Curriculum Course*

Course Description:

The study of mechanical ventilation with emphasis on ventilator classification, methods, principles, and operational characteristics (3-4-0)

End-of-Course-Outcomes:

Describe procedures for mechanical ventilation as related to spontaneous and artificial ventilation with emphasis on ventilator classification, methods, principles, and operational characteristics; explain indications, complications, and physiologic effects/principles of mechanical ventilation; and apply initiation, management, and weaning of ventilator support.

Text, References, and Supplies:

Egan's Fundamentals of Respiratory Care, 11th ed., Craig Scanlan, Mosby
Clinical Application of Mechanical Ventilation, 4th ed. David W. Chang, Delmar

Disclaimer

The instructor reserves the right to make modifications to this course throughout the semester.

Students MUST actively participate by completing an academic assignment required by the instructor by the official census date. Students who do not actively participate in an academically-related activity will be reported as never attended and dropped from the course.

Course Objectives and Student Learning Outcomes

Upon successful completion of this course, students will:

- I. Identify indications and contraindications of mechanical ventilation.
 - A. Define respiratory failure and distinguish between its two primary types
 - B. Compare and contrast acute and chronic respiratory failure
 - C. Identify causes of respiratory failure
 - D. Justify ventilatory support in special circumstances
- II. Demonstrate proficiency in initiating mechanical ventilation.
 - A. Differentiate between physician ordered and therapist-controlled parameters
 - B. Differentiate between pressure ventilation and volume ventilation
 - C. Establish an appropriate minute volume for initial ventilator settings
 - D. Establish appropriate FiO₂ setting for initial mechanical ventilation
 - E. Explain the relationship between flow, inspiratory time, and expiratory time
- III. Differentiate between common modes of mechanical ventilation
 - A. Define the terms trigger, limit, and cycle as they pertain to modes of mechanical ventilation

- B. Differentiate between ventilator breaths and spontaneous breaths as they relate to modes of mechanical ventilation
 - C. Produce graphic representations of different modes of mechanical ventilation
 - D. Describe controlled mandatory ventilation (CMV)
 - E. Differentiate between intermittent mandatory ventilation and synchronized intermittent mandatory ventilation
 - F. Describe assist control ventilation
 - G. Differentiate between pressure control and volume control ventilation
 - H. Describe pressure support mode (PSV)
 - I. Describe continuous positive airway pressure (CPAP) mode of ventilation
 - J. Describe between PSV and CPAP
- IV. Describe the difference between PEEP, CPAP, and PS
- A. Define positive end expiratory pressure
 - B. Explain indications for PEEP
 - C. Determine optimal PEEP
 - D. Describe hazards of PEEP
 - E. List contraindications for PEEP
 - F. Define CPAP
 - G. Explain indications for CPAP
 - H. Define pressure support
 - I. Explain indications for pressure support
- V. Define and discuss the relationship between inspiratory time, expiratory time, I:E ratio, rate, minute volume, and inspiratory flow rate
- A. Discuss the relationships between tidal volume, flow, and I:E ratio
 - B. Calculate all components needed to establish appropriate I:E ratio
 - C. Differentiate between various flow waveforms
 - D. Describe the correct setting of the sigh mechanism
 - E. List indications for initiating the sigh mechanism
- VI. Explain the importance of proper alarm settings
- A. Differentiate between input and output alarms
 - B. Identify the need for each alarm and state the normal ranges for each.
 - C. Troubleshoot activated alarms
- VII. Describe hazards and complications of mechanical ventilation
- A. Identify hazards related to positive pressure ventilation
 - B. Explain alteration of V/Q ratio by mechanical ventilation
 - C. Explain decreased venous return as it relates to central venous pressure
 - D. Identify pressures that may include barotrauma
 - E. Identify hazards related to the patient's condition
 - F. Identify hazards related to the ventilator and artificial airway
 - G. Identify hazards related to medical professionals
- VIII. Differentiate between compliance and resistance
- A. Define compliance
 - B. Describe how compliance will affect volume changes in the lung
 - C. Differentiate between static and dynamic compliance
 - D. Calculate dynamic and static compliance
 - E. List factors influencing compliance

- F. Identify disease processes in comparison to compliance changes
- G. Define and describe resistance
- H. Calculate airway resistance
- I. Identify disease processes in comparison to resistance changes
- IX. Student will utilize a systematic review of ventilator waveforms and their use in ventilator management and troubleshooting.
 - A. Identify all phases of a pressure-time waveform
 - B. Identify breath types that can be viewed with pressure-time waveforms
 - C. Assess plateau pressure, patient triggering and peak flow rate using pressure-time waveform
 - D. Identify all phases of a flow-time waveforms
 - E. Determine the presence of auto peep with the flow-time waveforms
 - F. Evaluate I-time with flow-time curves
 - G. Identify flow waveform shapes
 - H. Detect leaks with volume-time waveforms
 - I. Identify mandatory and spontaneous breaths with pressure-volume loops
 - J. Assess patient's work to trigger, changes in compliance and resistance, lung over-distention, and inflection points with pressure-volume loops
 - K. Evaluate the effect of bronchodilators using flow-volume loops
 - L. Determine the presence of secretions in the airway or water in the circuit using flow-volume loop
- X. Manage the patient-ventilator system by gathering data from physiologic measurements and general patient assessment
 - A. Recommend appropriate adjustments in ventilatory support settings, given ABG parameters
 - B. Describe when and how to conduct a comprehensive patient-ventilator system check
 - C. Interpret the meaning of common flow, volume, and pressure waveforms seen during mechanical ventilation
 - D. Given specific clues regarding abnormal patient ventilator function, identify the possible causes and potential corrective actions.
 - E. Outline the steps to be taken in managing sudden distress in a patient receiving ventilatory support
- XI. Demonstrate competence, care, and diligence in managing and monitoring the critical care patient
 - A. Identify factors contributing to ventilator dependence
 - B. Differentiate among preweaning, weaning, and extubation phases of ventilator withdrawal
 - C. Identify physiologic and psychological prerequisites for successful weaning and methods to achieve them
 - D. Identify criteria useful in determining when to extubate a patient after withdrawal of ventilatory support
- XII. Identify, initiate, manage and evaluate noninvasive ventilation
 - A. List and describe terms and acronyms associated with noninvasive ventilation
 - B. List and describe types, goals, indications and criteria for selection and exclusion for noninvasive ventilation

- C. Describe clinical applications for noninvasive ventilation
 - D. Describe advantages and disadvantages of noninvasive ventilation
 - E. Describe the troubleshooting associated with noninvasive ventilation and interfaces
- XIII. Demonstrate an understanding of the science of weaning and be able to identify different weaning techniques
- A. Identify factors contributing to ventilator dependence.
 - B. Differentiate among preweaning, weaning, and extubation phases of ventilator withdrawal
 - C. Identify physiologic and psychological prerequisites for successful weaning and methods to achieve them
 - D. Identify criteria useful in determining when to extubate a patient after withdrawal of ventilatory support

Evaluation of Students

A minimum of five (5) exams will be given and a comprehensive final (unless otherwise designated by the instructor). The final exam is 20% of the final grade. Weekly quizzes are 10% of the final grade. Test/exam questions will come from lecture, reading assignments and homework assignments. Most tests will be objective in nature. All students must take the final exam (failure to do so can result in the inability to proceed to the next semester within the program).

Attendance	10%
Exams	50%
Quizzes	10%
Assignments and Laboratory exercises	10%
Final Exam	20%

Student Contributions, Responsibilities and Class Policies:

Each student will spend at least 4 hours per week preparing for class. Attendance is critical in this class. The college attendance policy will be followed.

Class Policies

All classroom performance and behavior will be considered academic.

Advising

Any student that scores below a 70 on an exam is responsible for emailing the instructor and scheduling an advising session.

Make Up exam Policy

Any student that misses an exam/test or final, will receive a zero score (Any and all exam makeups are at the discretion of the instructor and the instructor may require documented reason for absence).

All personal communication devices are to be placed on silence/vibrate during class time. If you must answer your device, please leave the immediate area.

No personal communication devices allowed in testing areas.

Scholastic Dishonesty and Academic Misconduct

The Midland College Policy will be followed.

Evaluation of Students:

There will be 5 exams, quizzes, and laboratory exercises and competencies

Course Schedule:

This class meets for 4 lecture hours and 4 lab hours (Monday 9:00-11:00, Tuesday 9:00-11:00/
Lab Tuesday 12:00-3:50).

Division Information:

Division Chairman: Miranda Poage, PhD

Division Office Location and Telephone: 208, 685-4600

AMERICANS WITH DISABILITIES ACT (ADA) Statement:

Midland College provides services for students with disabilities through Student Services. In order to receive accommodations, students must visit www.midland.edu/accommodation and complete the Application for Accommodation Services located under the Apply for Accommodations tab. Services or accommodations are not automatic, each student must apply and be approved to receive them. All documentation submitted will be reviewed and a "Notice of Accommodations" letter will be sent to instructors outlining any reasonable accommodations.

NON-DISCRIMINATION STATEMENT:

Midland College does not discriminate on the basis of race, color, national origin, sex, disability or age in its program and activities. The following individuals have been designated to handle inquiries regarding the non-discrimination policies:

Tana Baker

Title IX Coordinator/Compliance Officer

3600 N. Garfield, SSC 131

Midland, TX 79705

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For further information on notice of non-discrimination, visit the ED.gov Office of Civil Rights website, or call 1 (800) 421-3481.