RSPT 2319

LAMAR INSTITUTE OF TECHNOLOGY

INSTRUCTOR CONTACT INFORMATION

Instructor: Stacy Taylor

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Office Location: Gateway Room 106

Office Hours: Office hours posted on door

CREDIT

3 Semester Credit Hours (2 hours lecture, 4 hours lab)

MODE OF INSTRUCTION

Face to Face

PREREQUISITE/CO-REQUISITE:

Pre-requisite: RSPT 1201, RSPT 1213, RSPT 1310, RSPT 1240, RSPT 1325, RSPT 1160, RSPT 2414, RSPT 1311, RSPT 1360, RSPT 1461, RSPT 2325, RSPT 2255, RSPT 2210, RSPT 2361

Co-requisite: RSPT 2147, RSPT 2362, RSPT 2230

COURSE DESCRIPTION

A study of mechanical ventilation for the neonatal and pediatric patient.

COURSE OBJECTIVES

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

1. Perform, analyze, and interpret the assessment of oxygenation and ventilation
2. Identify and discuss neonatal and pediatric diseases.
3. Describe the concepts of mechanical ventilation
4. Perform and describe the management of the patient-ventilator system
5. Identify common ventilators and monitors
6. Describe special procedures and nonconventional ventilator techniques.
7. Discuss and critically analyze cases scenarios

1. **Fetal Lung Development**
    a. List the five stages of fetal lung development and gestational age at which they occur.
    b. Explain the key steps of each stage of fetal development.

c. Identify the gestational age during which extrauterine viability occur and explain why it cannot, with current technology, occur earlier.
d. Identify several conditions that lead to abnormal lung development and injury.

2. **Fetal Gas Exchange and Circulation**
    a. Discuss the identifiable stages of heart development and explain the development of the heart chambers.
    b. Name the three fetal shunts and discuss their role during fetal circulation.
    c. Explain the direction of blood flow and relative vascular pressures in the placenta, umbilical vein, three fetal shunts, right-side heart chambers, left-side heart chambers, pulmonary artery, lungs, aorta, and umbilical arteries.
    d. Describe the cardiac and pulmonary sequences of events that occur when transitioning from fetal to extrauterine life, including the changes in fetal shunts.
3. **Antenatal Assessment and High-Risk Delivery**
    a. Identify various high-risk conditions that may adversely affect pregnancy outcome.
    b. Describe current methods used for antenatal and intrapartum assessment of fetal well-being.
    c. Explain preterm labor and post term pregnancy evaluation and management.
    d. Describe the current recommendations for assisting the newborn for intrauterine to extrauterine life.

4. **Examination and Assessment**
    a. List steps for initial stabilization of the newborn.
    b. Describe the Apgar scoring system and how and when it is performed on the newborn.
    c. List criteria for determining whether an infant is large for gestational age, appropriate for gestational age, or small for gestational age.
    d. List critical vital signs to be evaluated as part of the newborn's initial physical examination.
    e. Describe criteria for determining whether an infant is displaying apneic spells versus periodic breathing.
    f. Identify signs and symptoms of respiratory distress in the newborn.
    g. Describe the technique for rapid identification of a pneumothorax in a newborn.
    h. List the elements of a basic neurologic examination in the newborn.
5. **Radiographic Assessment of the Neonate**
    a. Understand the importance of patient positioning during radiograph acquisition**.**
    b. Understand how different densities appear on x-ray and what the silhouette effect is.
    c. Develop a systematic approach for the evaluation of a chest radiograph.
    d. Understand the appropriate location of support devices in neonates.

e. Understand the basic respiratory pathologies and complications seen in the NICU and their classic radiographic appearance.

6. **Invasive Blood Gas Analysis of the Neonate**
    a. Describe indications for obtaining blood gas samples in neonates.
    b. Identify common anatomic sampling sites used to obtain blood gases in neonates.
    c. Describe potential neonate and caregiver complications associated with blood gas sampling.
    d. Discuss various measurements that can be used to determine the adequacy of cellular oxygenation.
    e. Identify variables that can shift the oxygen dissociation curve.
7. **Noninvasive Monitoring in the Neonate**
    a. Describe the fundamental monitoring methods used to assess heart rate, respiratory rate, and blood pressure.
    b. Recognize the principles of operation of pulse oximetry.
    c. Describe proper placement of a pulse oximeter probe.
    d. Describe the difference between end-tidal CO2 monitoring and volumetric capnography.
    e. Explain the physiologic phenomenon responsible for a gradient between end-tidal and arterial CO2 measurements.
    f. Interpret specific abnormalities associated with capnograms.
    g. Explain the importance of proper transcutaneous site selection and application.
    h. List two problems associated with transcutaneous monitoring.
    i. State the objective of indirect calorimetry.
    j. Identify limitations of indirect calorimetry.
    k. Describe the general function of near-infrared spectroscopy and most common use in infants.
8. **Neonatal Pulmonary Disorders**
    a. Identify and differentiate the causes of neonatal respiratory distress and understand the underlying pathophysiology of each one.
    b. Discuss the factors in prenatal and postnatal life that may increase the risks for developing respiratory distress.
    c. Recognize the clinical features of common pulmonary disorders in neonates, differentiate among various diagnostic entities, and identify those that are life threatening.
    d. Describe the preventive and therapeutic approach for various forms of neonatal pulmonary diseases to optimize outcomes and minimize morbidity.
9. **Surgical Disorders in the Neonate that Affect Respiratory Care**
    a. Discuss the anatomy and pathophysiology of the various congenital anomalies and surgical conditions in newborns and infants that affect respiratory care.
    b. Recognize and manage an infant in respiratory distress resulting from choanal atresia or other upper airway anomalies.

c. Discuss the anatomy and pathophysiology of esophageal atresia with or without a tracheoesophageal fistula.
d. Recognize and manage the signs and symptoms of esophageal atresia with or without a tracheoesophageal fistula.
e. Discuss the embryology, anatomy, and pathophysiology of congenital diaphragmatic hernia.
f. Recognize and perform the steps related to immediate diaphragmatic hernia.
g. Discuss the anatomy, diagnosis, and management of an infant with congenital lung lesion, including congenital pulmonary airway malformations and sequestrations.
h. Discuss the embryology and management of abdominal wall defects (gastroschisis and omphalocele.

10. Congenital Cardiac Defects

a. Describe normal cardiac anatomy and blood flow in newborns.
b. Describe normal transition from intrauterine to extrauterine blood flow.
c. Define shunt and understand the different types of shunts seen with congenital heart disease.
d. Understand the basic classifications of congenital cardiac defects.
e. Explain the most common congenital cardiac defects.
f. Recognize the various factors affecting pulmonary vascular resistance.
g. Describe the importance of balancing pulmonary and systemic blood flow (Qp/Qs) associated with various defects.
h. Recommend ventilator strategies commonly used with various congenital cardiac defects.
i. Recommend and understand the limitations of various types of physiological monitoring necessary for the care of patients with congenital cardiac defects.

11. Surfactant Replacement Therapy

a. Explain how surfactant affects surface tension and improves lung function.
b. Identify disease processes associated with surfactant deficiency, dysfunction, or inactivation.
c. Discuss the delivery, benefits, and adverse effects of surfactant replacement.
d. Identify patients and disease processes that may benefit from surfactant replacement therapy.

12. Noninvasive Mechanical Ventilation and Continuous Positive Pressure of the Neonate.

a. Provide a brief history of the various methods used to generate continuous positive airway pressure (CPAP) in infants.
b. Describe the various physiologic effects of noninvasive mechanical ventilation (NIV).
c. Describe the indications and contraindications for CPAP and NIV.
d. Identify commonly used delivery systems and nasal interfaces for delivering NIV.

e. Discuss potential differences in the operation and patient response between gas delivery systems and NIV interfaces.
f. Determine various strategies used to manage patients receiving NIV and how these may impact outcomes.
g. Describe monitoring strategies for determining positive and negative responses to NIV.
h. Identify common complications and how they can be avoided when using NIV.
i. Review bedside care procedures performed by clinicians that contribute to the successful use of NIV in infants.
j. Describe various weaning strategies that have been used for withdrawing NIV in infants.
k. Describe when NIV may be beneficial.

13. Invasive Mechanical Ventilation of the Neonate

a. Explain when mechanical ventilation is indicated in neonates.
b. Describe the fundamentals of mechanical ventilator operation.
c. Identify complications associated with mechanical ventilation.
d. Explain various approaches for minimizing complication with ventilators.
e. Compare differences in operation between pressure, volume, and adaptive control breath types.
f. Provide reasons why one mode of ventilation would be chosen over another for certain conditions.
g. Determine initial ventilator settings for various patient sizes.
h. Recognize factors that could improve the interaction between patient and mechanical ventilator.
i. Define and discuss various weaning strategies.
j. Define conventional and high-frequency ventilation.
k. Describe how gas is delivered and exhaled during high-frequency jet ventilation.
l. Describe how gas is delivered and exhaled during high-frequency oscillatory ventilation.

14. Pediatric Airway Disorders and Parenchymal Lung Disease

a. Identify and name upper and lower airway disorders.
b. Recognize the signs of severe or complete airway obstructions requiring intervention.
c. Describe the basic intervention and recommended therapy for each of the airway disorders and parenchymal lung diseases.
d. Discuss the different types, and therefore the etiology, of pneumonia.

15. Asthma

a. Explain the pathophysiology of Asthma.
b. Treat asthma using an evidence-based approach
c. Identify the five components of asthma.
d. Explain how to improve the efficacy of the medications used to treat asthma.

16. Cystic Fibrosis

a. Describe how the diagnosis of cystic fibrosis is made.

b. Understand the pathophysiology of cystic fibrosis.
c. List the common pulmonary manifestations of cystic fibrosis.
d. List the common non-pulmonary manifestations of cystic fibrosis.
e. List the current treatments used to manage cystic fibrosis pulmonary disease.
f. Discuss new advances and the overall outlook for patients with cystic fibrosis.

17. Acute Respiratory Distress Syndrome

a. Define the criteria to diagnose acute respiratory distress syndrome.
b. Describe the pathologic stages of acute respiratory distress syndrome.
c. Describe the pathophysiology of acute respiratory distress syndrome.
d. Describe the role of brain-lung crosstalk.
e. Explain the clinical approach to the management of a patient with acute respiratory distress syndrome.
f. Apply appropriate ventilator strategies in conventional mechanical ventilation of patients with acute respiratory distress syndrome.
g. Outline adjunct therapies in the management of acute respiratory distress syndrome.
h. Understand the role of high-frequency ventilation and extracorporeal membrane oxygenation in the management of acute respiratory distress syndrome.

18. Invasive Mechanical Ventilation of the Child

a. Explain when mechanical ventilation is indicated in pediatric patients
b. Describe the fundamentals of mechanical ventilator operation.
c. Describe and execute the management of patients undergoing mechanical ventilation.
d. Identify complications associated with mechanical ventilation.
e. Explain various approaches for minimizing complications with ventilators.
f. Determine initial ventilator settings for various patient sizes.
g. Recognize factors that could improve the interaction between the patient and the mechanical ventilator.
h. Identify mechanical ventilation strategies for a given pathophysiology.

19. Oxygen Administration

a. Discuss causes, clinical signs and symptoms, and evidence of hypoxemia.
b. Identify adverse physiologic effects and equipment-related complications associated with oxygen administration to neonates, infants, and children.
c. Differentiate between variable-performance and fixed-performance oxygen delivery systems and provide examples of each.
d. Discuss the indications and contraindications for use of oxygen delivery devices in neonatal and pediatric populations.
e. Describe the methods used to apply devices to deliver oxygen to neonates, infants, and children.

20. Aerosols and Administration of Inhaled Medications

a. Describe the impact of differences in patient size and age on aerosol delivery.

b. Understand the basic operating mechanisms of nebulizers, pressurized metered-dose inhalers, and dry powder inhalers.
c. Select the best device for a pediatric patient for specific clinical applications.
d. Select the best interface for infants and pediatrics.
e. Initiate and modify aerosol therapy in children.
f. Discuss the range of medications available for administration via aerosol.

21. Airway Clearance Techniques and Hyperinflation Therapy

a. Explain the indications and risks of airway clearance techniques.
b. Apply the various techniques of airway clearance.
c. Understand how to avoid complications associated with airway clearance techniques.
d. Understand the role of hyperinflation therapy and its relationship to proper airway clearance.

22. Airway Management

a. Identify indications for intubation.
b. Explain how to perform orotracheal intubation.
c. Explain how to perform nasotracheal intubation.
d. Select the correct sized endotracheal tube for patients of different ages.
e. Describe the complications of intubation.
f. Explain the criteria for extubation.
g. Appraise the reasons for failed extubation and treatment strategies.
h. List the indications for tracheostomy.
i. Describe the major complications of tracheostomy.
j. List the criteria for decannulation.
k. Describe the setup and list the equipment needed for tracheostomy tube changes.

23. Administration of Gas Mixture

a. Identify the basic chemical properties of nitric oxide.
b. Describe the process of smooth muscle contraction and relaxation.
c. Differentiate between intravenous vasodilators (such as nitroprusside or prostaglandin E) and inhaled nitric oxide regarding ventilation-perfusion matching and shunt.
d. Identify the potential side effects of inhaled nitric oxide.
e. Describe the beneficial properties of helium with used medically.
f. Describe how heliox affects nebulizers, flow meters, and mechanical ventilators.
g. List the inhaled anesthetic agents commonly used to treat status asthmaticus.
h. List the physiologic effects of inhaled anesthetic agents.

24. Pharmacology

a. Identify pharmacokinetic parameters that differ between pediatric and adult patients.
b. Discuss the place in therapy of B2-adrenergic agonists in the treatment of asthma, chronic obstructive pulmonary disease (COPD), and exercise-induced bronchospasms.

c. Identify potential adverse effects observed with the use of inhaled short-acting B2-adrenergic agonists.
d. Explain administration issues with inhalation of corticosteroids.
e. Discuss the place in therapy of the leukotriene modifiers.
f. Discuss the mechanism of action of the mucolytic agents.
g. Discuss the place in therapy of antiviral and immunomodulatory agents commonly used in the treatment of pediatric viral infections.
h. Discuss the place in therapy of aerosolized antimicrobials used in the treatment of infectious respiratory diseases.

REQUIRED TEXTBOOK AND MATERIALS
Neonatal and Pediatric Respiratory Care by Brian Walsh, 6th edition
ISBN 978-0-323-79309-4
Mechanical Ventilation Physiological and Clinical Applications by Jim Cairo
ISBN 978-0-323-55127-4
Workbook for Mechanical Ventilation Physiological and Clinical Applications by Jim Cairo
ISBN 978-0-323-55126-7

ATTENDANCE POLICY
Attendance – If you do not attend class you are missing some very valuable information. Test will include both textbook material and anything mentioned in class.

Homework Assignments –Please turn in homework assignments at the start of the next class meeting. NO LATE WORK ACCEPTED!!!! If you have an excused absence you may e-mail your work to me before the class starts. If the absence is not excused you will receive a zero.

Absences – Attendance is expected. Students are allowed **2 absences per semester**, with or without a Dr.'s excuse. Each absence in excess of the 2 allowable absences will result in a 10% reduction, per absence, in the student's final class grade. Example: 3 total absences (2 allowed + 1 excessive) = 10% reduction in final class grade, 4 absences = 20% reduction in final class grade, etc. Deductions as a result of excessive absences, will be applied to the student's final class grade at the end of the semester. If absences (whether approved or not) seriously interfere with student performance, the instructor may recommend to the Department Chair that the student be dropped from the course.
Students are to follow the absenteeism policy for each course. If the policy is not followed the student may be cited with a Level I or Level II offense, as defined in the Code of Conduct and Disciplinary Policy.
Absences in lab will result in a grade of 0 for that lab day.

Make-up Exam - You may make-up an exam only if the absence is excused by the instructor. The make-up exam will be taken on the next class day that you return. YOU MUST CALL IN PRIOR TO THE EXAM. IF YOU DO NOT CALL IN PRIOR TO EXAM YOU WILL RECEIVE A 0 FOR YOUR EXAM GRADE.

Class Roll – will be taken on the first and fourth class days. If your name is not on the class roster on the fourth class day, you will be asked to leave class until this matter is taken care of. **NO EATING, NO DRINKING, TURN OFF BEEPERS, TURN OFF CELL PHONES, NO DISRUPTIVE BEHAVIOUR, AND NO CHILDREN ALLOWED IN CLASS PLEASE!**

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)
	Schedule Tentive		
1 Jan 20-23	Fetal Lung Development Fetal Gas Exchange and Circulation	*Chapter 1 and 2*	
2 Jan 26-30	Antenatal Assessment and High-Risk Delivery **Exam 1 (Ch 1-3) 01/29**	*Chapter 2 and 3*	
3 Feb 2-6	Examination and Assessment Radiographic Assessment of the Neonate	*Chapter 5 and 6*	
4 Feb 9-13	Invasive Blood Gas Analysis of the Neonate Non-invasive Monitoring in Neonatal Care	Chapter 7 and 8	
5	**Exam 2 (Ch 5-8) Feb 19**	*Ch 9 and 10*	

Feb 16-20	Neonatal Pulmonary Disorders Surgical Disorders in the Neonate that Affect Respiratory Care		
6 Feb 23-27	Congenital Cardiac Defects **NRP (TBD)**	*Chapter 11*	
7 March 2-6	**Exam 3 (9-11) March 5** Surfactant Replacement Therapy	*Chapter 12*	
March 9-13	**Spring Break**		
8 March 16-19	Non-invasive Mechanical Ventilation and Continuous Positive Pressure of the Neonate	*Chapter 13*	
9 March 23-27	Invasive Mechanical Ventilation of the Neonate Invasive Mechanical Ventilation of the Child	*Ch 14 and 32*	
10 March 30-April 2	**Exam 4 (12-14, 32) April 2** Pediatric Airway Disorders and Parenchymal Lung Disease	*Chapter 23*	
11 April 6-10	4/7 One Vision Seminar 4/8 One Vision Seminar 4/9-Asthma	*Chapter 24*	
12 April 13-17	Cystic Fibrosis Acute Respiratory Distress Syndrome	*Chapter 25 and 26*	
13 April 20-24	**Exam 5 (23-26**) April 21 Oxygen Administration Aerosols and Administration of Inhaled Medications	*Chapter 33 and 34*	
14	Airway Clearance Techniques and Hyperinflation Therapy Airway Management	*Chapter 35 and 36* *Competencies*	
15 May 4-8	Review/Projects Administration of Gas Mixtures Pharmacology **Exam 6 (33-37, 39) May 7**	*Competencies* *Chapter 37 and 39*	

16 May 11-13	**Projects/Competencies Final**	*Competencies*	
5/19	Graduation	*TBD*	

COURSE EVALUATION

Final grades will be calculated according to the following criteria:

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Exam 5-7 60%

*Quizzes Daily pop quizs will be given at the start of class. If you are late for class this pop quiz will not be made up. The average of the daily pop quiz grades will count as 1 exam. You may drop 2 daily pop quiz grades prior to average.

Project	20%
Lab	20%
Total	100%

**Neonatal Resuscitation Provider Certification Course must be obtained and passed to pass this class, FAIL NPR fail class.

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GRADING SCALE

A = 90 – 100 %
B = 80 - 89 %
C = 77 - 79 %
D = 68 - 76%
F = 67 and below

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. You may also visit the online resource at 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. 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

Cellphone Policy

- Cell phones must be silenced or turned off during class time.
- Cell phones will be placed in the appointed cell phone pocket hanger.
- Attendance will be taken from the cell phone hanger with assigned names.
- Any cell phone use in class will result in your dismissal from class.
- If cell phones are used during an exam, you will be dismissed from the Respiratory Care Program.
- Computer usage not relating to course content is prohibited and will result in your dismissal from the Respiratory Care Program.

ARTIFICIAL INTELLIGENCE STATEMENT

Lamar Institute of Technology (LIT) recognizes the recent advances in Artificial Intelligence (AI), such as ChatGPT, have changed the landscape of many career disciplines and will impact many students in and out of the classroom. To prepare students for their selected careers, LIT desires to guide students in the ethical use of these technologies and incorporate AI into classroom instruction and assignments appropriately. Appropriate use of these technologies is at the discretion of the instructor. Students are reminded that all submitted work must be their own original work unless otherwise specified. Students should contact their instructor with any questions as to the acceptable use of AI/ChatGPT in their courses.