



**INSTRUCTOR CONTACT INFORMATION**

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**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. Embryological Development of the Cardiopulmonary System**

Development and Care Of The Fetus: Conception to Birth

The student will be able to:

- a. Describe the embryology of the morula, blastocyst, blastoderm, and trophoblast.

- b. Identify the three germ layers and body structures that evolve from each.
- c. Describe the development of the placenta and umbilical cord and identify the major anatomical structures of each.
- d. Explain the function of amniotic fluid and define:
  - 1. Polyhydramnios
  - 2. Oligohydramnios
- e. Identify the five periods of embryonic lung growth and describe the features of each period.
- f. Define surface tension and describe the following:
  - 1. How it is developed
  - 2. Laplace's Law
  - 3. Application to alveolar mechanics
- g. With regard to surfactant, describe the following:
  - 1. Function and purpose
  - 2. The approximate gestational age at which immature and mature surfactant appears.
  - 3. Components and methods to detect its presence
  - 4. How lung maturity is determined
- h. Regarding fetal lung fluid, describe the following:
  - 1. Composition
  - 2. Function
  - 3. The hazards of lung fluid retention
- i. Describe the embryologic development of the heart including:
  - 1. Development of the cardiac chambers
  - 2. Formation of major vessels and cardiac valves

## 2. Assessment of Fetal Growth and Development

- a. Describe at least three ways ultrasonography is used to assess fetal age.
- b. Define amniocentesis and describe the role of each of the following:
  - 1. L/S ratio
  - 2. Determination of alpha-fetoprotein
  - 3. Bilirubin level
  - 4. Creatinine level
  - 5. Identification of meconium staining
  - 6. Cytologic examination of cells
- c. Describe the different methods of measuring fetal heart rate (FHR)
- d. Describe the cause and/or characteristics of the following:
  - 1. Baseline heart rate
  - 2. Beat-to-beat variability
  - 3. Bradycardia
  - 4. Tachycardia
  - 5. Accelerations
  - 6. Decelerations
- e. Explain how the fetal scalp pH is used to assess fetal asphyxia.
- f. List and describe the five methods used to estimate the date of delivery.

- g. Compare and contrast the contraction stress test (CST) and the non-stress test (NST). Describe how each test is performed , as well as their advantages and disadvantages.
- h. Describe the use of vibroacoustic stimulation , fetal movements, and amniotic fluid volume as methods of assessing fetal well- being.
- i. Describe the five tests used in the biophysical profile and how each is scored.
- j. Explain the implications of meconium-stained amniotic fluid in assessing fetal status.
- k. Describe chorionic villus sampling, cordocentesis, and MRI in assessing fetal status.
- l. Compare and contrast material estriol determination and human placental lactogen(HPL) levels as to their roles in determining fetal status.
- m. Identify and list at least five factors they indicate a high- risk pregnancy.

### **3. Labor , Delivery, and Physiologic Changes after birth**

- a. List the five events that make up the birth process.
- b. Compare and contrast cervical dilation and effacement
- c. Identify the most common presentation.
- d. Define station and how it is expressed.
- e. Describe the sequence of events that lead to the descent and delivery of the fetus.
- f. Define tocolysis and describe the various methods used to achieve tocolysis.
- g. Define dystocia and describe the three etologic factors that cause it.
- h. Describe each of the following:
  - 1. Complete breech
  - 2. Incomplete breech
  - 3. Frank breech
  - 4. Face presentation
  - 5. Transverse lie
  - 6. Prolapse of umbilical cord and occult cord compression
- i. Identify and describe the three types of placenta Previa.
- j. Describe the three categories of abruptio placentae.
- k. List the indications for a cesarean birth
- l. Explain why multiple gestations create high-risk pregnancies.
- m. List factors that are responsible for the first breath.
- n. Describe the importance of overcoming surface forces in adapting to extra uterine life.

### **4. Techniques of Resuscitation and Stabilization of the Neonatal Patient**

- a. List the four factors that can lead to asphyxia.
- b. Compare and contrast primary to secondary apnea.
- c. Describe the cardiovascular events that occur during periods of intrauterine asphyxia.

- d. Discuss the effects of asphyxia on the lungs.
- e. List and describe three factors that provide proper preparation for neonatal resuscitation
- f. Describe and discuss each step in the neonatal resuscitation process.
- g. Describe each of the following skills as it relates to neonatal resuscitation:
  1. Thermoregulation
  2. Opening the airway
  3. Evaluation of respirations
  4. Evaluation of heart rate
  5. Evaluate color
  6. Positive pressure ventilation (PPV)
  7. Reevaluation
  8. Chest compressions
  9. Intubation
  10. Delivery of medications
- h. List the drugs used during neonatal resuscitation. Include correct concentration used, dosages, and routes of administration.
- i. Assign an appropriate APGAR score when provided with patient data.
- j. Describe the sources of fetal and neonatal glucose.
- k. List the serum glucose values that indicate hypoglycemia. Include a description of the clinical signs.
- l. List and describe the cause of hypoglycemia, techniques used to measure glucose, and the treatment for hypoglycemia
- m. Describe the procedure for obtaining arterial blood from the umbilical stump.
- n. Discuss the indications , procedure for placement, and complication of a umbilical artery catheter(UAC)
- o. Define the mnemonic S.T.A.B.L.E., and describe the purpose and function of the training.

### **5. Assessment of the Neonatal and Infant Patient**

- a. State at least 10 anatomic and physiologic differences between the infant and adult.
- b. Given a patient's obstetrical history (PARA), identify the following: previous pregnancies, miscarriages, premature births, and living children.
- c. Identify the physical and neurologic signs examined in the Dubowitz and the Ballard Gestational Age Assessments.
- d. Compare and contrast the Dubowitz and Ballard Gestational Age Assessments.
- e. Describe seven physical signs that are used to determine gestational age and relate findings of each to varying gestational ages.
- f. List five purposes of the neonatal physical examination.
- g. Describe each of the following as it pertains to the physical examination. Include a description of the unique aspects of each examination.  
Quiet examination

Hands on examination  
Neurologic examination

- h. List four indications for performing pulmonary function tests on neonatal patients.
- i. Describe two methods used to measure compliance and resistance, and two methods used to measure expiratory flows in the neonatal patient.
- j. Briefly describe the use of helium dilution, nitrogen washout, and body plethysmography in assessing lung volumes.
- k. When shown a volume-pressure loop, determine whether it is normal, or whether it demonstrates abnormal compliance or resistance.

## 6. **Continuing Care of the Neonate**

- a. Explain the physiology of thermoregulation, including a description of the thermoneutral zone and nonshivering thermogenesis.
- b. Define the internal thermal gradient (ITG) and describe the reasons why a preemie has a decreased ability to maintain it ITG.
- c. Describe each of the following as it relates to the external thermal gradient (ETG). Include examples for each type of heat loss and a description of how each method of heat loss can be prevented or reduced I the nursery.
  - Radiant
  - Conductive
  - Convective
  - Evaporative
- d. Describe how a neonate reacts to sold stress and to hyperthermia.
- e. Discuss thermoregulation of the neonate in the delivery room and nursery, including methods of heat loss prevention.
- f. Compare and contrast incubators and open warmers, focusing on the advantages, disadvantages, and thermoregulation in each.
- j. Explain the physiologic effects of overstimulation of the premature neonate.
- k. Identify and describe those factors involved in behavioral-based care.
- l. Describe the use of environmental controls and parental involvement in reducing overstimulation and increasing more normal interactions and relationships.
- m. Describe the physiologic factors that make the skin of the preemie more susceptible to trauma.
- n. Discuss those factors that will reduce skin trauma on the neonate.
- o. Describe the distribution of body water and its solutes. Compare and contrast the percentage of extracellular fluid (ECF) and intracellular fluid (ICF) between the preemie and the term neonate.

## 7. **Perinatal Lung Disease and Other Problems of Prematurity**

- a. Describe each of the following as it relates to respiratory distress syndrome (RDS)
  - Etiology

Pathophysiology

Clinical Signs

Treatment

Complications

- b. Describe the pathophysiology, diagnosis, and treatment of bronchopulmonary.
- c. Discuss the pathophysiology, clinical signs, and the treatment of pulmonary dysmaturity (Wilson-Mikity Syndrome).
- d. Summarize the stages of eye development in the fetus.
- e. Identify and describe the factors that lead to retinopathy of prematurity (ROP), developing ocular membranes in the newborn.
- f. Compare and contrast the pathophysiology and complications of intracranial and intraventricular hemorrhages.
- g. Identify and describe the four stages of intraventricular hemorrhage.
- h. Define asphyxia and identify its incidences in neonates.
- i. Describe the pathophysiologic changes that occur with asphyxia, its consequences, and treatment.
- j. Identify the cause of meconium release in utero and describe the diagnosis, pathophysiology, and treatment of meconium aspiration.
- k. Relate the diagnosis and treatment of a pneumothorax in contrast to a pneumomediastinum and pneumopericardium.
- l. Describe the pathophysiology and treatment of pulmonary interstitial emphysema.
- m. Identify the factors that lead to pulmonary air embolism and subcutaneous air leaks.
- n. Describe the etiology, diagnosis, and treatment of persistent pulmonary hypertension of the newborn (PPHN).
- o. Identify and discuss several factors responsible for the onset of transient tachypnea of the newborn (TTN).
- p. Compare and contrast central and obstructive apnea with regard to causes and treatments.

## **8. Causes of Persistent Perinatal Illness**

- a. Explain how infections are acquired by the fetus and neonate.
- b. Identify the organisms in the TORCH acronym.
- c. Define chorioamnionitis and discuss the role of Group B strep in perinatal illness.
- d. Describe the three stages of HIV and its pathophysiology.
- e. Describe the following tests used to diagnose HIV: western blot, ELISA, PCR, P24 antigen, and HIV culture. For each list at least one advantage and disadvantage.
- f. Briefly describe the following HIV medications and their mechanism of action in inhibiting HIV: Fusion inhibitors, NNRTI's, NRTI's, and protease inhibitors.
- g. Describe the postpartum care of the neonate exposed to HIV.

- h. Identify the effects of cytomegalovirus, rubella, herpes simplex, and toxoplasmosis on the developing fetus.
- i. Discuss each of the following as it relates to standard precautions and infection control:
  - Hand hygiene,
  - Use of personal protective equipment,
  - Safe injection practices,
  - Safe handling of potentially contaminated equipment or surfaces in the patient environment, and
  - Respiratory hygiene/cough etiquette
- j. Describe the role of each of the following antibodies:
  - IgA
  - IgD
  - IgE
  - IgG
  - IgM
- k. Describe the pathophysiology. Diagnosis, and treatment of the following:
  - Tracheoesophageal
  - Choanal atresia
  - Micrognathia (Pierre-Robin sequence)
- l. For each of the following cardiac anomalies, identify the defect from an artist's rendering and describe the diagnosis treatment:
  - Patent ductus arteriosus
  - Atrial septal defect
  - Ventricular septal defect
  - Tetralogy of Fallot
  - Complete transposition of the great vessels
  - Subaortic stenosis
  - Coarctation of the aorta
  - Tricuspid atresia
  - Anomalous venous return
  - Truncus arteriosus
  - Hypoplastic left heart syndrome
- m. Describe the respiratory care of a neonatal patient with any of the above anomalies.

### **9. Pediatric Diseases Requiring Respiratory**

- a. Describe the steps in pediatric advanced life support (PALS) for each of the following scenarios:
  - Pulseless arrest
  - Bradycardia
  - Tachycardia
- b. Describe the anatomic and physiologic differences between an adult and child and discuss how they relate to trauma care.

- c. List and describe each of the steps involved in the primary survey.
- d. When given patient responses, determine an appropriate Glasgow Coma Score.
- e. Describe the secondary survey and the purpose of each step.
- f. Regarding shock, describe each of the following:  
 Pathophysiology  
 Types  
 Treatment
- g. Define near drowning and describe its pathophysiology and initial respiratory management.
- h. Compare and contrast epiglottitis and croup with regard to their presentation and treatment.
- i. Describe the factors that make children prone to foreign body aspiration.
- j. Describe the diagnosis and treatment of hydrocarbon aspiration.
- k. Regarding the inhalation of smoke and chlorine, describe the diagnosis, monitoring, and treatment of each.
- l. Compare and contrast first, second, and third degree burns.
- m. When provided with area on a child's body that are burned, calculate the amount of body surface area involved.
- n. Describe the evaluation and management of the burn patient.
- o. Using parkland formula, calculate the amount of fluid resuscitation when given the patient weight of the surface area burned.
- p. Describe the etiology and treatment of neck injuries in the pediatric population.
- q. When given a diagram of a cross section of the skull, the student will label anatomical landmarks.
- r. Discuss and describe the pathophysiology of primary and secondary head injury.
- s. Compare and contrast epidural hematoma and subdural hematoma regarding causes, signs, and symptoms.
- t. Describe the goals of treatment of head injury and identify the specific strategies to achieve those goals.
- u. Identify the four factors that have been identified that elevate the risk of sudden infant death syndrome (SIDS) in the prone position.
- v. Describe the management of poisoning in the pediatric patient.
- w. Describe anaphylaxis and discuss common causes and treatment.

## **10. Assessment of the Pediatric Patient**

- a. List at least seven anatomic and physiologic differences between a pediatric patient and an adult.
- b. Describe the terms "chief complaint" and "differential diagnosis" and how they are used to arrive at a diagnosis.
- c. Define and describe a "well-child" visit and how it differs from an ill-child visit.
- d. Describe the steps taking a history during a well-child visit and ill-child visit.



- e. Explain the general concepts of physical examination in pediatric patients.
- f. When given appropriate data, calculate a patient's status using an appropriate growth chart.
- g. Discuss and describe strategies used during the physical examination of an infant and child that will help make the encounter safe and less stressful for the patient.
- h. Describe how to perform a general assessment on a pediatric patient.
- i. Describe and explain the performance of a head-to-toe examination patient.
- j. List three goals to be achieved when examining the pediatric pulmonary system. Include a description of how each goal is assessed.
- k. Define the term "anticipatory guidance" and list resources that are available to help in education of parents.
- l. List the indications and the contraindications for performing a pulmonary function (PFT) on a pediatric patient.
- m. Describe the special requirements needed when assessing pulmonary function on the pediatric patient

#### **11. Continuing Care of the Pediatric Patient**

- a. Describe the rationale for screening pediatric patient for hypertension.
- b. Using Tanner maturity scale, estimate the level of sexual maturity of a patient when given the physical characteristics.
- c. List typical screening test used in the pediatric population.
- d. Describe the reason for nutritional deficiencies in pediatric and adolescent patients.
- e. Compare and contrast each of the following:  
Autistic disorder  
Asperger syndrome  
Pervasive developed disorder
- f. Identify and describe the three types of attention deficit/hyperactivity disorder (ADHD)
- g. Use the Pediatric Symptoms Checklist to identify behavioral emotional problems in school-aged children.
- h. Identify the recommended vaccines for ages 0-18.
- i. Identify common sleep interrupters.
- j. Describe the physical causes of obstructive sleep apnea.
- k. Describe the signs of oppositional defiant disorder and conduct disorder.
- l. Compare and contrast anorexia nervosa and bulimia.
- m. List the symptoms of eating disorders in adolescents.
- n. Identify a febrile infant at low-risk for serious bacterial infection using Rochester Criteria.
- o. List the complications of acute otitis media (AOM)

#### **12. Pediatric Diseases Requiring Respiratory Care**

- a. Describe the characteristic sign and symptoms, disease pathophysiology, and treatment of following disorders:

- Acute respiratory distress syndrome (ARDS)
- Asthma
- Cystic fibrosis
- b. Compare and contrast progressive spinal muscular atrophy of infants (Werdnig-Hoffman paralysis), juvenile spinal muscle atrophy (Kugelberg-Welander disease), and muscular dystrophy.
- c. Identify the causative organisms, accompanying signs of the disorder, and treatment of the following:
  - Gullian-Barre syndrome
  - Tetanus
  - Botulism
- d. Describe the common etiology and diagnosis of myasthenia gravis.
- e. Identify and explain the manifestations of Reye's syndrome.
- f. Describe, for each of the following infectious diseases, the causative organisms, symptoms, diagnosis, and treatment of: Pneumonia  
Bronchiolitis

### **13. Respiratory Care Procedures**

- a. Discuss the indications for and hazards of oxygen therapy.
- b. Describe, for each of the following, its role in oxygen delivery:
  - Oxygen blenders and flowmeters
  - Oxygen analyzers
- c. Compare and contrast bubble and wick humidifiers.
- d. Describe the indicators, hazards, and approximate FO<sub>2</sub> for each of the following:
  - Oxygen hood
  - Oxygen cannula
  - High-flow nasal cannula (HFNC)
  - Simple oxygen mask
  - Nonrebreathing mask
  - Venturi mask
  - Tent
  - Incubator
  - Resuscitation bags.
- e. List the indications for airway clearance
- f. List the contraindicators of airway clearance techniques:
  - Positive expiratory pressure (PEP)
  - Forced exhalation technique (FET)
  - Autogeneic drainage
  - High-frequency chest compression
  - Flutter valve therapy
- g. Describe the procedure for performing CPT including:
  - Auscultation
  - Postural drainage
  - Percussion
  - Vibration
  - Removal of secretions

- h. Review the indicators for and hazards of suctioning and the equipment when the patient's clinical signs indicate.
- i. Discuss the following as they apply the aerosol delivery:
  - Particle amount
  - Particle size
  - Particle characteristics
  - Airway anatomy
  - Ventilatory pattern
- j. Discuss the advantages and disadvantages of each of the following:
  - Small volume nebulizer (SVN)
  - Metered dose inhaler (MDI)
  - MDI spacer
  - Dry power inhaler (DPI)
  - Ultrasonic nebulizer
  - Continuous nebulizer
- k. List the indications for aerosolized drug therapy
- l. Describe the equipment used to deliver aerosolized medications. Compare and contrast updraft nebulizers to mainstream nebulizers.
- m. Discuss the procedure for placement of a medication nebulizer inline to a ventilator circuit.
- n. List and describe the hazards of aerosolized medications.
- o. Explain the techniques used to prevent ventilator malfunction when aerosolizing ribavirin into a ventilator circuit.

#### **14. Pharmacology**

- a. List and discuss the physiologic factors and mechanisms of drug transfer across the placenta.
- b. Define a teratogenic substance and describe its actions on the fetus.
- c. Discuss each of the following as it relates to neonatal pharmacokinetics. Include a description of the routes of absorption and the methods of distribution.
  - Absorption
  - Distribution
  - Metabolism
  - Excretion
- d. Briefly describe how antibiotics work against bacteria, fungi, and viruses.
- e. List the nine categories of antibiotics and at least one antibiotic from each category.
- f. For each of the following cardiovascular conditions, describe at least one drug that is used in its treatment:
  - Congestive Heart Failure
  - Closure of the ductus arteriosus
  - Pulmonary Hypertension
  - Hypotension
  - Edema

- g. List at least one drug from each of the following categories of respiratory medications. For each drug listed, describe briefly its indications and dosage:
  - Sympathomimetic
  - Parasympatholytic
  - Steroid
  - Antiviral
  - Mucolytic
- h. Describe at least one drug from each of the following categories. Include the indications and adverse effects:
  - Anticonvulsant
  - Steroid
  - Sedative
  - Paralytic
- i. Describe the effects of maternal drug abuse on the fetus.

### **15. Assessment of Oxygenation and Ventilation**

- a. For each of the following, describe how it is used in the assessment of oxygenation and ventilation:
  - Respiratory Rate
  - Patient color
  - Work of breathing
  - Breath sounds
  - Tactile fremitus
- b. List the indications for obtaining an arterial or capillary blood gas sample in neonatal and pediatric patients.
- c. Identify the methods of obtaining blood samples for analysis, and describe why the UAC is the preferred blood sampling site.
- d. Identify arterial sampling sites that are pre- and postductal, and describe how a right-to-left shunt through the ductus arteriosus can be detected using blood gas PaO<sub>2</sub>, transcutaneous monitors, and/or pulse oximetry.
- e. Identify the hazards and contraindications associated with each of the blood gas sampling methods.
- f. Define “normal” and “safe” levels of PaO<sub>2</sub>, PaCO<sub>2</sub>, pH, base excess, and HCO<sub>3</sub>. Describe why values in the midrange are desirable.
- g. Compare total blood oxygen to PaO<sub>2</sub>.
- h. Describe the limitations of PaO<sub>2</sub>.
- i. Identify and discuss the determinants of PaCO<sub>2</sub>.
- j. Define pH and using the Henderson-Hasselbalch equation, describe the relationship between CO<sub>2</sub> and HCO<sub>3</sub> in maintaining proper pH.

### **16. Interpretation of Chest X-Rays**

- a. Explain why x-rays alone cannot be used for a differential diagnosis
- b. Describe the basic mechanics of how an x-ray is taken.
- c. List and describe the four densities found on an x-ray.
- d. Discuss the diagnostic usefulness and limitations of x-ray.
- e. Describe how each of the following are determined when interpreting a chest x-ray.

- Patient identification
- Orientation of the x-ray
- Quality of the x-ray
- Patient position
- Determination of inspiration or expiration
- Proper heart size
- Proper position of the umbilical artery and vein catheter
- Congestive heart failure and right-to-left shunting
- Proper position of the endotracheal tube
- f. Describe the cause and appearance of air bronchograms.
- g. Describe the appearance of the following neonatal disorders on a chest x-ray:
  - Respiratory distress syndrome
  - Atelectasis
  - Transient tachypnea of the newborn
  - Pneumonia
  - Meconium aspiration syndrome
  - Diaphragmatic hernia
  - Congenital lobar emphysema
  - Pneumothorax
  - Pneumomediastinum
  - Pneumopericardium
  - Pulmonary interstitial emphysema (PIE)
  - Bronchopulmonary dysplasia
- h. Describe the radiographic appearance of the following pediatric disorders:
  - Adult respiratory distress syndrome (ARDS)
  - Foreign body aspiration
  - Cystic fibrosis
  - Asthma
  - Epiglottitis
  - Croup

### **17. Concepts of Mechanical Ventilation**

- a. Describe the primary goal of mechanical ventilation and the skills required to reverse respiratory failure.
- b. Define each of the following terms. Include a description of how each is determined and the ventilator parameters that determine each one.
  - Peak inspiratory pressure (PIP)
  - Positive end-expiratory pressure (PEEP)
  - Frequency or rate
  - Inspiratory time (IT)
  - Mean airway pressure (MAP)
  - Tidal Volume ( $V_t$ )
  - Minute ventilation (VE)
  - Deadspace (VD)
  - Alveolar ventilation
  - Opening pressure
  - Driving pressure

Functional residual capacity (FRC)

Diffusion time

Flow Rate

- c. Discuss the relationships that exist between ventilator parameters, using Figure 17-12 as a guide.
- d. Define compliance and describe how lung compliance is measured.
- e. Compare and contrast static and dynamic lung compliance.
- f. State the normal range of lung compliance values in the neonate.
- g. Describe the determinants of pulmonary compliance.
- h. Discuss the compliance of the thorax and how it is developed.
- i. Describe the relationship between the lungs and thorax that determines the overall compliance.
- j. Compare and contrast the three positions on the lung compliance curve. Describe conditions that create each position.
- k. Identify and discuss several lung disorders that alter lung compliance.
- l. List the four factors that create resistance and identify the factor that is responsible for airway resistance changes.
- m. State range of airway resistance in the normal newborn and how it is measured.
- n. List and describe three factors that increase resistance in the neonatal airway and how each can be countered.
- o. Define a time constant. Discuss the significance of three time constants and expiratory time.
- p. When given compliance and resistance values, calculate a minimal expiratory time needed.
- q. Describe how changes in resistance and compliance change time constants.

### **18. Management of the Patient-Ventilator System**

- a. List and describe several indications for mechanical ventilator support of the neonate and child.
- b. Compare and contrast partial ventilator support and full ventilator support.
- c. Describe how the following initial ventilator parameters are determined: ventilator mode, peak inspiratory pressure, set rate, sensitivity, PEEP, FiO<sub>2</sub>, inspiratory flow rate, inspiratory time, I:E ratio, and/or tidal volume.
- d. Describe volume-control versus pressure-controlled ventilation.
- e. Describe how changes are made in ventilator settings based on arterial blood gases and clinical assessment and evaluation.
- f. Discuss several hazards/complications of mechanical ventilation.
- g. Discuss weaning procedures and extubation strategies to remove the neonatal and pediatric patient from mechanical ventilation.
- h. Discuss indications/considerations for early extubation of the neonatal and pediatric patient.

### **19. Common Infant and Pediatric Ventilators**

- a. Identify and discuss, each of the following ventilators, modes, capabilities and monitoring options:
  - Bio-Med CV-2I
  - Carefusion 3100A
  - Carefusion AVEA
  - Drager Babylog 8000 plus
  - Drager Evita XL
  - Hamilton Galileo
  - Maquet Servo-i
  - Newport HT70 Plus
  - Puritan Bennett 840
  - Sechrist Millennium

**20. Special Procedures and Nonconventional Ventilatory Techniques**

- a. Describe each of the following, as they relate to surfactant replacement therapy.
  - Patient History
  - Indications
  - Administration techniques
  - Outcomes
- b. Identify the major advantage of HFV
- c. Describe, for each of the three types of HFV, the following:
  - Rates of ventilation
  - Indications
  - Clinical uses
  - Hazards
- d. Explain why a conventional ventilator is used in conjunction with HFJV and HFO.
- e. Describe the mechanisms of action of inhaled nitric oxide and its role in treatment of the newborn and pediatric patient in respiratory failure.
- f. Describe the basic components of inhaled nitric oxide delivery.
- g. Discuss the safety of inhaled nitric oxide and possible adverse effects of its use.
- h. Discuss the use of heliox for pediatric patients with airflow obstruction.
- i. Describe each of the following as they relate to ECLS:
  - History
  - Venoarterial vs. venovenous bypass
  - Components of the ECLS circuit
  - Use of mechanical ventilation during ECLS
- j. Identify methods used for selecting patients for ECLS and recognize those for which ECLS is contraindicated.
- k. Describe how ECLS is initiated, the indications for termination, and the complications associated with its use.
- l. Discuss each of the following, as they are related to negative pressure ventilation:
  - History
  - Methods of delivery

Current uses

Advantages and disadvantages

- m. Briefly describe the history and use of partial liquid ventilation

## 21. Perinatal Transport

- a. Describe the levels of NICU's and how each is defined.
- b. Define regionalization and the role of transport.
- c. Compare and contrast the types of transport, with regard to distances covered, advantages, and disadvantages.
- d. Discuss the effects of altitude on PaO<sub>2</sub> and discuss the changes required in FiO<sub>2</sub> as altitude increases to maintain PaO<sub>2</sub>.
- e. Describe the effects of altitude on closed air spaces.
- f. Describe the skills required by transport personnel.
- g. List the equipment needed for transport and describe the modifications required for use during transport.
- h. Calculate the duration of oxygen flow with an E and H cylinder when given necessary data.
- i. Discuss the preparation required before transporting an infant.
- j. Describe four methods to help thermoregulate an infant during transport.
- k. Describe the care and transport of the following disorders:
  - Diaphragmatic hernia
  - Tracheoesophageal fistula
  - Omphalocele
  - Gastroschisis
  - Meningomyelocele
  - Cyanotic heart disease

## 22. Home Care

- a. Home ventilators
- b. Apnea Monitoring

### REQUIRED TEXTBOOK AND MATERIALS

**Comprehensive Perinatal & Pediatric Respiratory Care by Kent Whitaker**

**ISBN 978-1-4390-5943-2**

**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** – According to LIT policy students with approved absences shall be allowed to make up examinations and written assignments without penalty. This privilege does not extend to unapproved absences. The determination of whether an absence is excused or approved is the responsibility of the instructor, except in the case of approved absence for an Institute-sponsored activity. If absences seriously interfere with performance the instructor may recommend to the Department Chair that the student be dropped from the course. You may be asked to present documentation to the instructor as to why the absence was necessary for the next class meeting that you attend, (i.e. doctor excuse, funeral pamphlet, note from child’s doctor, etc.).

**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.

**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**

<b>DATE</b>	<b>TOPIC</b>	<b>READINGS (Due on this Date)</b>	<b>ASSIGNMENTS (Due on this Date)</b>
1	Embryological development of Cardiopulmonary System	<i>Chapter 1</i>	
2	Assessment of fetal Growth and development.	<i>Chapter 2 and 3</i>	

	Labor , Delivery, and Physiological Changes after birth		
3	Techniques of Resuscitation and Stabilization. Assessment of the Neonatal and Infant Patient	<i>Chapter 4 and 5</i>	
4	<b>Exam 1 (Chapter 1-5)</b> Continuing Care of the Neonate	<i>Exam 1 Chapter 6</i>	
5	Perinatal Lung Disease and Other Problems of Prematurity Causes of Persistent Perinatal Illness	<i>Chapter 7 and 8</i>	
6	Techniques of Pediatric Resuscitation and Stabilization Assessment of the Pediatric Patient	<i>Chapter 9 and 10</i>	
7	<b>Exam 2 (6-9)</b> Continuing Care of the Pediatric Patient Pediatric Diseases Requiring Respiratory Care	<i>Chapter 11 and 12</i>	
8	<b>NRP(TBD)</b> Respiratory Care Procedures	<i>Chapter 13</i>	
	<b>Spring Break</b>		
9	<b>Exam 3 (10-13) (Tuesday)</b> Persing (Thursday)		
10	Pharmacology Assessment of Oxygenation and Ventilation	<i>Chapter 14 and 15</i>	
11	Interpretation of Chest X-Rays Concepts of Mechanical Ventilation	<i>Chapter 16 and 17</i>	
12	<b>Common Infant and Pediatric Ventilators</b> <b>Exam 4 (14-17)</b>	<i>Chapter 18 and 19</i>	



## **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](mailto: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](http://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.