MACOMB COMMUNITY COLLEGE
DIVISION OF CAREER PROGRAMS
HEALTH & HUMAN SERVICES DEPARTMENT
RESPIRATORY THERAPY PROGRAM

COURSE SYLLABUS

COURSE TITLE: PHYSIOCHEMICAL BASIS OF RESPIRATORY THERAPY

CATALOG DESCRIPTION: This course is designed to teach the student basic mathematics, physics and chemistry as it applies to respiratory therapy. Topics covered include: measurement systems, mechanics, energy and matter, properties of fluids, gas laws, gas movement, solutions and drug calculations, elements and compounds, acid-base and fluid balance and nutrition and metabolism.

PREREQUISITES: Admission into the Respiratory Therapy Program and BIOL 2710

COREQUISITES: RSPT 1050, RSPT 1080 & RSPT 1090

COURSE NUMBER: RSPT 1060

SEMESTER CREDIT HOURS: 3

CONTACT HOURS: 3 HOURS/WEEK

EFFECTIVE TERM: Fall 2005

COURSE OUTCOMES AND OBJECTIVES:

I. OUTCOME A: Upon completion of this course, students will be able to demonstrate the use of basic math principles and concepts to solve problems in Respiratory Care.

A. Solve problems involving positive and negative numbers.
B. Follow the rounding rules.
C. Solve problems involving decimals.
D. Solve problems involving order of operation.
E. Solve problems involving fractions.
F. Solve problems involving ratios and proportions.
G. Set up a formula and convert between the measurement systems and within the Metric system.
H. Rearrange formulas.

II. OUTCOME B: Upon completion of this course, the student will be able apply the laws of gas behavior to equipment and clinical situations in Respiratory Care.

A. Demonstrate an understanding of the divisions of matter.
B. Demonstrate an understanding of basic inorganic chemistry.
C. Explain and apply Dalton's Law to respiratory therapy.
D. Define the following laws, explain the relationship between volume, pressure, mass and temperature, and use the mathematical formula to solve for an unknown.
    1. Boyle's Law
    2. Charles's Law
    3. Gay Lussac's Law
    4. Combined gas law
    5. Universal (Ideal) Gas Law
E. Explain the relationship between temperature, pressure and volume and convert between the temperature scales.
F. Explain the relationship between the things that affect humidity and describe the different forms of humidity.
G. Explain how properties of gases may change under extreme temperatures and pressures.
H. Explain what a critical point is and how it is used in gas therapy.

III. OUTCOME C: Upon completion of this course, the student will be able to explain how changes in surface tension, compliance and resistance will affect gas flow in the respiratory system.

A. Describe the processes of internal and external respiration.
B. Use following laws to explain the factors that affect diffusion of a gas into a liquid, dissolving of a gas in a liquid and gas movement into solution.
    1. Graham's Law
    2. Henry's Law
    3. Fick's Law
C. Explain the relationship between ventilation and perfusion.
D. Calculate and apply clinically the respiratory quotient, PAO_2, A-aDO_2, a/A ratio and PaO_2/FIO_2, oxygen delivery to the tissues, utilization and extraction using cardiac output and oxygen content.
E. Define and list the causes of hypoxemia and hypoxia.
F. Draw and explain the equation of motion.
G. Explain the relationship between pressure, surface tension, surfactant and radius if one if the variables is held constant.
H. Define, compare, list the formulae for, the normal values for and apply clinically the following:
    1. Lung compliance
    2. Thoracic compliance
    3. Total compliance
    4. Static compliance
    5. Dynamic compliance
    6. Airway resistance
I. Explain the significance Poiseuille's law and the Reynolds number as they relate to frictional resistance and ventilation

IV. OUTCOME C: Upon completion of this course, the student will be able to describe the processes of internal and external respiration, oxygenation, and acid-base balance in the human body.

A. Explain the relationship between matter, mixtures and solutions.
B. Explain the role of the following pressures and their affects on the blood and tracheobronchial tree:
    1. Osmotic
    2. Oncotic
    3. Tonicity
C. Perform drug calculations .
    1. Given %weight/volume solutions (%)
    2. Given ratio solutions (1:100)
    3. Using the Universal Formula for solving w/v solutions
    4. Drug dilution problems
    5. Given an adult dose of medication, use an infant's age in months, child's age in years, weight or body surface area to determine the correct dosage.
D. Draw and label the pH scale and explain how pH is regulated.
E. Differentiate between an acid, base & salt.
F. Given an ABG, indicate the primary Acid-Base disturbance, oxygenation abnormality, possible causes, symptoms, compensation and treatments:
    1. Respiratory acidosis and alkalosis
    2. Metabolic acidosis and alkalosis
G. Briefly define the following ventilatory acid-base abnormalities and give a blood gas example of each:
    1. Acute alveolar hyperventilation with hypoxemia (respiratory alkalosis or respiratory insufficiency)
    2. Acute ventilatory failure with hypoxemia (uncompensated respiratory acidosis)
    3. Chronic ventilatory failure with hypoxemia (compensated respiratory acidosis)
    4. Acute alveolar hyperventilation superimposed on chronic ventilatory failure
    5. Acute ventilatory failure superimposed on chronic ventilatory failure
H. Explain the role of electrolytes in acid base balance and identify the macronutrients and micronutrients found in the human body
I. Explain the role of body fluid balance, how body fluid is controlled, what causes disorders in body fluids and what symptoms can be caused by imbalance in body fluid volume.

V. **METHODS OF COURSE ASSESSMENT**:

A. Pre- and Post-Test.