STANDARD COURSE OUTLINE

RESP 2104 **Respiratory Care Sciences**

PREREQUISITE: Admission into the Respiratory Therapy (RT) Program.

COURSE DESCRIPTION: This course is designed to supply the student with a basic understanding of the scientific principles important to respiratory therapy.

CREDIT HOURS: 4 credit hours / may transfer to other respiratory therapy. programs.

TARGET AUDIENCE: Students admitted to the RT Program.

INSTRUCTIONAL MATERIALS: Respiratory Care Sciences, an Integrated Approach Wojciechowski; 3rd Edition, 2000, Delmar Co.

COURSE OBJECTIVES:

Upon successful completion of this course, the student will

1. Write numbers using scientific notation.
2. Add, subtract, multiply, and divide exponential numbers
3. Calculate FiO_2, air flow, oxygen flow, and total flow using the Magic Box.
4. Calculate ratios and proportions.
5. Use Charles' and Boyle's Laws.
6. Convert percents to decimals and decimals to percents.
7. Use the metric system appropriately.
8. Use a Base 10 Logarithms.
9. Label the parts of a graph.
10. Define measurement bias, performance bias, and observation bias.
11. Define cross-sectional study, longitudinal study, retrospective study, and blind study.
12. Identify the best type of study.
13. Define PEER Review.
14. Calculate mean.
15. Identify the median of a group of numbers.
16. Define Standard Deviation.
17. State the numbers that fall within one, two, and three standard deviations.
18. Define Z Score.
19. Define the following: Work, Power, Watt, Energy, Kinetic Energy, Potential Energy, Pressure, Atmospheric Pressure.
20. State the Kinetic Theory of Matter.
21. Convert Atmospheric Pressure to mmHg, cmH_2O or psi.

22. Define and relate the following gas laws to everyday life:
    - Boyle's Law
    - Charles' Law
    - Gay-Lussac's Law
    - Combined Gas Law
    - Dalton's Law
    - Avogadro's Law
23. Define the following: ATPS, STPD, BTPS
24. Work Dalton's Law for any given gasses or pressures.
25. Describe how a Hyperbaric Chamber works.
26. Calculate the P_AO_2 by using the Alveolar Air equation.
27. State the Law of Continuity and relate it to Respiratory Therapy and Cardiology.
28. State the Bernoulli Principle and be able to relate it to Respiratory Therapy.
29. Apply the Venturi Principle to Respiratory Therapy equipment.
30. Calculate the Air:Oxygen entrainment ratio by using the 'Magic Box".
31. Describe what Respiratory Therapy equipment works off of the Venturi Principle.
32. Define Laminar and Turbulent Flow.
33. Define Viscosity.
34. Define Tracheobronchial Flow and describe where it would be found.
35. Calculate V_A.
36. Describe the five different modes of O_2 transport.
37. List and define the three types of Airway Resistance.
38. Calculate Airflow Resistance in the lung.
39. Describe what factors influence the flow of fluids, according to Poiseuille's Law of Laminar Flow.
40. Calculate 'Reynold's Number' and know why we use it.
41. State Hooke's Law as it relates to Elastic Recoil and Elastic Limit.
42. Describe physiologically why we use Hooke's Law.
43. Compute lung compliance.
44. Relate the compliance pressure-volume curve to disease states.
45. Define Time Constants and calculate it from R_{aw} and C_L.
46. List the percentage of inspiration for each Time Constant.
47. Describe the importance of LaPlace's Law.
48. State the importance of Pulmonary Surfactant.
49. Define Hydrostatic and Osmotic Pressures.
50. Define Diffusion and Osmosis.
51. List the four pressures that influence capillary dynamics.
52. Describe what happens if any of the above pressures are high or low.
53. List the major Anions and Cations.
54. Describe what takes place in Systemic and Pulmonary Edema.
55. Describe how a Paramagnetic Susceptibility Analyzer operates.
56. Describe how a Thermal Conductivity Analyzer operates.

TOPICAL OUTLINE:

This course includes (but is not limited to) the following topics:

MATH:

MODULE 1: Scientific Notation and Exponents
Air to Oxygen Ratios
Magic Box
Inspiratory to Expiratory Ratio
Proportions
Charles' Law
Boyle's Law
Fractions and Percents
Units of Measure
Logarithms
Graphs
Statistics and Studies

CHEMISTRY:

MODULE 1: Atomic Structure and Electron Configuration
Chemical Bonding
Henry's Law
Graham's Law
Molarity
Henderson-Hasselbach Equation
Chemical Equilibrium
Electrolytes
Temperature Scales
Electrochemistry
Oxygen Analyzers

MODULE 2: Organic Chemistry
Cellular Anatomy
Carbohydrates, Proteins, Amino Acids, Lipids
Surfactant
Nucleic Acids

MODULE 3: Hemoglobin.
Oxygen Toxicity
Inhaled Nitric Oxide
ARDS
Mechanisms of Bronchospasm
Mast Cells

PHYSICS

MODULE 1: Work, Energy, Pressure
Kinetic Energy
Gas Laws
Boyle's Law
Charles' Law
Gay-Lussac's Law
Combined Gas Laws
Dalton's Law
Avagadro's Law
Ideal Gas Law

MODULE 2: Fluid Dynamics
Bernoulli's Principle
Physical and Electrical Oxygen Analyzers
Venturi Principle
Oxygen Transport
Airway Resistance
Viscosity

MODULE 3: Mechanics of Ventilation
Hooke's Law
Compliance
Time Constants
LaPlace's Law
Starling's law of the Capillaries
Anions and Cations
Physical and Electrical Oxygen Analyzers.