MOHAWK VALLEY COMMUNITY COLLEGE, UTICA-ROME, NY

Respiratory Care

COURSE OUTLINE

1. COURSE DESCRIPTION:

**RC101 Basic Science for Respiratory Care** C-2, Cr-2

This course addresses topics in mathematics, physics, chemistry and microbiology related to respiratory care practice. Mathematical areas include graphing, nomograms, and basic statistics. Physics and chemistry topics include the states of matter, humidity, gas pressure, gas laws, acids, bases, buffers, fluid dynamics, compliance, resistance, elastance and surface tension. A four-week module provides an introduction to microbiology at the end of the semester. Emphasis is placed on microbes that commonly involve the respiratory system. The course delivery mode is a hybrid on-line/on-site combination requiring attendance at microbiology lab sessions on the Utica Campus the last two weeks of class.

**Prerequisites:** An appropriate Mathematics Placement test result or MA089 Arithmetic (minimum grade of C)

1. STUDENT LEARNING OUTCOMES

**Upon completion of this course the student will be able to:**

1. Convert units within the metric system.
2. Cancel units to solve the problem correctly.
3. Rearrange a formula to solve for an unknown item.
4. Round the answer to the nearest whole number or decimal.
5. Apply the Kinetic Molecular Theory to all three states of matter.
6. Distinguish the three states of matter based on their fundamental properties.
7. Explain change of state based on the Kinetic Molecular Theory.
8. [Explain the dissolving of a solid in a liquid based on the Kinetic Molecular Theory.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Knob4.html)
9. [Explain ionization and dissociation according to the Kinetic Molecular Theory.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Knob5.html)
10. Explain diffusion and factors affecting it based on the Kinetic Molecular Theory.
11. [Discuss various temperature and energy related measurements associated with change of state.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Knob7.html)
12. [Explain the relationship of temperature and pressure when determining the state of matter at which a particular substance exhibits.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Knob8.html)
13. [Interpret a simple phase diagram.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Knob9.html)
14. [Comment on the abundance and importance of water.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Waob1.html)
15. [List water's important properties which give it biological and clinical significance.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Waob2.html)
16. [Discuss the chemical structure of the water molecule and the forces among water molecules.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Waob3.html)
17. Reproduce from memory a phase diagram for water and discuss significant features of this diagram.
18. [Comment on the importance and abundance of oxygen.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Oxob1.html)
19. [Briefly discuss the discovery of oxygen.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Oxob2.html)
20. [List common processes used to prepare oxygen.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Oxob3.html)
21. [List significant properties of oxygen.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Oxob4.html)
22. [Discuss the chemical structure of oxygen including its allotrope ozone.](http://mvcc.blackboard.com/courses/1/RC101/content/_3177_1/dir_lecturesbsrc.zip/lecturesbsrc/Lectures/lec1/Oxob5.html)
23. [State Dalton's Law in words and symbol](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec3/GAS2ob1.html)
24. [State Henry's Law in words](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec3/GAS2ob1.html) and symbols.
25. [State Graham's Law in words](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec3/GAS2ob1.html) and symbols.
26. [State Charles' Law in words and symbols.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec3/GAS2ob2.html)
27. [State Boyle's Law in words and symbols.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec3/GAS2ob3.html)
28. [State Gay Lussac's Law in words and symbols.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec3/GAS2ob4.html)
29. [List the Combined Gas Law.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec3/GAS2ob5.html)
30. [Correct a mixture of gases for pressure contributions due to water vapor.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec3/GAS2ob6.html)
31. [Understand the concept of gas density and modify the combined gas law to deal with gas density.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec3/GAS2ob7.html)
32. [State and give the meaning of the common symbols used in gas law problems.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec3/GAS2ob8.html)
33. [Prepare a simple graph given appropriate data.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/Lecture%205/graob1.html)
34. [Define basic terminology associated with graphs.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/Lecture%205/graob2.html)
35. [Read and interpret data given in graphic form.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/Lecture%205/graob3.html)
36. [Use a nomogram to find predicted values.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/Lecture%205/graob4.html)
37. [To understand what data is and to realize that there are two basic methods used to collect data.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/Lecture%205/staaob1.html)
38. [To define and calculate the three basic measures of central tendency.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/Lecture%205/staaob2.html)
39. [To understand the concept of variability and to calculate variance and standard deviation.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/Lecture%205/staaob3.html)
40. [To appreciate the distinction between association and causation.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/Lecture%205/staaob4.html)
41. [Define and recognize an acid; define weak and strong acids; list the common properties of acids.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec6/acbacob1.html)
42. [Define and recognize a base; define weak and strong bases; list the common properties of bases.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec6/acbacob2.html)
43. [Discuss the ionization of water and the pH scale.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec6/acbacob3.html)
44. [Define a buffer system and give relevant examples of buffer systems showing how they work.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec6/acbaapob1.html)
45. [Derive the Henderson Hasselbalch equation and apply it to a buffer system.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec6/acbaapob2.html)
46. [Define these common acid base terms per Alan W. Grogono, M.D:  
    Neutral, pH, Logarithm, Respiratory Acid, Respiratory Acidosis  
    Metabolic Acids, Metabolic Acidosis, Bicarbonate, Base Excess (BE)](http://www.unipa.it/%7Elanza/gta/acid-base/AB_Terms.html)
47. [Read and summarize the discussion of Alan W. Grogono, M.D.  
    Acid Base Balance: Acid-Base Physiology](http://www.unipa.it/%7Elanza/gta/acid-base/AB_Physiol.html)
48. [State Poiseuille's Law and define all the terms in the law.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec7/fludyob1.html)
49. [Use the law to answer simple questions about the effects of tube diameter, flow and pressure on fluid behavior.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec7/fludyob2.html)
50. [Use basic relationships of pressure, volume and flow to determine the duration of cylinder flow for a gas.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec7/fludyob3.html)
51. [State, understand and apply Bernoulli's Principle.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec7/fludyob4.html)
52. [Define Elastance and Compliance](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec8/ecstob1.html)
53. [Relate Changes in Compliance to Work of Breathing](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec8/ecstob2.html)
54. [Explain the Relative Contributions of Surface Tension and Tissue Elasticity to Compliance](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec8/compst/Lung%20Compliance.html)
55. [Explain the Contribution of Water's Cohesive Forces to Surface Tension](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec8/surface%20tension%20physics/PhysicsST.html)
56. [List the Basic Condition necessary for Surface Tension](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec8/surface%20tension%20physics/PhysicsST.html)
57. [List the major Factors Influencing Surface Tension.](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec8/surface%20tension%20physics/PhysicsST.html)
58. [Explain the Impact of Surface Tension on the Work of Breathing](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec8/surfactant/lungsten.html)
59. [Discuss How the Law of Laplace Exacerbates the Influence of Surface Tension](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec8/surfactant/lungsten.html)
60. [Discuss How the Surfactant Controls the Influence of Surface Tension](http://mvcc.blackboard.com/courses/1/12589-16920-RC101/content/_217171_1/dir_lecturesbsrc_3.zip/lecturesbsrc/Lectures/lec8/surfactant/lungsten.html)
61. MAJOR TOPICS:
62. Basic Math Concepts
63. The Kinetic Molecular Theory
64. Gases Part I: The Ideal Gas, Gas Pressure and Humidity
65. Gases Part II: Introduction to the Gas Laws
66. Graphing and Basic Statistics
67. Acids and Bases Part I: Chemistry
68. Acids and Bases Part II: Application to Physiology
69. The Behavior of Fluids
70. Surface Tension, Elastance, and Compliance
71. Microorganisms Survey
72. Disease
73. Microbial Control
74. Microbiology Lab