

**Common Course Outline for: VACT 1010****A. Course Description**

1. Number of credits: 2
2. Lecture hours per week: 2  
Lab hours per week: none
3. Prerequisites: eligible for Math 601 recommended
4. Co-requisites: none
5. MnTC Goals: none

Basic principles of chemistry, math and physics are applied to the understanding of concepts needed to continue in courses of vacuum technology. Topics include atomic structure, states of matter, compounds, behavior of gases, scientific measurement and calculations, intermolecular forces, and simple circuits.

**B. Date last reviewed:** none

**C. Outline of Major Content Areas**

1. Matter and Atomic Structure
  - i. Types of matter
  - ii. States of matter
  - iii. Changes in matter
  - iv. Atomic structure
  - v. The Periodic Table
2. Compound Names
3. Quantitative relationships between mass, moles and counts
4. Gas Behavior
  - i. Kinetic Molecular Theory
  - ii. Pressure
  - iii. Temperature
  - iv. Density
  - v. Vacuums
  - vi. Gas Laws
5. Heat Transfer
6. Math tools
  - i. Dimensional analysis
  - ii. Significant digits
  - iii. Scientific notation
  - iv. Logarithms
  - v. Algebraic equations
  - vi. Graphing
7. Intermolecular Forces

- i. Molecular polarity
  - ii. Vapor pressure
  - iii. Surface adsorption
- 8. Chemical Safety
- 9. Acids and Bases
  - i. Common acids and bases
  - ii. pH scale
- 10. Simple circuits
  - i. Parts of a circuit
  - ii. Ohm's Law

#### **D. Course Learning Outcomes**

Upon successful completion of the course, the student will be able to:

1. Describe matter and changes in matter in terms of atoms, molecules and ions.
2. Calculate and convert scientific values in common scientific units of measure using significant digits.
3. Describe the behavior of gases using gas laws and Kinetic Molecular Theory.
4. Apply behaviors of gases to the concepts of heat transfer, and vacuums.
5. Demonstrate how logarithms are used in graphing.
6. Identify the factors that affect vapor pressure of a liquid or solid.
7. Interpret the safe handling of chemicals from MSDS and NFPA data.
8. Explain the role of acids and bases, and the pH scale.
9. Apply the basic principles of electric circuits.

#### **E. Methods for Assessing Student Learning**

- a. A midterm exam
- b. A final comprehensive exam
- c. Assessments may include
  - i. Quizzes
  - ii. Lab simulations and reports
  - iii. Worksheets
  - iv. Case studies
  - v. Collaborative projects

#### **F. Special Information**

- a. This course is organized into 8 modules. Each module contains video lectures, activities, and a module-end quiz. The course can be taught as a half semester or a full semester course.