MONTE VISTA CHRISTIAN SCHOOL
SCIE 3520, Chemistry
Course Syllabus

Course Description:
An experimental science concerned primarily with the search for and acquisition of knowledge about the fundamental nature and characteristics of the materials of which the universe is composed. This course is a one year physical science lab course based on lecture, experimentation and observation. The course will stress the understanding of the basic theoretical concepts as well as the descriptive aspects of chemistry. Application of basic chemical principles will be given to everyday life situations.

Curriculum Mapping:
This course will build upon the students' scientific method skills learned in Biology and problem solving skills learning in Algebra, as well as prepare the students for Physics and Human Anatomy.

Course Objectives:
Upon the successful completion of this course the student will be able to:
1. Demonstrate proper use of lab equipment and techniques
2. Make and record accurate observations
3. Organize information, evaluate, interpret and communicate experimental results
4. Write balanced equations in terms of atoms, molecules, and moles
5. Exhibit skill in the use of the periodic table in the following ways:
    - classifying elements according to their properties
    - predicting and writing chemical reactions
    - writing electron configurations and showing intermolecular forces
    - determining the subatomic makeup and mass of elements
6. Demonstrate through problem solving and correct use of nomenclature and understanding of the following:
    - scientific notations and significant figures
    - conservation of mass and energy (stoichiometry)
    - thermodynamics and kinetics
    - gas reactions
    - acid-base reactions
    - chemical equilibrium
    - solution concentrations
    - oxidation-reduction reactions
7. Show proficiency in drawing and identifying organic compounds as well as applying

their use to everyday life (consumer chemistry)

8. Develop and in-depth knowledge of the origin and use of radioactivity in our growing world of energy needs (citizen responsibility)

Text:

Your necessary digital texts for this class will be part of a "Required Course Materials Fee" thru the EdTech bookstore. This is a bundle purchase of digital texts for your full schedule of classes and will be available for purchase after 7/18/16. For further instructions please visit the 16-17 School Year icon on the MVCS homepage. Please note: some courses may require additional purchases outside of the course materials fee.

Prerequisites: Previous credit should be obtained in Biology or another approved lab science. In addition, Algebra II must have been successfully completed or be taken concurrently.

Course Outline and Requirements:

I. Science, Chemistry and You
   - A. Scientific Method
   - B. History of chemistry
   - C. Lab exercise making simple observations and recording data
   - D. Lab exercise in using the Bunsen burner to make glass U-tubes

II. Matter
   - A. Classification of Matter
   - B. Lab exercise designed to classify mixtures and compound on the basis of their observable differences
   - C. Lab exercise designed to separate a mixture into components by using filtration and evaporation techniques
   - D. Forms of Energy in matter
   - E. States of matter

III. Math: The Central Language of Science
   - A. Measurements of matter
   - B. Lab exercise to measure length, volume, mass, density and percent error.
   - C. Significant figures
   - D. Scientific notation

IV. Atomic structure
   - A. Historical development of atomic models
   - B. Lab exercise in viewing spectrums of various elements with spectroscopes
   - C. The Quantum model
   - D. Numbers of atomic particles
   - E. Lab exercise calculating the weighted average of an isotopic mixture

F. Valence electrons

V. Elements
   A. History of the Periodic table
   B. Parts of the Periodic Table
   C. Predicting electron configurations from the Periodic Table
   D. Periodic trends
   E. Lab exercise in graphing atomic size vs atomic number
   F. Descriptive chemistry
   G. Lab exercise designed to separate elements into groups using their physical properties

VI. Chemical Bonds
   A. Types of bonds
   B. Lab exercise to investigate the physical properties of substances containing various bond types
   C. The Quantum model
   D. Molecular shapes
   E. Molecular bonds
   F. Lab exercise in assembling models of molecules and determining their polarity

VII. Describing chemical composition
   A. Oxidation numbers
   B. Naming compounds
   C. The mole and Avogadro's Number
   D. Calculating percent compositions
   E. Calculations with empirical formulas
   F. Lab exercise calculating the percent composition of a compound and deriving its empirical formula

VIII. Describing chemical reactions
   A. Chemical equations
   B. Balancing chemical equations
   C. Types of reactions
   D. Lab exercise observing changes in a chemical reaction and writing equations to represent the changes
   E. Stoichimetry
   F. Lab exercise to determine the relationship between moles of reactants and products

IX. Gases
   A. Kinetic description of gases
   B. Physical properties of gases

C. Effects of pressure, temperature, and volume on gases
D. Gas laws
E. Lab exercise demonstrating Charles' law
F. Lab exercise demonstrating Boyle's law
G. Dalton's law of partial pressures

X. Solids and Liquids
A. Intermolecular forces
B. Kinetic description of solids
C. Crystalline structures
D. Polymorphs and allotropes
E. Binding forces in crystals
F. Lab display of various crystal types
G. Kinetic description of liquids
H. Evaporation and Vapor Pressure
I. Boiling and distillation
J. Lab exercise of performing a simple distillation
K. Critical values
L. Specific heats

XI. Water
A. The structure of water
B. Hydrogen bonding in water
C. Physical properties of water
D. The reactions of water
E. Water in compounds
F. Lab exercise to determine the formula of an unknown hydrate compound

XII. Solutions
A. Types of solutions
B. Dissolving mechanisms
C. Solvent Selectivity
D. Solution equilibrium
E. Rates of solution
F. Lab exercise in developing a solubility curve of a salt, as the temperature is varied
G. Measuring concentration
H. Colligative properties
I. Lab exercise determining the Gram Molecular Weight of a substance by measuring the boiling point elevation
J. Colloids

XIII. Thermodynamics and kinetics

A. Chemical energy stored in bonds
B. Conservation of energy
C. Enthalpy: Heat content of a compound
D. Lab exercise determining the enthalpy for two reactions and a solution Process
E. Entropy: randomness
F. Mapping energy changes - potential energy diagrams
G. Rates of reactions
H. Lab exercise observing the factors that effect rates

XIV. Chemical Equilibrium
A. Shifted equilibrium
B. Equilibrium constants
C. How equilibriums handle stress
D. Lab exercise observing equilibrium shifts when the concentration of the reaction components change
E. Application of equilibrium chemistry

XV. Acids, bases and salts
A. Definition of acids and bases
B. Observable properties
C. Autoprotolysis of water
D. The pH scale
E. Acid-Base strengths
F. Polyprotic acids
G. Indicators
H. Lab exercise testing the colors and end points of various indicators
I. Neutralization
J. Lab exercise titrating solutions with a solution of unknown concentration

XVI. Oxidation - Reduction
A. Redox reactions
B. Balancing redox reactions using the half-reaction method
C. Redox titrations
D. Electrochemical reactions
E. Lab exercise observing factors relating to corrosion

XVII. Organic chemistry
A. Hydrocarbons
B. Classification
C. Isomers
D. Substituted hydrocarbons
E. Lab exercise building organic models and identifying isomers and

functional groups

F. Lab exercise creating alcohols, esters, aldehydes, and ketones and testing their properties

G. Organic reactions

H. Lab exercise observing various organic reactions

XVIII. Biochemistry

A. Carbohydrates

B. Lab exercise calculating how many calories are in a food item

C. Lab exercise testing for reducing sugars with Benedict's solution

D. Proteins

E. Lab exercise testing for elements present in proteins

F. Lipids

G. Lab exercise to make soap from fats

H. Biochemical cellular processes

XIX. Research Project

A. Research paper on an assigned chemistry topic

B. Oral presentation of research

XX. Nuclear chemistry

A. Natural radioactivity

B. Nuclear equations

C. Radioactive decay series

D. Half-life

E. Nuclear stability

F. Induced reaction

G. Nuclear binding and mass defect

H. Responsible citizenship

Grading:

Grade Book Categories		**Semester Weighted Grading Configuration**	
Homework	20%	Quarter	40%
Labs	20%	Quarter	40%
Tests	60%	Final Exam	20%

On the average, a General Chemistry student should **plan on spending 30 minutes a day** on homework / review. No partial credit will be given for late work. See page 8 of the chemistry

manual for homework guidelines. See page 9 of the chemistry manual for explanation on how homework is graded.

High School Grading Policy:
Please refer to the policy and procedures posted online in our student handbook

Class Policies:
1. **Preparation:** Students will not be excused from class to go get forgotten items
2. **Tardiness**: A tardy is given to a student not in their seat when the bell rings.
3. **Attendance:** Students are expected to be in class every day. If students are unable to attend class, it is their responsibility to get notes from a classmate. If an absence is due to a pre-planned school or personal outing, students must turn in your work before they go on their outing. See pages 10 and 13 of chemistry manual.

School Policies and Expected Student Learning Results (ESLR's)
Students are subject to all academic policies of the school as printed in the Academic Catalog and Student Handbook. Furthermore, it is each student's responsibility to read and follow all academic policies of the school.
The following five ESLRs listed below are stated in our school handbook, along with the components we are striving to demonstrate / teach to our students.

*** Spiritual**
*** Intellectual**
*** Self-Management**
*** Character**
***Technology**

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Terms of Agreement

Parents and students can expect the course instructor to:

- post unit outlines at least two weeks in advance on moodle.mvcs.org
- provide unit review sheets on moodle.mvcs.org
- return graded papers and projects the next class period after their due date.
- post grades on FOCUS each day
- be timely in responding to e-mail messages MrsTarr@mvcs.org

Instructor will expect the student to:

- come to class each day with hardcopy homework from moodle.mvcs.org
- Read the assigned textbook pages
- know and follow the rules and guidelines of this syllabus as well as their school handbook.
- be responsible in doing their school work on time.
- seek out help when confusion strikes.
- have gotten notes and read the assignment BEFORE coming to the instructor for help.