**Course: Chemistry (2015-2016)**

Grade Level: 10 - 12th Grade

Pre-Requisites: Algebra I, Physical Science Moodle stuff in GREY

**I. Introduction and Philosophy**

Chemistry is a course which lays a foundation of understanding toward modern chemistry,

but also builds upon that understanding to give the student a strong working knowledge of the world of chemistry. The course content is designed to prepare students for entry-level college chemistry.

The course content is demanding. The course includes student and demonstration labs designed to familiarize students with laboratory techniques and safety. It is designed to give students an understanding into the wonders of God’s universe and an appreciation of the world around us.

**“Through faith we understand that the worlds were framed by the word of God, so that things which are seen were not made of things which do appear.” Hebrews 11:3**

**II. Scope and Sequence**

Chemistry students are required to have successfully completed Algebra I, and Physical

Science, as a pre-requisite. Generally chemistry is taken in 10th or 11th grade, however it can alsobe taken during the student’s senior year.

**III. Instructional Goals**

A. Students will be challenged to grasp the magnificence of God’s creation and relate this to the world in which

 they live.

B. Students will be required to understand the classification, structure and states ofmatter.

C. Students will investigate role that mathematics plays in relation to chemistry.

D. Students will gain a strong working knowledge of atomic structure, atomic mass,isotopes, ions, chemical and physical changes in matter.

E. Students will study the foundational stoichiochemistry.

F. Students will learn about gases, gas laws and molar mass determinations.

G. Students will learn the basics of electronic structure, including the nature of light,quantum mechanics and electron configurations.

H. Students will learn about the periodic table and associated chemical properties.

I. Students will study chemical bonds and intermolecular forces.

J. Students will learn about solutions, colloids, chemical kinetics and equilibrium.

K. Students will study acids, bases, salts, titrations, osmosis and ionic solutions.

L. Students will study Re-dox reactions and electrolysis.

M. Students will learn about nuclear chemistry, power generation.

N. Students will study foundational organic chemistry and classification or organic

compounds.

 This course is a “Moodle” class. Moodle is an electronic classroom environment that augments and accelerates WCA’s traditional teacher-taught program. Moodle has a proven ability to increase learning and content. Moodle is by far the most widely used Learning Management System on the planet. Students will use Moodle to submit homework and keep track of all class assignments. Parents and students will still use RenWeb for checking grades. (Moodle is sync’d with RenWeb automatically.)

**IV. Instructional Objectives**

A. Introduction to Chemistry

1. States and Classification of Matter

2. Energy and Matter

3. Energy Changes in Chemical Reactions

4. Second law of Thermodynamics

5. Careers in Chemistry

B. Mathematics in Chemistry

1. Scientific Notation, Significant Figures, Metric System

2. Dimensional Analysis

C. Matter

1. Properties of Matter (Atoms, Molecules, Compounds)

2. Mixtures vs. Pure Substances

3. Separation of Matter

4. Atomic Number, Mass, Isotopes, Ions, Elements

D. Stoichiochemistry

1. Formulas and Nomenclature

2. The Mole

3. Percent Composition

4. Balancing Equations

5. Limiting Reactants

E. Gases

1. Kinetic - Molecular Theory

2. Proportionality Concept

3. Pressure, Moles, Temperature, Volume

4. Laws: Boyles, Charles’s, Combined, Ideal

5. Avogadro’s Number, Molar Mass Determinations

6. Partial Pressures, Diffusion Principles

F. Thermodynamics

1. Energy, Heat, Enthalpy

2. Calorimetry

3. Changes of State

4. Entropy

G. Electronic Structure

1. Nature of Light, Atomic Spectra

2. Models of Atomic Structure and Quantum Mechanics

3. Orbital Shapes and Electron Configurations

H. The Periodic Table

1. Historical Development

2. Classification of Elements

3. Periodicity, Atomic Size, Ionization Energy, Electronegativity

I. Chemical Bonds and Intermolecular Forces

1. Ionic, Covalent and Metallic Bonding, Octet Rule

2. Polar Covalent Bonds

3. Dipole-Dipole, London Forces, Hydrogen Bonds

J. Solutions and Colloids

1. Solution Types

2. Molarity, Molality

3. Solvent / Solute Interactions

4. Factors affecting Solubility

5. Freezing Point Depression and Boiling Point Elevation

6. Osmotic Pressure

K. Chemical Kinetics

1. Reaction Rates

2. Catalyst Effect

3. Concentration and Temperature Effects

L. Chemical Equilibrium

1. Reversible Reactions

2. Equilibrium Constants

M. Acids, Bases and Salts

1. Arrhenius / Bronstred - Lowry Concepts

2. Naming Acids and Bases

3. Ionic and Net-Ionic Equations

4. Equivalents and Normality

O. Ionic Equilibrium

1. Ionization

2. pH Scale

3. Acid - Base Titrations

P. Oxidation - Reduction Reactions

1. Oxidation Numbers

2. Balancing Redox Equations

Q. Nuclear Chemistry

1. History

2. Types of Radioactivity

3. Detecting Radiation

4. Nuclear Stability, Nuclear Reactions

5. Natural Decay, Half-lives

6. Effects of Radiation on Matter

7. Power Generation, Military Uses, Medical Uses

R. Organic Chemistry

1. Chemical Bonding in Organic Compounds

2. Structural Formulas

3. Functional Groups and Classifications

4. Nomenclature System

**V. Evaluation and Instructional Technique**

There will be homework given two or three times a week. Homework will receive a grade for

completeness, neatness, spelling, and proper grammar. Homework is not graded on the basis of

having the correct answer. Homework assignments will receive up to eight points. Questions must

be answered in complete sentences. Homework is mandatory. An ***incomplete*** grade for any

assignment will cause the entire quarter grade to revert to a 60% or lower, as per school policy.

Students have 10 school days after the end of the quarter to hand-in incomplete work.

Chapter tests and quizzes will be given regularly. In addition, laboratory experiments and study

worksheets will be assigned during each marking period. Each homework assignment, test, quiz,

lab experiment and worksheet will have an assigned point value, which will be used to calculate

marking period grades. Individual extra-credit is not available because of its negative affect on

regular tests and study habits.

Biology is a subject that requires students study for retention, as opposed to cramming and

forgetting. **It is imperative** that students not fall behind in their understanding. In order to maintain

this progressing knowledge base, questions from previously taught chapters will routinely appear on

each new test In addition, there will quarter review tests for each marking period.

Mr. Moore is always available for extra help for students who are struggling.

**REMEMBER** that students should check for grades and missing assignments in RenWeb … not Moodle.

**VII. Resources**

1. Chemistry – Precision and Design, by Boddle, Parker, Abeka Books, 2014

2. Conceptual Physics, by Paul Hewitt, published by Addison-Wesley, c2005

3. Conceptual Physics Video Series, by Paul Hewitt, c1992

4. Assorted apparatus for experiments and demonstrations

5. Assorted video programs approved for school use.

**VIII. Time Frame**

A. Introduction to Chemistry - (1.5 weeks)

1. States and Classification of Matter

2. Energy and Matter

3. Energy Changes in Chemical Reactions

4. Second law of Thermodynamics

5. Careers in Chemistry

B. Mathematics in Chemistry - (3 weeks)

1. Scientific Notation, Significant Figures, Metric System

2. Dimensional Analysis

C. Matter - (3 weeks)

1. Properties of Matter (Atoms, Molecules, Compounds)

2. Mixtures vs. Pure Substances

3. Separation of Matter

4. Atomic Number, Mass, Isotopes, Ions, Elements

D. Stoichiochemistry - (3.5 weeks)

1. Formulas and Nomenclature

2. The Mole

3. Percent Composition

4. Balancing Equations

5. Limiting Reactants

E. Gases - (2.5 weeks)

1. Kinetic - Molecular Theory

2. Proportionality Concept

3. Pressure, Moles, Temperature, Volume

4. Laws: Boyles, Charles’s, Combined, Ideal

5. Avogadro’s Number, Molar Mass Determinations

6. Partial Pressures, Diffusion Principle

F. Thermodynamics - (2 week)

1. Energy, Heat, Enthalpy

2. Calorimetry

3. Changes of State

4. Entropy

G. Electronic Structure - (2.5 weeks)

1. Nature of Light, Atomic Spectra

2. Models of Atomic Structure and Quantum Mechanics

3. Orbital Shapes and Electron Configurations

H. The Periodic Table - (3 weeks)

1. Historical Development

2. Classification of Elements

3. Periodicity, Atomic Size, Ionization Energy, Electronegativity

I. Chemical Bonds and Intermolecular Forces - (3 weeks)

1. Ionic, Covalent and Metallic Bonding, Octet Rule

2. Polar Covalent Bonds

3. Dipole-Dipole, London Forces, Hydrogen Bonds

J. Solutions and Colloids - (2.5 weeks)

1. Solution Types

2. Molarity, Molality

3. Solvent / Solute Interactions

4. Factors affecting Solubility

5. Freezing Point Depression and Boiling Point Elevation

6. Osmotic Pressure

K. Chemical Kinetics - (1 week)

1. Reaction Rates

2. Catalyst Effect

3. Concentration and Temperature Effects

L. Chemical Equilibrium - (1.5 week)

1. Reversible Reactions

2. Equilibrium Constants

M. Acids, Bases and Salts - (2.5 weeks)

1. Arrhenius / Bronstred - Lowry Concepts

2. Naming Acids and Bases

3. Ionic and Net-Ionic Equations

4. Equivalents and Normality

O. Ionic Equilibrium - (2 weeks)

1. Ionization

2. pH Scale

3. Acid - Base Titrations

P. Oxidation - Reduction Reactions - (1.5 weeks)

1. Oxidation Numbers

2. Balancing Redox Equations

Q. Nuclear Chemistry - (2.5 weeks)

1. History

2. Types of Radioactivity

3. Detecting Radiation

4. Nuclear Stability, Nuclear Reactions

5. Natural Decay, Half-lives

6. Effects of Radiation on Matter

7. Power Generation, Military Uses, Medical Uses

R. Organic Chemistry - (2.5 weeks)

1. Chemical Bonding in Organic Compounds

2. Structural Formulas

3. Functional Groups and Classifications

4. Nomenclature Systems

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PLEASE DETACH AND RETURN TO MR. MOORE

We have read the course syllabus for Chemistry 2015-2016.

Student Name - Please Print \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Student Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Parents Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_\_\_