

## Chemistry (2007-2008 School Year)

Mr. Morse

### Course Description

This two semester course provides students with a fundamental understanding of matter and change, scientific measurements and procedures, atomic structure, chemical bonding, chemical formulas, chemical reactions and equations, states of matter, gas laws, solution chemistry, reaction rates, acids and bases, and oxidation-reduction reactions. We will include a historical perspective in each major unit, focusing on the questions posed, analyzed and answered by the founders of modern chemistry. Students will do a number of laboratory experiments and investigations. The details of these labs will be recorded in the laboratory notebooks. A formal laboratory report will be required for many of the experiments.

### Syllabus (subject to change)

#### First Semester

Week	Topics
	<b>First Quarter</b>
1	Course logistics, definition of chemistry, properties of matter, elements
2	Scientific method, units of measurement, density, chemical and physical change
3	Review and test on intro to chemistry ( <i>Chapters 1-2</i> ), atomic structure, atomic mass
4	Counting atoms, Avogadro's number and the mole
5	Classical and quantum models of the atom, electron configurations,
6	Review and test on atomic structure ( <i>Chapters 3-4</i> ), the periodic law
7	Electron configurations in the periodic table, periodic properties
	<b>Second Quarter</b>
8	Review and test on periodic law ( <i>Chapter 5</i> ), introduction to chemical bonding
9	Covalent bonding, ionic bonding, molecular and ionic compounds, metallic bonding
10	Molecular geometry, VSEPR theory, review and test on bonding ( <i>Chapter 6</i> )
11	Naming ionic and covalent compounds, oxidation numbers
12	Formula mass, molar mass, molar mass conversions, percent composition
13	Determining chemical formulas, review and test on formulas and compounds ( <i>Chapter 7</i> )
14	Describing chemical reactions, types of chemical reactions, chemical equations
15	Activity series, review and test on chemical equations ( <i>Chapter 8</i> )
16	Introduction to stoichiometry

## Second Semester

### Week

### Topics

#### Third Quarter

- 1 Ideal stoichiometric calculations, limiting reactants, percent yield
- 2 Stoichiometric problems, review and test on stoichiometry (*Chapter 9*), kinetic theory of matter, pressure
- 3 Boyle's, Charles's and Gay-Lussac's laws
- 4 Review and test on gas characteristics (*Chapter 10*), ideal gas law
- 5 Stoichiometry of gases, effusion and diffusion
- 6 Review and test on gas laws (*Chapter 11*), liquids and solids, changes of state
- 7 Water and its properties
- 8 Review and test on liquids and solids (*Chapter 12*), types of mixtures
- 9 The solution process, molarity and molality

#### Fourth Quarter

- 10 Calculations with solutions
- 11 Review and test on solutions (*Chapter 13*), ions in aqueous solutions
- 12 Dissociation and ionization, colligative properties, review and test on ions in aqueous solutions (*Chapter 14*)
- 13 Properties of acids and bases, acid-base theories
- 14 Acid base reactions, neutralization reactions
- 15 Hydronium ions, concept of pH
- 16 Titration techniques, review and test on acids and bases (*Chapters 15-16*)
- 17 Thermochemistry, driving force of reactions, activation energy, reaction rate
- 18 Reaction process, oxidation and reduction, redox reactions
- 19 Review and test on thermochemistry and redox reactions (*Chapters 17 and 19*)

### Grading

- 60% Tests and quizzes
- 25% Lab notebooks and lab reports
- 15% Homework/class participation

Tests will be given at the end of each major course unit or about every 2-3 weeks. Each unit test will count as 100 points toward the test/quiz grade. In addition to unit tests, quizzes will be given in the middle of some of the longer units. Quizzes will be weighted to count 20-40% of the value of a unit test.

Lab notebooks will be collected and graded at least once per quarter, primarily for completeness and adherence to the Ridgeview Classical Schools Lab Notebook Guidelines. Lab reports will be required for many lab experiments performed in class. Lab reports should follow the structure outlined at the end of this syllabus.

Homework will be assigned almost every day. Most homework assignments will require the student to answer questions – these assignments will be graded for correctness and completeness. In addition to written homework assignments, students will be required to read material from the text and from selected other sources. Students are expected to complete the reading assignments and be ready to participate in class discussions based on these assignments. Class participation will be partly evaluated on the student's ability to discuss key points covered in the reading assignments.

## **Lab Reports**

Some lab experiments will require submission of a formal lab report. Experiments requiring these reports will be specifically identified as the course proceeds. The formal lab reports should follow the following template. These lab reports are intended to be a brief (1 single spaced typed page) summary of the experiment performed by the student. Strive for conciseness and readability. Use tables and/or graphs to enable the reader to quickly understand your results. Include all sections on each report and label the sections. Each student is expected to turn in a report (no “team” reports).

Title – the name of the experiment performed. Normally this will be the name assigned in class and written in your lab notebook.

Introduction – explains the hypothesis you set out to test and why you and your class were asked to perform the experiment. It could include a summary of information you already know from previous studies and how that knowledge would be expanded, challenged or verified by doing the experiment. If appropriate it could include references to specific scientific laws or theories.

Materials and methods – provides a brief description of what you did. It should include a list of the materials and equipment used and a description of the experimental procedure. Provide enough detail that another student would be able to perform a similar experiment by referring to this section. Include the names of your lab partner(s) in this section.

Results - presents the key data gathered in the experiment. You don't need to include detailed data tables showing all your measurements – this should already be in your lab notebook. Just provide a summary of the data in the form of a simple table or graph. For example if you performed 5 trials and timed each trial, just include the average of the times. Explain how the results relate to the hypothesis you are testing.

Discussion – explains your interpretation of the results of the experiment. Did the experiment provide a valid test of your hypothesis? Did it support or refute your hypothesis? What were the likely sources of error? Include possible ways to minimize errors and improve the overall experimental process.

## **Text**

Davis, Metcalfe, Williams, Castka – *Modern Chemistry*  
Holt, Rinehart and Winston, 2002 edition

**Course materials and other requirements**

1. A basic scientific calculator such as a TI Model 30 that provides scientific notation and a square root function. (Additional functions are OK. A graphing calculator is not required.) Much of the course work will consist of solving problems. Students must bring their calculator to class every day.
2. Bound lab notebook. (Most students will use notebooks started in previous science classes.)
3. A Student Safety Contract read, understood and signed by the student and his/her parent or guardian. For everyone’s safety in the lab, terms of the safety contract will be strictly enforced. (please return this to Mr. Morse by September 7)
4. A copy of this course description sheet signed by the student and his/her parent or guardian, acknowledging having read it. (please return this to Mr. Morse by September 7)

**Signatures**

Each student and his/her parent or guardian is to sign this course description sheet, acknowledging having read it. Please return this page of the course description to Mr. Morse.

Additional copies of this course description are available on the Ridgeview Classical Schools website: [www.ridgeviewclassical.com](http://www.ridgeviewclassical.com).

---

Student signature

---

Parent/guardian signature