SYLLABUS AND POLICIES FOR AP CHEMISTRY 2

Mrs. LeGrone / Rooms 427 and 429

What is AP Chemistry?

This is an advanced placement course designed to prepare the student for AP Chemistry Research and Design and to take the AP Chemistry exam. The course covers the equivalent of one full year of college level General Chemistry, comparable to a first year course at a college or university. The course is a rigorous math-based course, with a strong laboratory component. It is intended for students who have demonstrated a willingness to commit considerable time to studying and completing assignments outside of class, and who have successfully completed a prior course in chemistry during high school.

The course will develop the student's ability to incorporate mathematical skills in the solution of chemistry problems, both through the use of textbook problems and laboratory activities. Significant emphasis will be placed on developing the student's ability to solve problems through dimensional analysis and estimation. Students will be required to do extensive writing, and to keep a thorough and accurate ongoing laboratory notebook.

Since passing the AP exam may qualify the student to by-pass a first-year college chemistry course, AP Chemistry should not be considered "college prep." Rather, this is a college class, with college level expectations for behavior, participation and effort.

PLEASE READ THIS!!!

AP Chemistry is not for those who just barely made it in Chemistry CP. If you made a **D** in Chemistry CP, you're probably not going to do well in AP Chemistry. If you made a **C** in Chemistry CP, you're going to have to work diligently to get up to speed and hang with us in this class. If you don't remember anything from Chemistry CP (or "we didn't learn *any*thing in Chemistry CP"), you've no business being in this class. I am serious about your commitment level in this class. I would venture to say that this is one of the most difficult classes offered at MGM. If you are not willing to give 200% and study EVERY night, you may need to seriously think about taking another class. I strive to teach this class like a college level class & do not tolerate any excuses like "this is too hard. We are just in high school. We're not college students." You are being warned now. For those of you planning to attend college, you may hate me over the course to this semester, but I promise that you will be eternally grateful that you stuck through it when you go to take college chemistry. The choice is yours…work hard now while your education of free, or work hard when you have to pay for your education.

A Word About Calculators

You *will* be bringing your calculator to class *every day*; this *isn't* an option. The preferred type of calculator for AP Chemistry is the Texas Instruments® TI-30. It's inexpensive (about $10 at Wal-Mart or Office Max/Depot), yet powerful enough to handle anything you'll encounter in AP Chemistry or Physics. Beware of the so-called "algebraic" calculators like the two-line TI-34 and larger Casio® calculators; they require a different problem-solving approach. Whichever calculator you use, it should be able to handle scientific notation (look for the **EE** or **EXP** key) and logarithms (look for the **log** key). A $3 credit-card-sized "four-banger" simply won't handle everything you're going to have to do in this course.

Brief Course Outline

We will be using the text Steven S. Zumdahl and Susan A. Zumdahl, Chemistry, Seventh Ed., Houghton Mifflin Co., Boston, 2000. These books are new and you will be held responsible for any damage incurred during the semester the book is assigned to you. Because of the fluidity of the school schedule – holidays, club schedules, assemblies, pep rallies, testing, etc. – it's impossible to give specific dates on which we'll address specific topics. I *can*, however, give you a rough outline of the topics we will cover and how we'll cover them.

WEEK 1	**Introduction, Safety, Intro Inquiry Activity, etc.** • COS - 1 • **Topics:** Significant digits, Lab Safety & Equipment, Scientific Method, Data Analysis, Dimensional Analysis	WEEK 11	**Gas Laws** • COS – 9 • **Topics:** pressure, volume, temperature, and number of particles in ideal gases using the kinetic theory to explain Boyle's, Charles's, Avogadro's, Gay-Lussac's, Dalton's and the Ideal Gas Law. • **Recommended AP Lab –** Determination of molar mass by vapor density • **Recommended AP Lab –** Determination of the molar volume of a gas

WEEK 2	**Atomic Theory & Classification of Matter** • COS –2, 3 • **Topics:** Calculate the number of protons, neutrons, electrons, and mass number of isotopes, identify the benchmark discoveries of the history of the atom, chemical/physical, heterogeneous/homogeneous, intensive/extensive, element/mixture/compound/pure substance, solid/liquid/gas, kinetic theory • **Recommended AP Lab –** Separation by chromatography	WEEK 12	**Acids & Bases** • COS – 11 • **Topics:** the nature and interactions of acids and bases using the Arrhenius, Bronsted-Lowry and Lewis theories, coordination complexes (amphoterism), calculate K_a, K_b, pH, pOH, pK, $[H^+]$, $[OH^-]$, common ion effect, buffers, and hydrolysis. • **Recommended AP Lab –** Standardization of a solution using a primary standard • **Recommended AP Lab –** Determination of concentration by acid=base titration, including a weak acid or a weak base • **Recommended AP Lab –** Determination of appropriate indicators for various acid-base titrations: pH determination • **Recommended AP Lab –** Preparation and properties pf buffer solutions
WEEK 3	**Electrons** • COS – 4, 5, 12 • **Topics:** Electromagnetic radiation, Quantum Mechanical Theory, electron configuration, periodic trends, VSEPR, shapes, bond angles, bond types (sigma & pi), polarity, hybridization, dipole moments, structural isomerism, and resonance structures of molecules and polyatomic ions • **Recommended AP Lab –** Colorimetric or Spectrophotometric analysis	WEEK 13	**Equilibrium** • COS – 14 • **Topics:** concepts of dynamic equilibria using the equilibrium constant (K_{eq}, Kp, Kc), LeChatelier's Principle • **Recommended AP Lab –** determination of the equilibrium constant for a chemical reaction
WEEK 4	**Nomenclature & Reactions** • COS – 6, 7, 16 • **Topics:** Nomenclature & formula writing, writing reactions, balancing chemical equations, classification of reactions, net ionic equations, solubility rules, activity series, bonding types: ionic, covalent, metallic, hydrogen bonding, van der Waals (including London dispersion forces) and relate bonding to states, structure, and properties of matter. • **Recommended AP Lab –** Determination of the formula of a compound • **Recommended AP Lab –** Determination of percentage of water in a hydrate	WEEK 14	**Thermodynamics** • COS – 13 • **Topics:** endothermic/exothermic, energy calculations, specific heat, entropy, enthalpy, 1st Law of Thermodynamics, the 2nd Law of Thermodynamics, calorimetry, Hess's Law, and the relationship of change in free energy to equilibrium constants and electrode potentials. • **Recommended AP Lab –** Determination of enthalpy change associated with a reaction
WEEK 5	**The Mole & Stoichiometry** • COS – 7 • **Topics:** The mole, stoichiometry, limiting reactants, percent yield, theoretical yield, empirical formulas, molecular formulas, percent composition • **Recommended AP Lab –** Determination of mass and mole relationship in a chemical reaction • **Recommended AP Lab –** Synthesis of a coordination compound and its chemical analysis	WEEK 15	**Kinetics** • COS – 15 • **Topics:** Factors affecting reaction rates, concept of the rates of chemical reactions, use of experimental data and graphical analysis to determine reactant order, rate constants, and reaction rate laws, the effect of temperature change on rates, energy of activation (the role of a catalyst), and the relationship between the rate determine step and the mechanism. • **Recommended AP Lab –** Determination of the rate of a reaction and its order
WEEK 6	**Solutions** • COS – 10 • **Topics:** preparation and properties of solutions including the solution preparation process, factors affecting solubility, concentration calculations, solubility, colligative properties, Raoult's law, K_{sp} expressions, and nonideal behavior. • **Recommended AP Lab –** Determination of molar mass by freezing point depression	WEEK 16	**Oxidation / Reduction** • COS – 7, 18 • **Topics:** Balancing oxidation/reduction reactions by oxidation number method, half reaction method acidic, and half reaction method basic, assigning oxidation numbers • **Recommended AP Lab –** Determination of concentration by oxidation reduction titration
WEEK 7	**Solids, Liquids, Gases** • COS – 17 • **Topics:** the motion of particles in liquids and solids from the kinetic-molecular theory using phase diagrams of one-component systems, changes of state, including critical points and triple points, and structure of solids with lattice energies. • **Recommended AP Lab –** Separation and qualitative analysis of cations and anions	WEEK 17	**Electrochemistry** • COS – 18 • **Topics:** electrolytic and galvanic cells, Faraday's laws, standard half-cell potentials, and the Nernst equation. • **Recommended AP Lab** – Determination of electrochemical series • **Recommended AP Lab** – Measurements using electrochemical cells and electroplating
WEEK 8	**Nuclear Chemistry** • COS – 8 • **Topics:** Types & properties of radiation, transmutation equations, half life, half life calculations, & chemical applications • **Recommended AP Lab –** Analytical gravimetric determination	WEEK 18	**Organic** • COS – 6 • **Topics:** nomenclature, basic atomic structure, basic functional groups • **Recommended AP Lab –** Synthesis, purification, and analysis of an organic compounds
WEEK 9	**Midterms**	WEEK 19	**Finals**

Topic Outline

The following list of topics for an AP course is intended to be a guide to the level and breadth of treatment expected rather than to be a syllabus. The percentage after each major topic indicates the approximate proportion of multiple-choice questions on the examination that pertain to the topic.

I. Structure of Matter (20%)

A. Atomic theory and atomic structure

1. Evidence for the atomic theory
2. Atomic masses; determination by chemical and physical means
3. Atomic number and mass number; isotopes
4. Electron energy levels: atomic spectra, quantum numbers, atomic orbitals
5. Periodic relationships including, for example, atomic radii, ionization energies, electron affinities, oxidation states

B. Chemical bonding

1. Binding forces
   a. Types: ionic, covalent, metallic, hydrogen bonding, van der Waals (including London dispersion forces)
   b. Relationships to states, structure, and properties of matter
   c. Polarity of bonds, electronegativities
2. Molecular models
   a. Lewis structures
   b. Valence bond: hybridization of orbitals, resonance, sigma and pi bonds
   c. VSEPR
3. Geometry of molecules and ions, structural isomerism of simple organic molecules and coordination complexes; dipole moments of molecules; relation of properties to structure

C. Nuclear chemistry: nuclear equations, half-lives, and radioactivity; chemical applications

II. States of Matter (20%)

A. Gases

1. Laws of ideal gases
   a. Equation of state for an ideal gas
   b. Partial pressures
2. Kinetic-molecular theory
   a. Interpretation of ideal gas laws on the basis of this theory
   b. Avogadro's hypothesis and the mole concept
   c. Dependence of kinetic energy of molecules on temperature
   d. Deviations from ideal gas laws

B. Liquids and solids

1. Liquids and solids from the kinetic-molecular viewpoint
2. Phase diagrams of one-component systems
3. Changes of state, including critical points and triple points
4. Structure of solids; lattice energies

C. Solutions

1. Types of solutions and factors affecting solubility
2. Methods of expressing concentration (The use of normalities is not tested.)
3. Raoult's law and colligative properties (nonvolatile solutes); osmosis
4. Non-ideal behavior (qualitative aspects)

III. Reactions (35-40%)

A. Reaction types

1. Acid-base reactions; concepts of Arrhenius, Brønsted-Lowry, and Lewis; coordination complexes; amphoterism
2. Precipitation reactions
3. Oxidation-reduction reactions
   a. Oxidation number
   b. The role of the electron in oxidation-reduction
   c. Electrochemistry: electrolytic and galvanic cells; Faraday's laws; standard half-cell potentials; Nernst equation; prediction of the direction of redox reactions

B. Stoichiometry

1. Ionic and molecular species present in chemical systems: net ionic equations
2. Balancing of equations including those for redox reactions
3. Mass and volume relations with emphasis on the mole concept, including empirical formulas and limiting reactants

C. Equilibrium

1. Concept of dynamic equilibrium, physical and chemical; Le Chatelier's principle; equilibrium constants
2. Quantitative treatment
   a. Equilibrium constants for gaseous reactions: Kp , Kc
   b. Equilibrium constants for reactions in solution
      (1) Constants for acids and bases; pK; pH
      (2) Solubility product constants and their application to precipitation and the dissolution of slightly soluble compounds
      (3) Common ion effect; buffers; hydrolysis

D. Kinetics

1. Concept of rate of reaction
2. Use of experimental data and graphical analysis to determine reactant order, rate constants, and reaction rate laws
3. Effect of temperature change on rates
4. Energy of activation; the role of catalysts
5. The relationship between the rate-determining step and a mechanism

E. Thermodynamics

1. State functions
2. First law: change in enthalpy; heat of formation; heat of reaction; Hess's law; heats of vaporization and fusion; calorimetry
3. Second law: entropy; free energy of formation; free energy of reaction; dependence of change in free energy on enthalpy and entropy changes
4. Relationship of change in free energy to equilibrium constants and electrode potentials

IV. Descriptive Chemistry (10-15%)

Knowledge of specific facts of chemistry is essential for an understanding of principles and concepts. These descriptive facts, including the chemistry involved in environmental and societal issues, should not be isolated from the principles being studied but should be taught throughout the course to illustrate and illuminate the principles. The following areas should be covered:

1. Chemical reactivity and products of chemical reactions
2. Relationships in the periodic table: horizontal, vertical, and diagonal with examples from alkali metals, alkaline earth metals, halogens, and the first series of transition elements
3. Introduction to organic chemistry: hydrocarbons and functional groups (structure, nomenclature, chemical properties).

V. Laboratory (5-10%)

The differences between college chemistry and the usual secondary school chemistry course are especially evident in the laboratory work. The AP Chemistry Examination includes some questions based on experiences and skills students acquire in the laboratory:

- making observations of chemical reactions and substances
- recording data
- calculating and interpreting results based on the quantitative data obtained
- communicating effectively the results of experimental work

Labs and Lab Fees

The AP Chemistry Examination includes some questions based on experiences and skills students acquire in the laboratory: making observations of chemical reactions and substances; recording data; calculating and interpreting results based on the quantitative data obtained; and communicating effectively the results of experimental work.

Meaningful laboratory work is important in fulfilling the requirements of a college-level course of a laboratory science and in preparing a student for sophomore-level chemistry courses in college. Because chemistry professors at some institutions ask to see a record of the laboratory work done by an AP student before making a decision about granting credit, placement, or both, in the chemistry program, students need to keep reports of their laboratory work that can be readily reviewed. In this class this will take the form of a permanent, bound laboratory notebook that will be turned in each time that a lab write up is due. More to come on the correct lab write up procedure.

We'll be doing about as more labs in AP Chemistry than we did in Chemistry CP – and they're frequently more involved than the ones in Chemistry CP. The lab activities will correlate with the topic(s) we're covering at the moment and, as I said earlier, have a nasty way of showing up on tests and exams.

Yes, there *is* a lab fee for AP Chemistry – it's $15 per student. This money goes toward purchasing materials that are used up during the course, usually chemicals and glassware. Any excess money is used for lab equipment maintenance and purchase (a single digital balance runs about $225, so it goes fast). Checks may be made payable to Mary G. Montgomery High School.

Yes, I am *still* an absolute tyrant in lab – more so than in Chemistry CP – and especially where safety is concerned. If a student is misbehaving in lab, disregarding the procedure, or otherwise endangering himself or others, I will not hesitate to remove him from the lab area. Depending on the severity of the infraction, I *may* or *may not* allow him back into the lab, at least for a while. More about lab safety in another handout …

We have a state-of-the-art chemistry classroom and lab, with excellent furniture, fixtures, and safety equipment. These facilities are there to be *used*, and we're going to use them in the ways they were *intended* to be used. Students who abuse the facilities – and I have a very broad definition of what constitutes "abuse" – will be sent to the office on a discipline referral. *Period*. End of discussion.

Assignments and Grading
Grades will be assigned according to the formula

Percentage = (points earned ÷ points possible) × 100

on the standard "90 – 100 = **A**" grading scale. Rounding is done according to standard rules.

Tests come at the end of a *topic*, usually every Friday. Tests count 100 points each and make up 60% of your grade. The remaining 40% of your grade will be made up of quizzes, homework, early work, and labs. Quizzes count 10 points and are given **every day** except test days. Lab activities count 50 points each. We will usually have lab on Thursdays. Homework assignments are worth 10 points each. Your homework grade is determined by how ***completely*** and ***accurately*** you do the assignment. You don't automatically get full points for simply having turned in a paper. You will be taking a CRT in Chemistry CP. This test will make up 20% of your quarter grade.

There will be *no* extra-credit assignments. The grades will *not* be scaled. You will get the grade you *earn*.

You may check STI Home for you grades; however, please understand that this is just s snapshot of your grade. It takes time for STI Home to update, so your actual grade may be different than what STI Home states.

Please look at the grade calculation handout at the back of this syllabus to determine how to calculate your grade.

Make-Up Work
If you miss a test, quiz, or class work, you will be assigned a grade of zero. If the work is not made up within 1 week, the grade of zero will become final. **It is YOUR responsibility to find out what you missed when you return.** I will not track you down to give you your assignments. You must get notes and assignments from a classmate; after a ***valid*** attempt at completing the work, I will be available after school to help you. You have three school days after your absence to schedule which day you will be making up your test or quiz. Failure to make arrangements will result in the forfeiture of your one-week time period, and the zero will stand. All class work and homework that must be made up is due within three school days. The time limit for make up tests is 2:38 on the following Friday. I will NOT stay after on Friday afternoons for you to make up a test.

I reserve the right to make make-up tests and quizzes different from the regularly scheduled test/quiz. While I will endeavor to make the degree of difficulty comparable to the original test/quiz, I am under no *obligation* to do so. It *is* to your benefit to take the tests and quizzes on the scheduled days.

If you are absent you may go to www.molecafe.com and get your assignments for the day. The lecture, homework, and any worksheets or handouts can be found there. Therefore, there is NO excuse for falling behind! If you have any problems with your homework, there is a link for a live chemistry tutor. You can access them Monday – Friday 3:00 pm to midnight.

Expectations
Besides yourself, there are a few things that you will be required to bring to class each and every day. These things include: your chemistry notebook, loose-leaf paper, a pencil, black pen, your lab notebook, your calculator, and your book. Failure to bring any of these items may result in a reduced grade for the day. **ALL class work must be done in pencil.** Absolutely *NO* class work will be accepted in pen. All lab notebooks must be done in black pen.

Parent Conferences
Parent conferences may be scheduled through the school office at **221-3153**, or at the midterm PTO meeting; impromptu conferences are strongly discouraged. However, I am available for conferences during my planning period. I may also be contacted through my e-mail address at teeda21@yahoo.com. Your parents may also contact me through school email, but please let them know that many emails are thrown out of the MCPSS email system. If you want to ensure that the email gets to me, use the yahoo email address. Because of privacy concerns, I *will not* discuss a student's performance via E-mail; this address will be strictly for scheduling conferences and answering any questions that you may have.

Class Rules

I have quite a few classroom rules. They are very simple and follow the guidelines in your student handbook. These rules are made to create an environment that will aid student learning. They are not intended to be restrictive of one's character or personality, but rather each student will develop his/her greatest potential.

1. When you enter the room, turn in your homework from the previous day and begin your early work without talking.

2. If you have parent notes, doctor's notes, or admit slips place them in the signature box. I will get them back to you sometime during the class.

3. You must bring your notebook, book, pencil, paper, and calculator everyday. Failure to bring even one of these items may result in a reduced grade.

4. You may NOT share calculators during a test. If I see you I will assume that you are cheating and you will receive a grade of zero.5. With the exception of turning in your work, do not leave your seat without permission.

6. You may bring a bottle of water to class; however, you will not be allowed to leave the classroom to go get water.

7. You may NOT leave my classroom to go anywhere else (another teacher, guidance, the office…) unless you are requested either in writing or called over the intercom and then, your work must be completed in order for you to leave. This is AP Chemistry. You need to be in this class!

8. Please refrain from any disrespectful gestures or remarks in this class. This includes eye rolling and any improper language.

9. When in lab, if I start talking you are to immediately become silent. I am probably trying to tell you something important about the lab that involves either your safety or your grade.

10. Do not be even one second late for this class. You are to be in your seats when the bell rings.

11. You will come to class in proper uniform. This includes the appropriate shoes, backpack, shirt tails tucked in, and NO cell phones.

12. You are not to get out of you seat until you are dismissed. I will not hold you late, but I will also not let you congregate around the door or the desks. I may have some important closing information that I need you to hear.

13. Once you are done with you class work, you are to remain quiet at your desk. Do not start talking to those around you. Be respectful of the fact that others may not be done with their work.

14. You may NOT eat anything or chew gum in this class. Gum has a nasty way of ending up under the desks & food tends to attract roaches.

Consequences

There will be consequences for violating the school policies and procedures. Remember, it is your responsibility to know these policies and procedures, and when you violate them I presume it is a choice that you have made knowing that there are consequences that will follow. The basic consequences are outlined below; these pertain to all class A offences. Any offences of class B or C nature will result in a written disciplinary referral and the student will be sent to the office.

1st offense – T/S conference / verbal warning
2nd offense – T/S conference / written behavioral essay, returned and signed by parents
3rd offense – referral to guidance with explanation of infractions
4th offence – disciplinary referral, student is sent to office with documentation of prior offenses

Note: Failure to return an essay with a parent signature is classified as "deliberate disobedience" a class B offense. Please refer to the student handbook for other possible consequences.

Survival Tips

- Keeping up with class notes and assignments is crucial.
- AP Chemistry is a *cumulative* course; that is, if you get lost at any point, chances are your grades will suffer from that point onward.
- This course is designed for college-bound students and is an honors course, and I strive to teach it that way as much as possible. If you think *I'm* moving too fast or boring you to tears, wait 'til you get to college!
- Don't be afraid to ask questions – that's why I'm here. On the other hand, don't expect me to *give* you an answer – I'll ask leading questions that will help you figure out the answer for yourself.

Mary G. Montgomery High School Category Points Grading Scale

Tests 60%
Test grades will include: _____*tests*_____

Other grades 40%
Other grades will include: ____*early work, homework, quizzes, labs*_____

Example grade calculation for Category Points

Tests (60%)	Earned	Possible
Test 1	97	100
Test 2	82	100
Test 3	57	100
Project 1	40	50
Project 2	20	50
	296	400

To get your test average, add up all of your earned points and divide by the possible points.
296 points ÷ 400 points = 74.0 average

Other (40%)	Earned	Possible
Homework 1	60	75
Class work 1	88	100
Quiz 1	70	100
Homework 2	45	50
Homework 3	8	20
	271	345

To get your "other" average, add up all of your earned points and divide by the possible points.
271 points ÷ 345 grades = 78.6 average

To get your class average, take your test average and multiply by 0.6. Then take your other average and multiple by 0.4. Lastly add those two numbers together. This is your class average.

74.0 x 0.6 = 44.4
78.6 x 0.4 = 31.44

Average = 75.84 (Quarter Net Average)

This is your average going into the CRT (also called QNA). To get your grade after the CRT you take your QNA and multiply it by 4. Then you add your CRT grade. Finally, you divide that number by 5. This is your final quarter average.

For example, you have a 75.84 going into the CRT and you make a 65 on the CRT.
(75.84 x 4) + 65 = 368.36

Now divide by 5…
368.36 ÷ 5 = 73.67
This is your final quarter average.

Final Quarter Grade = 74

AP Chemistry syllabus signature form

Both you and *your parents* should read this syllabus and sign it. Return this page to me no later than **August 15th**, and place the rest in your notebook.

Student Name _____

I/we have read the above syllabus and understand the expectations of the class. I will keep this syllabus in the front of my notebook and use it as a guide throughout the semester. A parent and I have signed this syllabus as a statement of accepting the challenges and responsibilities of this class in order to achieve my greatest academic potential.

Student signature _____ Date _____

Parent signature _____ Date _____