To: AP Chemistry Student
From: Ms. Dandridge, AP Chemistry Teacher
Date: June 1st, 2017
RE: Summer Assignment and Course Syllabus

Dear Student,

Thank you for registering AP Chemistry for the 2017-2018 school year! I am looking forward to being your teacher and offering you a more in-depth and broader perspective of the subject of chemistry. We will work fast and hard so that we can accomplish what is set forth in the syllabus with the ultimate goal of the AP exam in May. Each chapter covered will take 5 to 10 days to complete. Choosing not to do this work ahead of time will hinder your success in the class. Each chapter will have a quiz to check your skills and understanding. At the culmination of each unit there will be an exam that will encompass all chapters within the prescribed unit. This course also consists of several laboratory investigations that may require additional time, outside of school, for you to finish. Each lab will have an accompanying lab report or assessment.

In order to prepare for the exam, a topic-outlined calendar will be followed. Please keep this for reference throughout the school year. You are expected to stay ahead of the material and have it completed on time. As you know from this year, chemistry is a cumulative course – you can't go from one chapter to the next without using material from before!

Please check out the AP Chemistry text book (*Chemistry: A Molecular Approach*, AP* Edition, Third Edition. Tro, Nivaldo) before the last day of school. It is **highly** encouraged that you purchase an AP Exam Study Guide book. I recommend one that offers you a summary of each section/chapter and that allows you the chance to problem solve through both multiple choice style questions and free response within the realm of that specific content summarized. In addition, the study guide book should offer you 1 – 2 complete practice exams which we will utilize later in the year. Make sure that your review book is for the NEW test – it was revised for the 2013-2014 school year.

If you have any questions, please don't hesitate to stop by my room, C141 or email me at ldandridge@everettsd.org

I look forward to seeing you in the fall!

Lauren Dandridge

AP Chemistry
Ms. Dandridge
Jackson High School, C141
2017-2018

Prerequisites:

- **Chemistry** (a minimum grade of C+ is recommended, or recommendation from a science teacher; waived with teacher approval)
- **Algebra II with Trigonometry** (a minimum grade of C+ is recommended, or a recommendation from a math teacher)
  Note: It is the student's responsibility to determine whether or not the college(s) the students wishes to attend will accept the AP credits.

Textbook and Reference Materials:

1. *Chemistry: A Molecular Approach*, AP* Edition, Third Edition. Nivaldo J. Tro. Upper Saddle River, NJ: Pearson Education/Prentice Hall, Inc.
2. *****_Vernier Chemistry Investigations for Use with AP Chemistry_. Jack Randall, Melissa Hill, and Elaine Nam
3. *_POGIL for AP Chemistry_, Laura Trout, ed. Flinn Scientific.

Note: Additional labs come from multiple sources and some are teacher-generated. Online resources are used for research, simulations, animations, models, and online tutorials and reviews.
**I will supply all lab-handouts for this course – you will not need to purchase these items separately.*

Materials Required:

- Pens (blue/black/red)
- Pencils
- Graphing Calculator
- Two notebooks
  - Lab notebook: bound composition book with gridded paper
  - Spiral or composition book for notes and in-class assignments
- Highlighter

AP CHEMISTRY CURRICULUM:

Big Ideas and Science Practices

This AP Chemistry course is designed to be the equivalent of a two semester college introductory chemistry course usually taken by chemistry majors during their first year. This is a science course that focuses on advanced, key concepts and topics, not typical of general high school chemistry. These concepts are placed in the broader context of six conceptual themes, or Big Ideas as outlined by The College Board:

1. All matter is composed of atoms. The chemical elements are fundamental building materials of matter, and all matter can be understood in terms of arrangements of atoms. These atoms retain their identity in chemical reactions.
2. Chemical and physical properties of materials can be explained by the structure and the arrangement of atoms, ions, or molecules and the forces between them.
3. Chemical reactions and changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.
4. Rates of chemical reactions are determined by the details of particle collisions.
5. The laws of thermodynamics describe the essential role of energy and explain and predict the direction of physical and chemical changes in matter.
6. Any bond or intermolecular attraction that can be formed can be broken. These two processes are in a dynamic competition, sensitive to initial conditions and external perturbations. Equilibrium represents a balance between enthalpy and entropy for physical and chemical changes.

Each Big Idea is broken down into Key Science Practices detailing the learning targets for the course. This syllabus describes the Big Ideas and Science Practices associated with each chapter and section. Within the schedule grid, these connections will be referenced by the following notation, (BI: Big Idea, SP: Science Practice)

AP Chemistry places a strong emphasis on students making connections across the Science Practices and Big Ideas. Students also make connections through advanced laboratory experiences designed to further develop important science process and application skills, including experimental design, manipulation of variables, data interpretation, statistical analysis, and operation of technical equipment. The goal is to provide students with the conceptual framework, factual knowledge, and analytical skills necessary to deal critically with the science of chemistry. This is a demanding but rewarding course, covering a large amount of material at a fast pace.

Course Overview and Grading:

This course is designed to provide a thorough, first-year university chemistry experience. Students will be required to demonstrate problem-solving skills in both written work and laboratory work. Labs will serve as supplements to concepts covered in lecture with a heavy emphasis on data analysis and interpretation. Because this is a second-year chemistry course, students entering should have a solid understanding of the following concepts:

- Mass-mole relationships
- Atomic structure
- Stoichiometry
- Intra- and intermolecular forces
- Physical Behavior of Gases
- Atomic Theory
- Solution chemistry

Although these topics will be covered in detail, students should anticipate a quicker pace for review topics, so that newer concepts can be taught at a greater depth. Concepts covered include all of the above and:

- Reaction kinetics
- Chemical equilibrium
- Thermodynamics
- Oxidation-Reduction and Electrochemistry
- pH and Acid-Base Equilibrium
- Materials Chemistry
- Organic Chemistry
- Transition Metal Chemistry
- Biochemistry

Each chapter in the AP Chemistry textbook will be covered at a rate of one chapter every five to seven days. Students will be assigned various homework problems (online) and practice worksheets that must be completed on time. Each Friday, students will be quizzed on the week's essential learnings. Students should expect an exam at the end of every unit (every two to three weeks).

Students will be graded using the following weighted percentages: Notes (5%), Homework (10%), Labs and Projects (25%), Quizzes (25%), and Tests (35%). Students' final grades will be determined according to the following grading scale:

Letter Grade	Grade Point	Percent	Letter Grade	Grade Point	Percent
A	4.0	93.0 – 100.0	C	2.0	74.0 – 76.9
A-	3.7	90.0 – 92.9	C-	1.7	70.0 – 73.9
B+	3.3	87.0 – 89.9	D+	1.3	67.0 – 69.9
B	3.0	84.0 – 86.9	D	1.0	64.0 – 66.9
B-	2.7	80.0 – 83.9	D-	0.7	60.0 – 63.9
C+	2.3	77.0 – 79.9	F	0.0	0.0 – 59.9

Notes (5%)

It is expected that all students will do the assigned reading before the class section in which the material is covered. Notes will be checked frequently, but not every day. There is no late credit for notes except in the case of excused absences. Do your notes on time so that you are prepared for interactive problem solving in class.

Homework (15%)

Each chapter includes a variety of both in-class, online, and at-home practice problems. Most of this work will be assigned online via MasteringChemistry. Completion of work in a timely manner is an essential skill that all college-bound students must develop.

Labs and Projects (20%)

Throughout AP Chemistry, students will be conducting laboratory investigations as a way to explore and explain various concepts being studied. Students will be engaged in some form of laboratory work no less than 25% of the time. Each lab activity is intended to both challenge and extend the students' knowledge of chemical concepts. A prelab assignment (including flow chart) is due prior to the start of ALL labs. Analysis (including calculations) and post-lab discussions will usually be completed in class following the activity. Lab quizzes will be open (lab) notebook, and will test your ability to analyze lab data and apply lab principals to other situations. End of year projects will also go into this portion of your grade.

Quizzes (25%)

At the end of each chapter, a quiz will be given to check your mastery of that chapter's content. Quizzes can be corrected for half of the missed points back. Quiz corrections will be due the one week from when the quiz was taken.

Exams (35%)

Exams are given as a culmination at the end of a unit of study. It is expected that students continually study and prepare themselves for assessments. **IF** a student has all of their homework finished on time throughout the course of a unit, they are eligible for an exam retake.

Course Expectations:

Students will meet for one 55-minute period each day (43 minutes on LIF days). Most lab work can be completed during the normal class period, but on occasion, some labs may require students to stay after school or come in during lunch to complete laboratory investigations. Assigned readings, videos and other homework should be completed before class. I expect students to work independently and collectively both at home and at school. In our experience, real science happens when ideas are shared collectively so that all group members can benefit from independent genius. Attendance is a critical component to success in this class. Each absence creates a deficit in students' knowledge that is hard to replicate. Please make all possible effort to be in class and on time.

All students will receive frequent formative feedback to inform them of their progress toward meeting the learning targets of the lesson, and the 6 Big Ideas in AP Chemistry. Adaptive Learning questions will automatically be assigned to struggling students as a way to reinforce and reteach specific concepts the student had difficulty answering through Mastering Chemistry. The teacher will also provide access to online videos and tutorials for all students to use for extra support outside of the classroom. Students who are showing significant struggles with the content will be invited to meet with the teacher to help clarify any misconceptions.

AP Chemistry Exam Preparation:

Students will be given opportunities toward the end of the year to take Practice AP Examinations. In addition to these two separate practice exam sessions, students will be given multiple AP Released items in each chapter. These opportunities will be frequent enough so that students will be familiar with the level and types of questions asked on the AP Examination. These preparatory experiences will be frequent and varied in format. Students will engage in timed exercises, multiple-choice practice, and both calculator and non-calculator extended response questions. In addition to this guided preparation, it is strongly encouraged that students purchase and AP Chemistry review book to review and practice throughout the school year. After the AP Chemistry exam, students will participate in learning opportunities with a focus on Engineering and Design, and Advanced Lab activities with a focus on development of 21st century skills.

H. M. Jackson High School AP Science Programs
Full Value Contract

The Full Value Contract is a mutual contract between the students, parents, and teachers that defines the following expectations to be upheld by each member of the class and his/her support network at home:

In-Class Expectations

- Adhere to all safety guidelines and class rules.
- Agree to receive feedback and work toward changing unproductive/inefficient behavior and work practices when needed.
- Pay attention. Listen to what others say and focus on their ideas.
- Come to class daily and arrive on time.
- Put away all electronic devices for entertainment purposes to minimize distractions.
- Complete test re-takes prior to the next unit test and only if you have had all your homework completed and checked off by the initial test date.
- Grow as a learner of science and as a critical thinker
- If absent on a test day, you will be expected to take the test during class on the day you return.
- Have FUN!

Outside of Class Expectations

- Do all assignments as assigned/study every night
  - Do review packets, practice tests and worksheets for each test
  - There will be very few opportunities for extra credit; there no extensions for extra credit completion
- Use the textbook as a resource to complete assignments
- Study in groups or with a partner for each unit test
- Use the internet as a resource for learning, not a source of answers for a quick grade
  - Watch online videos that explain concepts if did not fully understand them based on what was learned in class and read in the textbook
- Seek help from the teacher immediately if you do not understand a concept presented in class
- Check grades biweekly
  - Have a conversation with parents/guardians biweekly to explain grade status based on work/preparation and resultant success.
- Use an "AP study guide book" as a resource for learning in conjunction with your textbook and not as a sole resource
- Go to after school study sessions and Saturday review sessions when scheduled.
- Grow as a learner of science and as a critical thinker
- Have FUN!

_____ _____

Signature of Student Date Printed name of Student

_____ _____

Signature of Parent/Guardian Date Printed name of Parent/Guardian

_____ Lauren Dandridge

Signature of Teacher Date Printed name of Teacher

Student Safety Contract
Laboratory and Safety Rules

1. **Dress code**
   a. Goggles are required anytime chemicals, heat, or glassware are in use.
   b. Shoes must be closed-toed anytime chemicals, heat or glassware are in use.
   c. Students with bare midriffs, tank tops, and/or excessively low-cut tops will not be allowed to participate in laboratory activities.

2. **General behavior and student responsibilities concerning the laboratory**
   a. Students are not allowed in the lab without a teacher being present.
   b. Be familiar with the location of the nearest fire extinguisher, safety shower, and eye-wash station. Notify your teacher immediately of any unsafe conditions.
   c. Be prepared for your work in the laboratory. Read and understand all procedures thoroughly before entering.
   d. Never fool around in the laboratory. Horseplay, practical jokes, and pranks are dangerous and prohibited.
   e. Do not sit or lean on lab stations/benches.
   f. Food and drink are not allowed in the lab; never taste anything in the lab without first being instructed to do so.
   g. Cell phones, radios, headphones are prohibited.

3. **Conduct during laboratory activities**
   a. Notify your teacher of any injury, however slight.
   b. Immediately report an accident or chemical spill to your instructor.
   c. Follow disposal instruction; when in doubt ask, do not assume it is okay to pour chemicals down the sink.
   d. Replace lids and caps on all reagent bottles and waste containers immediately after use.
   e. Do not leave warming substances unattended. Turn off and unplug any hotplate or burner when not in use.
   f. Clean up your workstation after the lab activity has been completed.

I have read all of the above rules and will be held responsible for them. I understand that I may be required to take and pass a quiz on these rules.

_____ _____

Student Name (please print) Student Signature & Date

By my signature, I attest that I have read the student safety contract and will instruct my son/daughter to uphold his/her agreement to follow the rules contained therein.

_____ _____

Parent Name (please print) Parent Signature & Date

Chapter & Big Ideas [BI]	Topics & Learning Objectives [LO]	Labs/Activities & Science Practices [SP]
Chapter 1: Matter Measurement & Problem Solving [BI: 1, 2, 3]	1.1 Atoms and molecules 1.2 Scientific approach to knowledge [LO 1.13, 1.16, 1.17] 1.3 Classification of matter [LO 1.17, 3.1] 1.4 Physical and chemical changes and physical and chemical properties [LO 1.17, 3.1, 3.2, 3.10] 1.5 Energy: A fundamental part of physical and chemical change [LO 3.10] 1.6 Units of measurement 1.7 Reliability of measurements 1.8 Solving chemical problems	**Summer Homework**
Chapter 2: Atoms & Elements [BI: 1,2,3]	2.1 Imaging and moving individual atoms 2.2 Early ideas about the building blocks of matter 2.3 Modern atomic theory and the laws that led to it [LO 1.12, 1.13, 3.5, 3.6] 2.4 The discovery of the electron [LO 1.12, 1.14] 2.5 The structure of the atom [LO 1.1,1.13] 2.6 Subatomic particles: Protons, neutrons and electrons [LO 1.1] 2.7 Finding patterns: The periodic law and the periodic table [LO 1.1] 2.8 Atomic mass [LO 1.1, 1.4, 1.14, 1.18] 2.9 Molar mass [LO 1.4, 1.18]	**Summer Homework**
Chapter 3: Molecules, Compounds and Chemical Equations [BI: 1, 2, 3]	3.1 Hydrogen, oxygen, and water 3.2 Chemical bonds [LO 2.1] 3.3 Representing compounds: Chemical formulas and molecular models [LO 1.18, 2.1] 3.4 An atomic-level view of elements and compounds [LO 1.18, 2.1] 3.5-3.7 IUPAC Nomenclature [LO 1.18, 2.1] 3.8 Formula mass and the mole concept for compounds [LO 1.4, 1.18] 3.9 Composition of compounds [LO 1.1, 1.2, 1.4, 1.18] 3.10 Determining a chemical formula from experimental data [LO 1.1, 1.2, 1.4, 1.18] 3.11 Writing and balancing chemical equations [LO 1.4, 1.18, 3.1, 3.2 3.3 3.4]	**Summer Homework**
Chapter 4: Chemical Reactions and Aqueous Reactions [BI: 1,2,3] (3 weeks)	4.1 Climate change and the combustion of fossil fuels 4.2 Reaction stoichiometry: How much carbon dioxide? [LO 1.17, 3.3, 3.4, 3.10] 4.3 Limiting reactant, theoretical yield, and percent yield from initial reactant masses [LO 3.3, 3.4, 3.10] 4.4 Solution concentration and solution stoichiometry [LO 2.2, 2.9, 3.10] 4.5 Types of aqueous solutions and solubility [LO 2.1, 2.2, 2.9, 3.10] 4.6 Precipitation reactions [LO 3.1, 3.2, 3.10]	**AP Lab #1: Investigating Food Dyes in Sports Beverages** **AP Lab #3: Investigating Water Hardness (INQUIRY)**

	4.7 Representing aqueous reactions: molecular, ionic and complete ionic equations [LO 2.2, 3.1, 3.2, 3.10] 4.8 Acid-base and gas-evolution reactions [LO 1.20, 2.2, 3.1, 3.2, 3.3, 3.4, 3.7, 3.10] 4.9 Oxidation-reduction reactions [LO 3.2, 3.3, 3.4, 3.8, 3.10]	**AP Lab #4: The Acidity of Juices and Soft Drinks**
Chapter 5: Gases [BI: 2, 3] (1 week)	5.1 Breathing: putting pressure to work 5.2 Pressure: the result of molecular collisions 5.3 The simple gas laws [LO 2.4, 2.6, 3.1] 5.4-5.5 The ideal gas law [LO 2.4, 2.5, 2.6, 2.15] 5.6 Mixtures of gases and partial pressures [LO 2.4, 2.5] 5.7 Gas stoichiometry [LO 2.4, 2.5, 3.3, 3.4] 5.8 Kinetic molecular theory: A model for gases [LO 2.4, 2.5] 5.9 Mean free path, effusion and diffusion of gases [LO 2.4, 2.5] 5.10 Real gases: The effects of size and intermolecular forces [LO 2.4, 2.5]	**No Lab**
Chapter 6: Thermochemistry [BI: 3, 5] (2 weeks)	6.1 Chemical hand warmers [LO 3.11, 5.2, 5.3, 5.4, 5.6] 6.2 The nature of energy: Key definitions [LO 3.11, 5.2, 5.3, 5.4, 5.6] 6.3 The first law of thermodynamics [LO 3.11, 5.2, 5.3, 5.4, 5.5, 5.6] 6.4 Quantifying heat and work [LO 3.11, 5.2, 5.3, 5.4, 5.4, 5.5, 5.6] 6.6 Enthalpy: The heat evolved in a chemical reaction at constant pressure [LO 3.11, 5.6, 5.7, 5.8] 6.7 Constant-pressure calorimetry: Measuring ΔH_{rxn} [LO 5.4, 5.6, 5.7, 5.8] 6.8 Relationships involving ΔH_{rxn} [LO 5.4, 5.6, 5.8] 6.9 Determining enthalpies of reaction from standard enthalpies of formation [LO 5.6, 5.8] 6.10 Energy use and the environment	**AP Lab #12: Designing a Hand Warmer (INQUIRY)**
Chapter 7: The Quantum Mechanical Model [BI: 1] (1 week)	7.1 Schrodinger's cat [LO 1.6] 7.2 The nature of light [LO 1.15] 7.3 Atomic spectroscopy and the Bohr model [LO 1.6, 1.9, 1.10, 1.12, 1.13, 1.15] 7.4 The wave nature of matter: the de Broglie wavelength, and uncertainty principle [LO 1.6, 1.9, 1.10, 1.12, 1.13, 1.15] 7.5 Quantum mechanics and the atom [LO 1.6, 1.9, 1.10, 1.12, 1.13, 1.15] 7.6 Shapes of atomic orbitals [LO 1.6, 1.9, 1.10, 1.12, 1.13, 1.15]	**AP Lab #2: Percent Copper in Brass**
Chapter 8: Periodic Properties of the Elements [BI: 1,2,5] (2 weeks)	8.1 Nerve signal transmission [LO 1.6, 1.13] 8.2 The development of the periodic table [LO 1.6, 1.7, 1.9, 1.10, 1.13] 8.3 Electron configurations: How electrons occupy orbitals [LO 1.6, 1.7, 1.8, 1.9, 1.10, 1.12, 1.13, 2.14, 2.23, 2.24, 5.1, 5.8] 8.4 Electron configurations, valence electrons and the periodic table [LO 1.6, 1.7, 1.9, 1.10, 1.12, 1.13]	**AP Lab #7: Investigating the Purity of a Mixture**

	8.5 The explanatory power of the periodic table [LO 1.6, 1.7, 1.9, 1.10, 1.13] 8.6 Periodic trends in the size of atoms and effective nuclear charge [LO 1.6, 1.7, 1.9, 1.10, 1.13] 8.7 Ions: Electron configurations, magnetic properties, ionic radii and ionization energy [LO 1.6, 1.7, 1.9, 1.10, 1.13] 8.8 Electron affinities and metallic character [LO 1.6, 1.7, 1.9, 1.10, 1.13] 8.9 Some examples of periodic behavior [LO 1.7, 1.9, 1.10, 1.11]	
Chapter 9: Chemical Bonding I: The Lewis Model **[BI: 2,5]** **(2 weeks)**	9.1 Bonding models and AIDS drugs 9.2 Types of chemical bonds [LO 2.17, 2.18, 2.23, 2.28, 2.31, 2.32] 9.3 Representing valence electrons with dots [LO 2.17, 2.18, 2.31, 2.32] 9.4 Ionic Bonding: Lewis notation and lattice energies [LO 2.17, 2.18, 2.19] 9.5 Covalent bonding: Lewis structures [LO 2.17, 2.18, 5.1] 9.6 Electronegativity and bond polarity [LO 2.17, 2.18, 2.21, 5.1] 9.7 Lewis structures of molecular compounds and polyatomic ions [LO 2.21] 9.8 Resonance and formal charge [LO 2.18, 2.21] 9.9 Exceptions to the octet rule [LO 2.21] 9.10 Bond energies and bond lengths [LO 2.21, 5.1, 5.8] 9.11 Bonding in metals [LO 2.2]	**AP Lab #6: Investigating the Contents of an Unlabeled Container**
Chapter 10: Chemical Bonding II: Molecular Shapes, Valence Bond Theory and Molecular Orbital Theory **[BI: 2]** **(1 week)**	10.1 Artificial sweeteners: Fooled by molecular shape 10.2 VSEPR theory: The five basic shapes [LO 2.21] 10.3 VSEPR theory: The effect of lone pairs [LO 2.21] 10.4 VSEPR theory: Prediction molecular geometries [LO 2.21] 10.5 Molecular shape and polarity [LO 2.21] 10.6 Valence bond theory: Orbital overlap as a chemical bond [LO 2.21] 10.7 Valence bond theory: Hybridization of atomic orbitals [LO 2.21]	**AP Lab #9: Investigating the Components of a Commercial Tablet**
Chapter 11: Liquids, Solids, and Intermolecular Forces **[BI 2,6]** **(1 week)**	11.1 Climbing Geckos and IMFs [LO 2.23, 2.24, 5.9, 5.10] 11.2 Solids, Liquids, and Gases: A molecular comparison [LO 2.1, 2.3, 2.12, 2.13, 2.19, 2.23, 2.24, 2.25, 2.26, 2.27, 2.28, 2.29, 2.30, 2.31, 2.32, 5.9, 5.10] 11.3 MFs: The forces that hold condensed states together [LO 2.1, 2.3, 2.12, 2.13, 2.19, 2.23, 2.24, 2.25, 2.26, 2.27, 2.28, 2.29, 2.30, 2.31, 2.32, 5.9, 5.10, 5.11] 11.4 IMFs in Action: Surface tension, viscosity, and capillary action [LO 5.9, 5.10] 11.9 Water: An extraordinary substance [LO 5.9, 5.10] 11.12 Crystalline solids: The fundamental types [LO 2.3]	**AP Lab #5: Separating Molecules (INQUIRY)**
Chapter 12: Solutions Theory **[BI: 2, 6]** **(1 week)**	12.1 Thirsty solutions: Why you shouldn't drink seawater 12.2 Types of solutions and solubility [LO 2.8] 12.3 Energetics of solution formation [LO 6.24] 12.4 Solution equilibrium and factors affecting solubility 12.5 Expressing solution concentration [LO 2.9]	

Chapter 13: Chemical Kinetics **[BI: 4]** **(2 weeks)**	13.1 Catching Lizards [LO 4.1, 4.2, 4.3] 13.2 The Rate of a Chemical Reaction [LO 4.1, 4.2, 4.3, 4.4] 13.3 The Rate law: The effect of concentration on reaction rate [LO 4.1, 4.2, 4.3, 4.4] 13.4 The Integrated rate Law: The dependence of concentration on time [LO 4.1, 4.2, 4.3, 4.4] 13.5 The effect of temperature on reaction rate [LO 4.1, 4.2, 4.3, 4.4, 4.5, 4.6] 13.6 Reaction mechanisms [LO 4.7] 13.7 Catalysis [LO 4.8, 4.9]	**AP Lab #10: The Effect of Acid Rain on Marble Structures** **AP Lab #11: Kinetics of Crystal Violet Fading**
Semester Break		
Chapter 14: Chemical Equilibrium **[BI: 6]** **(2 weeks)**	14.1 Fetal hemoglobin and equilibrium [LO 6.1] 14.2 The concept of dynamic equilibrium [LO 6.1, 6.6, 6.7] 14.3 The equilibrium constant (K) [LO 5.17, 6.2, 6.4, 6.6, 6.7] 14.4 Expressing the equilibrium constant in terms of pressure [LO 6.2, 6.4, 6.6, 6.7] 14.5 Heterogeneous equilibria: Reactions involving solids and liquids [LO 6.2, 6.4, 6.6, 6.7] 14.6 Calculating the equilibrium constant from measured equilibrium concentrations [LO 6.4, 6.5, 6.6, 6.7] 14.7 The reaction quotient: Predicting the direction of change [LO 6.4, 6.7] 14.8 Finding equilibrium concentrations 14.9 Le Châtelier's principle: How a system at equilibrium responds to disturbances [LO 6.8, 6.9, 6.10]	**AP Lab #13: Applications of Le Chatelier's Principle (INQUIRY)**
Chapter 15: Acids and Bases **[BI: 2,6]** **(2 weeks)**	15.1 Heartburn [LO 6.11, 6.12, 6.15, 6.16, 6.19] 15.2 The nature of acids and bases [LO 6.11, 6.12, 6.15, 6.16, 6.19] 15.3 Definitions of acids and bases [LO 6.11, 6.12, 6.15, 6.16, 6.19] 15.4 Acid strength and the acid ionization constant (K_w) [LO 2.2, 6.7, 6.11, 6.12, 6.15, 6.16, 6.19] 15.5 Autoionization of water and pH [LO 6.14, 6.15, 6.16] 15.6 Finding the [H_3O^+] and pH of strong and weak acid solutions [LO 6.15, 6.16] 15.7 Base solutions [LO 6.11, 6.12, 6.15, 6.16] 15.8 The acid-base properties of ions and salts [LO 6.15, 6.16] 15.9 Polyprotic acids 15.10 Acid strength and molecular structure [LO 6.15, 6.16]	**AP Lab #14: Acid-Base titrations (INQUIRY)**
Chapter 16: Aqueous Ionic Equilibrium **[BI: 6]** **(2 weeks)**	16.1 The danger of antifreeze [LO 6.13, 6.15, 6.16, 6.18, 6.20] 16.2 Buffers: Solutions that resist pH change [LO 6.1, 6.11, 6.12, 6.13, 6.15, 6.16, 6.20] 16.3 Buffer effectiveness: Buffer range and buffer capacity [LO 6.13, 6.15, 6.16, 6.20] 16.4 Titrations and pH curves [LO 6.11, 6.12, 6.13, 6.15, 6.16, 6.20]	**AP Lab #15: Buffers in Household Products**

	16.5 Solubility equilibria and the solubility product constant K_{sp} and molar solubility [LO 6.21,6.22, 6.23] 16.6 Precipitation [LO 6.2, 6.21, 6.22, 6.23] 16.7 Qualitative chemical analysis [LO 6.21, 6.22, 6.23]	**AP Lab #16: Properties of Buffer Solutions (INQUIRY)**
Chapter 17: Free Energy and Thermodynamics [BI: 5] (2 weeks)	17.1 Nature's heat tax [LO 5.13, 5.18] 17.2 Spontaneous and nonspontaneous processes [LO 5.13, 5.18] 17.3 Entropy and the 2nd law of thermodynamics [LO 5.13, 5.18] 17.4 Heat transfer and changes in the entropy of the surroundings [LO 5.12, 5.13, 5.18] 17.5 Gibbs free energy [LO 5.12, 5.13, 5.14, 5.18] 17.6 Entropy changes in chemical reactions: Calculating ΔS^{o}_{rxn} [LO 5.12, 5.13, 5.14, 5.18] 17.7 Free energy changes in chemical reactions: Calculating ΔG^{o}_{rxn} [LO 5.12, 5.13, 5.14, 5.15, 5.16, 5.18] 17.8 Free energy ehanges for nonstandard states: The relationship between ΔG^{o}_{rxn} and ΔG_{rxn}[LO 5.12, 5.13, 5.18] 17.9 Free energy and equilibrium: Relating ΔG^{o}_{rxn} to the equilibrium constant (K) [LO 5.12, 5.13, 5.18]	**No Lab**
Chapter 18: Electrochemistry [BI: 3, 5] (2 weeks)	18.1 Pulling the plug on the power grid [LO 3.8] 18.2 Balancing oxidation-reduction equations [LO 3.8] 18.3 Voltaic (or Galvanic) cells: Generating electricity from spontaneous chemical reactions [LO 3.1, 3.8, 3.12] 18.4 Standard electrode potentials [LO 3.12, 3.13] 18.5 Cell potential, free energy, and the equilibrium constant [LO 3.12] 18.6 Cell potential and concentration (LO 3.12) 18.7 Batteries: Using chemistry to generate electricity [LO 3.12] 18.8 Electrolysis: Driving nonspontaneous chemical reactions with electricity [LO 3.12, 5.15]	**AP Lab #8: Determining the percent of Hydrogen Peroxide in a Commercial Product**
Chapter 20: Organic Chemistry [BI: 5]	20.14 Polymers (LO 5.11)	
Chapter 22: Chemistry of the Nonmetals [BI: 2]	22.3 Silicates: The most abundant matter in Earth's crust [LO 2.29] 22.4 Boron and its remarkable structures [LO 2.29, 2.30] 22.5 Carbon, carbides and carbonates [LO 2.29, 2.30]	