

## School Description

The School at which this Advanced Placement Course is taught is an inner-ring suburban public school with great diversity. There are hundreds of students within the school district who previously lived in refugee camps where they did not learn to read/write in their native language. There are students who live in group homes as wards of the state, and there are students who live in multi-million dollar homes. About 30% of the students are on the “free and reduced lunch program”; about 30% of the students are on individual development plans. It is not uncommon that during a class when we are counting electrons that we are able to count in 8 different languages as a result of the diversity of the AP Chemistry class. This adds a superb richness to the class.

## Course Description

This AP<sup>®</sup> Chemistry course is a first year chemistry course for most of the students. Thus, all the topics in the AP college board approved curriculum that are stated to be “prior knowledge” are taught in addition to the approved AP Chemistry curriculum. It is because of this extensive amount of content, our curriculum committee has allotted 86 minutes of class (laboratory and lecture) everyday. In addition, optional study groups (teacher - present) are held at school for four hours per week, outside the official school day.

AP Chemistry is open to students (sophomores, juniors, and seniors) who have either earned all A's and B's in all science and math courses thus far, if taken as a first year course, or who have earned an A or B in the regular high school chemistry course, if taken as a second year. The students also demonstrate a strong commitment to independent study, exhibited by the completion of summer work, assigned and completed prior to beginning the course in the fall.

On average, two days per week are focused in the laboratory. (CR5a) The first quarter has a large discovery lab component, during which almost everyday for weeks the students are doing hands-on experiments. In the third quarter, there are fewer lab days because the course is content heavy.

During the 2<sup>nd</sup> and 3<sup>rd</sup> quarters 6 inquiry labs are completed by the students. These 6 labs were written this past summer in alignment with the inquiry labs published by the College Board. (CR6) Two days of class time per lab per week have been allotted for the completion of these labs.

The objectives achieved while teaching this course are focused around the framework the College Board has provided: The six big ideas, with enduring understandings, (CR2) the learning objectives as demonstrated in the grasping the essential knowledge and the science practices.

**Big idea 1:** Structure of matter (BI1)

**Big idea 2:** Properties of matter-characteristics, states and forces of attraction (BI2)

**Big idea 3:** Chemical reactions (BI3)

**Big idea 4:** Rates of chemical reactions (BI4)

**Big idea 5:** Thermodynamics (BI5)

**Big idea 6:** Equilibrium (BI6)

Please note: This course contains more content information and background depth than a second year Chemistry course. It is a first year chemistry course for most students, taught 80 minutes per day, 5 days per week, thus topics covered are from BOTH years of chemistry.

## Objectives

- \* Use laboratory experiences to teach, and re-enforce concepts and problem-solving. **(CR5a) (CR6) (CR7)**
  - \* Use laboratory experiences as a spring board for discussion of processes and reactions on a molecular basis.
  - \* Use laboratory experience to develop and practice critical thinking skills. **(CR4)**
  - \* Use laboratory experience to familiarize students with scientific equipment, measurements, standard deviation, significant figures, technology, scientific literature, and software. **(CR7) (CR4)**
  - \* Use laboratory experiences to extend students' ability to analyze, manipulate, and integrate data such that logical conclusions can be drawn and additional experiments can be proposed and/or performed.
  - \* Use laboratory experiences to give students practice presenting and defending chemical data. **(CR7)**
  - \* In the laboratory use industry-related vocabulary and practices (e.g. good laboratory practices and standard operating procedures) **(CR4)**
  - \* Use lecture to answer questions and present connections between industry, academic research, and concepts learned. **(CR2) (CR3a) (CR3b) (CR3c) (CR3d) (CR3e) (CR3f)**
  - \* Use lecture to present and strengthen difficult-to-grasp concepts **(CR2) (CR3a) (CR3b) (CR3c) (CR3d) (CR3e) (CR3f)**
  - \* Use guided practice (homework) to broaden and strengthen chemical concepts. **(CR2) (CR3a) (CR3b) (CR3c) (CR3d) (CR3e) (CR3f)**
- Ultimately the objective of this course is for students to develop their critical thinking skills, integrating additional chemical concepts, and to improve their ability to make good decisions in problem solving, based on scientifically logical data and analysis. **(CR all)**

## Textbook, Laboratory Manual and Supporting Materials

Brown, Theodore L., et al., Chemistry The Central Science, 10<sup>th</sup> Edition, Upper Saddle River, NJ, Pearson Prentice Hall, 2006. **(CR1)**

The Laboratory Manual has been written and edited over the last 20 years of the AP program by the AP chemistry teachers at the school. This year there was a major revision with the addition of 6 inquiry labs.

Supporting materials include:

1. Each student receives a copy of an older textbook to keep at home as a reference and a second source of problems, examples and explanations: Ebbing, Darrell D., General Chemistry, 5<sup>th</sup> Edition, Boston, Houghton Mifflin Company, 1996.
2. Each student has access to an on line PLATO chemistry course, for foundational chemistry concepts, particularly for auditory and visual learners. **(CR3a)**
3. Example from current chemical literature (usually from the American Chemical Society) and the teacher's 12 years of experience in the pharmaceutical industry, are regularly discussed in class. **(CR3a) (CR3b)**
4. Each student has access to additional chemistry textbooks and review books for the AP Exam and recommended on line sites. **(CR3c)**
5. Each student practices how to access the College Board, AP central website for additional supporting information and past exams.

## Required Materials

Splash Proof goggles

Scientific Calculator

Composition notebook for laboratory work

Provided to the students (and shared with other science classes) are standard laboratory equipment, laboratory aprons, and graphing calculators specifically when needed for laboratory assignments.

## Laboratory Work

The double period everyday allows for laboratory everyday, as (a) formal labs, (b) student demonstrations and (c) simple experimentation. A minimum of 25% of student contact time during the school day is spent performing hands-on laboratory learning. **(CR5a)**

Each lab group is responsible for reading understanding and/or generating a procedure to complete the lab.

Students work individually and in groups of 2 and 3; students are encouraged to ask each other questions and collaborate not only within their lab group but between groups. One representative from each lab group is often called aside for specific training (e.g. on electronic balances, Vernier equipment, spectrophotometers) and then is responsible for relaying this training and information to their individual lab groups. During the laboratory portion of the semester exam, students work individually, usually to identify an unknown.

Each student records the data they generate, when appropriate they provide this data electronically to a class data set which is then distributed (hard copy or electronically) to the class. Data is often shared to allow for statistical analysis; sometimes it is shared with each group doing a different temperature for temperature dependence studies. **(CR7)**

Each individual student answers questions in writing and prepared analysis, conclusions for each laboratory assignment, connecting the results with the objectives of the laboratory. Mastery of laboratory objectives is assessed via lab reports, lab quizzes, and hands-on semester laboratory exam(s).

The content of the laboratory is listed below as well as included in the syllabus below:

Safety	Distillation <b>(SP1)</b> (molecular drawing) <b>(SP5)</b> <b>(SP7)</b>
Equipment Std Deviation <b>(SP2)</b>	Heating Curve of Water <b>(SP1)</b> <b>(SP5)</b> <b>(SP7)</b>
Filtering/Decanting	Boiling water at 90°C under reduced pressure <b>(SP1)</b> <b>(SP3)</b> <b>(SP7)</b>
Dry ice <b>(SP1)</b> (molecular drawing) <b>(SP7)</b>	Metric Balance Training: Density <b>(SP2)</b> <b>(SP3)</b>
CRC <b>(SP2)</b> <b>(SP6)</b>	Merck Index
MSDS <b>(SP5)</b>	Bunsen Burner
Solubility <b>(SP4)</b>	Conversions: Thickness of Metal Foil <b>(SP2)</b> <b>(SP3)</b> <b>(SP7)</b>
Cathode Ray Tube <b>(SP3)</b> <b>(SP6)</b> <b>(SP7)</b>	Measuring Correctly . . . <b>(SP2)</b> <b>(SP7)</b>
Hydrogen Gas <b>(SP3)</b>	Carbon Dioxide Gas <b>(SP3)</b>
Silver ion . . .soluble? <b>(SP3)</b>	Sodium Bicarbonate <b>(SP3)</b>
Phosphate ion . . .soluble? <b>(SP3)</b>	Aluminum Chloride <b>(SP3)</b>
Hydroxide . . . soluble? <b>(SP3)</b>	Oxygen Gas <b>(SP3)</b>
Avogadro's Number <b>(SP1)</b> <b>(SP2)</b> <b>(SP6)</b> <b>(SP7)</b>	What is it lab? Chemical Reactions <b>(SP3)</b> <b>(SP5)</b> <b>(SP6)</b>
Mass/mole Relations: Stoichiometry <b>(SP2)</b> <b>(SP5)</b>	Empirical Formula Magnesium Oxide <b>(SP2)</b> <b>(SP5)</b>
Silver Content: Gravimetric Analysis <b>(SP2)</b> <b>(SP5)</b>	Percent Composition; Magnesium Sulfate Hydrate <b>(SP2)</b> <b>(SP5)</b>
Hess's Law: Thermochemistry <b>(SP2)</b> <b>(SP5)</b> <b>(SP6)</b>	Mole Ratio by Heat of Rx <b>(SP2)</b> <b>(SP5)</b>
Molecular Models & Geometry <b>(SP1)</b> <b>(SP6)</b> <b>(SP7)</b>	Boyle's Law <b>(SP2)</b> <b>(SP5)</b> <b>(SP7)</b>
MM from Density of Vapor <b>(SP2)</b>	Gas Stoichiometry <b>(SP2)</b> <b>(SP5)</b>
Beer's Law <b>(SP2)</b> <b>(SP5)</b> <b>(SP6)</b> <b>(SP7)</b>	Chromatography: Intermolecular Forces <b>(SP5)</b> <b>(SP6)</b> <b>(SP7)</b>
Equilibrium Constant <b>(SP2)</b> <b>(SP5)</b> <b>(SP6)</b>	Crystal Violet Kinetics <b>(SP2)</b> <b>(SP5)</b>
Acid Base Titration <b>(SP2)</b> <b>(SP5)</b> <b>(SP6)</b>	Generations of Titration Curve <b>(SP2)</b> <b>(SP5)</b> <b>(SP7)</b>
Solubility Product Constant <b>(SP2)</b> <b>(SP5)</b> <b>(SP6)</b>	Redox Titration <b>(SP2)</b> <b>(SP5)</b>
Electrochemical Series <b>(SP5)</b> <b>(SP6)</b> <b>(SP7)</b>	Crystal Structure Parameters <b>(SP2)</b> <b>(SP1)</b> <b>(SP7)</b>
Determination of Ka of Weak Acid <b>(SP2)</b> <b>(SP3)</b>	Synthesis of Coordination Compound <b>(SP3)</b> <b>(SP4)</b> <b>(SP5)</b> <b>(SP7)</b>
INQUIRY ONE: Transmitted Light <b>(SP3)</b> <b>(SP1)</b> <b>(SP5)</b> <b>(SP6)</b> <b>(SP7)</b>	
INQUIRY TWO: Separation of Molecules <b>(SP3)</b> <b>(SP1)</b> <b>(SP5)</b> <b>(SP6)</b> <b>(SP7)</b>	
INQUIRY THREE: Physical/Chemical Changes <b>(SP3)</b> <b>(SP1)</b> <b>(SP5)</b> <b>(SP6)</b>	
INQUIRY FOUR: Acidic Drinks? <b>(SP2)</b> <b>(SP3)</b> <b>(SP4)</b> <b>(SP5)</b> <b>(SP6)</b> <b>(SP7)</b>	
INQUIRY FIVE: Buffers <b>(SP2)</b> <b>(SP3)</b> <b>(SP4)</b> <b>(SP5)</b> <b>(SP6)</b> <b>(SP7)</b>	
INQUIRY SIX: How Fast? At what Temperature? <b>(SP2)</b> <b>(SP4)</b> <b>(SP3)</b> <b>(SP5)</b> <b>(SP7)</b>	
Alchemy? Metallurgy? <b>(SP1)</b>	Glass Blowing

## Laboratory Written Work

The Students are guided in preparing for, completing and analyzing laboratory work. Each laboratory assignment is recorded in the laboratory notebook with all or a subset of the following sections:

1. Title
2. Date
3. Pre-lab conceptual questions
4. Pre-lab data tables
5. Pre-lab Procedure Outline
6. Data Collected (Raw Data)
7. Group Data
8. Data Analysis (calculations, graphs and assessment)
9. Conclusion including
  - a. The purpose/goal of the experiment was;
  - b. An assessment of whether or not that goal was met and why (error analysis);
  - c. What techniques and concepts were learned or re-enforced via the lab
10. Post-lab conceptual questions

## Advanced Placement Chemistry Overview

### Summer Assignment

1. **Memorize the common ions** given on the attached sheet.
2. **Read and study chapters 1 and 2 in BOTH textbooks:** General Chemistry 5<sup>th</sup> Edition by Darrell Ebbing; Chemistry The Central Science 10<sup>th</sup> Edition by Brown, LeMay, Bursten. **(CR3a)**  
IN A SPIRAL NOTEBOOK,\* include the following:
  - A. Notes from your reading of chapter 1 in Ebbing
  - B. Notes from your reading of chapter 2 in Ebbing
  - C. Notes from your reading of chapter 1 in Brown/LeMay/Bursten
  - D. Notes from your reading of chapter 2 in Brown/LeMay/Bursten

Notes should include (a) the definition (or explanation) of bolded or italicized words; (b) key concepts from each section of the chapters written in your own words; (c) question marks (?) or some other designation where you don't fully understand the concept.

3. **Complete the following problems** IN THE SPIRAL NOTEBOOK, which contain your notes.
  - A. In the textbook authored by Ebbing, the 10 exercises in chapter 1;
  - B. In the textbook authored by Ebbing, the 12 exercises in chapter 2;
  - C. In the textbook authored by Brown/LeMay/Bursten, pgs 30-35, #1, 2, 3, 4, 5, 6, 7, 8, 18, 29, 38, 48;
  - D. In the textbook authored by Brown/LeMay/Bursten, pgs 70-77, #1, 2, 3, 4, 5, 6, 12, 15, 21, 44, 52, 60, 64, 70

Once again, if you don't fully understand, place a question mark (?) so that you remember to ask about it. (Before placing the "?" make sure that you have written down (a) the "given" information; (b) the "Unknown"; (c) anything that might apply to the problem; and (d) finally, write down your best attempt to use (a)-(c) to solve the problem.)

4. **(Optional) You have been "assigned" an on line PLATO chemistry course** that covers the basic concepts in the entire first year chemistry. Students, from previous years, found it helpful to listen to these programs, take notes, and/or take the mastery tests. If you are a visual or auditory student, learning from these programs will

## AP<sup>®</sup> Chemistry Syllabus 2013

give you an extra advantage as you face the challenge of AP chemistry. So, as time permits, please do so. This on line course will be available to you throughout the year.

### Scope and Sequence

#### Quarter 1

Prior to the scheduled topic for the day, there is usually a 5 point, 5 minute homework quiz and then, student-generated questions are addressed. Once in awhile, the students generate 40 minutes of questions.

Number of Days in Lab	20	44%	
Number of Days Testing	7	16%	(including state testing)
Number of days in Lecture	15	33%	
Other	3	7%	

The first quarter is lab intensive; this helps the students to start thinking, learning, and doing independently. In the lab, basic equipment, chemical and analytical skills are practiced.

Timing	Topic 1 <sup>st</sup> quarter	Assignments	Other
Day 1	Welcome Start Safety	Chapters 1&2 Brown and Ebbing	Hand in summer work
Day 2	Pre-Assessment Exam (The American Chemical Society National Exam) Ion Exam	Chapters 1&2 Brown and Ebbing	
Day 3	Stations Lab: Safety MSDS	Chapters 1&2 Brown and Ebbing	Summer Homework Quiz Lab Safety Agreements Due
Day 4	School Assemblies	Chapters 1&2 Brown and Ebbing	No Class
Day 5	Stations Lab: Distillation Filtration	Chapters 1&2 Brown and Ebbing	Summer Homework Quiz
Day 6 (BI1)	Stations Lab: Water Heating Curve (Molecular Pictures; use of hot plates, thermometers) Laboratory Equipment (Standard Deviation)	Chapters 1&2 Brown and Ebbing	Summer Homework Quiz
Day 7 (BI1)	Stations Lab: Water Boiling under reduced pressure (Molecular Pictures; vacuum apparatus) Significant Figures	Brown/LeMay/Bursten Ch 1 # 11,13,15,17	Summer Homework Quiz
Day 8	Stations Lab: Vocabulary ch 1 Vocabulary ch 2	Brown/LeMay/Bursten Ch 1 # 19,23,25,27	Homework Quiz

AP<sup>®</sup> Chemistry Syllabus 2013

Day 9 <b>BI2</b>	Stations Lab: Density (Metric Balance Training; application of standard deviation to making measurements) Bunsen Burner training	Brown/LeMay/Bursten Ch 1 # 31,34,35,39	Homework Quiz
Day 10	Stations Lab: Lab equipment standard	Brown/LeMay/Bursten Ch 1 # 41,43,49,51,60	Homework Quiz TURN IN LAB BOOK

Day 11	Stations Lab: Merck Index CRC Handbook Students use the CRC handbook to investigate isotopic masses and then use the data to confirm the average atomic mass of Tellurium <b>CR3a</b>	Brown/LeMay/Bursten Ch 2 # 7,9,11,13	Homework Quiz
Day 12 <b>(BI1)</b>	Stations Lab: Dry Ice (Molecular Pictures) Solubility (temperature dependence)	Brown/LeMay/Bursten Ch 2 # 17,19,25,27	Homework Quiz
Day 13	Stations Lab: Thickness of Metal Units Units Units	Brown/LeMay/Bursten Ch 2 # 33,35,41,43	Homework Quiz

<b>Timing</b>	<b>Topic 1<sup>st</sup> quarter</b>	<b>Assignments</b>	<b>Other</b>
Day 14	Stations Lab: Measuring, Calculating, Rounding, Sig Fig's Chemical Formulas and Names	Study 1-3 hours Brown/LeMay/Bursten Ch 2 # 45,47,49,53, 63	Homework Quiz
Day 15 <b>(BI1)</b>	Stations Lab: Cathode Ray tube Dalton's Atomic theory	Study 1-3 hours ( <b>CR3a</b> )	Homework Quiz
Day 16	<i>EXAM CHAPTER 1&amp;2</i>	Brown/LeMay/Bursten Ch 1 #79 Ch 2#79	
Day 17 <b>BI3</b>	6 types of chemical reactions; phase labels, general terminology, balancing	Brown/LeMay/Bursten Read and take notes on Ch 3 sect 1-2 and Ch 4 sect 1-4	Homework Quiz
Day 18 <b>BI3</b>	Synthesis, Decomposition	Brown/LeMay/Bursten Ch 3 #1,2,3,4	Homework Quiz
Day 19 <b>BI3</b>	Single Replacement Double Displacement	Brown/LeMay/Bursten Ch 3 # 9,11,14	Homework Quiz
Day 20 <b>BI3</b>	Molecular, Complete Ionic, Net Ionic Chemical Equations	Brown/LeMay/Bursten Ch 3 #13,15,17,19	Homework Quiz TURN IN LAB BOOK
Day 21 <b>BI3</b>	Stations Lab: Study Carbonate Rxn Study Phosphate Rxn	Brown/LeMay/Bursten Ch 4 1,2,3,5,14,15	Homework Quiz

AP<sup>®</sup> Chemistry Syllabus 2013

Day 22 <b>BI3</b>	Stations Lab: Study Hydroxide Rxns Study Silver Ion Rxns	Brown/LeMay/Bursten Ch 4 # 8,9,10,27,29,37	Homework Quiz
Day 23 <b>BI3</b>	Stations Lab: Make H <sub>2</sub> and explode it Make O <sub>2</sub> and test it	Brown/LeMay/Bursten Ch 4 # 23,32,35,36,39	Homework Quiz
Day 24 <b>BI3</b>	Stations Lab: Make CO <sub>2</sub> and test it Study AlCl <sub>3</sub> Rxns	Brown/LeMay/Bursten Ch 4 # 45,46,47,48,53,55	Homework Quiz
Day 25 <b>BI3</b>	LAB Qualitative Analysis or What is it? Lab	Study 1-3 hours Brown/LeMay/Bursten Ch 4 # 7,21,24,28,30	Homework Quiz Extra Credit Mole Project Assigned
Day 26 <b>BI3</b>	LAB Qualitative Analysis or What is it? Lab	Study 1-3 hours	Homework Quiz
Day 27 <b>BI3</b>	<i>EXAM Chem Rxns</i> Ch 3 & 4	Brown/LeMay/Bursten Ch 3 #81 Ch 4 #44	
Day 28	Formula & Molecular Weight; Percent Composition	Brown/LeMay/Bursten Read and take notes on Ch 3 sect 3-7 and Ch 4 sect 5-6	Homework Quiz
Day 29	THE MOLE Avogadro's Number Molar Mass	Brown/LeMay/Bursten Ch 3 # 5,21,23,25,27	Homework Quiz
Day 30	Combustion Analysis Emp & Molec Formulas Mass Spectrometry	Brown/LeMay/Bursten Ch 3 # 6,43,45,47,49	Homework Quiz TURN IN LAB BOOK
<b>Timing</b>	<b>Topic 1<sup>st</sup> quarter</b>	<b>Assignments</b>	<b>Other</b>
Day 31	Stoichiometry	Brown/LeMay/Bursten Ch 3 # 7,56,57,59,61	Homework Quiz
Day 32	Limiting/Excess Reactants Percent Yield	Brown/LeMay/Bursten Ch 3 # 8,68,70,73,77	Homework Quiz
Day 33	Solutions, Molarity, Dilutions	Brown/LeMay/Bursten Ch 3 # 29,33,53,63,79	Homework Quiz
Day 34	Quantitative Analysis (titrations)	Brown/LeMay/Bursten Ch 4 # 25,26,40,42,56,57	Homework Quiz
Day 35	LAB Avogadro's Number	Study 1-3 hours Brown/LeMay/Bursten Ch 4 # 59,61,63,73,75	Homework Quiz
Day 36	LAB Empirical Formula	Study 1-3 hours	Homework Quiz
Day 37	<i>EXAM – Stoichiometry</i> Ch 3 & 4	Brown/LeMay/Bursten Ch 3 # 103 Ch 4 #110	
Day 38	State Testing	Review chapters 1-4 Read Chapter 5	No Class
Day 39	State Testing	Review chapters 1-4 Read Chapter 5	No Class
Day 40	State Testing	Review chapters 1-4 Read Chapter 5	No Class
Day 41 <b>BI3</b> <b>BI5</b>	Thermochemical Equations; Energy; Enthalpy	Brown/LeMay/Bursten Read and take notes on Ch 5	Homework Quiz TURN IN LAB BOOK
Day 42	Exothermic	Brown/LeMay/Bursten	Homework Quiz

AP<sup>®</sup> Chemistry Syllabus 2013

<b>BI5</b>	Endothermic Pressure Work	Ch 5 # 1,2,3,4,5,6	
Day 43 <b>BI5</b>	Enthalpies of Rxns Calorimetry	Brown/LeMay/Bursten Ch 5 # 10,14,19,23,47,49	Homework Quiz
Day 44 <b>BI5</b>	Hess's Law Enthalpies of Formation	Brown/LeMay/Bursten Ch 5 #7,8,31,61,67	Homework Quiz
Day 45	MOLE DAY CELEBRATION	Brown/LeMay/Bursten Ch 5 # 11,25,33,51,70	Homework Quiz Extra Credit Mole Project DUE

## Scope and Sequence

### Quarter 2

Prior to the scheduled topic for the day, there is usually a 5 point, 5 minute homework quiz and then, student-generated questions are addressed. Once in awhile, the students generate 40 minutes of questions.

Number of Days in Lab	13	29%	
Number of Days Testing	8	18%	(including semester exams)
Number of days in Lecture	24	53%	

The second quarter is lab intensive as well but unlike the first quarter the labs each have a major content topic to practice and strengthen.

<b>Timing</b>	<b>Topic 2<sup>nd</sup> quarter</b>	<b>Assignments</b>	<b>Other</b>
Day 1 <b>BI5</b>	LAB – Calorimetry Hess's Law	Study 1-3 hours Brown/LeMay/Bursten Ch 5 # 18 37,53,63,71	Homework Quiz
Day 2 <b>BI3</b>	LAB – Gravimetric Analysis	Study 1-3 hours	Homework Quiz
Day 3 <b>BI5</b>	<i>EXAM – ch 5</i> <i>Thermochemistry</i>	Brown/LeMay/Bursten Ch 5 # 76, 92	
Day 4	Atomic Theory/History The Bohr Model; 3 Light Equations	Brown/LeMay/Bursten Read and take notes on Ch 6	Homework Quiz
Day 5	Electronic Configuration 3 Rules	HW: Hand-outs Brown/LeMay/Bursten Ch 6 # 1,2,3,4,9	Homework Quiz TURN IN LAB BOOK
Day 6	Noble Gas Abbreviations Exceptions to Aufbau Orbital Diagrams	Brown/LeMay/Bursten Ch 6 # 5,6,10,29,33	Homework Quiz
Day 7 <b>(BI1)</b>	Waves Uncertainty Principle Shapes of Orbitals	Brown/LeMay/Bursten Ch 6 # 7,38,47,49,54	Homework Quiz
Day 8	Atomic Orbitals Photo Electron Spectroscopy Quantum Numbers The students are provided with Photo Electron Spectra in which they are	Brown/LeMay/Bursten Ch 6 # 11,13,15,17,19	Homework Quiz



AP<sup>®</sup> Chemistry Syllabus 2013

	Looking for patterns which to the electronic structure of element. <b>CR3</b>		
Day 9 <b>BI2</b>	Electron Configuration & the Periodic Table	Brown/LeMay/Bursten Ch 6 # 8,21,57,63	Homework Quiz
Day 10	LAB - Spectroscopy	Study 1-3 hours Brown/LeMay/Bursten Ch 6 # 23,66,67,72	Homework Quiz
Day 11	LAB – Hydrogen Orbital Studies	Study 1-3 hours	Homework Quiz
Day 12	<i>Exam ch 6 Atomic structure</i>	Brown/LeMay/Bursten Ch 6 # 84,99	
Day 13	Effective Nuclear Charge Coulomb's Law	Brown/LeMay/Bursten Read and take notes on Ch 7	Homework Quiz
Day 14 <b>(BI1)</b>	Periodic Trends Atomic Size Ionic Size	Brown/LeMay/Bursten Ch 7 # 3,4,7,9,11,13	Homework Quiz
Day 15 <b>BI2</b>	Electronegativity Electron Affinity Ionization Energy	Brown/LeMay/Bursten Ch 7 # 5,25,27,29,35,39	Homework Quiz TURN IN LAB BOOK
Day 16	Lattice Energy Students are provided the formulas and lattice Energies of ionic Compounds from which They identify patterns and Principles associated with ionic bond strength <b>CR3b</b>	Brown/LeMay/Bursten Ch 7 # 6,17,23,33,43,49	Homework Quiz
Day 17 <b>BI3</b>	LAB – Synthesis of Coordination Compound	Brown/LeMay/Bursten Read and take notes on Ch 8	Homework Quiz
Day 18 <b>BI3</b>	LAB – Synthesis of Coordination Compound	Brown/LeMay/Bursten Ch 8 # 2,9,15,17,21,27	Homework Quiz
Day 19 <b>(BI1)</b>	Ionic & Covalent Bonding . . . Lewis Dots	Brown/LeMay/Bursten Ch 8 # 1,3,5,11,31,45	Homework Quiz
Day 20	Lewis Dots Organic Compounds Inorganic Polyatomics	Brown/LeMay/Bursten Ch 8 # 4,35,37,39,41,43	Homework Quiz
<b>Timing</b>	<b>Topic 2<sup>nd</sup> quarter</b>	<b>Assignments</b>	<b>Other</b>
Day 21	Bond Polarity Dipole Moment	Brown/LeMay/Bursten Ch 8 #12,47,51,53,61,63	Homework Quiz TURN IN LAB BOOK
Day 22	Advanced Lewis Dots Resonance Free Radicals Formal Charge	Brown/LeMay/Bursten Ch 8 # 6,14,65,67,69,71	Homework Quiz Extra Credit Project: Polymerization ( <b>CR3a</b> ) ( <b>CR3b</b> )
Day 23 <b>(BI1)</b>	Bond Energy Bond Length	Study 1-3 hours Brown/LeMay/Bursten Ch 8 25,37,57,59,80,94	Homework Quiz
Day 24	LAB – Melting Point Determination	Study 1-3 hours	Homework Quiz
Day 25	<i>Exam – ch 7-8 Periodic Properties &amp;</i>	Brown/LeMay/Bursten Ch 7 # 66 Ch 8 # 97	

AP<sup>®</sup> Chemistry Syllabus 2013

	<i>Bonding</i>		
Day 26 <b>(BI1)</b>	Geometry Intro to VSEPR	Brown/LeMay/Bursten Read and take notes on Ch 9	Homework Quiz
Day 27 <b>(BI1)</b>	VSEPR	Brown/LeMay/Bursten Ch 9 # 1,3,11,15,17,19	Homework Quiz
Day 28 <b>BI2</b>	Molecular Polarity	Brown/LeMay/Bursten Ch 9 # 2,13,21,23,25,27	Homework Quiz
Day 29	Hybrid Orbital Theory Multiple Bonds	Brown/LeMay/Bursten Ch 9 # 4,29,31,33,35,37	Homework Quiz
Day 30 <b>(BI1)</b>	Molecular Models Activity Students make drawings of a series of molecules and from those drawings they predict the geometry, hybridization, and polarity. Then they make models to Confirm their predictions Of geometry [CR3b]	Brown/LeMay/Bursten Ch 9 # 6,39,41,43,45,47	Homework Quiz
Day 31	LAB - Physical Change? Chemical Change? Ambigu	Study 1-3 hours Brown/LeMay/Bursten Ch 5,7,8,38,49,51	INQUIRY LAB Homework Quiz
Day 32	LAB - Physical Change? Chemical Change? Ambiguous?	Study 1-3 hours	INQUIRY LAB Homework Quiz
Day 33	<i>Exam – Ch 9</i> <i>Molecular Geometry</i>	Brown/LeMay/Bursten Ch 9 # 96, 99	
Break <b>BI3</b>	Chemical Equations Students observe chemical reactions for which they 1. Classify the type of reaction, and 2. Write a balanced net ionic chemical equation, and 3. Identify phase labels driving forces [CR3c]	Holiday Packet of Chemical Equations	Due the first school day Of the New Year!
Day 34	Gases, Pressure, Vapor Pressure, Barometers	Brown/LeMay/Bursten Read and take notes on Ch 10	Homework Quiz Extra Credit Project: Polymerization DUE
Day35	Gas Laws	Brown/LeMay/Bursten Ch 10 # 1,2,9,11,13,15	Homework Quiz
Day36	Ideal Gas law Dalton's Law	Brown/LeMay/Bursten Ch 10 # 17,19,21,23,27	Homework Quiz TURN IN LAB BOOK
Day 37 <b>(BI1)</b>	Kinetic Molecular Theory of Gases	Brown/LeMay/Bursten Ch 10 # 29,31,33,35,39	Homework Quiz
Day 38	Effusion, Diffusion, Graham's Law	Brown/LeMay/Bursten Ch 10 # 3,41,55,67,73	Homework Quiz
Day 39	LAB – Transmitted Light	Brown/LeMay/Bursten Ch 10 # 7,69,71,75,81	INQUIRY LAB Homework Quiz
Day 40	LAB – Transmitted Light	Study 1-3 hours Brown/LeMay/Bursten Ch 10 # 105, 112	INQUIRY LAB Homework Quiz

AP<sup>®</sup> Chemistry Syllabus 2013

Timing	Topic 2 <sup>nd</sup> quarter	Assignments	Other
Day 41	LAB – Boyle's Law	Study 1-3 hours	Homework Quiz
Day 42	<i>Exam – Ch 10 Gases</i>	Brown/LeMay/Bursten	
Day 43	Semester Exams		Good Luck
Day 44	Semester Exams	Laboratory Exam An experiment is chosen for the students to do to strengthen specific skills	May your hard work pay off!
Day 45	Semester Exams	Multiple Choice Written Exam	Choose students for the International Chemistry Olympiad <b>(CR3a) (CR3b)</b>

## Scope and Sequence

### Quarter 3

Prior to the scheduled topic for the day, there is usually a 5 point, 5 minute homework quiz and then, student-generated questions are addressed. Once in awhile, the students generate 40 minutes of questions.

Number of Days in Lab	10	22%	
Number of Days Testing	7	16%	(including state testing)
Number of days in Lecture	28	62%	

The third quarter tackles very tough concepts: intermolecular forces, kinetics, and a variety of topics on equilibrium. Thus this quarter is slightly less lab intensive and more discussion/lecture oriented.

Timing	Topic 3 <sup>rd</sup> quarter	Assignments	Other
Day 1 <b>BI1</b>	Gases, Liquids Solids	Brown/LeMay/Bursten Read and take notes on Ch 11	Homework Quiz
Day 2 <b>BI2</b>	Intermolecular forces melting and boiling points	Brown/LeMay/Bursten Ch 11 # 2,4,47,49,67,73	Homework Quiz
Day 3 <b>BI2</b>	Properties of liquids Viscosity, surface tension	Brown/LeMay/Bursten Ch 11 # 1,3,15,17,21,23	Homework Quiz TURN IN LAB BOOK
Day 4 <b>BI2</b>	Vapor Pressure Clausius Clapeyron	Brown/LeMay/Bursten Ch 11 # 7,9,59,61,63,65	Homework Quiz
Day 5 <b>BI1</b>	Phase Diagrams Pharmaceutical Example	Brown/LeMay/Bursten Ch 11 # 19,25,27,29,31,35	Homework Quiz
Day 6 <b>BI1</b>	Solids and Cells	Brown/LeMay/Bursten Ch 11 # 6,11,13,33,52,90	Homework Quiz
Day 7	LAB – solids and cells	Brown/LeMay/Bursten Read and take notes on Ch 13	Homework Quiz
Day 8 <b>BI2</b>	Solutions and Solubility	Brown/LeMay/Bursten Ch 13 # 1,5,9,13,19	Homework Quiz
Day 9	Henry's Law and	Brown/LeMay/Bursten	Homework Quiz

AP<sup>®</sup> Chemistry Syllabus 2013

	dissolution of gases	Ch 13 # 23,25,29,31,33	
--	----------------------	------------------------	--

Timing	Topic 3 <sup>rd</sup> quarter	Assignments	Other
Day 10	Concentration Units % M m N	Brown/LeMay/Bursten Ch 13 # 37,41,45,49,59	Homework Quiz
Day 11	Colligative Properties	Study 1-3 hours Brown/LeMay/Bursten Ch 13 # 67,71,75,79,99	Homework Quiz
Day 12	LAB – Freezing Point Depn	Study 1-3 hours	Homework Quiz
Day 13	<i>Exam - ch 11, 13 Solids, Liquids Gases</i>	Brown/LeMay/Bursten Ch 11 #80 ch 13 #89	
Day 14 <b>BI4</b>	Reaction Rates	Brown/LeMay/Bursten Read and take notes on Ch 14	Homework Quiz Extra Credit – Freezing point Depression Assigned ( <b>CR3b</b> )
Day 15 <b>BI4</b>	First order Kinetics Students represent data graphically to determine the order of reaction. <b>(CR3d)</b>	Brown/LeMay/Bursten Ch 14 # 1,2,3,11,13,17,	Homework Quiz
Day 16 <b>BI4</b>	Second Order Kinetics Students represent data graphically to determine the order of reaction. <b>(CR3d)</b>	Brown/LeMay/Bursten Ch 14 # 19,21,29,33,35	Homework Quiz TURN IN LAB BOOK
Day 17 <b>BI4</b>	Temperature Dependence Arrhenius Equation Students assess energy diagrams to determine the thermochemical properties of system.	Brown/LeMay/Bursten Ch 14 # 4,5,6,45,47,49	Homework Quiz
Day 18 <b>BI4</b>	Reaction Mechanisms Catalysis Students assess energy diagrams to determine the affect of a catalyst <b>(CR3d)</b>	Brown/LeMay/Bursten Ch 14 # 7,8,9,51,59,63	Homework Quiz
Day 19 <b>BI4</b>	LAB - How fast . . . ? at what temperature?	Study 1-3 hours Brown/LeMay/Bursten Ch 14 # 10,25,41,55,84	INQUIRY LAB Homework Quiz
Day 20 <b>BI4</b>	LAB - How fast . . . ? at what temperature?	Study 1-3 hours	INQUIRY LAB Homework Quiz
Day 21 <b>BI4</b>	<i>Exam – ch 14 Kinetics</i>	Brown/LeMay/Bursten Ch 14 # 98, 105	
Day 22 <b>BI6</b>	Equilibrium Keq Kc Students determine concentration of species from equilibrium data <b>(CR3f)</b>	Brown/LeMay/Bursten Read and take notes on Ch 15	Homework Quiz
Day 23 <b>BI6</b>	Heterogeneous Kc Using Kc	Brown/LeMay/Bursten Ch 15 # 1,2,9,13,17,19	Homework Quiz

AP<sup>®</sup> Chemistry Syllabus 2013

Day 24 <b>BI6</b>	LeChatelier	Brown/LeMay/Bursten Ch 15 # 3,4,11,15,27,29	Homework Quiz
Day 25	LAB – Determining Keq	Brown/LeMay/Bursten Ch 15 # 5,6,31,37,41,45	Homework Quiz
Day 26	Definitions of Acids and bases	Brown/LeMay/Bursten Read and take notes on Ch 16	Homework Quiz
Day 27	pH Hotel	Brown/LeMay/Bursten Ch 15 # 7,8,49,51,53,55	Homework Quiz
Day 28	pH for Strong and Weak Acids and Bases	Brown/LeMay/Bursten Ch 16 # 1,2,11,13,101	Homework Quiz TURN IN LAB BOOK
Day 29	Ka from pH H from Ka	Brown/LeMay/Bursten Ch 16 # 3,4,33,35,37	Homework Quiz
Day 30 <b>BI6</b>	LAB – Determining Ka	Brown/LeMay/Bursten Ch 16 # 5,6,43,51,55	Homework Quiz
Day 31 <b>BI6</b>	Acidic/Basic Salts Hydrolysis	Brown/LeMay/Bursten Ch 16 # 7,8,57,75,77	Homework Quiz

Timing	Topic 3 <sup>rd</sup> quarter	Assignments	Other
Day 32	Polyprotic Acids Acid Structure	Brown/LeMay/Bursten Ch 16 # 9,10,79,81,83	Homework Quiz
Day 33 <b>BI6</b>	LAB - Acidic Drinks?	Study 1-3 hours Brown/LeMay/Bursten Ch 16 # 63,65,91,93,95,97	INQUIRY LAB Homework Quiz
Day 34 <b>BI6</b>	LAB - Acidic Drinks?	Study 1-3 hours	INQUIRY LAB Homework Quiz
Day 35 <b>BI6</b>	<i>Exam – ch 15, 16</i> <i>Keq Kc Ka Kb Kw</i>	Brown/LeMay/Bursten Ch 15 # 83 Ch 16 # 110	
Day 36	State Testing	Review chapters 1-16 Read Chapter 17	No Class
Day 37	State Testing	Review chapters 1-16 Read Chapter 17	No Class
Day 38	State Testing	Review chapters 1-16 Read Chapter 17	No Class
Day 39 <b>BI6</b>	Buffers Common Ion Effect Students apply Le Chatelier's principle to system which are altered <b>(CR3f)</b>	Brown/LeMay/Bursten Read and take notes on Ch 17	Homework Quiz Extra Credit – Freezing point Depression DUE
Day 40 <b>BI6</b>	Ksp - Solubility Equilibria Precipitation	Brown/LeMay/Bursten Ch 17 # 1,2,9,13,15,17	Homework Quiz
Day 41	Titrations Students generate Titration curves by Calculations (dry lab) <b>(CR3f)</b>	Brown/LeMay/Bursten Ch 17 # 3,4,5,6,21,25	Homework Quiz TURN IN LAB BOOK
Day 42 <b>BI6</b>	Kf - Formation Constant Separation of Ions	Brown/LeMay/Bursten Ch 17 # 7,8,31,35,39	Homework Quiz

AP<sup>®</sup> Chemistry Syllabus 2013

	Qualitative Analysis		
Day 43 <b>BI6</b>	LAB – Buffers	Study 1-3 hours Brown/LeMay/Bursten Ch 17 # 11,19,33,47,63	INQUIRY LAB Homework Quiz
Day 44 <b>BI6</b>	LAB – Buffers	Study 1-3 hours	INQUIRY LAB Homework Quiz
Day 45 <b>BI6</b>	<i>Exam – ch 15, 16, 17 ALL K's!</i>	Brown/LeMay/Bursten Ch 15 #78 Ch 16 #107 Ch 17 #96	

## Scope and Sequence

## Quarter 4

Prior to the scheduled topic for the day, there is usually a 5 point, 5 minute homework quiz and then, student-generated questions are addressed. Once in awhile, this uses up to 40 minutes of the 86 minute class period.

Number of Days in Lab	13	29%	
Number of Days Testing	8	18%	(including 2 Saturdays, the AP test and final exams)
Number of days in Lecture	11	24%	
Number of days of Review	13	29%	(including 2 the two Saturdays mentioned above)
Other	4	9%	

The fourth quarter enjoys the review of all topics; the culmination of the AP exam and the extra time to complete labs and “fun” labs.

Timing	Topic	Assignments	Other
Day 1 <b>BI5</b>	Enthalpy, Entropy, Gibbs Free Energy	Brown/LeMay/Bursten Read and take notes on Ch 19	Homework Quiz
Day 2 <b>BI5</b>	State Functions Exothermic, Endothermic	Brown/LeMay/Bursten Ch 19 # 1,7,11,13,15,19	Homework Quiz
Day 3 <b>BI5</b>	Reversible, Irreversible Spontaneous, Non-spont	Brown/LeMay/Bursten Ch 19 # 2,3,4,5,23,27	Homework Quiz
Day 4 <b>BI5</b>	3 Laws of Thermodynamics Given a set of conditions for a chemical reaction, students evaluate the entropy, and enthalpy to assess the spontaneity of the system ( <b>CR3e</b> )	Brown/LeMay/Bursten Ch 19 # 6,31,35,39,41,47	Homework Quiz TURN IN LAB BOOK
Day 5 <b>BI5</b>	Free energy in relation to equilibrium	Brown/LeMay/Bursten Ch 19 # 49,53,57,61,71,75	Homework Quiz
Day 6 <b>BI2</b>	LAB – Separation of Molecules	Study 1-3 hours Brown/LeMay/Bursten Ch 19 # 9,21,33,43,65,79	INQUIRY LAB Homework Quiz
Day 7 <b>BI2</b>	LAB – Separation of Molecules	Study 1-3 hours	INQUIRY LAB Homework Quiz
Day 8 <b>BI5</b>	<i>Exam – Ch 19 thermodynamics</i>	Brown/LeMay/Bursten Ch 19 # 86, 90	
Spring	Practice Multiple Choice	Results due upon return	Results due upon return

AP<sup>®</sup> Chemistry Syllabus 2013

Break	AP Exam	from spring break	from spring break
Day 9 <b>BI5</b>	Oxidation States Half reactions	Brown/LeMay/Bursten Read and take notes on Ch 20	Homework Quiz
Day 10	Balancing Redox Equations using half reactions	Brown/LeMay/Bursten Ch 20 # 1,2,11,13,14,15	Homework Quiz
Day 11 <b>BI5</b>	Voltaic Cells Standard emf	Brown/LeMay/Bursten Ch 20 # 3,4,5,17,19,21	Homework Quiz
Day 12 <b>BI5</b>	Non-standard emf Nernst Equation	Brown/LeMay/Bursten Ch 20 # 23,25,27,31,37	Homework Quiz
Day 13 <b>BI5</b>	Free Energy Equilibrium	Brown/LeMay/Bursten Ch 20 # 6,7,39,47,51,57	Homework Quiz TURN IN LAB BOOK
Day 14	Electrolytic Cells Batteries corrosion	Study 1-3 hours Brown/LeMay/Bursten Ch 20 # 8,9,63,71,79,85	Homework Quiz
Day 15	LAB – make batteries	Study 1-3 hours	Homework Quiz
Day 16	<i>Exam – ch 20 Electrochemistry</i>	Brown/LeMay/Bursten Ch 20 # 61, 89	
Day 17	REVIEW – Nuclear Chemistry	Brown/LeMay/Bursten Read and take notes on Ch 21	Homework Quiz HW 3 extended response questions
Day 18 <b>BI1</b>	REVIEW – Atomic Structure	Brown/LeMay/Bursten Chapters 2,6,7	Homework Quiz HW 4 extended response questions
Day 19	REVIEW – Bonding	Brown/LeMay/Bursten Chapters 7,8,9	Homework Quiz HW 4 extended response questions
Saturday	Practice Exam	Optional	
Day 20	REVIEW – Stoichiometry	Brown/LeMay/Bursten Chapters 3,4,	Homework Quiz HW 4 extended response questions
Day 21 <b>BI3</b>	REVIEW – Chemical Equations: Students observe chemical reactions for which they 1. Classify the type of reaction, 2. Write a balanced net ionic chemical equation, and 3. Determine the driving force towards thermodynamic stability [CR3c] [CR3e]	Brown/LeMay/Bursten Chapters 3,4,	Homework Quiz HW 4 extended response questions
Day 22 <b>BI2</b>	REVIEW – Gases/Phases/Solutions	Brown/LeMay/Bursten Chapters 4,11,13	Homework Quiz HW 4 extended response questions
Day 23	REVIEW – Equilibrium	Brown/LeMay/Bursten Chapters 15,17	Homework Quiz HW 4 extended response questions
Day 24	REVIEW – Acids Bases	Brown/LeMay/Bursten Chapters 16,17	Homework Quiz HW 4 extended response questions

AP<sup>®</sup> Chemistry Syllabus 2013

Saturday	Practice Exam	Optional	
Day 25 <b>BI4</b>	REVIEW – Kinetics	Brown/LeMay/Bursten Chapter 14	Homework Quiz HW 4 extended response questions
Day 26	REVIEW – Electrochemistry	Brown/LeMay/Bursten Chapters 20	Homework Quiz HW 4 extended response questions
Day 27 <b>BI5</b>	REVIEW – Thermodynamics	Brown/LeMay/Bursten Chapters 20	Homework Quiz HW 4 extended response questions
Day 28	REVIEW – Lab/Descriptive/Organic	Brown/LeMay/Bursten Chapters	Homework Quiz HW 4 extended response questions
Day 29 <b>BI4</b>	LAB – Crystal Violet Kinetics	Brown/LeMay/Bursten	Homework Quiz HW – get a good night's sleep
Day 30	AP EXAM	GOOD LUCK	
Day 31	Celebrate the completion of the exam LAB – glass blowing		
Day 32	VIDEO – The Science Of Crime		
Day 33 <b>BI2</b>	LAB – Chromatography		
Day 34 <b>BI6</b>	LAB – Titration curves		
Day 35 <b>BI6</b>	LAB – Determination of K <sub>sp</sub>		TURN IN LAB BOOK
Day 36	DO #1 and #2 from the 2013 AP Chem Exam		
Day 37	LAB – Molar Mass from Density of Vapor		
Day 38	DO #3 and #4 from the 2013 AP Chem Exam		
Day 39	LAB – Redox Titration		
Day 40	DO #5 and #6 from the 2013 AP Chem Exam		
Day 41	LAB – Alchemy Copper, Silver, Gold		
Day 42	LAB – Clean up		
Day 43	Final Exam		
Day 44	Final Exam The American Chemical Society National Exam		TURN IN LAB PORTFOLIO
Day 45	Final Exam		