Purpose: It is the intention of this Administrative-Master Syllabus to provide a general description of the course, outline the required elements of the course and to lay the foundation for course assessment for the improvement of student learning, as specified by FBISD, regardless of who teaches the course, the timeframe by which it is instructed, or the instructional method by which the course is delivered. It is not intended to restrict the manner by which an individual faculty member teaches the course but to be an administrative tool to aid in the improvement of instruction.

Course Title	Department	Credits	Course Code	Prerequisites
AP Chemistry	Science	1.5	SC361	Chemistry and Algebra II

I. PROGRAM INFORMATION

Program Guide Course Description: AP Chemistry is an in-depth study of the principles and concepts in chemistry comparable to a first-year college course. Content includes the study of atomic structure and bonding, states of matter, reactions, stoichiometry, equilibrium, kinetics, thermodynamics, and quantitative analysis. Emphasis is on laboratory experience. This course requires a two hour lab one evening per week. The focus of this course is preparation for successful completion of the AP exam in May.

Primary Textbook: Zumdahl, Steven S., and Susan A. Zumdahl. Chemistry. Belmont, CA: Brooks/Cole, Cengage Learning, 2014. Print.
ISBN: 9781133611103 Adoption Period: 2014-2022
Optional Text(s) and/or Materials: Students are encouraged to purchase an AP Chemistry Review book from a well-known publisher (Princeton Review, Kaplan, Barron's, etc) to use throughout the year as well as to review for the AP exam in May.
Websites:
www.apchemistrynmsi.wikispaces.com
https://apstudent.collegeboard.org/apcourse/ap-chemistry

Course Overview: The AP Chemistry course provides students with a college-level foundation to support future advanced course work in chemistry. Students cultivate their understanding of chemistry through inquiry-based investigations, as they explore topics such as: atomic structure, intermolecular forces and bonding, chemical reactions, kinetics, thermodynamics, and equilibrium.

Course Requirements: Must be able to attend 2 hours of after school lab per week.

Grading System: The State Board of Education has set 70 as a minimum passing grade. Written communication of the student's achievement is reported to the parents on a nine weeks basis. When letter grades are recorded, the following conversions are used: 90-100 = A, 80-89 = B, 75-79 = C, 70-74 = D, 69-below = F

Actual student numerical grades are recorded in the grade book and averaged as actual grades. An incomplete (I) is given on a report card if a student, because of illness or for some other excused reason, cannot complete the required work by the end of the reporting period. The work must be made up. The student should contact the teacher to arrange to complete the work. All other grading, re-teaching, and retesting procedures set by Fort Bend ISD will be followed.

Attendance: Students must be in attendance a minimum of 90 percent of the days after enrollment in the course.

In the event that grading or attendance guidelines conflict with FBISD district policy, the district policy will be followed.

II. LAB INVESTIGATIONS

Lab Requirements: Investigative labs will account a minimum of 25% of the course instruction. Labs emphasize development and testing of the hypothesis, collection, analysis and presentation of data, as well as discussion of results to discover unanswered questions about the particular topics addressed. Students will participate in a minimum of forty (40) hours of applied laboratory activities, aligned to big ideas throughout the full course occurring as two hour evening labs. These labs will be held as they occur within the curriculum. Evening labs allow for a rigorous experience and provide students with the tools and experiences needed to be successful in future scientific studies. The student-directed and inquiry-based laboratory investigations used throughout the course enable students to apply the seven science practices as defined in the Curriculum Framework.

Big Idea	Lab Investigation	SP 1	SP 2	SP 3	SP 4	SP 5	SP 6	SP 7
1	Beer's Law		✓		✓	✓	✓	
1	Beer's Law (Guided-Inquiry)		✓		✓	✓	✓	
1	Gravimetric Analysis	✓	✓		✓	✓	✓	✓
1	Acid/Base Titration	✓	✓	✓	✓	✓	✓	✓
2	Chromatography	✓			✓	✓	✓	
2	Chemical Bonding (Guided-Inquiry)	✓			✓	✓	✓	✓
3	Stoichiometry (Guided-Inquiry)		✓		✓	✓	✓	
3	REDOX/ Titration		✓		✓	✓	✓	
3	Buffers – Properties of Buffer Solutions	✓			✓		✓	
4	Kinetics		✓	✓	✓	✓	✓	✓
4	Rate Law	✓	✓		✓	✓	✓	
5	Thermochemistry (Guided-Inquiry)	✓	✓		✓	✓	✓	✓
6	Application of Le Châtelier's Principle (Guided-Inquiry)				✓	✓	✓	
6	Concentration of an Acid and a Base Influence the pH of the Resultant Solution During a Titration	✓	✓	✓	✓	✓	✓	✓
6	Titration Curves				✓	✓	✓	
6	Buffer's pH and Capacity (Guided-Inquiry)	✓	✓		✓	✓	✓	✓

*SP = Science Practice

Lab Notebook: All students are required to maintain a Laboratory Notebook (for example: a 1 inch three ring binder, a carbonless laboratory notebook, etc…) to organize all of their laboratory investigations including the pre-lab discussion notes, procedural designs and pertinent handouts, as well as the completed laboratory report for each investigation performed. The lab notebook is designed for the students to present to appropriate staff when enrolled in the college or university of their choice.

Lab Report Format: The lab report will include the following essential components:

1. Cover sheet: Student name, Investigation name/description, Date performed.
2. Purpose: In one or two well-developed sentences, the purpose, or rationalization, for performing the investigation must be provided.

3. Safety: Safety regarding the procedure, reagents, and materials. May include pertinent MSDS information.
4. Pre-lab questions or tasks completed with properly developed sentences and/or calculations that take into account precision and express the correct units of measure. Logical progression in the calculations must be thoroughly demonstrated. Qualitative expressions must take place at the particulate level.
5. Procedure: Summarized procedure for traditional format laboratory investigations, complete description of procedure for inquiry-based investigations. May include sketches of materials and apparatus.
6. Data and Analysis: All data is included in properly formatted data tables. Includes well developed responses to both quantitative and qualitative aspects of the investigation. All calculations must include proper precision, units, and logical progression from raw data to calculated analysis. All qualitative responses must be provided by way of properly developed sentences.
7. Conclusion: A well-developed paragraph that restates the purpose of the investigations describes the data collected, describes the analysis of quantitative and qualitative summations, and expresses possible sources of error in investigations that provide for such analysis. In inquiry-based investigations there must be discussion of modification of procedure and or analysis methods as appropriate.

III. BIG IDEAS

Course content is structured around enduring understandings within six big ideas which organize thought about chemistry.

- Big idea 1: 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.
- Big idea 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.
- Big idea 3: Changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.
- Big idea 4: Rates of chemical reactions are determined by details of the molecular collisions.
- Big idea 5: The laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter.
- Big idea 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.

IV. SCIENCE PRACTICES

Scientific practices are embedded throughout the curriculum to promote a more engaging and rigorous experience. These practices require that students:

1. Use representations and models to communicate scientific phenomena and solve scientific problems;
2. Use mathematics appropriately;
3. Engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course;
4. Plan and implement data collection strategies appropriate to a particular scientific question;
5. Perform data analysis and evaluation of evidence;
6. Work with scientific explanations and theories; and
7. Connect and relate knowledge across various scales, concepts and representations in and across domains.

V. COURSE LEARNING OUTCOMES/CURRICULUM REQUIREMENTS

Grading Period	Learning Objectives	Topics & Activities	1. Use representations and models	2. Use mathematics	3. Engage in scientific strategies	4. Plan & implement data collection strategies	5. Perform data analysis & evaluation of evidence	6. Work with scientific explanations/theories	7. Connect & relate knowledge	Big Idea 1: Structure of matter	Big Idea 2: Properties of matter-characteristics, states, and forces of attraction	Big Idea 3: Chemical reactions	Big Idea 4: Rates of chemical reactions	Big Idea 5: Thermodynamics	Big Idea 6: Equilibrium	Chapter, Pages	Est. Time Frame
	Unit 1: Chemistry Essentials																
1st	• LO1.1 [SP 6.1; EK1.A.1] • LO1.5 [SP 1.5, 6.2; EK1.B.1] • LO1.6 [SP 5.1; EK1.B.1] • LO1.17 [SP 1.5; EK1.E.1] • LO1.18 [SP 1.4; EK1.E.2] • LO2.7 [SP 6.2; EK2.A.3] • LO2.8 [SP 1.1, 1.2, 6.4; EK2.A.3] • LO2.9 [SP 1.1, 1.4; EK2.A.3] • LO2.10 [SP 4.2, 5.1, 6.4; EK2.A.3] • LO3.5 [SP 2.1, 4.2, 6.4; EK3.B.1] • LO3.6 [SP 2.2, 6.1; EK3.B.1]	**Topics:**															5 days
		Measurement and Calculations	✓	✓	✓	✓	✓	✓	✓	✓							Ch. 1 Pg. 3-27
		Atomic Theory	✓					✓	✓	✓							Ch. 2 Pg. 43-54
		Naming of Compounds	✓						✓	✓		✓					Ch. 2 Pg. 55-70
		Activities:															
		Suggested: • Lab: Physical & Chemical Change • Lab: Laboratory Techniques	✓	✓	✓	✓	✓	✓	✓	✓		✓					
	Unit 2: Stoichiometry																

		Topics:															5 days
	• LO1.2 [SP 2.2; EK1.A.2] • LO1.3 [SP 2.2, 6.1; EK 1.A.2] • LO1.4 [SP 7.1; EK1.A.3] • LO1.14 [SP 1.4, 1.5; EK1.D.2] • LO1.17. [SP 1.5; EK1.E.1] • LO1.18 [SP 1.4; EK1.E.2] • LO1.19 [SP 4.2, 5.1, 6.4; EK1.E.2] • LO1.20 [SP 4.2, 5.1, 6.4; EK1.E.2] • LO3.1 [SP 1.5, 7.1; EK components of 3.A–3.C] • LO3.2 [SP 1.5, 7.1; EK3.A.1] • LO3.3 [SP 2.2, 5.1; EK3.A.2] • LO3.4 [SP 2.2, 5.1, 6.4; EK3.A.2] • LO3.5 [SP 2.1, 4.2, 6.4; EK3.B.1] • LO3.6 [SP 2.2, 6.1; EK3.B.1]	Mole and molar mass	✓	✓	✓			✓	✓	✓		✓				Ch. 3 Pg. 81-92	
		Percent composition	✓	✓		✓	✓	✓		✓						Ch. 3 Pg. 94-95	
		Empirical and Molecular Formula		✓				✓	✓	✓						Ch. 3 Pg. 96-102	
		Reaction Stoichiometry	✓	✓					✓			✓				Ch. 3 Pg. 103-123	
		Activities:															
		Suggested: • Lab: Hydrates and Thermal Decomposition		✓			✓			✓							
		• Lab: Using the Principle That Each Substance Has Unique Properties to Purify a Mixture: An Experiment Applying Green Chemistry to Purification		✓		✓	✓	✓					✓				
		• Guided Inquiry Lab: Stoichiometry		✓		✓	✓	✓					✓				
	Unit 3: Reactions and Aqueous Solutions																
	• LO1.4 .[SP 7.1; EK1.A.3] • LO1.17 [SP 1.5; EK1.E.1] • LO1.18 [SP 1.4; EK1.E.2] • LO1.19 [SP 4.2, 5.1, 6.4; EK1.E.2] • LO2.7. [SP 6.2; EK2.A.3] • LO2.8 [SP 1.1, 1.2, 6.4; EK2.A.3] • LO2.9 [SP 1.1, 1.4; EK2.A.3] • LO2.10 [SP 4.2, 5.1, 6.4; EK2.A.3] • LO2.22 [SP 4.2, 6.4; EK components of 2.D]	**Topics:**															5 days
		Electrolytes	✓							✓						Ch. 4 Pg. 139-145	
		Solution Calculations		✓							✓					Ch. 4 Pg. 145-152	
		Precipitation Reactions	✓	✓				✓				✓				Ch. 4 Pg. 153-162	

	• LO2.23 [SP 1.1; EK2.D.1] • LO3.1 [SP 1.5, 7.1; EK components of 3.A–3.C] • LO3.2 [SP 1.5, 7.1; EK3.A.1] • LO3.3 .[SP 2.2, 5.1; EK3.A.2] • LO3.4 [SP 2.2, 5.1, 6.4; EK3.A.2] • LO3.5 .[SP 2.1, 4.2, 6.4; EK3.B.1] • LO3.6 [SP 2.2, 6.1; EK3.B.1] • LO3.8 [SP 6.1; EK3.B.3] • LO3.9 [SP 4.2, 5.1; EK3.B.3] • LO3.10 [SP 1.4, 6.1; EK3.C.1, *connects to* 5.D.2] • LO5.9. [SP 6.4; EK5.D.1] • LO5.10 [SP 5.1; EK5.D.2] • LO6.21 [SP 2.2, 2.3, 6.4; EK6.C.3] • LO6.22 [SP 2.2, 2.3, 6.4; EK6.C.3] • LO6.23 [SP 5.1, 6.4; EK6.C.3] • LO6.24 [SP 1.4, 7.1; EK6.C.3,*connects to* 5.E]	Acid Base Reactions	✓	✓				✓				✓				Ch. 4 Pg. 163-169	
		Redox Reactions	✓	✓				✓				✓				Ch. 4 Pg. 170-177	
		Activities:															
		Suggested: • Lab: How Much Acid Is in Fruit Juices and Soft Drinks?	✓	✓		✓	✓	✓				✓					
		• Lab: How Can We Determine the Actual Percentage of H_2O_2 in a Drugstore Bottle of Hydrogen Peroxide?	✓	✓		✓	✓	✓				✓					
		• Simulation: Redox Titration	✓	✓		✓	✓	✓				✓					
	Unit 4: Gas Laws																
	• LO1.2 [SP 2.2; EK1.A.2] • LO1.3 [SP 2.2, 6.1; EK 1.A.2] • LO2.4 [SP 1.4, 6.4; EK 2.A.2] • LO2.5 [SP 1.3, 6.4, 7.2; Essential knowledge 2.A.2] • LO2.6 [SP 2.2, 2.3; EK2.A.2] • LO2.12 [SP 5.1, 6.5; EK2.B.2, *connects to* 2.A.2] • LO2.13. [SP 1.4, 6.4; EK2.B.2] • LO2.14 [SP 1.4, 6.4; EK2.B.2] • LO2.15 [SP 1.4, 6.2; EK2.B.3, *connects to* 5.E.1] • LO2.16 [SP 6.2; Essential knowledge 2.B.3] • LO3.3 [SP 2.2, 5.1; EK3.A.2] • LO3.4 [SP 2.2, 5.1, 6.4; EK3.A.2] • LO5.2 [SP 1.1, 1.4, 7.1; EK5.A.1]	**Topics:**															5 days
		Gas Laws	✓	✓			✓	✓	✓	✓	✓			✓		Ch.5 Pg. 190-203	
		Gas Stoichiometry	✓	✓			✓			✓	✓	✓		✓		Ch. 5 Pg. 204-207	
		Dalton's Law	✓	✓			✓			✓	✓			✓		Ch. 5 Pg. 208-214	
		Kinetic Molecular Theory	✓	✓			✓	✓		✓	✓			✓		Ch. 5 Pg. 214-221	
		Effusion and Diffusion	✓	✓			✓			✓	✓			✓		Ch. 5 Pg. 222-224	

		Activities:														
		Suggested: • Lab: Molar Volume of gas from Mg and HCl		✓		✓	✓		✓	✓	✓	✓				
		• Lab: Molar Mass of Butane		✓		✓	✓		✓	✓	✓	✓				
	Unit 5: Atomic Structure and Periodicity															
	• LO1.5 [SP 1.5, 6.2; EK1.B.1] • LO1.6 [SP 5.1; EK1.B.1] • LO1.9 [SP 6.4; EK1.C.1] • LO1.10 [SP 6.1; EK1.C.1] • LO1.11 [SP 3.1, 5.1; EK1.C.1] • LO1.12 .[SP6.3; Essential knowledge 1 .C.2] • LO1.13 [SP 5.3; EK1.D.1] • LO1.15 [SP 4.1, 6.4; EK1.D.3] • LO1.16 [SP 4.2, 5.1; EK 1.D.3] • LO5.15 .[SP 6.2; EK5.E.4] • LO5.16 .[SP 6.4; EK5.E.4,*connects to* 6.B.1] • LO5.17 [SP 6.4; EK5.E.4,*connects to* 6.A.2]	**Topics:**															15 days
		Electromagnetic Radiation	✓	✓		✓		✓		✓				✓		Ch. 7 Pg. 296-305
		Historical Models				✓	✓	✓		✓						Ch. 7 Pg. 306-309
		Quantum Mechanical Model				✓	✓	✓		✓	✓					Ch. 7 Pg. 310-320
		Electron Configuration				✓	✓	✓		✓						Ch. 7 Pg. 322-328
		Periodic Trends				✓	✓	✓		✓	✓					Ch. 7 Pg. 329-338
		Activities:														
		Suggested: • Lab: What Is the Relationship Between the Concentration of a Solution and the Amount of Transmitted Light Through the Solution?		✓		✓	✓	✓		✓						
		• Lab: How Can Color Be Used to Determine the Mass Percent of Copper in Brass?		✓		✓	✓	✓		✓						

		• POGIL Activity: PES			✓		✓	✓		✓	✓						
2nd	**Unit 6: Bonding**																
	• LO1.5 [SP 1.5, 6.2; EK1.B.1] • LO1.6 [SP 5.1; EK1.B.1] • LO1.7 [SP 5.1, 6.2; EK1.B.2] • LO1.8 [SP 6.2; EK1.B.2] • LO1.9 .[SP 6.4; EK1.C.1] • LO1.10 [SP 6.1; EK1.C.1] • LO1.11 [SP 3.1, 5.1; EK1.C.1] • LO1.15 [SP 4.1, 6.4; EK1.D.3] • LO1. [SP 4.2, 5.1; EK 1.D.3] • LO2.17 [SP 6.4; Essential knowledge components of 2.C] • LO2.18 [SP 6.1; EK2.C.1] • LO2.19 [SP 1.1, 1.4, 7.1; EK2.C.2, *connects to* 2.D.1, 2.D.2] • LO2.20 [SP 6.2, 7.1; EK2.C.3, *connects to* 2.D.2] • LO2.21 [SP 1.4; EK2.C.4] • LO2.22 [SP 4.2, 6.4; EK components of 2.D] • LO2.23 [SP 1.1; EK2.D.1] • LO2.24 [SP 1.1, 6.2, 7.1; EK 2.D.1] • LO5.1 [SP 1.1, 1.4, 7.2, *connects to* Big Idea 2; EK components of 5.A–5.E]	**Topics:**															15 days
		Types of bonds	✓					✓	✓	✓	✓			✓		Ch. 8 Pg. 352-356	
		Bond Polarity	✓					✓	✓	✓	✓			✓		Ch. 8 Pg. 357-361	
		Ionic Bonding	✓					✓	✓	✓	✓			✓		Ch. 8 Pg. 361-368	
		Covalent Bonding	✓					✓	✓	✓	✓			✓		Ch. 8 Pg. 369-376	
		Lewis Structures	✓					✓	✓	✓	✓			✓		Ch. 8 Pg. 377-389	
		VESPR	✓					✓	✓	✓	✓			✓		Ch. 8 Pg. 390-401	
		PES	✓					✓	✓	✓	✓			✓		Ch. 9 Pg. 441-442	
		Activities:															
		Suggested: • Activity: Molecular Models of the Atom	✓					✓	✓	✓	✓						
		• Lab: What's in That Bottle?	✓			✓	✓	✓	✓		✓						
		• Project: Molecular Modeling	✓			✓	✓			✓	✓						
	Unit 7: States of Matter and Intermolecular Forces																
	• LO1.9 [SP 6.4; EK1.C.1] • LO1.11 [SP 3.1, 5.1; EK1.C.1] • LO2.3 [SP 6.4, 7.1; EK2.A.1] • LO2.7 [SP 6.2; EK2.A.3]	Topic:															8 days
		Intermolecular Forces of Attraction	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		Ch. 10 Pg. 455-457	

	• LO2.8 [SP 1.1, 1.2, 6.4; EK2.A.3] • LO2.9 [SP 1.1, 1.4; EK2.A.3] • LO2.10 [SP 4.2, 5.1, 6.4; EK2.A.3] • LO2. [SP 6.2, 6.4; Essential knowledge 2.B.1] • LO2.12 [SP 5.1, 6.5; EK2.B.2, *connects to* 2.A.2] • LO2.13 [SP 1.4, 6.4; EK2.B.2] • LO2.14 [SP 1.4, 6.4; EK2.B.2] • LO2. [SP 1.4, 6.2; EK2.B.3, *connects to*5.E.1] • LO2. [SP 6.2; Essential knowledge 2.B.3] • LO2.17 [SP 6.4; Essential knowledge components of 2.C] • LO2.19 [SP 1.1, 1.4, 7.1; EK2.C.2, *connects to* 2.D.1, 2.D.2] • LO2.20 [SP 6.2, 7.1; EK2.C.3, *connects to* 2.D.2] • LO2.24 [SP 1.1, 6.2, 7.1; EK 2.D.1] • LO2.25 [SP 1.4, 7.2; EK2.D.2] • LO2.26 [SP 6.4, 7.1; EK2.D.2] • LO2.27 [SP 1.1; EK2.D.2] • LO2.28 [SP 1.1, 6.2, 7.1; EK 2.D.2] • LO2.29 [SP 1.1; EK2.D.3] • LO2.30 [SP 1.1, 6.2, 7.1; EK 2.D.3] • LO2.31 [SP 1.1; EK2.D.4] • LO2.32 [SP 1.1, 6.2, 7.1; EK 2.D.4] • LO5.6 [SP 2.2, 2.3; EK5.B.3] • LO5.9 [SP 6.4; EK5.D.1] • LO5.10 [SP 5.1; EK5.D.2] • LO5.11 [SP 7.2; EK5.D.3] • LO6.1 [SP 6.2; EK 6.A.1]	Properties of Liquids	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		Ch. 10 Pg. 458-559	
		Properties of Solids	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		Ch. 10 Pg. 460-469	
		Alloys and Semiconductors	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		Ch. 10 Pg. 470-478	
		Vapor Pressure and Changes of States	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	Ch. 10 Pg. 483-490	
		Activities:															
		Suggested: • Lab: Can the Individual Components of Quick Ache Relief Be Used to Resolve Consumer Complaints?	✓			✓		✓		✓	✓	✓					
		• Lab: Chromatography	✓			✓		✓		✓	✓						
		• Lab: Vapor Pressure	✓			✓		✓		✓	✓						
	Unit 8: Properties of Solutions																
	• LO2.13 [SP 1.4, 6.4; EK2.B.2] • LO2.14 [SP 1.4, 6.4; EK2.B.2] • LO2.15 [SP 1.4, 6.2; EK2.B.3, *connects to* 5.E.1]	**Topic:**															7 Days
		Solution Composition		✓				✓			✓			✓		Ch. 11 Pg. 511-514	

	• LO2.16 [SP 6.2; Essential knowledge 2.B.3]	Energy of Solutions		✓			✓	✓			✓			✓		Ch. 11 Pg. 514-517	
		Solubility	✓	✓		✓	✓	✓	✓		✓			✓	✓	Ch. 11 Pg. 517-520	
		Colligative Properties (Without Calculations)	✓					✓			✓			✓		Ch. 11 Pg. 521-537	
		Activities:															
		Suggested: • Lab: Sticky Question: How Do You Separate Molecules That Are Attracted to One Another?	✓			✓	✓	✓		✓	✓						
	Unit 9: Kinetics																
	• LO4.1 [SP 4.2, 5.1; Essential knowledge 4.A.1] • LO4.2 [SP 5.1, 6.4; EK4.A.2, *connects to* 4.A.3] • LO4.3 [SP 2.1, 2.2; EK4.A.3] • LO4.4 [SP 7.1; EK4.B.1, *connects to* 4.A.3, 4.B.2] • LO4.5 [SP 6.2; EK4.B.2] • LO4.6 [SP 1.4, 6.4; EK4.B.3] • LO4.7 [SP 6.5;*connects to* EK4.C.1, 4.C.2, 4.C.3] • LO4.8 [SP 1.5; EK4.D.1] • LO4.9 [SP 6.2, 7.2; EK4.D.2]	**Topics:**															
		Relative Rates	✓	✓		✓	✓	✓	✓			✓	✓			Ch. 12 Pg. 553-557	15 days
		Simple Rate Laws	✓	✓		✓	✓	✓	✓			✓	✓			Ch. 12 Pg. 557-563	
		Integrated Rate Laws	✓	✓		✓	✓	✓	✓			✓	✓			Ch. 12 Pg. 563-574	
		Reaction Mechanisms	✓	✓		✓	✓	✓	✓			✓	✓			Ch. 12 Pg. 574-577	
		Collision Theory	✓	✓		✓	✓	✓	✓			✓	✓			Ch. 12 Pg. 577-588	
		Activities:															
		Suggested: • Lab: How Long Will That Marble Statue Last?		✓	✓	✓	✓	✓	✓				✓				

		• Lab: What Is the Rate Law of the Fading of Crystal Violet Using Beer's Law?	✓	✓		✓	✓	✓				✓				
		• Gizmo: Collision Theory	✓		✓				✓				✓			
3rd	**Unit 10: Equilibrium**															
	• LO6.1 [SP 6.2; EK 6.A.1] • LO6.2 [SP 2.2; EK6.A.2] • LO6.3 [SP 7.2; EK 6.A.3] • LO6.4 [SP 2.2, 6.4; EK 6.A.3] • LO6.5 [SP 2.2; EK6.A.3] • LO6.6 [SP 2.2, 6.4; EK6.A.3] • LO6.7 [SP 2.2, 2.3; Essential knowledge 6.A.4] • LO6.8 [SP 1.4, 6.4; EK 6.B.1] • LO6.9 [SP 4.2; EK6.B.1] • LO6.10 [SP 1.4, 7.2; EK6.B.2]	**Topics:**														10 days
		Characteristics of Equilibrium	✓	✓				✓	✓				✓		✓	Ch. 13 Pg. 607-609
		Equilibrium Constant	✓	✓				✓	✓				✓		✓	Ch. 13 Pg. 610-613
		Equilibrium Expressions		✓				✓	✓				✓		✓	Ch. 13 Pg. 614-618
		Reaction Quotient		✓				✓	✓				✓		✓	Ch. 13 Pg. 618-627
		Solving Equilibrium Problems		✓				✓	✓				✓		✓	Ch. 13 Pg. 628-632
		Le Chatelier's Principle	✓	✓				✓	✓				✓	✓	✓	Ch. 13 Pg. 633-639
		Activities:														
		Suggested: • Lab: Can We Make the Colors of the Rainbow? An Application of Le Châtelier's Principle				✓	✓	✓							✓	
		• Dry Lab: Determination of the Equilibrium Constant, Kc		✓	✓		✓								✓	

		• POGIL Activity: Equilibrium	✓	✓	✓		✓								✓		
	Unit 11: Acids, Bases, and Acid-Base Equilibria																
	• LO1.18 [SP 1.4; EK1.E.2] • LO1.19 [SP 4.2, 5.1, 6.4; EK1.E.2] • LO1.20 [SP 4.2, 5.1, 6.4; EK1.E.2] • LO2.12 [SP 5.1, 6.5; EK2.B.2, *connects to* 2.A.2] • LO2.13 [SP 1.4, 6.4; EK2.B.2] • LO2.14 [SP 1.4, 6.4; EK2.B.2] • LO3.3 [SP 2.2, 5.1; EK3.A.2] • LO3.4 [SP 2.2, 5.1, 6.4; EK3.A.2] • LO6.1 [SP 6.2; EK 6.A.1]	**Topics:**														15 days
		Nature of Acids and Bases	✓	✓								✓			✓	Ch. 14 Pg. 653-655	
		Acid Strengths	✓									✓			✓	Ch. 14 Pg. 656-660	
		pH		✓				✓				✓			✓	Ch. 14 Pg. 661-666	
		Weak Acids/ Polyprotic Acids		✓			✓	✓				✓			✓	Ch. 14 Pg. 666-674, 681-685	
		Bases	✓	✓				✓				✓			✓	Ch. 14 Pg. 675-680	
		Salt Hydrolysis	✓	✓				✓				✓			✓	Ch. 14 Pg. 686-690	
		Chemical Structure	✓									✓			✓	Ch. 14 Pg. 691-692	
		Acid Base Properties	✓	✓								✓			✓	Ch. 14 Pg. 693-694	
		Buffers/ Common Ion Effect		✓		✓		✓				✓			✓	Ch. 15 Pg. 712-726	
		Titration		✓				✓				✓			✓	Ch. 15 Pg. 727-747	

		Activities:															
		Suggested: • Lab: How Do the Structure and the Initial Concentration of an Acid and a Base Influence the pH of the Resultant Solution During a Titration?	✓	✓	✓	✓	✓	✓	✓						✓		
		• Lab: To What Extent Do Common Household Products Have Buffering Activity?				✓	✓	✓							✓		
		• Lab: The Preparation and Testing of an Effective Buffer: How Do Components Influence a Buffer's pH and Capacity?	✓	✓		✓	✓	✓	✓						✓		
	Unit 12: Solubility Equilibrium																
	• LO6.1 • LO6.21 [SP 2.2, 2.3, 6.4; EK6.C.3] • LO6.22 [SP 2.2, 2.3, 6.4; EK6.C.3] • LO6. 23[SP 5.1, 6.4; EK6.C.3] • LO6.24 [SP 1.4, 7.1; EK6.C.3, *connects to* 5.E]	**Topic:**															7 days
		KSP		✓				✓				✓			✓	Ch.16 Pg. 759-767	
		Selective Precipitation		✓				✓				✓			✓	Ch. 16 Pg. 768-773	
		Activities:															
		Suggested: • Lab: What makes hard water hard?	✓	✓		✓	✓	✓			✓						
	Unit 13: Thermochemistry &Thermodynamics																
	• LO2.15 [SP 1.4, 6.2; EK2.B.3, *connects to* 5.E.1] • LO2.16 .[SP 6.2; Essential knowledge 2.B.3]	**Topic:**															15 days
		Nature of Energy	✓			✓		✓	✓		✓			✓		Ch. 6 Pg. 246-252	

	• LO3.11 [SP 1.5, 4.4; EK3.C.2] • LO5.1 [SP 1.1, 1.4, 7.2, *connects to* Big Idea 2; EK components of 5.A–5.E] • LO5.2 [SP 1.1, 1.4, 7.1; EK5.A.1] • LO5.3 [SP 7.1; EK5.A.2] • LO5.4 [SP 1.4, 2.2, *connects to* EK5.B.1, 5.B.2] • LO5.5 [SP 2.2, *connects to* EK5.B.1, 5.B.2] • LO5.6 [SP 2.2, 2.3; EK5.B.3] • LO5.7 [SP 4.2, 5.1, 6.4; EK5.B.4] • LO5.8[SP 2.3, 7.1, 7.2; Essential knowledge 5.C.2] • LO5.12 [SP 1.4; EK 5.E.1] • LO5.13 [SP 2.2, 2.3, 6.4; EK5.E.2, *connects to* 5.E.3] • LO5.14 [SP 2.2; EK5.E.3, *connects to* 5.E.2] • LO5.15 [SP 6.2; EK5.E.4] • LO5.16 [SP 6.4; EK5.E.4, *connects to* 6.B.1] • LO5.17 [SP 6.4; EK5.E.4, *connects to* 6.A.2] • LO6.25 [SP 2.3; EK6.D.1]	Calorimetry		✓		✓	✓	✓	✓			✓		✓		Ch. 6 Pg. 252-260	
		Hess's Law		✓		✓	✓	✓	✓			✓		✓		Ch. 6 Pg. 260-264	
		Heat of Formation		✓		✓	✓	✓	✓			✓		✓		Ch. 6 Pg. 265-271	
		Bond Energy	✓	✓			✓	✓	✓		✓			✓		Ch. 8 Pg. 373-376	
		Entropy	✓	✓			✓	✓			✓			✓		Ch. 17 Pg. 788-795,801-805	
		Gibb's Free Energy		✓			✓	✓						✓	✓	Ch. 17 Pg. 798-801,805-809	
		Free Energy & Equilibrium		✓			✓	✓						✓	✓	Ch. 17 Pg. 813-817	
		Activities:															
		Suggested: • Lab: The Hand Warmer Design Challenge: Where Does the Heat Come From?	✓	✓		✓	✓	✓	✓					✓			
		• Gizmo: Temperature and Particle Motion	✓		✓			✓	✓					✓			
		• Data Analysis: Energy Source/CO_2 production		✓			✓		✓					✓			

4th	**Unit 14: Electrochemistry**															
	• LO3.2 [SP 1.5, 7.1; EK3.A.1] • LO3.8 [SP 6.1; EK3.B.3] • LO3.9 [SP 4.2, 5.1; EK3.B.3] • LO3.12 [SP 2.2, 2.3, 6.4; EK3.C.3] • LO3.13 [SP 5.1; EK3.C.3] • LO5.15 [SP 6.2; EK5.E.4] • LO5.16 [SP 6.4; EK5.E.4, *connects to* 6.B.1] • LO5.17 [SP 6.4; EK5.E.4, *connects to* 6.A.2] • LO6.1 [SP 6.2; EK 6.A.1]	**Topic:**															10 days
		Balancing Redox Reactions	✓			✓		✓	✓			✓				Ch. 18 Pg. 833-839	
		Electrochemical Cells/ Standard Reduction Potentials		✓				✓				✓				Ch. 18 Pg. 840-848	
		Cell Voltage and Free Energy		✓				✓				✓		✓		Ch. 18 Pg. 849-852	
		Cell Voltage and Concentration						✓				✓		✓		Ch. 18 Pg. 852-858	
		Electrolysis										✓				Ch. 18 Pg. 864-874	
		Activities															
		Suggested: • Lab: Electroplating		✓	✓	✓	✓	✓	✓			✓					
	AP Exam Review																
	• Practice Exams during April lab times after met all required labs • Topic Reviews in class after completing all units																20 days
	Applications of Chemistry																
	Optional topics of study: • Intro to organic chemistry • Careers in Chemistry • Special Topics																15 days

VI. BIG IDEA ACTIVITIES

At a minimum at least one of the activities in each big idea below will be performed by the students either individually or in small groups. Although only two activities are listed for each Big Idea, it should be understood that multiple activities for each of the six Big Ideas will be performed throughout the school year to enhance student instruction and learning of the concepts therein.

Big Idea	Activity Name, Brief Description, and Resources
1 LO: 1.9, 1.10, 1.11	• *"Why do they call it Periodic Table: Investigating and graphing periodic trends"* group activity by Laying The Foundation (Chapter 7). Students will be given a set of cards that contain certain properties. Without referring to the actual Periodic Table, they will attempt to put the cards in some order that makes sense to them. They will then justify their arrangement to the class as a group. In doing so, they will learn the trends of the Periodic Table. • *POGIL Activity: Photoelectron Spectroscopy (PES)* reinforces the electronic structure of the atom.
2 LO: 2.11, 2.13, 2.20, 2.21	• "*Bond With Me"* individual activity developed by the teacher (Chapter 8-9): Students will use the online molecular modeling program, WebMO, to construct molecular structures of 10 different molecules, optimize their geometry and determine some of their properties including bond length, molecular energy, bond angle, dipole moment and polarity. Students will then compare appropriate molecules establish trends in the properties. • *Molecular Modeling Activity/Project*. Students construct models of 10 molecules using household materials and relate their properties to each molecule's structure.
3 LO: 3.2	• *"AP Chemistry Chemical Equations"* group activity by Flinn Scientific (Chapter 4): Students watch a series of reaction videos by The National Math and Science Initiative at http://apchemistrynmsi.wikispaces.com/ as homework and then work in groups in class to complete 35 net ionic reactions and answer a descriptive chemistry question about each reaction. • The redox simulation provides an understanding of how particles interact.
4 LO: 4.1, 4.2, 4.3, 4.4	• *"Kinetics Graphing and Analysis Activity" by Adrian Dingle (Chapter 12).* Students will plot the given kinetic data for a known chemical reaction, analyze the graph and answer specific questions and solve numerical problems related to Kinetics. • *ExploreLearning Gizmo Activity: Collision Theory*. Students will interact with and manipulate online simulation that provides a visual model of how particle behavior affects the rate at which reactions occur.
5 LO: 5.3, 5.4, 5.5, 5.6, 5.7	• *"Determining the amount of energy found in food using data collection device"* group activity developed by Laying The Foundation (Chapter 6): Students will determine the amount of energy in a sample of traditional cheese curls and baked or puffed cheese puffs. Students will calculate the percent yield and percent error in the experiment and evaluate the sources of error. • *ExploreLearning Gizmo Activity: Temperature and Particle Motion*. Students will interact with and manipulate an online simulation that provides a model for relating particle motion to heat and thermodynamic properties.
6 LO: 6.11-6.17, 6.19, 6.20	• http://group.chem.iastate.edu/group/Greenbowe/sections/projectfolder/flashfiles/stoichiometry/acid_base.html *"Graphing Acid-Base Titrations"* individual activity developed by the teacher (Chapter 15): Students utilize SCAM charts and RICE tables to calculate the pH at various positions during an acid-base titration including the original, ½ equivalence, equivalence and post equivalence volumes. Students then sketch the titration curve and identify these points on the curve along with any buffer regions (if appropriate). The 2 titrations include a strong acid-base reaction, a weak acid-strong base reaction. • *POGIL Activity: Chemical Equilibrium* allows students to visualize reactions approaching equilibrium.