**AP Chemistry Syllabus**

**2022-2023, Amy Jacob**

**Contact:** **amy.jacob@ucps.k12.nc.us**

**Office Hours: Thursday Mornings, 7:30-8:00**

**Course Description:**

AP Chemistry is designed to be the equivalent of a two-semester introductory college chemistry course. Spanning two semesters, the class meets daily for an 80-minute block. Instruction consists mostly of lecture, labs, discussions, demonstrations, and written assignments which may include research projects, in-class assignments, homework, and online activities. Laboratory will require students to observe proper safety precautions and turn in a written lab report.

AP courses differ from honors courses in terms of the level of expectations placed on the students; the amount of independent work expected; the pace of coverage of content; the expected skill level; and the breadth and depth of the content covered. Therefore, considering the balance of coursework demands in relation to interest, ability, and extra-curricular activities, serious thought should be given as to what a student can handle without creating undue stress. AP courses are appropriate for fairly autonomous students who are self-motivated learners, and who are ready to move quickly from lower-order thinking (knowledge, comprehension) to more conceptual, higher-order thinking (application, analysis, synthesis). AP courses expect more work than honors courses and demand a stronger mastery of skills and more independent critical thinking. Often more assignments are given, which demands more self-discipline from the students to keep track of everything accordingly.

<https://apstudents.collegeboard.org/sites/default/files/2019-05/ap-chemistry-course-and-exam-description.pdf>

**Course Materials:**

* Required Materials - charged computer, paper, pen or pencil, scientific calculator, cell phones, ear buds
* Textbook - we will be using a pdf copy of the Zumdahl AP Chemistry Textbook. Physical copies can be checked out upon request.
* Goggles – sanatized goggles are available in the classroom. Students are welcome to purchase their own, these must be OSHA approved chemical splash goggles. I use UVEX Stealth Safety Goggles with Clear Uvextreme Anti-Fog Lens: [https://www.amazon.com/gp/product/B0001YXFFM/ref=ppx\_yo\_dt\_b\_search\_asin\_title?ie=UTF8&psc=1](https://www.amazon.com/gp/product/B0001YXFFM/ref%3Dppx_yo_dt_b_search_asin_title?ie=UTF8&psc=1)
* Lab Notebook - Because chemistry professors at some institutions ask to see a record of the laboratory work done by an AP student before making a decision about granting credit or placement in the chemistry program, students should keep a laboratory portfolio that includes reports of their laboratory.
* Student Study Guide - Students are encouraged to purchase a Student Study Guide to prepare for course exams and an AP review book to help them study for the exam. We will be using The Princeton Review AP Chemistry Prep, 2022 with 4 Practice Tests: <https://www.amazon.com/dp/0525570586?psc=1&smid=ATVPDKIKX0DER&ref_=chk_typ_imgToDp>

**Classroom Expectations:**

Respect the classroom: no eating or drinking in class, no gum, pick up any trash that you leave nearby, use the lab supplies correctly, backpacks should be under desks. Cell phones must be in the shoe pocket before the bell rings and will only be used when given prior permission.

Respect the teacher: ask permission by raising your hand before speaking or leaving your seat, ask questions to gain clarity.

Respect your classmates: keep hands and feet to yourself, use the pencil sharpener, trash, etc., before you sit down so as not to distract others, use the restroom before you enter the classroom, be respectful with language and gestures to others.

Respect yourself: do your own work (no plagiarism), bring all materials to class, and be prepared for class when the bell rings. Do your best! Have a positive attitude!

What happens if you do not follow the classroom expectations? First, a verbal warning; second, contact to guardian; third, disciplinary referral. Cheating or plagiarism violations result in zero credit, contact to guardian, and a disciplinary referral.

**Instructional Philosophy:**

Students taking AP Chemistry can expect an engaging hands-on learning experience. Assessments will be designed to apply the rigors which students will experience during the taking of the AP Examination, so that students will be prepared with the content and test-taking skills required to reach their full potential during that examination. Students enrolled in the course are juniors and seniors who have successfully taken Honors Chemistry and are enrolled in upper level, honors math courses. Students are expected to be self-motivated with the **time and dedication to devote to a rigorous course**. Students should have good note-taking skills and study habits. This course is a year-long class and students are required to take both semesters and sit for the AP exam in order to earn AP credit.

Students who receive a qualifying score on the AP Chemistry Exam may be able to take second-year chemistry coursework in their first year at their undergraduate institution, or, their score may fulfill their institution's lab science requirements thereby freeing time for other courses.

**Unit Structure:**

Each unit will consist of lectures, daily homework, daily reading, lab(s), activities, and individual practice. Answer Keys to homework assignments can be found on Canvas.

**Assessments and Grading Policy:**

Your AP Chemistry grade consists of the following: tests, demonstrations, projects, quizzes, classwork, and homework. Students are responsible for completing each component of an assignment regardless of whether or not that component is ultimately graded. All assignments will be turned in on Canvas. Work will NOT be accepted on paper.

Tests: 20 points Quizzes: 5-10 points Demonstrations/Labs/Projects: 10-20 points Homework and Classwork: 5-10 points Tests: 40% Quizzes: 25% Labs: 20% Homework and Classwork: 15%

**Absent/Late Work:**

When you are absent it is **YOUR** responsibility to collect your absent work from the absent folder and collect any missed lab data/notes from your peers or from Canvas. All absent work must be **turned in within 2 days of being absent for full credit**. It is your responsibility to label this work as absent along with the date on the top and place in the absent box, NO DATE = NO CREDIT. Late work will be accepted for a 25% reduction for each day late. Test makeups will follow the MRHS policy.

**Exam date**:

May 1, 2023

**Course Outline**

Unit 1: Atomic Structure and Properties

* 1.1 Moles and Molar Mass
* 1.2 Mass Spectroscopy of Elements
* 1.3 Elemental Composition of Pure Substances
* 1.4 Composition of Mixtures
* 1.5 Atomic Structure and Electron Configuration
* 1.6 Photoelectron Spectroscopy
* 1.7 Periodic Trends
* 1.8 Valence Electrons and Ionic Compounds

Unit 2: Molecular and Ionic Compound Structure and Properties

* 2.1 Types of Chemical Bonds
* 2.2 Intramolecular Force and Potential Energy
* 2.3 Structure of Ionic Solids
* 2.4 Structure of Metals and Alloys
* 2.5 Lewis Diagrams
* 2.6 Resonance and Formal Charge
* 2.7 VSEPR and Bond Hybridization

Unit 3: Intermolecular Forces and Properties

* 3.1 Intermolecular Forces
* 3.2 Properties of Solids
* 3.3 Solids, Liquids, and Gases
* 3.4 Ideal Gas Law
* 3.5 Kinetic Molecular Theory
* 3.6 Deviation from Ideal Gas Law
* 3.7 Solutions and Mixtures
* 3.8 Representations of Solutions
* 3.9 Separation of Solutions and Mixtures Chromatography
* 3.10 Solubility
* 3.11 Spectroscopy and the Electromagnetic Spectrum
* 3.12 Photoelectric Effect
* 3.13 Beer-Lambert Law

Unit 4: Chemical Reactions

* 4.1 Introduction for Reactions
* 4.2 Net Ionic Equations
* 4.3 Representations of Reactions
* 4.4 Physical and Chemical Changes
* 4.5 Stoichiometry
* 4.6 Introduction to Titration
* 4.7 Types of Chemical Reactions
* 4.8 Introduction to Acid-Base Reactions
* 4.9 Oxidation-Reductions (Redox) Reactions

Unit 5: Kinetics

* 5.1 Reaction Rates
* 5.2 Introduction to Rate Law
* 5.3 Concentration Changes Over Time
* 5.4 Elementary Reactions
* 5.5 Collision Model
* 5.6 Reaction Energy Profile
* 5.7 Introduction to Reaction Mechanisms
* 5.8 Reaction Mechanism and Rate Law
* 5.9 Steady-State Approximation
* 5.10 Multistep Reaction Energy Profile
* 5.11 Catalysis

Unit 6: Thermodynamics

* 6.1 Endothermic and Exothermic Processes
* 6.2 Energy Diagrams
* 6.3 Heat Transfer and Thermal Equilibrium
* 6.4 Heat Capacity and Calorimetry
* 6.5 Energy of Phase Changes
* 6.6 Introduction to Enthalpy of Reaction
* 6.7 Bond Enthalpies
* 6.8 Enthalpy of Formation
* 6.9 Hess’s Law

Unit 7: Equilibrium

* 7.1 Introduction to Equilibrium
* 7.2 Direction of Reversible Reactions
* 7.3 Reaction Quotient and Equilibrium Constant
* 7.4 Calculating the Equilibrium Constant
* 7.5 Magnitude of the Equilibrium Constant
* 7.6 Properties of the Equilibrium Constant
* 7.7 Calculating Equilibrium Concentrations
* 7.8 Representations of Equilibrium
* 7.9 Introduction to Le Chatelier’s Principle
* 7.10 Reaction Quotient and Le Chatelier’s Principle
* 7.11 Introduction to Solubility Equilibria
* 7.12 Common-Ion Effect
* 7.13 pH and Solubility
* 7.14 Free Energy of Dissolution

Unit 8: Acids and Bases

* 8.1 Introduction to Acids and Bases
* 8.2 pH and pOH of Strong Acids and Bases
* 8.3 Weak Acid and Base Equilibria
* 8.4 Acid-Base Reactions and Buffers
* 8.5 Acid-Base Titrations
* 8.6 Molecular Structure of Acids and Bases
* 8.7 pH and pKa
* 8.8 Properties of Buffers
* 8.9 Henderson-Hasselbalch Equation
* 8.10 Buffer Capacity

Unit 9: Applications of Thermodynamics

* 9.1 Introduction to Entropy
* 9.2 Absolute Entropy and Entropy Change
* 9.3 Gibbs Free Energy and Thermodynamic Favorability
* 9.4 Thermodynamic and Kinetic Control
* 9.5 Free Energy and Equilibrium
* 9.6 Coupled Reactions
* 9.7 Galvanic (Voltaic) and Electrolytic Cells
* 9.8 Cell Potential and Free Energy
* 9.9 Cell Potential Under Nonstandard Conditions
* 9.10 Electrolysis and Faraday’s Law

As your son/daughter’s teacher, I will treat all students equally and with respect. I strongly believe that effective parent/teacher communication will promote the academic success of students at Marvin Ridge High School.

Sincerely,

Amy Jacob

**Student Contract**

**As a student in Mrs. Jacob’s class, I agree to:**

- Follow procedures and expectations as outlined in the attached letter

- Abide by policies outlined in the school handbook

- Attend class regularly and be on time

- Be courteous and respectful to my peers, my teacher, and my school

- Stay on task in class and complete my assignments

STUDENT NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE: \_\_\_\_\_\_\_\_\_\_\_\_

STUDENT SIGNATURE:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PLEASE INTIAL THE FOLLOWING STATEMENTS INDICATING YOUR COMPLIANCE TO THE GRADING POLICY:**

\_\_\_\_\_\_ I understand that any late work will be accepted for a 25% reduction for each day late.

\_\_\_\_\_\_ I understand that if I am absent I am responsible for all missed work and notes.

**As a parent/guardian of a student in Mrs. Jacob’s class I:**

- Have read the course requirements/expectations information sheet for my child.

- Will let Mrs. Jacob know of any medical, physical, mental, or dietary needs of which she should be made aware.

- Will contact Mrs. Jacob with any questions or concerns.

GUARDIAN NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

GUARDIAN SIGNATURE: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Honesty Pledge: To be completed and signed by the student:**

*I pledge that my participation in this class will be one of integrity. In doing this I will…*

STUDENT NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE: \_\_\_\_\_\_\_\_\_\_\_\_

STUDENT SIGNATURE:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_