

AP Chemistry Syllabus 2023-2024

Contact Information

Teacher: Jamie O'Malley

School: [Helena High School](#)

Phone: (406) 324-2286

Email: jomalley@helenaschools.org

Teams: chat with me on Teams with questions or one-on-one instruction

Office Hours

Monday - Friday 3:15-3:45, or schedule an alternate time directly with me

Online Platforms

- **Teams:** we will be using Microsoft Teams and OneNote through the school district for our daily classwork. You can log into clever.com/in/helenaschools to access this class and the Teams page, or log into your Office 365 account.
- In Teams, all of your classwork and notes can be found in your **Class Notebook** and the associated **OneNote**.
- **AP Classroom:** we will be using [APClassroom.org](https://apclassroom.org) for tests and progress checks.

Supplies Needed

- Electronic device such as a Chromebook for online classwork or activities
- Pencils/pens
- Scientific calculator capable of scientific notation
- 3 ring Binder to keep track of handouts and notes
- Notebook paper

Teacher Wish List

- Hot chocolate packets
- Hot chocolate mugs
- Wooden stir sticks
- Candy for prizes

Supplies Needed For labs:

- Splash resistant safety goggles (students may buy a pair from me for \$3 or borrow a used pair)
- Closed toed shoes on lab days
- Hair ties for long hair
- Non-latex gloves for labs (one box)

Pre-requisites

Chemistry 1 and Algebra II

Textbook

Text: Brown, Lemay, Bursten, Murphy, and Woodward, (2012), *Chemistry, The Central Science*, (12th edition).

Lab Manuals: Vonderbrink, Sally Ann, Ph.D, *Laboratory Experiments for Advanced Placement Chemistry*, (2nd edition).

College Board, *AP Chemistry Guided-Inquiry Experiments: Applying the Science Practices*, (2013).

These will be provided.

Course Description

The purpose of Advanced Placement Chemistry is to provide a college level course in chemistry and to prepare the student to seek credit and/or appropriate placement in college chemistry courses.

Emphasis is placed on depth of understanding of a topic, rather than breadth of topics. We will be using AP Classroom for online progress checks and unit assessments.

These are the Science Practices that will be covered as suggested by the College Board.

1. Models and Representations: Describe models and representations, including across scales.
2. Question and Method: Determine scientific questions and methods.
3. Representing Data and Phenomena: Create representations or models of chemical phenomena.
4. Model Analysis: Analyze and interpret models and representations on a single scale or across multiple scales.
5. Mathematical Routines
6. Solve problems using mathematical relationships.
7. Argumentation: Develop an explanation or scientific argument.

**Units and topics
to be covered:**

Unit	Topics
1 Atomic Structure and Properties	<ol style="list-style-type: none"> 1. Moles and Molar Mass 2. Mass Spectroscopy of Elements 3. Elemental Composition of Pure Substances 4. Composition of Mixtures 5. Atomic Structure and Electron Configuration 6. Photoelectron Spectroscopy 7. Periodic Trends 8. Valence Electrons and Ionic Compounds
2 Molecular and Ionic Compound Structure and Properties	<ol style="list-style-type: none"> 1. Types of Chemical Bonds 2. Intramolecular Force and Potential Energy 3. Structure of Ionic Solids 4. Structure of Metals and Alloys 5. Lewis Diagrams 6. Resonance and Formal Charge 7. VSEPR and Bond Hybridization
3 Intermolecular Forces and Properties	<ol style="list-style-type: none"> 1. Intermolecular Forces 2. Properties of Solids 3. Solids, Liquids, and Gases 4. Ideal Gas Law 5. Kinetic Molecular Theory 6. Deviation from Ideal Gas Law 7. Solutions and Mixtures 8. Representations of Solutions 9. Separation of Solutions and Mixtures Chromatography 10. Solubility 11. Spectroscopy and the Electromagnetic Spectrum 12. Photoelectric Effect 13. Beer-Lambert Law
4 Chemical Reactions	<ol style="list-style-type: none"> 1. Introduction for Reactions 2. Net Ionic Equations 3. Representations of Reactions 4. Physical and Chemical Changes 5. Stoichiometry 6. Introduction to Titration 7. Types of Chemical Reactions 8. Introduction to Acid-Base Reaction 9. Oxidation-Reduction Reactions
5 Kinetics	<ol style="list-style-type: none"> 1. Reaction Rates 2. Introduction to Rate Law 3. Concentration Changes Over Time 4. Elementary Reactions 5. Collision Model 6. Reaction Energy Profile 7. Introduction to Reaction Mechanisms 8. Reaction Mechanism and Rate Law 9. Steady-State Approximation 10. Multistep Reaction Energy Profile 11. Catalysis
6 Thermodynamics	<ol style="list-style-type: none"> 1. Endothermic and Exothermic Processes 2. Energy Diagrams 3. Heat Transfer and Thermal Equilibrium 4. Heat Capacity and Calorimetry 5. Energy of Phase Changes 6. Introduction to Enthalpy 7. Bond Enthalpies 8. Enthalpy of Formation 9. Hess's Law
7 Equilibrium	<ol style="list-style-type: none"> 1. Introduction to Equilibrium 2. Direction of Reversible Reactions 3. Reaction Quotient and Equilibrium Constant 4. Calculating the Equilibrium Constant 5. Magnitude of the Equilibrium Constant 6. Properties of the Equilibrium Constant 7. Calculating Equilibrium Concentrations 8. Representations of Equilibrium 9. Introduction to Le Chatelier's Principle 10. Reaction Quotient and Le Chatelier's Principle 11. Introduction to Solubility Equilibria 12. Common-ion Effect 13. pH and Solubility 14. Free Energy of Dissolution
8 Acids and Bases	<ol style="list-style-type: none"> 1. Introduction to Acids and Bases 2. pH and pOH of Strong Acids and Bases 3. Weak Acid and Base Equilibria 4. Acid-Base Reactions and Buffers 5. Acid-Base Titrations 6. Molecular Structure of Acids and Bases 7. pH and K_a 8. Properties of Buffers 9. Henderson-Hasselbalch Equation 10. Buffer Capacity.
9 Applications of Thermodynamics	<ol style="list-style-type: none"> 1. Introduction to Entropy 2. Absolute Entropy and Entropy Change 3. Gibbs Free Energy and Thermodynamic Favorability 4. Thermodynamic and Kinetic Control 5. Free Energy and Equilibrium 6. Coupled Reactions 7. Galvanic (Voltaic) and Electrolytic Cells 8. Cell Potential Under Nonstandard Conditions 9. Electrolysis and Faraday's Law

Laboratory Requirement

AP Chemistry students will be spending at least 25% of their class time performing hands-on laboratory experiments. Students will be collecting, process, manipulating, and graphing data from both qualitative and quantitative observations. The students will be also designing, carrying out, and analyzing data from inquiry-based labs.

Safety for In-Person Labs

It is my responsibility to teach you the techniques for safe use of the chemistry lab, it is your responsibility to be mature and follow the rules. Failure to follow the safety rules will result in a phone call home and you will **not receive credit!** Wearing closed-toed shoes and safety goggles are a **must** for every lab. A lab safety contract must be signed before performing in-person labs.

Classroom Expectations

Effort

What you put into this class is what you'll get out! AP Chemistry is a tough subject, and it will take more hours of studying than a typical high school class. Please dedicate some time **every day** to studying AP Chem, whether it's reading, watching videos, completing assignments, or taking notes. Even just 15 minutes of time each day helps! There is a direct correlation between how much time you study outside of class and AP exam scores. We are pushing two semesters of college chemistry into a high school schedule, so we follow a tight and fast schedule.

Grading

Q1 (40%) Q2 (40%) Final Exam (20%). A: 90-100%; B: 80-90%; C: 70-79%; D: 60-69%; F: Below 60%. (Approximate) Tests or quizzes 80%, classwork 10%, labs 10%. Students who take the AP test in May will not be required to take a final exam.

Classwork: Classwork only counts for about 10% of your grade. This work will be corrected, or an answer key will be provided so you can see what you are doing correctly and/or incorrectly. If you work hard on the classwork and turn it in on time, the assessments will be much easier! We grade every assignment together in class and then I put completion points into the gradebook.

Assessments: The majority of your grade will be based on assessments, it concentrates more on what you know, than what you can complete as assignments. You can retake assessments once per test and I will put your highest score in powerschool. You have one week from the assessment for the retake. ***If you can't find the time to retake or make up a test within ONE WEEK, you will not receive credit for the test.***

Late Work: All unit classwork is due on the day of the unit test. Your score on classwork gets reduced by 70% if you turn it in late, which is after the day of the test. There is a direct correlation between chronic late work and poor test scores.

Food and Drinks: There will be no food or drinks in the lab.

Communication: Please tell me if you need help! I am usually very quick to reply to emails and Teams chat.

Copying/Cheating: How can you learn anything if you go through life **copying** others? We have 182 days of school, use them to get smarter! The lender and the copier will both receive zeroes if caught. Please exercise self-control when using the internet. You might be tempted to copy answers off the internet on your assignments, but this does not help you understand the material at a deeper level and will not help you be successful on the AP Exam in May.

AP Exam

The AP Chemistry exam is on Monday, May 6th, 2024 at 12:00 pm. It consists of 60 multiple choice questions and seven free response essay questions. The exam is not required but highly recommended. Exam registration is in the fall! Visit the College Board website for more detailed information: [College Board](#)

About Your Teacher

I graduated from South Whidbey High School in 1987 and the University of Washington in 1991. My husband of 28 years, Dan, and I have lived near Winston, MT for close to 12 years. I taught Biology and Math at North Kitsap High School for one year and Biology and AP Biology at Sultan High School for 6.5 years. After moving to Montana, I was the Director of Education at ExplorationWorks, and taught STEM at Starbase for 1.5 years. I have been teaching at HHS for seven years. Here at HHS, I have taught Chemistry 1, AP Chemistry, and Biology 1. I am also the advisor for Key Club and Science Olympiad. I have several years' experience working in a laboratory in Seattle performing microbiology quality control and immunology research, as well as providing support materials for chemical and biological testing at the Montana DPHHS. My most challenging career to date has been a stay-at-home mom for close to seven years.

I enjoy hiking, camping, fishing, gardening, hunting, riding horses, winter sports, and of course, teaching! We have two herd dogs, two cats, and approximately 40 chickens. We also have two kids, Jake and Katie, who graduated from HHS in 2016 and 2017. Katie lives in Bozeman and is a 2022 graduate of MSU with a degree in Graphic Design and is currently working in her field. Jake lives in Missoula with his Schnauzer puppy, Otto, and works in the insurance technology industry.

