

AP Chemistry Syllabus

Mrs. Kristen Steele

Email: kfsteele@madisoncity.k12.al.us

School Voicemail: 256-216-5313

Main Form of Communication: Schoology

Course Description

Chemistry is the study of the properties, composition, structure, and behavior of matter. A detailed list of topics to be studied is described below in the "Course Content Outline." The instructor will use a variety of teaching methods including lecture, demonstrations, laboratory exercises, and written assignments (both in-class and homework).

Pre-entry Standards and Expectations

In order to achieve a minimum passing grade for this course, a student must be able to follow and apply basic safety requirements, collect and analyze data, manipulate laboratory equipment and apparatus, perform laboratory work, prepare and interpret graphs, perform mathematical calculations using algebra, prepare written reports, communicate effectively both orally and in writing, solve problems, read, study, and complete assignments. **Students must be prepared to devote at least as much time to study and completing assignments outside of class as the time spent in class.**

Many students find Chemistry to be the first class in which they've ever had to study. Most students cannot expect to make A's or B's without **going home nightly**, looking over the material covered and doing some self-diagnostics asking themselves "Do I understand this concept?" or "Can I work this problem?". If you will identify weaknesses in your understanding and ask the next day, you will stay current. It is also necessary to access Schoology and either print out the PowerPoint slides or take notes from them so we can make better use of time. You will also be expected to watch videos to help you prepare for class.

I am assuming you are knowledgeable about the concepts covered in Chemistry I and I will expect you to use those skills. I will only be doing minor review on the content covered in Chemistry I.

Supplementary Materials:

It is suggested that you purchase an AP Chemistry prep manual from a bookseller (e.g. **The Princeton Review AP Chemistry 2025** and/or **Crash Course AP Chemistry (by Dingle)**). I will announce in class which review books we will use. Use this as a supplement of problems and concepts. We may have morning study sessions using this book.

There will also be videos posted to Schoology for you to watch. We will be employing a flipped classroom approach this year. Students will be responsible for watching video content as their homework and the majority of the time in class will be spent discussing lab results, working problems and trouble shooting. This approach makes the student responsible for their own education and moves the teacher from someone who pours knowledge into their head to a coach or facilitator who is available to help the student in their quest for success.

Grading

You will be graded on chapter questions, worksheets, written laboratory activities, assigned reports, projects, tests and in-class activities. At times, you will earn grades for doing assignments in class.

- **No late work or unexcused absence work will be accepted.**
- Tests will be a combination of multiple choice and free response to mimic the AP exam. A large part of chemistry is problem solving and you will be expected to show a proficiency in that skill.
- Your grade each nine-weeks will be calculated as follows:
 - ❑ 30% Daily work which could include: daily warmups, labs, classwork, and homework. To bolster student collaboration and communication WITHIN a lab team, individual lab work may be collected, and a grade assigned to the entire lab team.
 - ❑ 70% Tests and quizzes. Tests will be timed and taken during assigned class time. The AP exam is a timed exam and it is important for students to develop time management skills.

➤ Test Corrections

In order to reinforce concepts missed on tests, students will be allowed to come during refuel on teacher assigned dates to make corrections to the test. In the event that refuel as a whole is removed for JC students, a student may come in the morning as communicated to the class by the teacher. Students who come in the morning may come at 7:00 AM and must get a pass from the teacher the day before. Test correction time = one hour. There **will not** be makeup days for test corrections. Students must provide **the correct answer, a description of why the other choices are incorrect and an explanation of why the student missed that question**. If the work is incomplete or is not done to the standards set by the teacher, points will not be awarded back to the student. Students can earn $\frac{1}{4}$ of the points missed back on their test grade. The AP square root scaling method may be used on MCQ's based on teacher discretion, assuming unit homework packet and all unit test corrections have been completed fully. No points will be earned back on free response questions, only the multiple choice and mathematical computations parts of a test. The student may use their text and may seek help from the teacher when doing corrections. No corrections will be done at home.

- You may come see me any time before school or after school to see about your grades.
- Grades will be entered into the Power School system allowing parents and students to access grades using the internet.
- Make-ups. You need to schedule a makeup time with the teacher. It is the responsibility of the student to ask for the appropriate time for make-up tests. If a test is missed due to an excused absence, the student will have two weeks after the absence to make it up. Students who arrive late for a make-up test may NOT receive extra time to finish the test and any uncompleted sections will be counted as incorrect.
- End of Term Exam. The end of term exam is a comprehensive test or project given at the end of the semester which counts for 20% of the course grade. The final exam may possibly be (but is not limited to) a scaled down version of an AP exam with multiple choice.

Class Rules

In addition to the Student Code of Conduct and academic conduct policies found in the JCHS Student Handbook, please observe the following rules:

1. Always have a binder with loose leaf paper, a pen or pencil, highlighters, a dry-erase marker, an issued textbook, 3-prong lab folder for lab reports and a calculator (scientific or graphing). *A box of nitrile gloves will be useful during lab activities.
2. Always be a prepared, attentive and positive participant in class. *In the event of an emergency hybrid schedule or virtual schedule as mandated by MCBOE, students will continue participating in class DURING the regular assigned time. Student access to assignment directions and Webex virtual meeting links will be provided by teacher at the beginning of class. Cameras should remain on and microphone access should be readily available during live lessons to better facilitate class discussion. Any special circumstances must be communicated and approved by instructor.
3. Technology is a supplement to learning and should only be used for chemistry work as directed by the teacher. The default expectation is that technology is placed in a location assigned by the instructor until deemed ready for class use. Unauthorized use of technology (i.e., computer, smart phone, smart watch, earphones, unapproved calculator) may result in disciplinary action.
4. Treat others as you would like to be treated.
5. Take control of your own learning!

The National AP Chemistry Exam

Students will take the national AP Chemistry Exam in May. Most, but not all colleges will grant some form of credit or advanced placement for a minimum score on the exam. Student should contact the individual institutions they are interested in attending to find out their most current policies regarding their acceptance or use of AP grades.

Text: *Chemistry* by Zumdahl and Zumdahl, 9th ed., Houghton Mifflin Company, 2014.

AP Chemistry Content Description and Pacing Guide

Introductory and review concepts (½ week)

Primarily completed during Chemistry I or Pre AP Chemistry. It is assumed you know the following topics in depth:

1. Measurement topics
2. Atomic theory
3. Symbols and formulas
4. Periodic table
5. Ionic and covalent bonds
6. Nomenclature
7. Reactions
 - 7.1. Types of Reactions
 - 7.2. Solubility Rules
 - 7.3. Balancing equations
8. Stoichiometry
 - 8.1. Percent composition
 - 8.2. Empirical formulas
 - 8.3. Solutions
 - 8.4. Mole relationships
 - 8.4.1. percent (%) yield
 - 8.4.2. Limiting reagents
9. Gas Laws
 - 9.1. Ideal gases
 - 9.2. Boyle's law, Charles' law and Gay-Lussac's Law
 - 9.3. Dalton's law of partial pressure
 - 9.4. Ideal Gas Law and Combined Gas Law
10. Electronic Structure
 - 10.1. Evidence for the atomic theory
 - 10.2. Atomic masses
 - 10.3. Atomic number and mass number
 - 10.4. Electron energy levels: atomic spectra, quantum numbers, atomic orbitals, hybridized orbitals
 - 10.5. Periodic relationships
 - 10.6. Lewis structures
11. Arrhenius theory
 - 11.1. Properties of acids and bases
 - 11.2. Acid base neutralization
12. Lowry-Brønsted theory
 - 12.1. Amphoteric species
 - 12.2. Relative strengths of acids and bases
 - 12.3. Polyprotic acids
13. Lewis acids and bases. Comparison of all three definitions.

Types of Chemical Reactions and Solution Stoichiometry (1 week)

Chapter 4

1. Oxidation reduction reactions
 - 1.1. Oxidation number
 - 1.2. Electron transport

2. Stoichiometry
 - 2.1. Net ionic equations
 - 2.2. Balancing equations including redox
 - 2.3. Mass-volume relationships with emphasis on the mole

The Kinetic-Molecular Theory and States of Matter (1 week)

Chapters 5, 10

1. Gas Laws
 - 1.1. RMS velocity
 - 1.2. Graham's law
2. Kinetic-Molecular theory
 - 2.1. Avogadro's hypothesis and the mole concept
 - 2.2. Kinetic energy of molecules
 - 2.3. Deviations from ideality
3. Liquids and solids
 - 3.1. Liquids and solids comparisons
 - 3.2. Changes of state
 - 3.3. Structure of solids including lattice energies

Thermochemistry (1.5 weeks)

Chapter 6

1. Thermal energy, heat, and temperature
2. Calorimetry
3. Enthalpy changes
4. Hess's Law

Bonding and Molecular Structure (1 ½ weeks)

Chapters 8 and 9

1. Binding forces
 - 1.1. ionic
 - 1.2. covalent
 - 1.3. metallic including alloys
 - 1.4. hydrogen bonding
 - 1.5. Van der Waals
2. Relationships to states, structure, and properties of matter
3. Polarity of bonds, Electronegativities
4. VSEPR
 - 4.1. Geometry of molecules and ions
 - 4.2. Structural, geometric, optical, and conformational isomerism of:
 - 4.2.1. Organic molecules
 - 4.2.2. Coordination complexes
5. Polarity of molecules
6. Relation of molecular structure to physical properties
7. Complex Ions
 - 7.1. Names and structures of complex ions
 - 7.2. Bonding in coordination systems
 - 7.3. Formation of complex ions (reactions).
 - 7.4. Practical applications

Solutions and Colloids (1 week)

Chapter 11

1. Types of solutions
2. Factors affecting solubility
3. Raoult's law
4. Nonideality of solutions

Chemical Kinetics (1 week)

Chapter 12

1. Rate of reaction
2. Order of the reaction
3. Factors that change the rate of the reaction
 - 3.1. Temperature
 - 3.2. Concentration
 - 3.3. Nature of substance
 - 3.4. Catalysts
4. Relationship between the rate-determining step and the reaction mechanism

Equilibrium (1 week)

Chapter 13

1. Concept of dynamic equilibrium including Le Chatelier's principle
2. Equilibrium constants and the law of mass action

Weak Ionic Equilibrium (1 week)

Chapter 15

1. Weak acids and bases
 - 1.1. pH
 - 1.2. pOH
 - 1.3. Buffer systems
 - 1.4. Hydrolysis
2. Solubility Product
 - 2.1. Factors involving dissolution
 - 2.2. Molar solubility

Chemical Thermodynamics (1 ½ weeks)

Chapter 16

1. State functions
2. Laws of thermodynamics
3. Relationship of change of free energy to equilibrium constants

Electrochemistry (1 ½ weeks)

Chapter 17

1. Galvanic cells and cell potentials
2. Electrolytic cells
3. Electrochemistry: electrolytic and galvanic cells; Faraday's laws; standard half-cell potentials; Nernst equation; prediction of the direction of redox reactions