

Advanced Placement Chemistry Syllabus 2019-20

So... you're itching for some enriching?? You've come to the right place. The Advanced Placement Chemistry course is designed to be the equivalent of a first year university general chemistry course. Students in this course should gain a depth of understanding of fundamentals and a reasonable competence in dealing with chemical problems. The course should contribute to the students' abilities to think clearly and express their ideas, orally and in writing, with clarity and logic.

The prerequisite for AP chemistry is successful completion of both regular chemistry and Algebra II, along with the recommendation of the previous science teacher. There is a summer assignment covering Chapters 1-3 of Zumdahl Chemistry (7th edition).

Website: tinyurl.com/falkapchem (or <https://sites.google.com/a/busd.k12.ca.us/ap-chemistry-mayfair/>)

Time:

Significant laboratory time may be required in this course outside of the regular school day. If this course runs during period 2, 5 or 6, labs may run over into snack, lunch, or after school.

Students are expected to spend at least five hours a week in individual study, and the formation of a study group is strongly recommended. During the spring there will be mandatory practice exam sessions after school and on weekends, to be scheduled. All students are expected to participate.

Textbook:

Zumdahl, Steven S., and Susan A. Zumdahl, Chemistry, 7th ed., 2006.

Grading System: (approximate)

Assignments/Homework/eHomework	15%
Tests, Quizzes, Exams	60%
Lab Reports	<u>25%</u>
Total	100%

Grading Scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

AP Examination:

All students who enroll in AP chemistry are expected to take the AP examination on May 7, 2018. The fourth quarter grade is heavily based on practice test scores.

Seminar:

Following the AP exam, there will be a fourth quarter seminar project related to areas of current research in chemistry. You will have an exciting opportunity to teach the class for a period.

e-mail Communications:

I am making my e-mail address available to you for any school-related communications over the summer or during the school year: jfalk@busd.k12.ca.us. The subject line should be clear, like "AP chem questions" not "HELP" or "IMPORTANT." I may be out of town in June-July, but generally will try to respond to most e-mail within a couple of days or so. Please don't add me to lists nor send junk mail. Always identify yourself in e-mail correspondence to me. Please check with your parents that you have permission to communicate with me by e-mail.

Meanwhile, have a great summer. Do some traveling, some relaxing, and some reading for enjoyment. Next year will be a challenging one!

Parent/guardian signature: _____

Chemistry Course Requirements:

A. Bring the following materials to class daily:

1. three-ring notebook or folder with paper, not spiral bound; pen and pencil.
2. scientific calculator with 8- or 10-digit display; a programmable graphing calculator is permitted on most portions of the AP exam.

B. Homework

1. may be in pen, pencil, or typed.
2. use front and back; staple if >1 page.
3. show work on math problems for full credit; no points for answers only.
4. due the day after your return from an excused absence.

C. Laboratory work

1. One or two periods per week may be spent on laboratory work.
2. Experiments are done in class on the day assigned; no after-school makeups.
3. You may choose a lab partner to work with, subject to space available, enrollment, and my best judgment. Lab reports are done individually.
4. Lab reports must be typed and include the following, in order, as needed: title, purpose, data/observations, calculations, questions, sources of error, conclusion. (“Miscalculation” is not an acceptable source of error!)
5. Accuracy and honesty in laboratory work are equally important.
6. Lab reports are normally due 1 - 2 days after an experiment.
7. If you are absent on the day of a lab, the makeup lab is a 1000 word report covering assigned topic, listing sources of information, and due 1 - 2 days after you return from an excused absence.
8. Students must have a binder for typed lab reports. This will be collected and graded regularly.
9. Students are charged for loss and breakage in the laboratory.

E. Tests

1. Tests will be mixed in format; mainly multiple choice, often with math problems.
2. Tests will often include AP-style free response questions.
3. Usually 30-50 questions, typically covering one chapter.
4. Rough work must be shown for math problems.
5. Graded strictly on the basis of total points possible. No bell curve is ever used.
6. You must be present. No absent/makeup tests. Sorry! But see below.
7. Exams will be cumulative, covering at least one quarter's work. At my discretion, your exam score may replace your lowest (or an absent) test score for that quarter.

F. Extra credit

There is no extra credit available in AP chemistry. Sorry!

Some Helpful Hints:

In accordance with Mayfair’s policy on academic integrity, cheating and plagiarism will not be tolerated. The consequences will include a zero on the assignment or test in question, no makeup opportunity, a telephone call home and an office referral. School policy calls for a suspension for plagiarism.

There may be changes in the schedule and in specific plans for the year, as the year progresses.

I’m glad you’re planning to take AP chemistry. I hope you will all come back in August ready to participate and learn together. Let’s look forward to creating a positive learning environment for everyone.

Course Outline:

Chapter 1-3: Chemical Foundations; Atoms, Molecules, and Ions; Stoichiometry (summer work packet) (Mole, atomic mass, balancing equations, limiting reactants, empirical formulas, percent composition, percent yield)

Experiments: 0.5 week

- Identification of Unknown Compounds
- Hydrates

Chapter 4: Types of Chemical Reactions and Solution Stoichiometry 1 week

Experiments:

- Can you determine the ratio of a chemical reaction? ($\text{NaHCO}_3 + \text{HCl}$)
- Stoichiometric determinations ($\text{Mg} + \text{O}_2$)
- Reaction of calcium nitrate with sodium oxalate

Chapter 5: Gases (kinetic theory of gases, gas laws, Ideal gas law, van der Waals equation, Avogadro's Law, STP, Dalton's law, Graham's law, etc.) 1 week

Chapter 6: Thermochemistry (Enthalpy, thermochemical equations, heats of formation, bond energies, heats of reaction, etc., exothermic and endothermic reactions) 2 weeks

Experiment:

- Heat of reaction for magnesium and hydrochloric acid

Chapter 7: Atomic Structure and Periodicity (Atomic spectra, Bohr atom, quantum numbers, atomic orbitals, electron configurations, periodic table, trends in the periodic table in terms of physical and chemical properties)

Experiments: 2 weeks

- Periodic table
- Flame tests using methanol

Chapter 8: Bonding: General Concepts (valence electrons, Lewis dot structures, ionic bonding, lattice energy, covalent bonds, resonance structures, exceptions to the octet rule) 2 weeks

Chapter 9: Covalent Bonding: Orbitals (Lewis structures, ionic bonding, character of bonds, covalent model, octet rule and exceptions, resonance, VSEPR model, and hybridization) 2 weeks

Experiment:

- Molecular geometry (VSEPR model building)

Chapter 10: Liquids and Solids (Dipole-dipole interactions, hydrogen bonding, London forces, liquid state, types of solids, metallic bonding, network solids, vapor pressure, change of state, specific heat)

Experiments: 2 weeks

- Molar mass determination by vapor density method
- Determining vapor pressure and enthalpy of vaporization of water

Chapter 11: Properties of Solutions (Electrolytes and nonelectrolytes, molarity, mole fraction, Raoult's Law, Henry's law) 1.5 weeks

Chapter 12: Chemical Kinetics (Reaction kinetics, rate law expressions, order of reactions, rate constant, half-life, activation energy, catalysts, and reaction mechanism) 2

weeks

Experiments:

- Kinetic study of thiosulfate in acid

- TOPS Kinetics lab

Chapter 13: Chemical Equilibrium (Law of mass action, equilibrium expressions, calculations of K and equilibrium concentrations, Le Châtelier's principle, and effects of temperature, concentration, etc.)

Experiment: 1 week

- Finding an equilibrium constant

Chapter 14: Acids and Bases (pH, K_a and K_b expressions, titration, degree of ionization, K_w expressions, indicators, equivalence points, Arrhenius and Brønsted-Lowry and Lewis acid theories, and salt hydrolysis)

1 week

Chapter 15: Applications of Aqueous Equilibria (common ion effect, buffers, Henderson-Hasselbalch equation, titration curves, solubility, K_{sp} , solubility calculations, precipitation reactions)

2 weeks

Experiment:

- TOPS Acid-base equilibrium lab: Titration curve of an unknown amino acid

Chapter 16: Spontaneity, Entropy, and Free Energy (Gibbs free energy equation; laws of thermodynamics; enthalpy; entropy; free energy; energy and work)

1.5 weeks

Chapter 17: Electrochemistry (Oxidation and reduction half-cells and equations, electrochemical (voltaic) cells, standard voltages, standard voltages from a table, Nernst equation, Faraday's laws, writing redox equations, and balancing equations in acid/base solutions)

1.5 weeks

Experiments:

- Titration using an oxidation-reduction reaction
- Galvanic cells

Chapter 18: The Nucleus: A Chemist's View (nuclear equations, half lives, nuclear particle emissions, fission and fusion)

0.5 week

Chapter 19-20: The Representative Elements: (overview of typical reactions of the representative elements)

Experiment: 0.5 week

- Caffeine extraction

Chapter 22: Organic and Biochemical Molecules

AP Exam Review

2-3 weeks

AP Chemistry Summer Assignment:

To give you a sense of the pace of this class, note that the following assignment might take two or three weeks of class time, if we were to cover the material in class. (In fact, most of this will be a review of what is covered in Chemistry.) I do not recommend leaving it all to the last minute! You will do well to get together in study groups before September; however the answers to questions should be your own. You can expect tests on Chapters 1-2 on Day Two and on Ch. 3 on Day Four of the school year. Roughly speaking, the assignments will be worth 50 points (total) and the tests 100 points (total).

Please study the following:

- Study and memorize names and formulas of the polyatomic ions in Table 2.5 (p. 62).
- Study and memorize (again) the rules for naming ionic and molecular compounds in Section 2.8 (p. 58-64).
- Study and memorize the names of common acids in Section 2.8 (Tables 2.7, 2.8, p. 67).

Any sign of cheating or plagiarism on the summer work or first two chapter tests will lead to an automatic drop from the class.

Due dates:

All the summer homework will be eHomework from the University of Texas Quest website. Full instructions for accessing the Quest website are on my website, tinyurl.com/falkAPchem. There are three assignments, of about 100 questions each, due on the following dates:

Chapter 1	Thurs July 4, 2019	9:59 pm Pacific time
Chapter 2	Thurs July 18, 2019	9:59 pm Pacific time (See the “study and memorize” above.)
Chapter 3	Thurs Aug 1, 2019	9:59 pm Pacific time

You should keep any papers where you have shown your work on math problems, in case there is any issue with the website, etc.. Help will be available by e-mail but not necessarily on the due dates. I may be traveling and away from daily e-mail access. You will need to initiate a Quest account (or you may already have one), preferably by June 15, but you will also need my approval to enroll in the class, which has a course ID of 88888. You may e-mail me to remind me to enroll you, but again, don't leave it until the due date. Late work will not be accepted. Grades will not be visible in parent portal until school starts in August.

Have a great summer!!

