AP Environmental Science - A.P.E.S.

Why take the course?

- Well rounded curriculum which includes topics such as geology, biology, environmental studies, chemistry, geography, political science and sociology.
- The course topics are very similar to AP Human Geography, so if you liked this course as a freshman or sophomore you would like APES as well.
- ***The College Board has linked APES to 87 Careers and 36 college majors.***
- If a student scores a three or higher on the AP Exam they can earn college credit.

Topics/Activities the course covers:

- Can you taste the difference between tap and bottled water?
- Will the Earth be able to support another 3 Billion people in the next 30 years?
- Is organic food really better than traditional/generic food?
- Can a car really run on hydrogen?
- What difference does is it make if just one more polar bear dies today?
- Do vaccines really work, or is the flu vaccine just a way for drug companies to make money?
- Why do people die every day because they don't have water?
- Why should in the US care about China's rising population?
- What is e-waste and why can you no longer place an old TV at the end of your driveway to be picked up by garbage men?

This course also participates in a three part series with the Will County Forest Preserve District which includes and classroom visit and field experiences at both Hammel Woods and Lake Renwick.

Former students have said...

"Environmental Science is the best class you can take, it opens your eyes to the real world."

"You learn how much of a difference one small action can make, for better or for worse."

"For an AP class the workload is a lot, but often times it doesn't feel like "work" because what you are learning about is so interesting"

"AP classes help to prepare you for college, and APES was my favorite AP class by far!"

AP Chemistry
Mrs. Lemke

Contact Information:
Mrs. Lemke: llemke@psd202.org

Text: Chemistry, 8th edition (published 2010), by Zumdahl and Zumdahl and associated materials
Other laboratory material Flinn Scientific

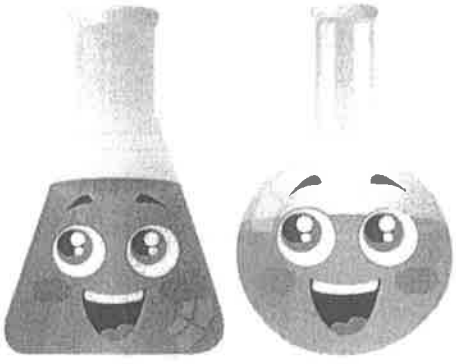
Materials: Scientific calculator
Laboratory Notebook
Three ring binder with dividers OR folder with notebook
Blue/Black pen and pencil

Welcome to Advanced Placement Chemistry!

This course is designed to be the equivalent of the general chemistry course taken during the first year of college. You will need to apply yourself and work with the other students in order to be successful. In general, the course is divided into three components: laboratory, lecture/discussion, and test/problem-solving.

- The laboratory component is approximately 35% of class time. Since much of the class is centered on the laboratory, you will need to quickly develop lab skills that will allow you to rapidly, efficiently, correctly and above all, safely work in the lab. You are expected to prepared for the laboratory work on the day the lab begins, pre-lab work will be assigned and you will need to have an understanding of the procedure before you begin the "hands-on" lab work.
- The lecture/discussion component is approximately 30% of class time. You will be expected to read the text and do the assigned homework problems so that you can participate in class discussions. In addition, there are some topics that require repetition for proficiency (such as balancing equations).
- The test/problem solving component is approximately 25% of class time. In order to prepare you for the AP test, there will be free response problems assigned, which will be either from retired AP tests, be very similar to AP test questions, or be applications from laboratory work. In second semester, you will have a major project, which will be either a formal AP preparatory assignment or a paper on the production, uses and disposal of a material in industrial use today. Details will be provided during the first week of second semester.

I EXPECT EVERYONE TO TAKE THE AP EXAM!



AP CHEMISTRY UNIT and LAB and ACTIVITY/ASSIGNMENT BREAKDOWN

Each Unit is structured around the six big ideas of AP Chemistry:

BIG IDEA 1 – Structure of matter:

- 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 – Properties of matter – characteristics, states, and forces of attraction

- 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 – Chemical reactions

- Changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.

BIG IDEA 4 – Rates of chemical reactions

- Rates of chemical reactions are determined by details of the molecular collisions.

BIG IDEA 5 – Thermodymanics

- The laws of thermodynamics describe the essential roles of energy and explain and predict the direction of changes in matter.

BIG IDEA 6 - Equilibrium

- 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.

Each Lab is structured around the six science practices of AP Chemistry:

Science Practice 1 – The student can use representations and models to communicate scientific phenomena and solve scientific problems.

Science Practice 2 – The student can use mathematics appropriately.

Science Practice 3 – The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.

Science Practice 4 – The student can plan and implement data collection strategies in relation to particular scientific questions. [Note: Data can be collected from many different sources, e.g. investigations, scientific observations, the findings of others, historic reconstruction, and/or archived data.]

Science Practice 5 – The student can perform data analysis and evaluation of evidence.

Science Practice 6 – The student can work with scientific explanations and theories.

LABORATORY INVESTIGATIONS FOR THE YEAR

Unit	Investigation	Science Practices
1	- Determining the Formula of a Hydrated Compound - Determination of the Stoichiometry of Chemical Reactions	2,5,6
2	- Determination of Concentration by Redox Titrations - Gravimetric Analysis (Guided Inquiry Lab)	2,3,4,5,6
3	- Determining the Molar Volume of a Gas - Determination of Molar Mass using Vapor Density	2,5,6
4	- Heat Capacity of Metals Calorimetry - Enthalpy of Reaction and Hess's Law	2,5,6
5	- Energy Levels and Electron Transitions - Developing a Periodic Table by Discovering Trends (Guided Inquiry Lab)	1,2,3,4,5,6
7	- Molar Mass by Freezing Point Depression - Chromatography (Guided Inquiry Lab) - Relationship Between Concentration of Solution and the Amount of Light Transmitted (Guided Inquiry Lab)	1,2,3,4,5,6
8	- Rate Law of the Fading of Crystal Violet Using Beer's Law (Guided Inquiry Lab)	1,2,3,4,5,6
9	- Colorimetric Analysis and Determination of Equilibrium Constant for a Chemical Reaction	2,5,6
10	- Standardization of a Primary Standard and Acid-base titration	2,5,6
11	- Solubility Product Constant for Calcium Sulfate (Guided Inquiry Lab)	2,3,4,5,6
12	- Spontaneity	2,5,6
13	- Electrochemical cells	2,5,6

ASSIGNMENT/ACTIVITES

Every unit will have assigned AP practice free response problems assigned

Big Idea	Assignment/Activities Students will:
1	• Determine masses of isotopes given mass spectrometry data. • Be given a problem set and asked to determine limiting reactants (converts from particles, moles, mass, and volume of given substances)
2	• Work in groups to model molecules using molecular modeling kits and origami. • Be given a problem set of substances and be able to predict the bond type. • Be given a problem set of substances and their properties and be able to match the properties to the substances based on bonding.
3	• Work in groups to analyze given combustion data to determine empirical and molecular formulas. • Be given chemical equations to balance and classify. • Be given redox equations to balance and identify what is oxidized and what is reduced.
4	• Be given reaction rate data and determine the rate law. • Be able to predict the rate law by making graphs of concentration vs. time of supplied reaction data.
5	• Be given a problem set to determine the ΔG, ΔH, ΔS from thermochemical data.
6	• Be given sets of initial concentrations for various chemical equations and asked to determine equilibrium concentrations. • Be given equilibrium concentrations and asked to give the value of K. • Apply LeChatlier's principle to given equilibrium data to predict how equilibrium will be affected.
Current Topics	• Summarize a current scientific article (from *Chemical & Engineering News* or similar source) on a poster. The article could be based on chemistry, environmental concerns, and/or technological advancement in relation to science.

You will receive a syllabus outlining the chapters in the book to be read for each topic, along with suggested problems that go along with the topic being covered. In addition, each unit will have a specific AP problem set that will need to be turned in at the end of the unit. Each unit will have laboratories demonstrating the topics, which will be written up in a laboratory notebook. Several quizzes will be given through the course of a unit and every unit will end with an exam.

Absences:

This is an advanced class. If you are absent, you are responsible for getting the notes from another member of your class. You will be responsible for assigned homework. Any handouts will be in the file box, arranged by chapters.

Late Work:

I do not except late work. If you will have trouble getting an assignment in on time due to an excused absence or have a truly unusual circumstance, discuss this with your teacher BEFORE the assignment is due.

Lab Safety:

Before you can do any laboratory work, you will need to watch the safety video and pass the safety exam with a 90% correct score. Before any laboratory work, we will do a quick review of safety rules that apply to the particular lab work we will be doing. I take safety very seriously. If you are doing something unsafe in lab, you will be removed from the lab and get a zero for that assignment. This may also affect the ability of your lab partner(s) to complete the lab as assigned.

Laboratory Notebooks:

Every student will purchase a laboratory notebook. The notebook needs to be graphing paper. Each of you will record your laboratory data in your laboratory notebook.

Getting help with chemistry:

There will be times when the material will be challenging. After all, this is a college level course. We will often work together in class on the topics we are exploring. If you don't understand something, ASK! Ask me, ask another chemistry teacher, ask another science teacher, ask a classmate, please ask. Don't decide you'll just figure it out later as chemistry topics build on one another. If you don't have a good foundation, your building will crumple. In addition, there are usually several ways of approaching any topic, and you may need a different approach than the one we've chosen.

If you think your teacher made a mistake, ask.

Finally, if you need additional assistance outside of class, I will be available in room 217 or 224 before school starting at 6:30am and after school until 2:45pm. Let me know that you are coming for help.

Grading:

The grade breakdown is:

Daily Work - 10%
Assessments – 40%
Labs/Projects - 30%
Final - 20%

- **AP Problems:**
  In order to prepare you for the AP test, there will be free response problems assigned for each unit, which will be either from retired AP tests, be very similar to AP test questions, or be applications from laboratory work. This is the only homework I collect.
- **Quizzes:**
  The quizzes are based off the suggested problems and/or additional problems I assign in class. Often the quiz questions will be same as a suggest problem or worksheet question so that I can check for understanding of the material.
- **Labs/Projects:**
  LAB: At least 25% of the time will be spent in laboratory. The laboratory is where chemistry happens. You will get specific lab notebook expectations for all labs when we do our first lab. Often what you learn in the laboratory will be included on quizzes or exams.
  Every lab will basically consist of these components: Title, Date, Partners, Pre-lab Information, Purpose/Hypothesis, Safety, Procedure, Data, Calculations, Post-lab Questions, and Conclusions
  PROJECT: You will be asked to summarize a current scientific article (from *Chemical & Engineering News* or similar source) on a poster and displayed about the room. The article could be based on chemistry, environmental concerns, and/or technological advancement in relation to science.
- **Exams:**
  Expect both multiple choice and free-response questions. Homework questions are an excellent study tool for exams. In order to give you time to process the information and ask questions, there will generally be several days between ending the unit and the exam on that unit. In that time we will move on to the next area. This is a common practice in colleges and universities.
- **Finals:**
  You will have a final in the first semester. It is a good practice for the AP test. In second semester, you will have a major project, which will be a formal AP preparatory assignment. Details will be provided during the first week of second semester.

I STRONGLY ENCOURAGE EVERYONE TO TAKE THE AP EXAM!

ARE YOU ASKING YOURSELVES WHY?

Here are the reasons:

1. AP Chemistry will challenge you to the limits of your academic ability. In the past you may have found classes "too easy", and therefore not stimulating you to do your very best. This will not be the case in AP Chemistry.
2. AP Chemistry will teach you to think at higher levels. Learning will rarely be of the "parrot-back" variety (i.e. where the teacher gives a lecture, and the student is expected to give back the same information on a test---similar to a parrot!) In AP Chemistry, you will be forced to think and apply concepts to new situations, and even derive your own theories from application. This is excellent preparation for the higher levels of thinking required in college.
3. Of course, one of the most obvious benefits to this course is that when you take and pass the national AP Chemistry Exam given in May, you will receive college credit for the course when you enroll at most colleges and universities in the United States. This will save you both time and money. (Some students who have passed the AP Exam elect to take first year college chemistry anyway, where they find the material an easy review, and achieve top grades while others around them are frustrated and struggling in a class which is too large and/or the instructor is unavailable for help! I especially recommend this approach for students considering majoring in chemistry or biochemistry.)
4. AP Chemistry looks great on your transcript or on a letter of recommendation. More and more of the best colleges and universities are looking for ways that students have distinguished themselves in high school. Being a "straight A" student no longer carries the weight it once did, and many 4.0 grade average students are finding themselves denied entry at the college of their choice. One of the first things admissions officers ask counselors about a potential candidate for their university is "did this student take the most challenging courses available?" Taking AP Chemistry is a way of distinguishing yourself in high school.
5. AP Chemistry is an intense course of study where students and the teacher REALLY get to know each other. It is to the student's advantage for the teacher to know them well when they need a letter of recommendation.
6. As difficult as AP Chemistry is, you will find that it will never be as easy to learn Freshman Chemistry as it is now! There are several reasons for this:

    A. High school classes are generally much smaller than college classes.

    B. Most college professors don't regard teaching Freshman Chemistry as a priority; many concentrate on their research, and consider teaching to be an interruption and distraction to that end.

    C. At times Freshman Chemistry is used to "weed out" students. Most colleges prefer not to have large class sizes in their upper division courses. Therefore the grades and difficulty level of the freshman courses are adjusted so that only small numbers of very outstanding students will be able to move on. This can result in a large portion of students in freshman chemistry flunking the course!