A.P. Chemistry Lecture & Lab (3106AP)

A.P. chemistry is equivalent to a first year college general chemistry course. Students that sign up for this course *must* take the A.P. exam in the spring. This course includes a sequence of laboratory experiments recommended by the A.P. College board which requires this class to be taken in conjunction with A.P. chemistry Lab. The class is 1.5 credits and will consist of double periods during the first semester of the year to accommodate laboratory experiments.

The AP Chemistry class is structured around the Chemistry Curriculum Frameworks 6 Big Ideas:

Big Idea 1: Structure of Matter
Big Idea 2: Properties of Matter
Big Idea 3: Chemical Reactions
Big Idea 4: Rates of Chemical Reactions
Big Idea 5: Thermodynamics
Big Idea 6: Equilibrium

Students will be exposed to both previously learned and new concepts through lecture, group work; practice problems guided inquiry laboratory experiments. I encourage students to form study groups for the duration of the course, very often a different point of view can be the key to learning new material. The minimum amount of time will be reserved for lectures to cover theory, basis and derivations of equations and any demonstrations that highlight specific topics and more than 25 percent of the time will be used performing laboratory experiments. The emphasis will be on a seminar format and lab work to engage the students in collaborative learning and develop problem solving skills that are essential for success on the A.P. exam.

Instructor: Jason Leavings **Room:** C124 **Email:** jleavings@rsd17.org

Course Website: The course website can be accessed through the district's main webpage. It is updated regularly and contains information regarding course assignments and projects.

Office Hours: Listed below are the times I will be available for help and/or conferences. Additional times can to be arranged; even though I have limited hours during the day I will make time for legitimate reasons.

Student Help/Office Hours:

- After/Before School by appointment
- Monday 1st Lunch, Friday 1st Lunch

Teacher Expectations: In order to be successful, please remember the following:

- Students *earn* their grades; they are not *given*.
- Do excellent work the first time. There are no extra credit opportunities to supplement poor grades or zeros.
- If you believe that you are falling behind or are having difficulty understanding the material, please see the teacher as soon as possible.

Students who disrupt the learning environment will not be tolerated and will be assigned appropriate consequences.

Required Course Materials:

- Textbooks: Chemistry, Chang & Goldsby A.P. 11th ed © 2012
- Internet Connection to access E-Connect (assignment website for some AP Chemistry assignments)
- Three ring binder with dividers and loose-leaf paper/notebook
    - You are required to take notes in class. There are NO exceptions.
    - Units will include but not limited to: Homework, Notes and Labs
- At least 2 pens (blue or black only) and 2 pencils
- Graphing Calculator (ex Ti-##)
- USB Drive for labs (we will be utilizing Vernier software for some labs)
- Lab Notebook (We will be making an Electronic Notebook this year) - This is a requirement for successful completion of this class, it may be asked for by colleges to validate credit for the course.

Haddam-Killingworth Grading System and Attendance Policy – See Student Handbook; Students who do not fulfill the attendance policy may lose course credit due to excessive tardies and/or absences.

Attendance/Absences: Students who are absent are responsible for obtaining in-class work, homework, or make-up work from the instructor during the absence (by contacting the guidance office) or on the day they return. Make-up work will be accepted for excused absences only; you will have 3 calendar days (including weekends) to turn in the assignment. Do not assume that if you were absent, that you do not need to turn something in. If you are absent on the day before an exam (review day) you will still be required to take the exam on the day it is administered.

Calculation of Grades: Grades will be calculated using a percent system. The total points you earn in that category will be divided by the total points possible in that category, and assigned using the following scale and categories. <u>It is important that you realize homework is essential for success within this course to solidify concepts but it is *NOT* counted in the calculation of a final grade. The grade that you receive in class has no input on your grade on the A.P. exam.</u>

100.0	–	90.0	=	A
89.9	–	80.0	=	B
79.9	–	70.0	=	C
69.9	–	60.0	=	D
59.9	–	0.0	=	F

Each Semester:

- Labs/Projects……...40%
- Tests/Quizzes……...60%

Overall: 1st & 2nd Semester:……80%

Midterm & Final……..20

Course Website & Power School: Each week, assignments and grades are posted online as an added support for students and parents/guardians. Daily work, assignments, lab/project information, course information are posted on the course website. Grades are posted on a weekly basis on Power school. Please make sure to check both regularly.

Tests/Assessments: Tests and assessments will be based on both new concepts and concepts discussed earlier in the semester. Depending on the length and amount of material covered, they will weigh differently in your overall grade. The format of exams will follow the format of past A.P. exams.

Midterm: At the end of the first semester, a midterm exam will be administered that will cover the material covered during the first half of the year.

Final: At the end of the second semester, a final exam will be administered that will cover all the material covered during the second half of the year.

Haddam-Killingworth High School
Science Department Homework Policy

Homework is defined as the time students spend outside the classroom in assigned learning activities. The HK High School Science Department believes that homework should be to practice, reinforce or apply acquired skills and knowledge. We also believe, as research supports, that assignments completed and well done are an effective part of the learning process. Homework should serve in the development of independent study skills and we believe that completing homework is the responsibility of the student. It is the intention of the HK High School Science Department to assign relevant and meaningful homework assignments that reinforce classroom learning objectives. Homework should provide the opportunity for students to apply and reinforce information presented in class, complete unfinished class assignments and should build student responsibility, self-discipline and lifelong learning habits.

**Note that highlighted areas are specific to all upper level classes (NOT ES/BIO)
Please note that students will be assessed on homework as follows:

2 (Valid attempt at completing homework)
1 (Partial attempt at completing homework)
0 (No attempt at completing homework)

Electronic Devices & Bring Your Own Technology Policy (from HK handbook)

Cell phones and all other electronic devices (e.g. ipods) may not be used during class periods except when the technology is explicitly used for instruction and learning under the direction of the teacher. ***The only acceptable place and time to use an electronic device such as a cell phone is during passing time and lunch – and only in the hallways and in the cafeteria***. Student tardiness to class due to phone use is unacceptable, as is leaving class to use the phone in the hallway or lavatory. In addition, headphones (i.e. or ear buds, etc.) shall not be used at all except in the cafeteria (including the outside dining area) during lunch. This is to encourage appropriate social interactions between students in the hallways and avoid the safety hazard caused by students unable to hear instructions, announcements, etc

A.P. Chemistry Unit Descriptions

Unit 1: Nomenclature, Math & Mole Relationships, and Stoichiometry
This unit provides a summary of key concepts needed to write chemical formulas, name compounds, determine mole, mass, atom ratios, and calculate quantities of reactants and products during a chemical reaction.

Activity: Moles Activity. Students quantitatively measure out a mole of different substances, calculate the distance that a mole of each substance would cover if placed in a row and relate this distance to known quantities (football fields etc.)

Chapters Covered	Big Ideas
1: Study of Change	1 and 2
2: Atoms, Molecules, and Ions	1
3: Mass Relationships in Chemical reactions	1 and 3

Unit 2: Predicting Products and Writing Balanced Chemical Equations
Classifying a reaction as one of several basic types, and predicting products that could form given only the reactants is emphasized. How to write balanced chemical equations for redox reactions by various methods is presented. Calculations are used to find which reactant is in excess and how to use this limiting factor to determine the amount of product(s) that will be formed and determining the percent yield of actual product.

Activity: Writing Chemical Reactions. Students observe a series of reactions through demos and videos, inspect the results, predict the products and write equations. This includes molecular, complete and net ionic equations

Chapters Covered	Big Ideas
3: Mass Relationships in Chemical Reactions	1 and 3
4: Reactions in Aqueous Solutions	1,2 and 3

Unit 3: Gas Laws
The development and application of general gas laws (Boyle, Charles, combined and Ideal) will be covered. Calculation of reactions involving the initial states of gases and the production of gases will be applied for ideal gases. Kinetic Molecular Theory will be discussed and the deviation of real gases from the ideal gas law.

Activity: Gas Law Derivation. Students use a computer simulation of a gas chamber to derive the different gas laws themselves and ultimately combine them to form the ideal gas law.

Chapters Covered	Big Ideas
5: Gases	2 and 3

Unit 4: Thermochemistry

The nature of exothermic versus endothermic reactions will be studied by calorimetric experiments. Thermal processes, work and systems, enthalpies of formation and Hess' Law will be applied to calculate energy changes that occur.

Activity: Thermochemistry of Foods. Students observe the consumption of a gummy bear in heated potassium chlorate, with this knowledge the students predict the products, identify the enthalpy of formation for the individual molecules and ultimately determine the enthalpy of the reaction.

Chapters Covered	Big Ideas
6: Thermodynamics	2, 3 and 5

Unit 5: Atomic Structure and Periodicity

Electron energy level changes and their relationships to the frequency, wavelength or energy of a photon of EMR are determined. The Quantum Model of the atom and electron configurations will be used to predict reactivity and properties of the elements. Energy changes during the formation of chemical bonds will be explored and various bond theories will be considered to explain the properties of elements and compounds.

Activity: Periodic Trends Graphs. Students graph values for atomic radii, electronegativity, ionization energy and use these visual aids to predict trends and help to explain the periodic nature of elements and their place in the periodic table.

Activity: Molecule Origami: Students construct origami representations of multiple molecules to visualize molecular structures.

Chapters Covered	Big Ideas
7: Quantum Theory and the Electronic Structure of Atoms	1 and 5
8: Periodic Relationships Among the Elements	2
9: Chemical Bonding I: Basic Concepts	1 and 2
10: Chemical Bonding II: Molecular Geometry & Hybridization	1

Unit 6: Liquids, Solids, and Solutions

The structures of solids, metals, network and molecular will be explored. The concepts of intermolecular forces (hydrogen, ionic, London and van der waals) and bonding will be introduced. A solutions vapor pressure, heating and cooling curves and the composition will be considered in explaining the properties of solutions.

Chapters Covered	Big Ideas
11: Intermolecular Forces and Liquids and Solids	2 and 5
12: Physical Properties of Solutions	2

Unit 7: Kinetics
How to control the rates of chemical reactions and determine the rate law equations will be studied. The effects of changing concentrations, temperature or addition of catalysts will be studied to determine the effects on the reaction rates.

Activity: Kinetics Simulation: Using a simulator students create concentration vs time graphs to evaluate different orders in chemical reactions.

Chapters Covered	Big Ideas
13: Chemical Kinetics	4

Unit 8: Equilibrium
Conditions for both physical and chemical equilibrium systems will be studied. LeChatelier's principle is applied to analyze how the system responds to stresses placed upon it.

Activity: Equilibrium Challenge. Students are given different sets of initial conditions, equilibrium constants, and the concentrations of species. They are then tasked to use le Chatliers principle to determine what the outcome of stressors on the system produce.

Chapters Covered	Big Ideas
14: Chemical Equilibrium	6

Unit 9: Acids & Bases
The equilibrium between concentrations of the hydronium and hydroxide ions in solutions is studied and related to the pH values. K_{eq}, K_w, K_a, and K_b calculations are used to predict the degree of completeness for reactions in solutions.

Chapters Covered	Big Ideas
15: Acids and Bases	3 and 6
16: Acids-Base Equilibria	6

Unit 10: Thermodynamics
Entropy changes will be examined as a driving force in opposition to enthalpy changes. Thermodynamics also plays a role in the establishment of equilibrium systems. Enthalpy, entropy and Gibb's free energy will be used to predict the spontaneity of reactions and the ability of the system to do work on its surroundings.

Chapters Covered	Big Ideas
17: Entropy, Free Energy and Equilibrium	5 and 6

Unit 11: Electrochemistry
Redox reactions will be used to produce electrical energy by creating various types of batteries, called electrochemical cells. Electrolysis, electroplating and corrosion reactions will be studied. Calculations to predict the voltages involved under various experimental conditions will be explored.

Chapters Covered	Big Ideas
18: Electrochemistry	3

Unit 12: Review and Presentations
Students will choose one lab performed during the course and relate it to one societal concern or technological advance of importance. A presentation will be prepared, along with appropriate resources, and conducted to help increase the awareness of fellow students about the role of the individual and chemistry in our world. (No two students may present the same topic and they must get approval before beginning research)

A.P. Chemistry Lab

Labs: Students will regularly participate in labs and projects. Labs will be held on double periods either Monday & Friday (90 minutes each) or Tuesdays (130 minutes) during the first semester. During the second semester the lab periods will be held on two consecutive days consisting of Tuesday- Wednesday or Wednesday- Thursday (130 minutes total). Some labs and projects will require work outside of class time and preparation beforehand by students.

*** Lab Reports: ***Selected*** labs will be submitted following a template format that will be available on the class website. One Lab from each quarter will be submitted in formal format for grading. (also included in lab journal)

Lab Notebooks: Students will keep a Lab Journal throughout the course of the class and will record all laboratory experiments within. A journal will be provided at the beginning of the year and will be handed in weekly for instructor verification and evaluation.

All lab write ups will consist of the following sections: Title, Problem/Purpose/Hypothesis statement, Background Information, Materials & Procedure, Data and Results section, Conclusion and Discussion.

AP Chemistry Lab Schedule				
Lab	**Big Idea**	**Unit**	**Name**	**Science Practices**
I-1,I-2	1,2 and 3	1	One tube reaction and Lab Separation techniques	3.1, 4.2
1	1	1	Determination of an Empirical Formula	1.4, 2.2, 4.3, 6.1
2	2 and 3	1	Analysis of Alum***	2.1, 2.2, 4.3, 5.3
3	1and 6	2	Gravimetric Analysis (I)	1.5, 2.2, 4.2, 5.1, 5.3, 6.2, 6.4, 7.1, 7.2
4	2 and 3	2	Analysis of a Mixture (Green Chemistry) (I)	1.4, 2.1,4.2, 5.1, 6.4
5	2	3	Molar Volume of a Gas***	2.1, 2.2, 4.3, 5.2, 6.1, 7.2
6	3	4	Designing a hand warmer (I)	1.1, 1.4, 2.2, 2.3, 4.2,5.1, 6.2, 7.1
7	1	5	Spectroscopy Lab (I)	2.2, 4.1, 4.2, 5.1, 6.4
8	1 and 2	5	Bonding in Solids (I)	1.2, 1.4, 4.2, 6.2,6.4, 7.1
9	1	5	Molecular Geometry Lab (Dry lab)	1.1, 1.2, 1.4, 3.3, 6.4
10	2	6	Solution Preparation Lab	1.2, 1.5, 2.2, 2.3, 4.4
11	2 and 5	6	Vapor Pressure Lab	1.2, 1.4, 3.3, 4.3, 5.3
12	4	7	Kinetics: Rate of Reaction (I) ***	1.4, 4.2, 5.1, 6.1
13	6	8	Equilibrium (I)	1.4, 1.5, 4.2, 4.4, 5.1, 5.2, 5.3, 6.4,7.2
14	3	9	Acid-Base Titration (acidity of beverages) (I)	1.1, 2.2, 3.1,4.2, 5.1, 6.4, 7.1
15	3 and 6	9	Buffers***	2.2,2.3, 4.2, 5.1, 6.1,6.4, 7.2
16	3 and 6	9	Designing Buffers (I)	2.2, 2.3, 3.1, 3.2, 3.3, 4.2, 5.1, 6.1, 6.4, 7.2
17	3	11	Redox Electrochemistry – Activity Series	1.5, 2.2, 4.3, 5.1, 6.1
18	3	11	Electrochemical Cells	2.2, 4.3, 5.1, 6.1

(I) :Guided Inquiry Based Labs
***Labs that will be submitted in a Formal Report
+++ Lab dates are subject to change due to weather related issues
Science Practices:

1. SP1: The student can use representations and models to communicate scientific phenomena and solve scientific problems.
2. SP2: The student can use mathematics appropriately.
3. SP3: The student can engage in scientific questioning to extend thinking or to guide investigations within the context of the AP course.
4. SP4: The students can plan and implement data collection strategies in relation to a particular scientific question.
5. SP5: The student can perform data analysis and evaluate evidence.
6. SP6: The student can work with scientific explanations and theories.

Student and Parent/Guardian Acknowledgement

It is important that all students and parents/guardians understand the course information and requirements in order to be successful in this class. If you have any questions or concerns at any time, please discuss them with the instructor as soon as possible.

Please check all boxes that apply:

☐ We have read and understand the syllabus for A.P. Chemistry.

OR ☐ We have read the syllabus, but need additional information about:

_____

☐ We will use the course website to stay updated about coursework, and Powerschool to review grades and progress.

OR ☐ We do not have reliable internet access and will need assistance in staying updated about coursework and grades.

_____	_____	_____
Student Name	Student Signature	Date
_____	_____	_____
Parent/Guardian Name	Parent/Guardian Signature	Date

Contact Information

☐ I/We **do not** wish to maintain contact through email.

Preferred method of contact: _____

☐ I/We **do** wish to maintain contact through email: _____

Please send an email to jleavings@rsd17.org that includes the following:

- Student's name, Course, and Period
- Parent/Guardian's name(s) and relationship to student
- Additional contact information or comments if necessary

Additional Comments: _____

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