



---

AP Chemistry  
Course Syllabus 2021-2022  
Ms. Burton (Ruth.Burton@hcps.org)

---

### Course Description

This AP Chemistry course is designed to be the equivalent of the general chemistry course usually taken during the first year of college. For most students, the course enables them to undertake, as a freshman, second year work in the chemistry sequence at their institution or to register in courses in other fields where general chemistry is a prerequisite. This course is structured around the six big ideas articulated in the AP Chemistry curriculum framework provided by the College Board. A special emphasis will be placed on the seven science practices, which capture important aspects of the work that scientists engage in, with learning objectives that combine content with inquiry and reasoning skills. AP Chemistry is open to all students that have completed a year of chemistry who wish to take part in a rigorous and academically challenging course.

Textbook Brown, LeMay, Bursten, Murphy. Chemistry: The Central Science, eleventh edition. Upper Saddle River, NJ: Pearson/Prentice Hall, 2015.

### Textbook and Materials

- Textbook Brown, LeMay, Bursten, Murphy. Chemistry: The Central Science, eleventh edition. Upper Saddle River, NJ: Pearson/Prentice Hall, 2015.
- Scientific Calculator. Bring to Class.
- A 2-inch binder with at least 4 dividers.
- Graph paper
- Paper and Pencils
- Closed-Toe shoes for laboratory (**KEEP EXTRA SHOES IN YOUR LOCKER IN CASE YOU FORGET AND WEAR OPEN-TOE SHOES**)

### Goals for Student Learning:

- Students will continue to refine and expand their knowledge of chemical concepts and processes at the college level.
- Students will learn methods of problem-solving specific to AP Chemistry topics as well as real world applications.
- Students will learn to collaborate with others in a lecture and laboratory setting.

### Course Outline

#### **Unit 1 Atomic Structure and Properties**

- 1.1 Moles and Molar Mass
- 1.2 Mass Spectroscopy of Elements
- 1.3 Elemental Composition of Pure Substances
- 1.4 Composition of Mixtures
- 1.5 Atomic Structure and Electron Configuration
- 1.6 Photoelectron Spectroscopy

1.7 Periodic Trends

1.8 Valence Electrons and Ionic Compounds

## **Unit 2 Molecular and Ionic Compound Structure and Properties**

2.1 Types of Chemical Bonds

2.2 Intramolecular Force and Potential Energy

2.3 Structure of Ionic Solids

2.4 Structure of Metals and Alloys

2.5 Lewis Diagrams

2.6 Resonance and Formal Charge

2.7 VSEPR and Bond Hybridization

## **Unit 3**

### **Intermolecular Forces and Properties**

3.1 Intermolecular Forces

3.2 Properties of Solids

3.3 Solids, Liquids, and Gases

3.4 Ideal Gas Law

3.5 Kinetic Molecular Theory

3.6 Deviation from

3.7 Solutions and Mixtures

3.8 Representations of Solutions

3.9 Separation of Solutions and Mixtures , Chromatography

3.10 Solubility

3.11 Spectroscopy and the Electromagnetic Spectrum

3.12 Photoelectric Effect

3.13 Beer-Lambert Law

## **Unit 4 Chemical Reactions**

4.1 Introduction for Reactions

4.2 Net Ionic Equations

4.3 Representations of net ionic equations

4.4 Physical and Chemical Changes

4.5 Stoichiometry

4.6 Introduction to Titration

4.7 Types of Chemical Reactions

4.8 Introduction to Acid-Base Reactions

4.9 Redox reactions

## **Unit 5 Kinetics**

5.1 Reaction Rates

5.2 Introduction to Rate Law

5.3 Concentration Changes Over Time

5.4 Elementary Reactions

5.5 Collision Model

## 5.6 Reaction Energy Profile

5.7 Introduction to Reaction Mechanisms

5.8 Reaction Mechanism and Rate Law

5.9 Steady-State Approximation

5.10 Multi- Step Energy Reaction

## Unit 6 Thermodynamics

6.1 Endothermic and Exothermic Processes

## 6.2 Energy Diagrams

6.3 Heat Transfer and Thermal Equilibrium

6.4 Heat Capacity and Calorimetry

6.5 Energy of Phase Changes

6.6 Introduction to Enthalpy of Reaction

6.7 Bond Enthalpies

6.8 Enthalpy of Formation

6.9 Hess's Law

## Unit 7 Equilibrium

## 7.1 Introduction to Equilibrium

7.2 Direction of Reversible

7.3 Reaction Quotient and Equilibrium Constant

7.4 Calculating the Equilibrium Constant

7.5 Magnitude of the Equilibrium Constant

7.6 Properties of the Equilibrium Constant

7.7 Calculating Equilibrium Concentrations

7.8 Representations of Equilibrium

## 7.9 Introduction to Le Châtelier's Principle

7.10 Reaction Quotient and Le Châtelier's Principle

7.11 Introduction to Solubility Equilibria

7.12 Common-Ion Effect

7.13 pH and Solubility

## Unit 8 Acids and Bases

## 8.1 Introduction to Acids and Bases

8.2 pH and pOH of Strong Acids and Bases

8.3 Weak Acid and Base Equilibria

8.4 Acid-Base Reactions and Buffers

8.5 Acid-Base Titrations

8.6 Molecular Structure of Acids and Bases

8.7 2 Properties of Buffers

8.8 pH and  $pK_a$

8.9 Henderson-Hasselbalch Equation

8.10 Buffer Capacity

## Unit 9 Applications of Thermodynamics

9.1 Introduction to Entropy

9.2 Absolute Entropy and Entropy Change

9.3 Gibbs Free Energy and Thermodynamic Favorability

- 9.4 Thermodynamic and Kinetic Control
- 9.5 Free Energy and 6 Equilibrium
- 9.6 Coupled Reactions
- 9.7 Galvanic (Voltaic) and Electrolytic Cells
- 9.8 Cell Potential and Free Energy
- 9.9 Cell Potential Under Nonstandard Conditions
- 9.10 Electrolysis and Faraday's Law

Quarter	1	2	3	4
Concepts	Units 1,2 and 3	Unit 3, 4 and 5	Unit 6,7,8	Unit 9

### **HCPS Grading Policy**

<b>PRODUCT (50%)</b> <i>Culminating Demonstration of Knowledge</i>	<b>PROCESS (30%)</b> <i>Addressing Specific Short-Term Learning Outcomes</i>	<b>PRACTICE (20%)</b> <i>Building Attitudes, Habits, and Skills</i>
Does it measure how well students achieved specific learning goals, standards, and/or competencies?	Does it provide feedback to students regarding growth towards the attainment of specific learning goals, standards and competencies?	Does it allow students to practice skills and/or reinforce content learning?
<ul style="list-style-type: none"> <li>• Primarily completed in presence of teacher</li> <li>• Rubric aligned to standards</li> <li>• Accuracy graded</li> </ul>	<ul style="list-style-type: none"> <li>• Primarily completed in presence of teacher</li> <li>• Rubric aligned to standards</li> <li>• Accuracy graded</li> </ul>	<ul style="list-style-type: none"> <li>• Graded for completion and participation</li> </ul>

**\*\*Extra credit will not be given for non-academic purposes\*\***

### **Absent Work Policy**

All assignments should be submitted on time. Students will be given the number of class periods equal to the number of lawful class periods absent to turn in completed make up assignments without penalty. If a student is unlawfully absent, work will be accepted with a penalty of one letter grade off the assessed when turned in to the teacher within 2 class periods.

### **Late Work Policy**

All assignments should be submitted on time in order to earn full credit. Any assignment, (product, process, or practice) will be allowed to be turned in late for one letter grade deduction from the grade a student earns on the assignment. In order to earn credit for late assignments, students must submit assignments by the end of the day on Wednesday (except for the last week of the quarter) following the designated

HAC update. Students are only able to submit assignments that have an established due date within the grading window before the designated HAC update. Assignments that are turned in for late credit will be identified by a footnote in HAC to include a statement about the deduction of a letter grade due to the lateness of the assignment.

Grading Window	Designated HAC Update	Late Work Due Date
September 8- September 24	September 24	September 29
September 27- October 13	October 13	October 20
October 14- October 29	October 29	November 5 (Friday)
November 8- November 19	November 19	November 24
November 22- December 10	December 10	December 15
December 13- January 13	January 13	January 21 (Friday)
January 24- February 11	February 11	February 16
February 14- February 25	February 25	March 2
February 28- March 11	March 11	March 16
March 14- March 25	March 25	March 31 (Thursday)
April 1- April 22	April 22	April 27
April 25- May 6	May 6	May 11
May 11- May 20	May 20	May 25

### **Academic Integrity**

Academic integrity is taking responsibility for the quality and completion of one's own work. Academic dishonesty is taking someone else's work and claiming it as one's own. Students at Bel Air High School are responsible for knowing what is considered to be Academic Dishonesty and the subsequent consequences. More information can be found in the BAHS Student Planner.

### **Classroom Rules and Procedures**

- Students are to use the restroom and retrieve materials from their lockers prior to the beginning of class.
- Only 1 student at a time will be allowed to leave the class for emergency restroom breaks or other issues.
- If students are given permission to leave class, they must sign out and back in on the sign out sheet.

- Sharpen pencils prior to class starting.
- Students may borrow a calculator during class and will return it to the holder when finished using it.
- Students will complete the warmup drill as soon as they enter the room.
- Students will place all work to be collected in the designated area.
- **Students must keep a pair of closed-toe shoes in their hall locker for emergency purposes. No student will be allowed to work in the laboratory if they are not wearing closed-toe shoes. A zero will be earned for the lab.**
- Students will check the makeup bin for handouts and assignments upon return from an absence.

### **Cell Phone Policy**

Students will place their electronic devices (including, but not limited to, cell phones, listening devices, smart watches, laptops, and iPads), either on silent or off, in a teacher designated area as they enter each classroom. Teachers will review with students the specific location for each room. The devices will remain in the teacher designated areas unless teachers explicitly tell students to use them as a part of classroom instruction.

- Devices will remain in the teacher designated area during bathroom visits.
- Devices will be retrieved from the teacher designated area at the end of the class at the direction of the teacher.
- School-appropriate cellphone use is permitted during class changes and lunch. Students are not permitted to make phone calls during school hours.
- Students will NOT be permitted to carry their electronic devices in a book bag throughout the school day.

*If the electronic device policy is violated, the student shall then be subject to disciplinary action up to, and including, confiscation of the device as well as an office referral.*

### Expectations to Meet when Submitting Work Electronically

- ✓ **Teachers will be evaluating and assessing many pieces of students' work, so be sure to adhere to the submission guidelines set by each of your teachers, including**
  - where completed work should be submitted.
    - Ex. If a teacher directs you to submit an assignment via Its learning, do not send it as an attachment in an email.
  - the type of document to submit.
    - Ex. If a teacher asks for a power-point, do not submit a word document.
  - the naming conventions as specified in the assignment.
    - Ex. If a teacher directs you to name an assignment "DBQ #1," do not submit an assignment saved as "My Work."
      - Work that does not follow submission guidelines may require resubmission to meet the assignment's specifications, which can cause a delay in assessing, grading, and providing feedback.

### Expectations to Meet when Communicating Electronically with School Personnel (teachers, counselors, support staff, administrators)

- ✓ **Use HCPS Student Email Only**
  - When it is necessary to send an email, email directly through your HCPS-student account. Students should not initiate communication with teachers via personal emails.
- ✓ **Include Course/Period (Ex: English 10/2A) in the subject line of the message.**
  - Failing to use your HCPS account and/or include **Course/Period** in the subject line may delay or prevent a response.
- ✓ **Adhere to the following writing standards**
  - Begin all email correspondence with an appropriate greeting/salutation.
    - Ex: *Hi, Ms. Jones,*
      - Tone is easily misunderstood in electronic exchanges; skipping this step can make your email sound unintentionally rude.
  - Provide some context for the purpose of your email.
    - Ex: *I'm emailing you because I can't remember how to submit my assignment on Itslearning.*
      - Teachers will need this context to provide you a specific response.
  - Make sure that your questions are direct but politely worded.
    - Ex: *Can you please remind me where I can find these directions?*
      - If your questions are too vague, your teacher will not be able to determine how to help you.
  - End your email with an appropriate closing.
    - Ex: *Thank you for your help.*
      - Skipping this step can make your email sound too curt or demanding.
  - Include your name after the closing.
    - Ex: *John Doe*
      - Proofread and spell check before you hit "send."

Sending an email with multiple typos is unprofessional and can interfere with the clarity of your message, as can use of abbreviations and slang. Email communication with school personnel is not synonymous with posts on social media such as Twitter or Snapchat. Punctuation matters. Capitalization matters. Formal language matters. Use these writing conventions consistently and purposefully, just as if you were communicating with your boss in a workplace setting.

**Reminders about Your Digital Footprint**

- ✓ Remember: Your account can be traced back to you easily, even if you post under an alias or a made-up handle. You leave data footprints whenever you are online. HCPS's Office of Technology can identify when you log on and off, when you access or open a folder or document, and when you submit an item. This data is all stored and can be retrieved.

