



## AP Chemistry COURSE SYLLABUS

**GRADE LEVEL: 11 & 12**

**TEACHER:** Mr. Michael Hoffmann

**SCHOOL YEAR:**2024-2025

**EMAIL:** mhoffmann@dishs.tp.edu.tw

### **COURSE DESCRIPTION:**

The AP Chemistry course provides students with a college-level foundation to support future advanced course work in chemistry. Students cultivate their understanding of chemistry through inquiry-based investigations, as they explore topics such as: atomic structure, intermolecular forces and bonding, chemical reactions, kinetics, thermodynamics, and equilibrium.

### **COURSE OBJECTIVES:**

The key concepts and related content that define the AP Chemistry course and exam are organized around underlying principles called the Big Ideas. They encompass core scientific principles, theories, and processes that cut across traditional boundaries and provide a broad way of thinking about the particulate nature of matter underlying the observations students make about the physical world. The following are Ideas:

**Idea 1:** 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.

**Idea 2:** 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.

**Idea 3:** Changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.

**Idea 4:** Rates of chemical reactions are determined by details of the molecular collisions.

**Idea 5:** The laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter.

**Idea 6:** 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.

### **ASSESSMENT:**

Pop Quizzes will be conducted occasionally.

They will be given a chapter test after the completion of every chapter.

Quarter exam will be conducted at the end of each quarter.

Projects, Lab Activities, Homework, and Seatwork will also be assessed.

This course will be assessed on the following four categories:

- Tests and Quizzes (30%)
- Seatwork, Homework and Participation (30%)
- Quarter Exam (30%)
- Deportment (10%)

### **PRIMARY TEXTBOOK & OTHER RESOURCES**

Chemistry: The Molecular Nature of Matter and Change, 9<sup>th</sup> Edition

By Silberberg and Amateis

Published by Pearson, Copyright © 2021,

Published Date: 2020

### **Laboratory Manuals**

Cesa, Irene. ed. Flinn ChemTopic Labs: Experiments and Demonstrations in Chemistry. Batavia, IL: Flinn Scientific, 2002.

Randall, Jack. Advanced Chemistry with Vernier. Beaverton, OR: Vernier Software & Technology, 2004.

Vonderbrink, Sally Ann. Laboratory Experiments for Advanced Placement Chemistry. Batavia, IL: Flinn Scientific, 1995.

Demonstration Manuals

Bilash, Borislav, II, George R. Gross, and John K. Koob. A Demo a Day: A Year of Chemical Demonstrations. Batavia, IL: Flinn Scientific, 1995.

Summerlin, Lee R., Christine L. Borgford, and Julie B. Ealy. Chemical Demonstrations: A Sourcebook for Teachers. 2nd ed. Vol. 2. Washington, DC: American Chemical Society, 1988.

### **Online Simulations and Resources**

“Activities.” The Concord Consortium. Accessed June 12, 2012.

<http://www.concord.org/activities>.

“Animations Index.” Chemical Education Research Group. Iowa State University.

Accessed June 12, 2012. <http://group.chem.iastate.edu/Greenbowe/sections/projectfolder/animationsindex.htm>.

“AP Chemistry Course Home Page.” AP Central. The College Board. Accessed June 12, 2019. [http://apcentral.collegeboard.com/apc/public/courses/teachers\\_corner/2119.html](http://apcentral.collegeboard.com/apc/public/courses/teachers_corner/2119.html)

**ADDITIONAL INFORMATION** – Please see Google Classroom for more information.

**Class code:**

**Note:** Student are required to buy a Ti-nspire CX Calculator I/II (non-CAS)

**SUBJECT: AP Chemistry**  
**1st QUARTER – TENTATIVE COURSE CONTENT**

<i>(NB: Depending on time and interest, the teacher may delete and/or add other selections.)</i>	
Week / Date	Topic / Projects / Assessments
<b>Week 1</b> <b>Aug 12<sup>th</sup> to 16<sup>th</sup></b> <b>5 Days of Class</b> 12~ First Day / Orientation Day 15~ Opening Mass & Assumption of Our Lady 8:00 15~ Induction of Class, Student Council Officers and DYM	<b>General Discussion about AP Chem.</b> <b>Course introduction</b> Wednesday – Orientation in the morning. M/H School regular class after lunch Discussion of class rules, collecting text books from the library
<b>Week 2</b> <b>Aug 19<sup>th</sup> to 23<sup>rd</sup></b>	<b>Unit 1: Atomic Structure</b> 1.1: The Mole 1.2: Mass Spectroscopy of Elements. 1.3 Elemental Composition of Pure Substances
<b>Week 3</b> <b>Aug 26<sup>st</sup> to 30<sup>th</sup></b> 26~Fire drill? 26~Middle and High School Catholic Bridge Program (after assembly) 28~St. Dominic de Guzman Feast Day Celebration	1.4 Composition of Mixtures. 1.5 Atomic Structure and Electron Configuration 1.6 Photoelectron Spectroscopy 1.7 Periodic Trends
<b>Week 4</b> <b>Sep 2<sup>nd</sup> to 6<sup>th</sup></b> 2~House Ceremony	1.8 Valence Electrons and Ionic Compounds <b>Unit Test</b>
<b>Week 5</b> <b>Sep 9<sup>th</sup> to 13<sup>th</sup></b> 9~ Mass & Birthday Mother Mary & VIP Induction	<b>Unit 2: Molecular and Ionic Compound Structure and Properties.</b> 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 <b>Unit Test and Lab Work</b>
<b>Week 6</b> <b>Sep 16<sup>th</sup> to 20<sup>th</sup></b> <b>1 Day of Class</b> 17~Moon Festival 18-20~ Teacher's Conference	<b>Unit 3: Intermolecular Forces and Properties.</b> 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.  <b>Lab Work</b>
<b>Week 7</b> <b>Sep 23<sup>rd</sup> to 27<sup>th</sup></b> 24-26~Pre-Exam Days	3.6 Deviation from Ideal Gas Law. 3.7 Solutions and Mixtures. 3.8 Representations of Solutions. 3.9 Separation of Solutions and Mixtures Chromatography. 3.10 Solubility <b>Unit Test and Lab Work</b>
<b>Week 8</b> <b>Sep 30<sup>th</sup> to Oct 4<sup>th</sup></b>	3.11 Spectroscopy and the Electromagnetic Spectrum. 3.12 Photoelectric Effect. 3.13 Beer-Lambert Law. <b>Unit Test and Lab Work</b>
<b>Week 9</b> <b>Oct 7<sup>th</sup> to 11<sup>th</sup></b>	<b>Review of all the lessons for Q1 Exam.</b>

**1 Day of Class**

7~Launching - Rosary Month and  
Bullying Prevention Day  
8-9 ~Q1 Exams  
10~Double Ten  
11~Record Day

## 2<sup>nd</sup> QUARTER – TENTATIVE COURSE CONTENT

*(NB: Depending on time and interest, the teacher may delete and/or add other selections.)*

Week / Date	Topic / Projects / Assessments
<b>Week 1 (10)</b> <b>Oct 14<sup>th</sup> to 18<sup>th</sup></b> 14~ Second Quarter Begins	<b>Unit 4: Chemical Reactions.</b> 4.1 Introduction for Reactions. 4.2 Net Ionic Equations. 4.3 Representations of Reactions. 4.4 Physical and Chemical Changes. 4.5 Stoichiometry <b>Unit Test and Lab Work</b>
<b>Week 2 (11)</b> <b>Oct 21<sup>st</sup> to 25<sup>th</sup></b> 25 – Book Fair 25- Masquerade Night	4.6 Introduction to Titration. 4.7 Types of Chemical Reactions. 4.8 Introduction to Acid-Base Reactions. 4.9 Oxidation-Reduction (Redox) Reactions. <b>Unit Test and Lab Work</b>
<b>Week 3 (12)</b> <b>Oct 28<sup>th</sup> to Nov 1<sup>st</sup></b> 1-All Saint's Day Mass	<b>Unit 5: Kinetics.</b> 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. <b>Unit Test and Lab Work</b>
<b>Week 4 (13)</b> <b>Nov 4<sup>th</sup> to Nov 8<sup>th</sup></b>	5.7 Introduction to Reaction Mechanisms. 5.8 Reaction Mechanism and Rate Law. 5.9 Steady-State Approximation. 5.10 Multistep Reaction Energy Profile. 5.11 Catalysis. <b>Unit Test and Lab Work</b>
<b>Week 5 (14)</b> <b>Nov 11<sup>th</sup> to 15<sup>th</sup></b>	<b>Unit 6: Thermodynamics</b> 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. <b>Unit Test and Lab Work</b>
<b>Week 6 (15)</b> <b>Nov 18<sup>th</sup> to 22<sup>nd</sup></b> 22-Gr.12 Q2 Exam 22 - YSC Contest	6.7 Bond Enthalpies. 6.8 Enthalpy of Formation. 6.9 Hess's Law. <b>Unit Test and Lab Work</b>
<b>Week 7 (16)</b> <b>Nov 25<sup>th</sup> to 29<sup>th</sup></b> 25-Gr.12 Q2 Exam 26-28~Pre-Exam Day	<b>Unit 7: Equilibrium</b> 7.1 Introduction to Equilibrium. 7.2 Direction of Reversible Reactions.

	<b>Unit Test and Lab Work</b>
<b>Week 8 (17)</b> <b>Dec 2<sup>nd</sup> to Dec 6<sup>th</sup></b> <b>6~Half Day</b> Foundation Day Celebrations	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.  <b>Unit Test and Lab Work</b>
<b>Week 9 (18)</b> <b>Dec 9<sup>th</sup> to 13<sup>th</sup></b> <b>3 Days of Class</b> 12-13 ~Q2 Exams	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. <b>Unit Test and Lab Work.</b>
	7.12 Common-Ion Effect. 7.13 pH and Solubility. 7.14 Free Energy of Dissolution. <b>Unit Test and Lab Work.</b>
<b>Dec 18<sup>th</sup> to Jan 1<sup>st</sup></b>	<b>Christmas Holiday</b>

### 3rd QUARTER – TENTATIVE COURSE CONTENT

Week / Date	Topic / Projects / Assessments
<b>Week 1 (19)</b> <b>Jan 6<sup>th</sup> to 10<sup>th</sup></b> <b>4 Days of Class</b> 6~Record Day 7~Third Quarter Begins 10 ~ New Year Mass	<b>Unit 8: Acids and Bases</b> 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. <b>Unit Test and Lab Work.</b>
<b>Week 2 (20)</b> <b>Jan 13<sup>th</sup> to 17<sup>th</sup></b>	8.6 Molecular Structure of Acids and Bases. 8.7 pH and pK <sub>a</sub> 8.8 Properties of Buffers. <b>Unit Test and Lab Work.</b>
<b>Week 3 (21)</b> <b>Jan 20<sup>th</sup> to 24<sup>th</sup></b>	8.9 Henderson-Hasselbalch Equation. 8.10 Buffer Capacity. <b>Unit Test and Lab Work.</b>
<b>Jan 27<sup>th</sup> to Jan 31<sup>st</sup></b>	<b>CNY Holiday</b>
<b>Week 4 (22)</b> <b>Feb 3<sup>rd</sup> to 7<sup>th</sup></b>	<b>Unit 9: Applications of Thermodynamics</b> 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.  <b>Unit Test and Lab Work.</b>
<b>Week 5 (23)</b> <b>Feb 10<sup>th</sup> to 14<sup>th</sup></b> 1-14~Catholic Week	9.5 Free Energy and Equilibrium. 9.6 Coupled Reactions. 9.7 Galvanic (Voltaic) and Electrolytic Cells.  <b>Unit Test and Lab Work.</b>

<b>Week 6 (24)</b> <b>Feb 17th to 21st</b>	9.8 Cell Potential and Free Energy. 9.9 Cell Potential Under Nonstandard Conditions. <b>Unit Test and Lab Work.</b>
<b>Week 7 (25)</b> <b>Feb 24<sup>th</sup> to 28<sup>th</sup></b> <b>4 Days of Class</b> 24~Lenten Mass? 25-27 ~ Pre-Exam Days 24-27~IOWA Assessments 28 ~ Memorial Day Holiday	9.10 Electrolysis and Faraday's Law <b>Unit Test and Lab Work.</b>
<b>Week 8 (26)</b> <b>March 3<sup>rd</sup> to 7<sup>th</sup></b> 5~ Ash Wednesday	<b>Review of all the lessons.</b>
<b>Week 9 (27)</b> <b>March 10<sup>th</sup> to 14<sup>th</sup></b> <b>4 Days of Class</b> 14 – Q3 Exams	<b>Review of all the lessons.</b>

## 4th QUARTER – TENTATIVE COURSE CONTENT

<i>(NB: Depending on time and interest, the teacher may delete and/or add other selections.)</i>	
Week / Date	Topic / Projects / Assessments
<b>Week 1 (28)</b> <b>March 17<sup>th</sup> 21<sup>st</sup></b> <b>4 Days of Class</b> 17 – Q3 Exams 18~ Fourth Quarter Begins 18~ Fire Drill? 19~ Feast of St. Joseph	<b>Lab Practical Work and Review of all the selected problems, Third Quarter Exam</b>
<b>Week 2 (29)</b> <b>March 24<sup>th</sup> to 28<sup>th</sup></b>	<b>Review; MCQ and Short answers questions 2014 to 2022 AP questions practice.</b>
<b>Week 3 (30)</b> <b>March 31<sup>st</sup> to April 4<sup>th</sup></b> <b>4 Days of Class</b> 4~Tomb Sweeping	<b>Review; MCQ and Short answers questions 2014 to 2022 AP questions practice.</b>
<b>Week 4 (31)</b> <b>Apr 7<sup>th</sup> to 11<sup>th</sup></b>	<b>Review of all MCQ of the Lab Practical Work</b>
<b>April 14<sup>th</sup> to April 18<sup>th</sup></b>	<b>Easter Break</b>
<b>Week 5 (32)</b> <b>Apr 21<sup>st</sup> to 25<sup>th</sup></b> 23~Easter Mass 21-25 ~ AP Mock Exams 26~Spring Fair	<b>AP Mock Exams</b>
<b>Week 6 (33)</b> <b>Apr 28<sup>th</sup> to May 2<sup>nd</sup></b> 4/29-5/1~ Pre-Exam Days 1-2~ Final Exams (K, 5, 8, 12 only)	<b>Review (AP exams)</b> <b>AP exams on Monday, May 1, 2024</b>
<b>Week 7 (34)</b> <b>May 5<sup>th</sup> to 9<sup>th</sup></b>	

<p>5-9~ Final Exams (K, 5, 8, 12 only) 5-9 ~ AP Exams</p>	
<p><b>Week 8 (35)</b> <b>May 12<sup>th</sup> to 16<sup>th</sup></b> <b>4 Days of Class</b> 14-15~ Q4 Exam 16~ Record Day 12-16 ~ AP Exams</p>	<p><b>AP exams dates 4th Quarter Final Exam</b></p>
<p><b>Week 9 (36)</b> <b>May 19<sup>th</sup> to 23<sup>rd</sup></b> 19-23 ~ Student Clearance 19~ Baccalaureate Mass 23~Gr. 6 – 7 Recognition and Gr. 8 Graduation</p>	<p><b>AP exams dates 4th Quarter Final Exam</b></p>
<p><b>Week 10 (37)</b> <b>May 26<sup>th</sup> to 30<sup>th</sup></b> <b>4 Days of Class</b> 26~House Culminating Activity 27~Gr. 9-11 Recognition and Gr. 12 Graduation 28! Class Party 29- ~ Students Last Day 30~ Teachers/Staff Meeting</p>	<p><b>Gr. 9-11 Recognition and Gr. 12 Graduation</b></p>