Course: **Chemistry**

Rationale: Knowledge of chemistry is important in our current society due to the technological, medical, pharmaceutical and material advances, which make use of chemical principles. The study of chemistry helps students to understand the ongoing changes in the aforementioned fields and become informed and effective consumers, able to make sound, ethical decisions in our constantly changing society.

Course Description: See Program of Study

Materials:

STUDENT AND TEACHER TEXTBOOK:
Holt Chemistry (Myers, Oldham, and Tocci) Holt, Rinehart and Winston Austin, TX (2002)

SUPPORT MATERIALS:
Holt, Rinehart and Winston Austin, TX (2004)

HANDS-ON ACTIVITY SUPPORT MATERIALS:

- Holt Chemistry Laboratory Manual
- Teacher Generated Laboratories
- Individual Laboratory Projects
- Group Laboratory Projects
- Laboratory Glassware
- Laboratory Hardware
- Mini-Laboratories
- Teacher Demonstrations
- Activity Worksheets

REINFORCEMENT AND ENRICHMENT SUPPORT MATERIALS:

- Critical Reading of Chemical Literature
- Reinforcement Activity Sheets
- Chapter Review Activity Sheets
- Chapter Review Problems

PROGRAM RESOURCE SUPPORT MATERIALS:

- Cross-Curricular Integration
- Technology Integration
- Sargent-Welch Periodic Chart

Instructional Strategies:

- Teacher – centered lecture, question and answer, demonstrations, discussions
- Laboratory Activities
- Laboratory Experiments
- Small Group, Cooperative Learning Activities
- Student – centered Independent Work
- Student – centered Research Work
- Content Relevant Writing and Reading

- Student – centered Oral Presentations
- Hands On/Project Based Learning
- Activator, Clarity, Reinforcement, Summarizer Activities
- Differentiated Instructional Strategies considering learning styles, modalities, multiple intelligences, and including pre-assessments, checking for understanding activities

Assessments:

- Class Participation/Behavior
- Homework
- Laboratory Activities
- Laboratory Experiment Write-ups
- Quizzes
- Research and Report Group Presentations
- Research and Report Individual Presentations
- Unit Tests
- Laboratory Projects and Write-ups
- Reading and Reporting on Chemical Literature
- Final Exam

Check appropriate box:

	Quarter Course	**X**	**Semester Course**		**Year Long Course**		**A.P. Course**

General Standard/Content	***Framework***	***Learning Objective***
Properties of Matter	1.1, 1.2, 1.3	The learner will be able to: 1. Define the science of chemistry 2. List examples of the branches of chemistry 3. Distinguish between the physical and chemical properties of matter 4. Classify changes of matter as physical or chemical 5. Explain the gas, liquid, and solid states of matter in terms of particles 6. Distinguish between a mixture and a pure substance
Atomic Structure	2.1 through 2.7	1. Explain the law of conservation of mass 2. Explain the law of definite proportions 3. Explain the law of multiple proportions 4. Summarize the essential points of Dalton's Atomic Theory

General Standard/Content	***Framework***	***Learning Objective*** The learner will be able to
		5. Explain the relationship between Dalton's Atomic Theory and the laws of conservation of mass, definite proportions, and multiple proportions 6. Summarize Rutherford's experiment 7. List the properties of protons, neutrons, and electrons 8. Define atom 9. Explain what isotopes are 10. Define atomic number and mass number 11. Given the identity of a nuclide, determine its number of protons, electrons, and neutrons 12. Define mole in terms of Avogadro's Number 13. Define molar mass 14. Solve problems involving mass, moles, and number of atoms of an element 15. Discuss the dual wave-particle nature of light 16. Describe the Bohr model of the atom 17. Compare and contrast the Bohr model and the quantum model 18. Relate the number of sublevels and orbitals to the main energy level 19. List the total number of electrons needed to fully occupy each main energy level 20. State and apply the Aufbau principle 21.State and apply the Pauli Exclusion principle 22.State and apply Hund's Rule 23. Describe the electron configurations for the atoms of any element using orbital notation, electron configuration notation, electron dot notation, and noble gas notation
Periodicity	3.1, 3.2, 3.3, 3.4	***Learning Objective*** The learner will be able to 1. Explain the roles of Mendeleev and Moseley in the development of the periodic table 2. Describe the modern periodic table 3. Explain how the periodic law can be used to predict the physical and chemical

General Standard/Content	***Framework***	properties of elements 4. Describe how the elements belonging to a group of the periodic table are interrelated in terms of atomic number 5. Describe the relationship between the electrons in sublevels and the length of each period of the periodic chart 6. Locate and name the four blocks of the periodic table 7. Discuss the relationship between group configurations and numbers 8. Define atomic and ionic radii, ionization energy, electron affinity, and electronegativity 9. Compare periodic trends of atomic and ionic radii, ionization energy, electron affinity, and electronegativity 10.Define valence electrons and state how many are present in atoms of each main group element 11.Compare the atomic and ionic radii, ionization energy, electron affinity, and electronegativity of the d-block elements and the main group elements
Chemical Bonding	4.1, 4.2, 4.3, 4.4, 4.5, 4.6	1. Types of chemical bonding 2. Ionic vs. covalent bonding 3. Formation of covalent bonds 4. Characteristics of the covalent bond 5. The octet rule 6. Lewis structures: single, double, and triple covalent bonds 7. Pure, polar, and non-polar covalent bonds 8. Resonance structures 9. Characteristics of the ionic bond 10. Comparison of ionic and covalent bonds 11. Writing ionic compounds 12. Metallic bonds 13. VESPR theory of molecular shape 14. Molecular polarity and dipole-dipole forces 15. Hydrogen bonding 16. Nomenclature of ionic compounds and covalent compounds 17. Naming Group I, II, and III metal compounds 18. Naming transition metal compounds

General Standard/Content	***Framework***	***Learning Objective*** The learner will be able to 20. Naming covalent compounds 21. Writing chemical formulas from chemical names
Chemical Reactions and Stoiciometry	5.1, 5.2, 5.3, 5.4, 5.5, 5.6	1. Molar mass: definition and calculations 2. Percent Composition: definition and calculations 3. The law of multiple proportions 4. The mole concept: definition and calculations 5. Avogadro's number: definition and calculations 6. Empirical Formulas: definition and calculations 7. Empirical Weight: definition and calculations 8. Molecular Formulas: definition and calculations 9. Molecular Weight: definition and calculations 10. Indicators of chemical reactions 11. Characteristics of chemical equations and reactions 12. Synthesis reactions: recognition, completion, and balancing 13. Decomposition reactions: recognition, completion, and balancing 14. Single replacement reactions: recognition, completion, and balancing 15. Double replacement reactions: recognition, completion, and balancing 16. Combustion reactions: recognition, completion, and balancing 17. Stoichiometry: stepwise method of solution 18. Stoichiometry: calculations 19. Limiting reactants: definition and calculations 20. Percent yield: definition and calculations
		Learning Objective The learner will be able to
States of Matter, Kinetic Molecular Theory, and Thermochemistry	6.1, 6.2, 6.3, 6.4, 6.5	1. Kinetic molecular theory of gases 2. Properties of gases 3. Deviations of real gases from ideal gas behavior 4. Pressure

General Standard/Content	***Framework***	5. Units of pressure 6. Standard temperature and pressure 7. Boyle's Law: theory and calculations 8. The Kelvin temperature scale 9. Charles' Law: theory and calculations 10.Gay-Lussac's Law: theory and calculations 11.The combined law: theory and calculations 12.Dalton's Law of Partial Pressure: theory and calculations 13.Gases collected by water displacement: theory and calculations 14. The law of combining volumes 15. Avogadro's Law 16. Molar Volume: theory and calculations 17. The ideal gas law: theory and calculations 18. The ideal gas law constant 19. Molar mass or density determinations using the ideal gas law 20. Stoichiometry of gases 21. Volume-volume calculations 22. Volume-mass calculations 23. Mass-volume calculations
Solutions, Rates of Reactions, and Equilibrium	7.1, 7.2, 7.3, 7.4, 7.5, 7.6	1. Properties of liquids and the kinetic-molecular theory 2. Evaporation and boiling 3. Phase changes: boiling and freezing 4. Properties of solids and the kinetic-molecular theory 5. Crystalline solids 6. Crystal binding forces 7. Crystal structures 8. Amorphous solids 9. Equilibrium 10.Equilibrium equations and phase changes 11.LeChatelie's principle 12.Equilibrium vapor pressure 13.Molar heat of vaporization 14.Molar heat of fusion 15.Phase changes 16.Structure of water 17.Physical properties of water
Acids and Bases and Oxidation-Reduction Reactions	8.1, 8.2, 8.3, 8.4	1. Draw the structure of the hydronium ion 2. Distinguish between strong and weak electrolytes.

General Standard/Content	***Framework***	***Learning Objective***
		The learner will be able to 3. List five general properties of aqueous acids and bases. 4. Name common binary and ternary acids given their formulas. 5. Define acid and base according to Arrhenius's theory of ionization. 6. Explain the difference between strong and weak acids and bases. 7. Define and recognize Bronsted-Lowry acids and bases. 8. Define a Lewis acid and base 9. Describe a conjugate acid and base system. 10. Describe and recognize an amphoteric compound. 11. Explain the process of neutralization. 12. Describe the self-ionization of water. 13. Define pH 14. Explain and use the pH scale 15. Calculate pH given the hydronium ion or hydroxide ion concentration. 16. Calculate the hydronium ion and hydroxide ion concentration given pH. 17. Describe how an acid-base indicator functions. 18. Describe what an acid-base titration is. 19. Calculate the molarity of a solution from titration data. 20. Explain strong acid – strong base titration systems. 21. Explain strong acid – weak base titration systems 22. Explain weak acid – strong base titration systems 23. Explain weak acid – weak base titration systems. 24. Describe oxidation and reduction reactions and give common examples 35. Assign oxidation numbers in chemical reactions.