**Course Overview**: Chemistry I will be one of the hardest courses you will take in high school. In this course, you will apply mathematics to real world problem solving situations, including the practical use of Algebra. It is also a course that requires a great deal of abstract thinking, visualization in three dimensions, and the use of logic and critical thinking skills.

The goal of Chemistry I is to provide students with a foundation to understand the structure and properties of chemical substances and to make predictions in regards to the movement of energy in a system. This course is designed to give you the background and skills to prepare you for more advanced science classes, such as AP Chemistry or advanced life sciences. By nature, this course is lab-based with special emphasis on quantitative and qualitative methods of analysis. You are expected to be prepared to participate in completing entrance questions on certain days and participate in all class activities. This is a very easy course to fall behind in quickly if you are not prepared and do not keep up with the pace of the course.

**Required Supplies**:

**3 ring binder** for all classroom materials including **loose leaf paper**

**Scientific calculator**

**Pencils**

Students are expected to be on time to class with their notebooks, homework, and scientific calculators. **No cell phones** are allowed for calculators or other purposes. Each quarter you will have one lab report that will be typed out and will follow the procedures given in class.

**Lab Safety:** Lab safety is of the utmost importance since many of these labs will be student-directed involving potentially dangerous chemicals. Close-toed shoes need to be worn on all days, even if you do not think there will be a lab. No food or drinks in class or the lab. Goggles will always be worn in the lab area, even during the "safe" lab activities.

**Grading:** 60% Measurement (tests and quizzes), 20% Performance (lab reports and projects), 20% Practice (homework and participation). Lab reports will be due by the Friday of the week following the lab activity. Expect a quick quiz once per week and a more extensive unit exam every 2-3 weeks.

**Absenteeism and Labs:** Laboratory investigationswill be a substantial component of this course. The logistics of set up for labs is difficult. If you know you will be absent, plan to come in either the afternoon before or the morning after to make it up. Assignment due dates will be posted in the classroom. SIS will be updated weekly so missing homework can be seen on the web interface.

**Late Policy:** Students will lose one letter grade per class period late without previous arrangements. Students will turn in any missed work within 2 days following an unexpected absence for full credit.

**Class Website:** My classes will be utilizing Google Classroom and Weebly. The Google Classroom is where labs will be done and turned in. Only students have access to this website but please check in with them on their Google Classroom to ensure assignments are being turned in. The Weebly website will have all the resources that we use in class available. It is open to the public so please take advantage of these resources. If a student is absent for any reason, the materials that we cover are on this website. The URL is: <https://gillypad.weebly.com/chemistry.html>

**Remind:** We will be utilizing a remind account for Chemistry I. This is encouraged for all students and parents of Chemistry I students. I will remind participants about test dates and other important dates. The information on how to join the Chemistry I Remind are located on the class website.

**General Statement of Academic Integrity:** Integrity of scholarship is essential for an academic community. Salisbury High School expects that students will honor this principle and in so doing protect the validity of Salisbury High School’s intellectual work. For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind.

Topics for Chemistry I

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| **Weeks** | **Unit** | **Topics** | **Lab Activities** |
| 1.5 weeks | 1 | **Introduction to Chemistry, Measurements, Dimensional Analysis, and Error**   * Lab Safety * Equipment * Functions of Science * Scientific Method * Graphs * Significant Figures * Scientific Notation | Lab: Candle Observations  Lab: Copper (II) Chloride Reaction Lab  Lab: Introduction to Measurement |
| 2.5 weeks | 2 | **Properties of Matter and Energy**   * Classification & Properties of Matter * Types of Energy (kinetic, potential, electromagnetic, chemical, nuclear, etc.) * Phases of Matter * Specific Heat Capacity * Heats of Fusion and Vaporization * Phase Diagrams * Homogeneous and Heterogeneous Mixtures * Pure Substances and Mixtures (solutions, colloids, suspensions) * Molecules, Compounds, and Allotropes | Activity: Steel Wool  Lab: Density (Phet)  Lab: Properties of Matter  Lab: Separating a Mixture by Filtration  Lab: Exploring Energy Lab  Lab: Measuring Energy Lab |
| 1.5 weeks | 3 | **Atomic Theory**   * Atomic Structure and Nucleons * Atomic Numbers and Defining Elements * Isotopes and Atomic Mass * Introduction to Avogadro's Number * Converting Between Atoms↔moles↔grams * Measuring Molecular Mass | Lab: Bean Bag Isotopes  Lab: Atomic Target Practice  Lab: Who’s Counting |
| 1.0 week | 4 | **Nuclear Chemistry**   * Transmutations * Radioactivity (α, β-, β+, γ) * Half-lives & Radioactive Decay * Carbon-14 and Radiometric Dating | Activity: Half Life |
| 2.0 weeks | 5 | **Electron Structure**   * Electron Orbitals * Aufbau Principal and Hund's Rule * Electron Spin and Pauli Exclusion Principal * Energy Levels (s, p, d, and f orbitals) * Electron Configuration * Valence Elections and Lewis Dot Structures * Octet Rule and Duet Rule * Hypervalency and Formal Charge * Spectral Analysis | Lab: Quantum Leap Lab  Activity: Electron Configuration Battleship  Lab: Flame Test |

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| **Weeks** | **Unit** | **Topics** | **Lab Activities** |
| 1.5 weeks | 6 | **Periodic Table**   * Periodic Relationships * Groups/families * Atomic and Ionic Radii * Electron Affinity * Ionization Energy * Electronegativity | Activity: Aliens  Lab: It’s in the Cards  Lab: Periodic Trends  Lab: All in the Family |
| 2.5 weeks | 7 | **Chemical Bonding and Molecular Geometry**   * Covalent Bonding * Drawing Molecules and Lewis Structures * VSEPR * Molecular Orbitals * Hybridization (sp, sp2, sp3) * Polarity and Asymmetry * Ionic Bonds * Geometry of Ions * Metallic Bonds * Properties of each bond’s compounds * Effects of Periodic Trends on Reactivity * Resonance and Formal Charge | Activity: Covalent Bonding Template  Activity: Molecular Shapes (Phet)  Lab: Properties of Solids |
| 1.0 week | 8 | **Inorganic Nomenclature**   * Ionic Compounds and Polyatomic Ions * Covalent Compounds * Acids and Bases | Activity: Nomenclature Bingo |
| 2.0 weeks | 9 | **Intermolecular Forces**   * Dipole-dipole and Hydrogen Bonding * Dipole-induced Dipole * London Dispersion Forces * Van der Waals Forces * Surface Tension and Capillary Action * Colligative Properties (viscosity, freezing point depression, and boiling point elevation) * Properties of Solids and Liquids | Lab: It’s Just a Phase  Lab: Properties of Solids  Lab: Properties of Liquids |
| 1.5 weeks | 10 | **Types of Chemical Reactions**   * Kinetic Theory * 5+1 Types of Chemical Reactions (synthesis, decomposition, single replacement, double replacement, combustion, acid/base) * The Reactivity Series * Precipitate Formation and Gas Evolution | Activity: Balancing Equation Simulation (Phet)  Lab: Classifying Chemical Reactions |
| **End of 1st Semester** | | | |

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| **Weeks** | **Unit** | **Topics** | **Lab Activities** |
| 4.0 weeks | 11 | **Stoichiometry**   * Law of Conservation of Mass * The Mole and Avogadro's Number * Balancing Equations * Chemical Reactivity and Products * Percent Composition * Empirical Formulas * Hydrate Crystals * Limiting Reagents and Excess * Percent Yield and Percent Error | Lab: Magnesium Oxide  Lab: Formula of a Hydrate  Lab: Mol Ratio  Activity: S’mores  Lab: Micro Mol Rockets |
| 1.5 weeks | 12 | **Oxidation, Reduction, and Introduction to Electrochemistry**   * Oxidation Numbers * Redox Reactions * Half-reactions and Balancing Electrons * Transition Metal Chemistry * Intro to Electrochemistry | Lab: Metal Activity and Reactivity |
| 3.0 weeks | 13 | **Solution Chemistry**   * Types of Solutions * Molarity / % Solution * Solution Stoichiometry * Gas Diffusion/Solubility * Factors Affecting Solubility of Ions and Gases * Solubility Curves * Solubility Rules * Expressing Concentration | Lab: Factors Affecting Solution Formation  Lab: It’s in Their Nature  Lab: Solubility and Temperature |
| 2.0 weeks | 14 | **Gas Laws**   * Kinetic Theory of Gases * Pressure/Temperature/Volume * Boyles Law and Charles Law * Gay-Lussac Law and Combined Gas Law * Ideal Gas Law * Dalton’s Law of Partial Pressures * Molar Mass of Gases * Gas Stoichiometry | Lab: Boyle’s Law in a Bottle  Lab: Molar Volume of Hydrogen |
| 2.5 weeks | 15 | **Enthalpy and Entropy**   * Enthalpy and Calorimetry * Endothermic/Exothermic reactions * Heats of Hydration and Dilution * Bond Enthalpy * Activation Energy * Heats of Formation * Hess’s Law * Entropy and Spontaneity | Lab: Discovering Instant Cold Packs  Lab: Heats of Reaction |

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| **Weeks** | **Unit** | **Topics** | **Lab Activities** |
| 2.0 weeks | 16 | **Acid and Bases**   * Arrhenius Acids/Bases * pH Scale * Strong Acids & Bases * Titrations * Brønsted-Lowry Acid/bases * Lewis Acids and Bases * Acid-base Properties of Salt Solutions * Acid/Base Titration | Lab: Acids and Bases |
| 1.0 weeks | 17 | **Introduction to Organic Chemistry**   * Nomenclature and properties of:   + Alkanes   + Alkenes   + Alkynes |  |
| **End of 2nd Semester** | | | |