**Westbrook School Department**

**Course Blueprint**

| **Content Area / Grade Level**  Science | |
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| **Course Title**  Honors Chemistry | |
| **Course Description**  This course is a first year high school Chemistry class designed and taught to prepare students to be successful in a college Chemistry course. This class covers the first half of the Big Ideas and Learning Objectives on the AP Chemistry college board website. Some of the topics addressed are matter and its classification, atomic theory, the periodic table and its trends, chemical bonding, chemical reactions, stoichiometry, behavior of gases, thermochemistry and equilibrium. Problem solving involving the factor label method and the application of algebra is frequently involved in this course. Numerous laboratory experiences requiring written lab reports are performed to reinforce the concepts presented in class. | |
| **Westbrook K-12 Learning Standards**   * Asking Questions and Defining Problems * Developing and Using Models * Planning and Carrying Out Investigations * Analyzing and Interpreting Data * Using Mathematics and Computational Thinking * Constructing Explanations and Designing Solutions * Engaging in Argument from Evidence * Obtaining, Evaluating and Communicating Information | **Guiding Principles / Vision of the Graduate**   * A clear and effective communicator * A self-directed and lifelong learner * A creative and practical problem solver * A responsible and involved citizen * An integrative and informed thinker |
| **Expected Outcomes -** Expectations for students upon completion of the course.  Students will be able to:   * Differentiate between chemical and physical properties and changes. * Explore atomic theory through the evolution of atomic models * Use the periodic table as a model to explain periodic trends. Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. * Differentiate between the different types of intra vs intermolecular forces * Identify the common molecular shapes and why they form * Name and write formulas for elements, molecular compounds, ionic compounds and some acids. * Calculate and convert quantities using molar mass, mole ratios and Avogadro's number. * Calculate empirical and molecular formulas from laboratory data. * Analyze the accuracy of lab work using percent yield and percent error. * Understand the differences between reactions and predict product formation. * Write net ionic equations * Determine limiting and excess reactants. * Perform stoichiometric conversions * Create equations for Boyles, Guy Lussac and Charles’ Laws * Prove R from the Ideal gas law * Apply calorimetry to determine energy gains and loses. * Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends on the changes in total bond energy. * Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. * Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium. * Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. | |
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| **Core Units of Study -** Each course has 4 - 6 Core Units of Study which are required and in which all targeted learning standards are embedded. Unit 1: Matter and ChangeUnit 2: Atomic Theory, Periodic Trends, Intramolecular vs Intermolecular forces, Nomenclature Unit 3: The Math of Chemistry and Chemical Quantities  Unit 4: Chemical Reactions and Stoichiometry  Unit 5: States of Matter with a focus on Gasses  Unit 6: Thermochemistry  Unit 7: Chemical Equilibrium | |

| **CORE UNIT # 1**  **Title: Matter and Change** | |
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| **Westbrook Learning Standards**   * Asking Questions and Defining Problems * Developing and Using Models * Planning and Carrying Out Investigations * Analyzing and Interpreting Data * Constructing Explanations and Designing Solutions * Engaging in Argument from Evidence * Obtaining, Evaluating and Communicating Information | **Content for this Unit:**   * matter * Element, compound, mixture * Physical vs chemical property * Physical vs chemical change * Indicators of a chemical change * Law of conservation of matter * Lab safety * Qualitative vs quantitative data * Observation vs interpretation |
| **Performance Indicators (Skills)**  The students will be able to: | **Essential Questions**   * How can one explain the structure, properties, and interactions of matter? * How do we differentiate between elements, compounds and mixtures |
| **Common Assessment** | |
| **Instructional Suggestions / Resources** - | **Assessment (formative) Suggestions/Resources** |

| **CORE UNIT # 2**  **Title: Atomic Theory, Periodic Trends, Bonding, Molecular and Ionic Compound Structure and Properties, Nomenclature** | |
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| **Westbrook Learning Standards** | **Content for this Unit:**   * History of Atomic Models * Atomic structure * Electron configurations * Periodic Trends * Types of Intramolecular forces * Lewis Structures * Types of Intermolecular forces * Naming and writing formulas for elements, molecular compounds, ionic compounds and selected acids and bases |
| **Performance Indicators (Skills)**  The students will be able to: | **Essential Questions**   * *How do particles combine to form the variety of substances one observes?* * *How do substances combine or change (react) to make new substances?* * *How can one explain and predict interactions between objects and within systems?* |
| **Common Assessment** | |
| **Instructional Suggestions / Resources** - | **Assessment (formative) Suggestions/Resources** |

| **CORE UNIT # 3**  **Title: Chemical quantities** | |
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| **Westbrook Learning Standards** | **Content for this Unit:**   * Significant Figures * Converting between mole, mass, number of particles and volume of a gas at STP * Determining Percent Composition * Determining Empirical and Molecular Formulas |
| **Performance Indicators (Skills)**  The students will be able to: | **Essential Questions**   * What is a mole? * What is the mass of a mole something? * How many particles in a mole? * What volume does a mole of gas occupy? * What is the percent composition of a substance? * How to determine the empirical and molecular formula of a substance? |
| **Common Assessment** | |
| **Instructional Suggestions / Resources** - | **Assessment (formative) Suggestions/Resources** |

| **CORE UNIT # 4**  **Title: Chemical reactions and stoichiometry** | |
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| **Westbrook Learning Standards**   * Asking Questions and Defining Problems * Developing and Using Models * Planning and Carrying Out Investigations * Analyzing and Interpreting Data * Constructing Explanations and Designing Solutions * Engaging in Argument from Evidence * Obtaining, Evaluating and Communicating Information | **Content for this Unit:**   * Word vs Chemical Equation * Balancing Chemical Equations * Classifying Reactions * Predicting Products * Net Ionic Equations * Interpreting Chemical Equations * Stoichiometic Calcuations * Limiting and Excess Reactant * Percent Yield |
| **Performance Indicators (Skills)**  The students will be able to: | **Essential Questions**   * How can one explain the structure, properties, and interactions of matter? * How do we differentiate between elements, compounds and mixtures |
| **Common Assessment** | |
| **Instructional Suggestions / Resources** - | **Assessment (formative) Suggestions/Resources** |

| **CORE UNIT # 5**  **Title: States of Matter with a focus of Gases** | |
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| **Westbrook Learning Standards**   * Asking Questions and Defining Problems * Developing and Using Models * Planning and Carrying Out Investigations * Analyzing and Interpreting Data * Constructing Explanations and Designing Solutions * Engaging in Argument from Evidence * Obtaining, Evaluating and Communicating Information | **Content for this Unit:**   * Kinetic Molecular Theory * 5 states of matter * Combined Gas Law * Ideal Gas Law * Dalton’s Law of Parial Pressure |
| **Performance Indicators (Skills)**  The students will be able to: | **Essential Questions**   * How can one explain the structure, properties, and interactions of matter? * How do we differentiate between elements, compounds and mixtures |
| **Common Assessment** | |
| **Instructional Suggestions / Resources** - | **Assessment (formative) Suggestions/Resources** |

| **CORE UNIT # 6**  **Title: Thermochemistry** | |
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| **Westbrook Learning Standards**   * Asking Questions and Defining Problems * Developing and Using Models * Planning and Carrying Out Investigations * Analyzing and Interpreting Data * Constructing Explanations and Designing Solutions * Engaging in Argument from Evidence * Obtaining, Evaluating and Communicating Information | **Content for this Unit:**   * Energy and Temperature * Specific heat, Heat of vaporization, Heat of fusion, specific heat * Calorimetry * Thermochemical equations |
| **Performance Indicators (Skills)**  The students will be able to: | **Essential Questions**   * How can one explain the structure, properties, and interactions of matter? * How do we differentiate between elements, compounds and mixtures |
| **Common Assessment** | |
| **Instructional Suggestions / Resources** - | **Assessment (formative) Suggestions/Resources** |

| **CORE UNIT # 7**  **Title: Equilibrium** | |
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| **Westbrook Learning Standards**   * Asking Questions and Defining Problems * Developing and Using Models * Planning and Carrying Out Investigations * Analyzing and Interpreting Data * Constructing Explanations and Designing Solutions * Engaging in Argument from Evidence * Obtaining, Evaluating and Communicating Information | **Content for this Unit:**   * Rate of reactions * Factors affecting reaction rates * Collision Theory and reactions * Equilibrium constant * Le Chatelier’s Principle * Entropy, enthapy, and Free energy |
| **Performance Indicators (Skills)**  The students will be able to: | **Essential Questions**   * How can one explain the structure, properties, and interactions of matter? * How do we differentiate between elements, compounds and mixtures |
| **Common Assessment** | |
| **Instructional Suggestions / Resources** - | **Assessment (formative) Suggestions/Resources** |