Unit Course Outline	Unit 1 Structure and Properties of Matter (10 weeks)	Unit 2 Conservation of Matter (8 weeks)	Unit 3 Reaction Rates and Chemical Equilibrium (7 weeks)	Unit 4 Nuclear Chemistry (5 weeks)	Unit 5 Applications of Chemistry (5 weeks)
NGSS Disciplinary Core Ideas (DCI)	HS.PS1.A, HS.PS1.C, HS.PS2.B, HS.LS1.C, HS.ESS2.C	HS.PS1.B, HS.PS1.A, HS.PS3.A, HS.PS3.B, HS.PS3.D, HS.LS1.C, HS.LS2.B, HS.ESS2.C, HS.ETSI.B, HS.ETSI.C	HS.PS1.A, HS.PS1.B, HS.PS3.A, HS.PS3.B, HS.PS3.D, HS.LS1.C, HS.LS2.B, HS.ESS2.C, HS.ETSI.B, HS.ETSI.C	HS.PS1.C, HS.PS1.B,	HS.PS1.C, HS.PS2.B, HS. PS2.C, HS.ETS1.C
Performance Expectations	HS-PS1-1, HS-PS1-3, HS-PS1-2	HS-PS1-2, HS-PS1-7, HS-PS1-4, HS-PS1-5, HS-PS1-6, HS-PS1-1 ,HS-PS1-3	HS-PS1-4, HS- PS1-5, HS-PS1-6,HS-PS1-7,HS-PS1-1, HS-PS1-2, HS-PS1-3,	HS-PS1-8, HS-ESS1-1	HS-PS3-3, HS-ESS16
Common Core Language Arts	RST.9-10.7, RST.11- 12.1, WHST.9- 12.2, WHST.9-12.5, WHST.9- 12.7, WHST.11- 12.8, WHST.9-12.9	RST.9-10.7, RST.11- 12.1, WHST.9- 12.2, WHST.9-12.5, WHST.9-12.7, WHST.11- 12.8, WHST.9-12.9, SL.11-12.5	RST.9-10.7, RST.11- 12.1, WHST.9- 12.2, WHST.9-12.5, WHST.9- 12.7, WHST.11- 12.8, WHST.9-12.9, SL.11-12.5	RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7, SL.11-12.5	RST.11-12.1, WHST.9-12.2, WHST.9-12.5, WHST.9-12.7
Mathematics	MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3, HSF-IF.B.5, HSS-ID.B.6	MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3,	MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3,	MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3,	MP.2, MP.4, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3,
Computer Science and Design Thinking	8.1.12.CS.1-4 8.1.12.NI.1-4 8.1.12.IC.1-3 8.1.12.DA.1-6 8.1.12.AP1-9 8.2.12.ED.1-6 8.2.12.ITH.1-3 8.2.12.NT.1-2 8.2.12.ETW.1-3	8.1.12.CS.1-4 8.1.12.NI.1-4 8.1.12.IC.1-3 8.1.12.DA.1-6 8.1.12.AP1-9 8.2.12.ED.1-6 8.2.12.ITH.1-3 8.2.12.NT.1-2 8.2.12.ETW.1-3	8.1.12.CS.1-4 8.1.12.NI.1-4 8.1.12.IC.1-3 8.1.12.DA.1-6 8.1.12.AP1-9 8.2.12.ED.1-6 8.2.12.ITH.1-3 8.2.12.NT.1-2 8.2.12.ETW.1-3	8.1.12.CS.1-4 8.1.12.NI.1-4 8.1.12.IC.1-3 8.1.12.DA.1-6 8.1.12.AP1-9 8.2.12.ED.1-6 8.2.12.ITH.1-3 8.2.12.NT.1-2 8.2.12.ETW.1-3	8.1.12.CS.1-4 8.1.12.NI.1-4 8.1.12.IC.1-3 8.1.12.DA.1-6 8.1.12.AP1-9 8.2.12.ED.1-6 8.2.12.ITH.1-3 8.2.12.NT.1-2 8.2.12.ETW.1-3

Career Readiness, Life Literacies, and Key Skills	9.1.12.FP.1-3 9.4.12.CI.1,2 9.4.12.CT.1 9.4.12.DC.1-4 9.4.12.GCA.1 9.4.12.IML.1-4 9.4.12.TL.1,2	9.1.12.FP.1-3 9.4.12.CI.1,2 9.4.12.CT.1 9.4.12.DC.1-4 9.4.12.GCA.1 9.4.12.IML.1-4 9.4.12.TL.1,2	9.1.12.FP.1-3 9.4.12.CI.1,2 9.4.12.CT.1 9.4.12.DC.1-4 9.4.12.GCA.1 9.4.12.IML.1-4 9.4.12.TL.1,2	9.1.12.FP.1-3 9.4.12.CI.1,2 9.4.12.CT.1 9.4.12.DC.1-4 9.4.12.GCA.1 9.4.12.IML.1-4 9.4.12.TL.1,2	9.1.12.FP.1-3 9.4.12.CI.1,2 9.4.12.CT.1 9.4.12.DC.1-4 9.4.12.GCA.1 9.4.12.IML.1-4 9.4.12.TL.1,2
Clarification Statements:	Focus is on the reasons electrons and neutrons do not determine the element: Electrons can be gained and lost which change the element into an ion with different properties from the parent element. The number of neutrons can vary for the same element, giving rise to isotopes which have similar properties but different masses. Focus is on the number of electrons or unfilled energy levels available for bonding in atoms and to combine in different ratios in compounds. Cross Cutting Concept: Examples of properties that could be predicted from patterns could include reactivity of metals, types of bonds formed, numbers	Examples of chemical reactions could include the reaction of sodium and chlorine, of carbon and oxygen, or of carbon and hydrogen. Cross Cutting Concept: The classification of chemical reactions should focus more on observable patterns rather than memorization of definitions of reaction types. Students need to be able to recognize single and double replacement reactions to predict when these reactions occur. Science and Engineering Concepts: Emphasis is on using mathematical ideas to communicate the proportional relationships between masses of atoms in the reactants and the	Cross Cutting Concept: Emphasis is on the idea that a chemical reaction is a system that affects the energy change. Examples of models could include molecular-level drawings and diagrams of reactions, graphs showing the relative energies of reactants and products, and representations showing energy is conserved. Emphasis is on student reasoning that focuses on the number and energy of collisions between molecules. Perturbations include change of mass, moles, volume, temperature, pressure, and addition of a catalyst. Emphasis is on the application of Le Chatelier's Principle and	Emphasis is on the differences in energy changes and the idea that chemical reactions involve the rearrangement of atoms and their valence electrons, while nuclear reactions involve changes in the nucleus. Balancing nuclear reactions is beyond the scope of these standards. Science and Engineering: Emphasis is on simple qualitative models, such as pictures or diagrams, and on the scale of energy released in nuclear processes relative to other kinds of transformations. Emphasis is on the energy transfer mechanisms that allow energy from nuclear fusion in the sun's core to reach Earth. Examples of	Emphasis is on both qualitative and quantitative evaluations of devices. Examples of devices could include Rube Goldberg devices, wind turbines, solar cells, solar ovens, and generators. Examples of constraints could include use of renewable energy forms and efficiency. Emphasis is on using available evidence within the solar system to reconstruct the early history of Earth, which formed along with the rest of the solar system 4.6 billion years ago. Examples of evidence include the absolute ages of ancient materials (obtained by radiometric dating of meteorites, moon rocks, and Earth's oldest minerals), the sizes and compositions of solar system objects, and the

	of bonds formed, and reactions with oxygen. Focus is on the energy required to overcome bonds of attraction in the liquid and or solid state during evaporation and melting, and that condensation and freezing release heat to the surroundings as internal energy is reduced and bonds of attraction are formed. Emphasis is on understanding the strengths of forces between particles, not on naming specific intermolecular forces (such as dipole-dipole). Examples of particles could include ions, atoms, molecules, and networked materials (such as graphite). Examples of bulk properties of substances could include the melting point and boiling point, vapor pressure, and surface tension.	products, and the translation of these relationships to the macroscopic scale using the mole as the conversion from the atomic to the macroscopic scale. Emphasis is on assessing students' use of mathematical thinking and not on memorization and rote application of problem-solving techniques. Emphasis is on assessing students' use of mathematical thinking and not on memorization and rote application of problem-solving techniques. Emphasis is on equilibrium resulting from an equality between the rates of the forward and reverse reactions, at which point Q = K.	on refining designs of chemical reaction systems, including descriptions of the connection between changes made at the macroscopic level and what happens at the molecular level. Examples of designs could include different ways to increase product formation including adding reactants or removing products.	evidence for the model include observations of the masses and lifetimes of other stars, as well as the ways that the sun's radiation varies due to sudden solar flares ("space weather"), the 11-year sunspot cycle, and non-cyclic variations over centuries.	impact cratering record of planetary surfaces. Modification of conditions includes dilution of or addition or removal of reactants or products by physical or chemical means. Comparisons of relative strengths of aqueous acid or base solutions made from similar acid or base substances is limited to arguments based on periodic properties of elements, electronegativity model of electron distribution, empirical dipole moments, and molecular geometry.
Assessment Boundary:	Assessment is limited to main group elements. Assessment does not include quantitative	Assessment is limited to chemical reactions involving main group	Assessment does not include calculating the total bond energy changes during a chemical reaction	Assessment does not include quantitative calculation of energy released. Assessment is	Assessment for quantitative evaluations is limited to total output for a given input. Assessment is

	understanding of ionization energy beyond relative trends. Assessment does not include Raoult's law calculations of vapor pressure.	elements and combustion reactions. Assessment does not include complex chemical reactions.	from the bond energies of reactants and products. Assessment is limited to simple reactions in which there are only two reactants; evidence from temperature, concentration, and rate data; and qualitative relationships between rate and temperature. Assessment is limited to specifying the change in only one variable at a time. Assessment does not include calculating equilibrium constants and concentrations.	limited to alpha, beta, and gamma radioactive decays. Assessment does not include details of the atomic and subatomic processes involved with the sun's nuclear fusion.	limited to devices constructed with materials provided to students. Reactions are limited to Arrhenius and Bronsted-Lowry acid-base reaction patterns with monoprotic acids. Acid or base strength comparisons are limited to homologous series.
Teacher Notes:					
Activities	1. Origami atoms and molecules 2. Cartoon elements 3. Color coding sections of the periodic table 4. Element t-shirt/scavenger hunt 5. Alien periodic table 6. Lab activity: Metal, Nonmetals, Metalloids 7. Organizing items into a Periodic Table activity	1. Lab activity: Chemical Reactions 2. Lab activity Rainbow Lab: Measuring mixtures 3. Lab activity Chromatography: Separating mixtures 4. Chromatography forensics 5. Chromatography flowers and butterflies activity 6. Mole Web Quest 7. Mole lab	1. Collision Theory Web Quest 2. Lab activity: Rate of Reactions 3. Reaction rate simulation activity 4. Gas Law Simulation activity 5. Lab Activity: Energy in Chemical Reactions	1. Chain reaction model using dominoes 2. Cell Phone Radiation: How Close is Too Close? 3. Radiation and Cancer: Cure or Cause? 4. Investigating the Safety of Nuclear Energy Using Real Radioactivity Data Example of Interdisciplinary with Math	1. Lab activity: Solid or Liquid 2. Lab activity: Acidity of foods and household products 3. Lab Activity: Quality control at the Pickle Factory 4. History of Earth Timeline Activity Example of Interdisciplinary with Social Studies

	8. Ionic Compound Web Quest 9. Lab activity: Reactivity of Halide Ions 10. Lab activity: Properties of Ionic and Covalent Compounds 11. Chemical Bonding Web Quest 12. Engineering and The Periodic Table activity 13. Lab activity: Candy Compounds 14. Lab activity: Ionic and Covalent Bonds 15. Periodic Table Trends activity 16. Ionic Bonding Puzzle-Poster activity 17. Bohr model activity 18. Laboratory Activity Density Lab	8. Mole decoding activity 9. Lab activity: Law of conservation of matter 10. Lab: Conservation of mass of gum 11. Lab activity: Combustion and Rusting		5. Mathematical Modeling Using Real Radioactivity Data	5. Research project: Renewable vs. nonrenewable energy resources
Interdisciplinary Examples/ Science and Engineering Practices	RST.9-10.7: Lab Activity: Density Lab: Students will formulate a hypothesis and write a lab report expressing the quantitative information obtained through data tables and graph analysis. RST.9-10.9: Lab Activity: Ionic and Covalent Bonds - Students will perform laboratory experiment and compare and contrast ionic	HSN-Q.A.1: Lab activity: Chemical Reactions - Students will use multi-step chemical reactions to understand and develop a solution. HSN-Q.A.3: Mole decoding activity - Students will practice their skills with converting moles, mass, and molecules using appropriate	HSN-Q.A.1: Lab Activity: Rate of Reactions - Students will measure how fast or slow different chemical reactions occur. Calculations will be made with consistent units used in formulas. HSN-Q.A.2: Gas law simulation activity - Students will investigate gas laws using online simulation. Quantities	RST.11-12.1: Radiation and Cancer: Cure or Cause? - Students will cite evidence to support their claim between the relationship of radiation and cancer. MP.4: Mathematical Modeling Using Real Radioactivity Data - Students will analyze radioactivity data and mathematically draw	HSN-Q.A.2: Lab Activity: Acidity of foods and household products - Students will measure the pH of certain products and quantify the acids vs. bases using descriptive modeling. RST.9-10.9: Lab Activity: Solid or Liquid - Students will perform experiment and compare the solids and liquids. Findings will be

	and covalent bonds through lab report. Findings will be compared with evidence from other scientific resources.	limitations in measurement when reporting quantities.	obtained will be used in modeling such as data tables and graphs.	conclusions using models, formulas, graphs, etc.	compared from other scientific resources.
Evaluation/ Formative Assessments	-Lab reports -Projects and web quests -Quizzes/tests -Do Nows -Class Discussions -Class Assignments -Constructed Response --Benchmark Assessment: Plan an experiment -Exit Tickets -Homework	-Lab reports -Projects and web quests -Quizzes/tests -Do Nows -Class Discussions -Class Assignments - Constructed Response --**Chemical Bond cartoon project** **Chemical Formula Assessment** **Type of reactions Assessment** -Exit Tickets -Homework	-Lab reports -Projects and web quests -Quizzes/tests -Do Nows -Class Discussions -Class Assignments -Constructed Response --Benchmark Assessment: Students draw graphs showing the release of energy in endothermic and exothermic reactions -Exit Tickets -Homework	-Lab reports -Projects and web quests -Quizzes/tests -Do Nows -Class Discussions -Class Assignments -Exit Tickets -Homework	-Lab reports -Projects and web quests -Quizzes/tests -Do Nows -Class Discussions -Class Assignments -Exit Tickets -Homework
Resources	1. Prentice Hall Chemistry Book 2. *Science World* Magazine (Scholastic publication) 3. bozemanscience.com/ 4. sciencespot.net/ 5. phet.colorado.edu/ 6.youtube.com/results?search_query=crash+course+chemistry 7.gpb.org/chemistry-physics/students/all 8.mw.concord.org/modeler/index.html 9.sciencecases.lib.buffalo.edu/cs/	1. Prentice Hall Chemistry Book 2. *Science World* Magazine (Scholastic publication) 3. bozemanscience.com/ 4. sciencespot.net/ 5. phet.colorado.edu/ 6youtube.com/results?search_query=crash+course+chemistry 7.msed.iit.edu/ids/curriculum/chemistry/model_lessons/12-%20Chem%20Cohort%201/Q4%20Chemistry/Unit_4_ConservationofMass061308.doc	1. Prentice Hall Chemistry Book 2. *Science World* Magazine (Scholastic publication) 3. bozemanscience.com/ 4. sciencespot.net/ 5. phet.colorado.edu/ 6.youtube.com/results?search_query=crash+course+chemistry 7.org/chemistry-physics/students/all 8.mw.concord.org/modeler/index.html 9.sciencecases.lib.buffalo.edu/cs/	1. Prentice Hall Chemistry Book 2. *Science World* Magazine (Scholastic publication) 3. bozemanscience.com/ 4. sciencespot.net/ 5. phet.colorado.edu/ 6.youtube.com/results?search_query=crash+course+chemistry 7.gpb.org/chemistry-physics/students/all 8.ilabcentral.org/radioactivity 9.mw.concord.org/modeler/index.html 10.sciencecases.lib.buffalo.edu/cs/	1. Prentice Hall Chemistry Book 2. *Science World* Magazine (Scholastic publication) 3. bozemanscience.com/ 4. sciencespot.net/ 5. phet.colorado.edu/ 6.youtube.com/results?search_query=crash+course+chemistry 7.gpb.org/chemistry-physics/students/all 8.mw.concord.org/modeler/index.html 9.sciencecases.lib.buffalo.edu/cs/

		8.www.gpb.org/chemistry-physics/students/all 9.mw.concord.org/modeler/index.html 10.sciencecases.lib.buffalo.edu/cs/			
Common Accommoda-tions	Extra time, chunking, modeling, frequent breaks, assigned seats, guided notes, use of models, digital text, text can read to students, graphic organizers, checklist, daily do-now, exit ticket, monthly outlook, study guides, require notebook/chromebook for class, oral responses acceptable as needed, word bank as needed, read tests aloud as needed, options to refine ideas, assigned/preferential seating additional time as needed, daily SEL activities				