

**MOORESTOWN TOWNSHIP PUBLIC SCHOOLS
MOORESTOWN, NEW JERSEY**

*Moorestown High School
Science Department*

*CP Chemistry
Grades 10-12*

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Contents

<u>Administration</u>	3
<u>Course Description and Fundamental Concepts</u>	4
<u>New Jersey Student Learning Standards</u>	4
<u>Pacing Guide</u>	10
<u>Units</u>	11

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Course Description and Fundamental Concepts

In this introductory course in chemistry, students will use the three dimensions of the Next Generation Science Standards in order to discover chemistry principles and practice chemistry skills. Students will utilize the Science and Engineering Practices in order to begin the process of mastering the Chemistry Disciplinary Core Ideas. In the process of discovering and understanding the Disciplinary Core Ideas students will search for and employ the following cross cutting concepts: Patterns, Cause and Effect, Scale Proportion and Quantity, Systems and System Models, Energy and Matter, Structure and Function, Stability and Change. Chemistry topics include: Introduction to Matter, Atomic Theory, Electrons, Kinetic Molecular Theory Solids and Liquids, Gases, Temperature & Pressure, The Periodic Table, Chemical Bonding, Chemical Formulas, Chemical Reactions, Stoichiometry, Solutions (Equilibrium), Radioactivity & Nuclear Energy.

New Jersey Student Learning Standards (NJSLS)

Subject/Content Standards

Include grade appropriate subject/content standards that will be addressed

Standard #	Standard Description
HS-PS1-1	<i>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.</i>
HS-PS1-2.	<i>Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties.</i>
HS-PS1-3	<i>Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles</i>
HS-PS1-4.	<i>Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.</i>
HS-PS1-5.	<i>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.</i>
HS-PS1-6.	<i>Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.*</i>
HS-PS1-7.	<i>Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction</i>

HS-PS1-8.	<i>Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.</i>
HS-PS2-4.	<i>Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects.</i>
HS-PS2-6	<i>HS-PS2-6. Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.*</i>
HS-PS3-1	<i>Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.</i>
HS-PS3-2.	<i>Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative positions of particles (objects)</i>
HS-PS3-3.	<i>Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.*</i>
HS-PS3-4.	<i>Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics)</i>
HS-PS3-4.	<i>Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics)</i>
HS-PS3-5.	<i>Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.</i>
HS-PS4-1.	<i>Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.</i>
HS-PS4-3.	<i>Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for in some situations one model is more useful than the other.</i>
HS-PS4-4.	<i>Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. [</i>
HS-PS4-5.	<i>Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.*</i>

English Companion Standards

List grade-level appropriate companion standards for *History, Social Studies, Science and Technical Subjects (CTE/Arts) 6-12*. English Companion Standards are required in these subject/content areas.

Unit Addressed	Standard #	Standard Description
1,6,7	RST.9-10.7	<i>Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. (HS-PS1-1)</i>
1, 3	RST.11-12.1	<i>Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. (HS-PS1-3),(HS-PS1-5)</i>
7, 8, 9	WHST.9-12.2	<i>Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (HS-PS1-2),(HS-PS1-5)</i>
7,8	WHST.9-12.5	<i>Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. (HS-PS1-2)</i>
1, 5,7	WHST.9-12.7	<i>Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (HS-PS1-3),(HS-PS1-6)</i>
1,4	WHST.11-12.8	<i>Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation. (HS-PS1-3)</i>
1,2	WHST.9-12.9	<i>Draw evidence from informational texts to support analysis, reflection, and research. (HS-PS1-3)</i>
4, 5	SL.11-12.5	<i>Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. (HS-PS1-4)</i>

21st-Century Skills and Technology Integration ([Standard 8](#))

List appropriate units below for which strands (A through F) will be addressed

Standard 8.1 (K-12)		Educational Technology: <i>All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.</i>
Unit Addressed	Strand Letter	Standard Description
1-8	Strand A	Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems, and operations.</i>
7,8	Strand B	Creativity and Innovation: <i>Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.</i>
1-9	Strand C	Communication and Collaboration: <i>Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.</i>
8,9	Strand D	Digital Citizenship: <i>Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</i>
1-8	Strand E	Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i>
4, 5	Strand F	Critical thinking, problem-solving, and decision making: <i>Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</i>

Career Ready Practices ([Standard 9](#))

List appropriate units below for which CRPs will be addressed

Unit Addressed	Standard #	Standard Description
1-8	CRP1	<i>Act as a responsible and contributing citizen and employee.</i>

1,4,6,7	CRP2	<i>Apply appropriate academic and technical skills.</i>
1-8	CRP3	<i>Attend to personal health and financial well-being.</i>
6,7,8	CRP4	<i>Communicate clearly and effectively and with reason.</i>
6,7,8	CRP5	<i>Consider the environmental, social and economic impacts of decisions.</i>
1-8	CRP6	<i>Demonstrate creativity and innovation.</i>
1,4,8	CRP7	<i>Employ valid and reliable research strategies.</i>
1	CRP8	<i>Utilize critical thinking to make sense of problems and persevere in solving them.</i>
1-9	CRP9	<i>Model integrity, ethical leadership, and effective management.</i>
1	CRP10	<i>Plan education and career paths aligned to personal goals.</i>
1-8	CRP11	<i>Use technology to enhance productivity.</i>
1,2,3,8	CRP12	<i>Work productively in teams while using cultural global competence</i>

Interdisciplinary Connections

List any other content standards addressed as well as appropriate units

Visual & Performing Arts Integration ([Standard 1](#))

List appropriate units below for which standards (1.1 through 1.4) may be addressed

Unit Addressed	Standard #	Standard Description
	Standard 1.1	The Creative Process: <i>All students will demonstrate an understanding of the elements and principles that govern the creation of works of art in dance, music, theatre, and/or visual art.</i>
7	Standard 1.2	History of the Arts and Culture: <i>All students will understand the role, development, and influence of the arts throughout history and across cultures.</i>
	Standard 1.3	Performing/Presenting/Producing: <i>All students will synthesize those skills, media, methods, and technologies appropriate to creating, performing, and/or presenting works of art in dance, music, theatre, and/or visual art.</i>

	Standard 1.4	Aesthetic Responses & Critique Methodologies: <i>All students will demonstrate and apply an understanding of arts philosophies, judgment, and analysis to works of art in dance, music, theatre, and/or visual art.</i>
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Other Interdisciplinary Content Standards		
<i>List appropriate units below for any other content/standards that <u>may be addressed</u></i>		
Unit Addressed	Content / Standard #	Standard Description....
1,4,7,8	<i>MP.2</i>	<i>Reason abstractly and quantitatively. (HS-PS1-5),(HS-PS1-7)</i>
1,4,5,6,7,8	<i>MP.4</i>	<i>Model with mathematics. (HS-PS1-4),(HS-PS1-8)</i>
1,6,7,8	<i>HSN-Q.A.1</i>	<i>Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. (HS-PS1-2),(HS-PS1-3),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7),(HS-PS1-8)</i>
1,2,3,4,6,7,8	<i>HSN-Q.A.2</i>	<i>Define appropriate quantities for the purpose of descriptive modeling. (HS-PS1-4),(HS-PS1-7),(HS-PS1-8)</i>
1	<i>HSN-Q.A.3</i>	<i>Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. (HS-PS1-2),(HS-PS1-3),(HS-PS1-4),(HS-PS1-5),(HS-PS1-7),(HS-PS1-8)</i>

Pacing Guide (All Dates are approximate based on the school calendar)

Unit/ Topic	Month (w/Approx number of Teaching Days)
1. Introduction to Matter Matter & Change (Ch1) Methods & Measurement (Ch 2) Units & Conversions (Ch 2)	September (~15 days)
2. Atomic Theory (Ch 3)	October (~19 days)
3. Electrons (Ch 4)	November (~16 days)
4. The Periodic Table (Ch5) 5. Chemical Bonding & IMFs (Ch6)	December (~15 days)
5. Chemical Bonding & IMFs (Ch6) MIDTERM EXAM	January (~18 days)
6. Chemical Formulas (Acid & Base Properties) (Ch 7) & (Ch14/15) 7. Chemical Reactions/ Advanced (Acids & Bases) (Ch 8) & (Ch14/15)	February (~18 days)
8. Stoichiometry (Ch 9) 9 Kinetic Molecular Theory, Solids and Liquids (Ch 10)	March (~15-20 days)
10. Gases (Temperature & Pressure) (Ch 11)	April (~15-20 days)
11. Solutions (Equilibrium) (Ch12)	May (~18 days)
11. Solutions (Equilibrium) (Ch12) FINAL EXAM	June (~15 days)

[Units](#)

Contact the Content Supervisor for unit details.