



Platte County

HOME OF THE PIRATES

SCIENCE CURRICULUM

SECONDARY EDUCATION

Board Approval Date: pending
May 2024

The Platte County School District curriculum is the result of a collaborative effort by K-12 educators across the district aligned to the Missouri Learning Standards (MLS) established by the Missouri Department of Elementary and Secondary Education (DESE). This two-year process is anchored in the work of Dr. Grant Wiggins (*Understanding by Design*) and Larry Ainsworth (*Rigorous Curriculum Design*). These curricular documents serve as the blueprint that guides the development of a guaranteed and viable learning experience for all students.

Following the two year development process, the Board of Education considers the work for approval in accordance with Board Policies IF- Curriculum Development and IIA- Instructional Materials.

Key Terms

Curriculum- Standards-based sequence of planned experiences where students practice and achieve proficiency in content and applied learning skills. The curriculum is the central guide for all educators as to what is essential for teaching and learning, so that every student has access to rigorous academic experiences. (Ainsworth & Wiggins)

Depth of Knowledge (DOK) - Indicated the highest level of cognitive complexity that would typically be assessed on a large scale assessment such as the state assessment. The DOK ceiling is not intended to limit the complexity one might reach in classroom instruction.

Instructional Material/Resource- A collection of materials (books, videos, activities, support documents, etc.) that bring the learning outcome identified in the district, curriculum to life in the classroom. Resources support student engagement as they work to achieve proficiency of the grade and course standards. Instructional resources are selected for use in the classroom by teachers using the *Three Lense approach* for resource selection (Rigor, Relevance, and Engagement).

Scope and Sequence- A sequenced plan, usually in chart form, with a range of instructional standards organized according to the successive levels at which they are taught.

Unpacked Unit of Study- A unit of study is a document that clearly delineates content and skills students are expected to know and be able to do upon mastery of the expectation.





SIXTH GRADE SCIENCE CURRICULUM SCOPE AND SEQUENCE

Quarter	Suggested Pacing	MLS Code with link to unpacked standard including supporting standards	PCR3 Determined Power Standards 6th Grade Science Missouri Learning Standard Description	Assessment
Engineering Design				
1-4	1 wk/ qtr	ETS1.B.3	Develop a model to generate data for interactive testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.	To be completed during the 2024-2025 school year.
Earth Processes				
1	8 weeks	6-8.ESS2.A.2	Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.	To be completed during the 2024-2025 school year.
Natural Resources				
2	7 weeks	6-8.ESS3.C.1	Analyze data to define the relationship for how increases in human population and per-capita consumption of natural resources impact Earth's System.	To be completed during the 2024-2025 school year.
		6-8.ESS3.A.1	Construct a scientific explanation based on evidence for how the uneven distribution of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes and human activity.	
Solar System				
3	7 weeks	6-8.ESS1.A.3	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.	To be completed during the 2024-2025 school year.
Earth's Atmosphere/ Weather				
4	9 weeks	6-8.ESS2.C.1	Design and develop a model to describe the cycling of water through Earth's System driven by energy from the sun and the force of gravity.	To be completed during the 2024-2025 school year.



SEVENTH GRADE SCIENCE CURRICULUM SCOPE AND SEQUENCE

Quarter	Suggested Pacing	MLS Code with link to unpacked standard including supporting standards	PCR3 Determined Power Standards 7th Grade Science Missouri Learning Standard Description	Assessment
Force and Motion				
1	9 weeks	6-8.PS2.A.1	Apply physics principles to design a solution that minimizes the forces of an object during a collision and develop an evaluation of the solution.	To be completed during the 2024-2025 school year.
Energy				
2	9 weeks	6-8.PS3.A.4	Plan and conduct an investigation to determine the relationship among energy transferred, the type of matter, the mass, and the change in temperature of the sample.	To be completed during the 2024-2025 school year.
Waves and Electromagnet Radiation				
3	9 weeks	6-8.PS4.A.2	Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.	To be completed during the 2024-2025 school year.
Electricity and Magnetism				
4	9 weeks	6-8.PS2.B.3	Conduct an investigation and evaluate the experimental design to provide evidence that electric and magnetic fields exist between objects exerting forces on each other even though the objects are not in contact.	To be completed during the 2024-2025 school year.



EIGHTH GRADE SCIENCE CURRICULUM SCOPE AND SEQUENCE

Quarter	Suggested Pacing	MLS Code with link to unpacked standard including supporting standards	PCR3 Determined Power Standards 8th Grade Science Missouri Learning Standard Description	Assessment
Chemistry				
1	6 weeks	6-8.PS1.A.1	Develop models to describe the atomic composition of simple molecules and extended structures.	To be completed during the 2024-2025 school year.
		6-8.PS1.B.1	Develop and use a model to describe how the total number of atoms remains the same during a chemical reaction and thus mass is conserved.	
Cell Biology and Cell Structure				
2	6 weeks	6-8.LS1.A.2	Develop and use a model to describe the function of a cell as a whole and ways parts of the cell contribute to that function.	To be completed during the 2024-2025 school year.
		6-8.LS1.C.1	Construct a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of	
Diversity of Living Things				
3	6 weeks	6-8.LS1.B.1	Construct an explanation for how characteristic animal behavior as well as specialized plant structures affect the probability of successful reproduction of animals and plants respectively.	To be completed during the 2024-2025 school year.
Interactions in Ecosystems				
	6 weeks	6-8.LS2.A.2	Construct an explanation that predicts the patterns of interactions among and between the biotic and abiotic factors in a given ecosystem.	
Biology				
4	6 weeks	6-8.LS4.C.1	Interpret graphical representation to support explanations of how natural selection may lead to increases and decreases of specific traits in population over time.	To be completed during the 2024-2025 school year.
Body Systems				
4	6 weeks	6-8.LS1.A.4	Present evidence that body system interact to carry out key body functions, including providing nutrients, and oxygen to cells, removing carbon dioxide and waste from cells and the body, controlling body motion/activity and coordination and protecting the body.	To be completed during the 2024-2025 school year.



PHYSICAL SCIENCE CURRICULUM SCOPE AND SEQUENCE

Quarter	Suggested Pacing	MLS Code with link to unpacked standard including supporting standards	PCR3 Determined Power Standards Physical Science Missouri Learning Standard Description	Assessment
Unit 1: Experimental Design/Critical Thinking in Science				
1st Quarter	3-4 weeks	***	Experimental Design/Lab Safety/SI Measurement	
			Data analysis/CER-ECR	
Unit 2: Properties of Matter				
1st Quarter	4 weeks	9-12.PS1.A1	Use the organization of the periodic table to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	To be completed during the 2024-2025 school year.
		9-12.PS1.A.2	Construct and revise an explanation for the products 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.	
		9-12.PS1.A.3	Plan and conduct an investigation to gather evidence to compare physical and chemical properties of substances such as melting point, boiling point, vapor pressure, surface tension, and chemical reactivity to infer the relative strength of attractive forces between particles.	
Unit 3: Chemical Bonding				
2nd Quarter	7-8 weeks	9-12.PS1.A4	Apply the concepts of bonding and crystalline/molecular structure to explain the macroscopic properties of various categories of structural materials (i.e., metals, ionic [ceramics], and polymers).	To be completed during the 2024-2025 school year.
		9-12.PS1.B1	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.	
		9-12.PS1.B3	Use symbolic representations and mathematical calculations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	
Unit 4: Force and Motion				
3rd Quarter	4-5 weeks	9-12.PS2.A1	Analyze data to support and verify the concepts expressed by Newton's 2nd law of motion, as it describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.	To be completed during the 2024-2025 school year.
		9-12.PS2.A.3	Apply scientific principles of motion and momentum to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.	
		9-12.PS2.B.1	Use mathematical representations of Newton's law of gravitation to describe and predict the gravitational forces between objects.	
Unit 5: Energy				
3rd/4th Quarter	4-5 weeks	9-12.PS3.A2	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 position of particles (objects).	To be completed during the 2024-2025 school year.
		9-12.PS3.A3	Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy.	
		9-12.PS3.B1	Plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperatures are combined within a closed system results in a more uniform energy.	
Unit 6: Waves				
4th Quarter	4-5 weeks	9-12.PS4.A1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media.	To be completed during the 2024-2025 school year.
		9-12.PS4.A2	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 some situations one model is more useful than the other.	
		9-12.PS4.B1	Communicate technical information about how electromagnetic radiation interacts with matter.	

 BIOLOGY CURRICULUM SCOPE AND SEQUENCE				
Suggested Pacing	MLS Code with link to unpacked standard including supporting standards	PCR3 Determined Power Standards Biology Missouri Learning Standard Description	Assessment	
Unit 1 - Intro to Biology				
Quarter 1	2 weeks	9-12.LS1.A.2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	To be completed during the 2024-2025 school year.
Unit 2 - Chemistry of Life [1]				
Quarter 1	3 weeks	9-12.LS1.C.3	Construct and revise an explanation based on evidence that organic macromolecules are primarily composed of six elements, where carbon, hydrogen, and oxygen atoms may combine with nitrogen, sulfur, and phosphorus to form large carbon-based molecules.	To be completed during the 2024-2025 school year.
		9-12.LS1.A.1	Construct a model of how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	
Unit 3 - Homeostasis: Cell, Transport, and Body Systems				
Quarter 1	3 weeks	9-12.LS1.A.2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	To be completed during the 2024-2025 school year.
		9-12.LS1.A.3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	
Unit 4 - Photosynthesis and Cellular Respiration				
Quarter 2	1.5 weeks	9-12.LS2.B.1	Construct and revise an explanation based on evidence that the processes of photosynthesis, chemosynthesis, and aerobic and anaerobic respiration are responsible for the cycling of matter and flow of energy through ecosystems and that environmental conditions restrict which reactions can occur.	To be completed during the 2024-2025 school year.
		9-12.LS2.B.3	Use a model that illustrates the roles of photosynthesis, cellular respiration, decomposition, and combustion to explain the cycling of carbon in its various forms among the biosphere, atmosphere, and geosphere.	
Unit 5 - Mitosis, Meiosis, and DNA Replication [2]				
Quarter 2	3 weeks	9-12.LS1.B.1	Develop and use models to communicate the role of mitosis, cellular division, and differentiation in producing and maintaining complex organisms.	To be completed during the 2024-2025 school year.
		9-12.LS3.A.1	Develop and use models to clarify relationships about how DNA in the form of chromosomes is passed from parents to offspring through the processes of meiosis and fertilization in sexual reproduction.	
		9-12.LS3.B.3	Make and defend a claim that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) mutations occurring during replication, and/or (3) mutations.	
		9-12.LS3.B.2	Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.	
Unit 6 - Protein Synthesis [3]				
Quarter 2	2.5 weeks	9-12.LS1.A.1	Construct a model of how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	To be completed during the 2024-2025 school year.
		9-12.LS3.B.2	Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism.	
Unit 7 - Genetics [4]				
Quarter 3	3 weeks	9-12.LS3.B.4	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	To be completed during the 2024-2025 school year.
		9-12.LS3.A.1	Develop and use models to clarify relationships about how DNA in the form of chromosomes is passed from parents to offspring through the processes of meiosis and fertilization in sexual reproduction.	
		9-12.LS3.B.3	Make and defend a claim that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) mutations occurring during replication, and/or (3) mutations.	
Unit 8 - Natural Selection [5]				
Quarter 3	4 weeks	9-12.LS4.A.1	Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	To be completed during the 2024-2025 school year.
		9-12.LS4.B.1	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	
		9-12.LS4.C.2	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	
		9-12.LS4.C.3	Create or revise a model to test a solution to mitigate adverse impacts of human activity on biodiversity.	
Unit 9 - Ecology [6]				
Quarters 3 and 4	7 weeks	9-12.LS2.C.1	Evaluate the claims, evidence, and reasoning that the interactions in ecosystems maintain relatively consistent populations of species while conditions remain stable, but changing conditions may result in new ecosystem dynamics.	To be completed during the 2024-2025 school year.
		9-12.LS2.B.2	Communicate the pattern of the cycling of matter and the flow of energy among trophic levels in an ecosystem.	
		9-12.LS2.B.3	Use a model that illustrates the roles of photosynthesis, cellular respiration, decomposition, and combustion to explain the cycling of carbon in its various forms among the biosphere, atmosphere, and geosphere.	
		9-12.LS4.C.3	Create or revise a model to test a solution to mitigate adverse impacts of human activity on biodiversity.	

 CHEMISTRY CURRICULUM SCOPE AND SEQUENCE				
Quarter	Suggested Pacing	MLS Code with link to unpacked standard including supporting standards	PCR3 Determined Power Standards Chemistry Missouri Learning Standard Description	Assessment
Unit 1 - Properties of Matter				
1st Quarter	2.5 Weeks	9-12.PS1.A.1	Use the organization of the periodic table to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	To be completed during the 2024-2025 school year.
		9-12.PS1.A.3	Plan and conduct an investigation to gather evidence to compare physical and chemical properties of substances such as melting point, boiling point, vapor pressure, surface tension, and chemical reactivity to infer the relative strength of attractive forces between particles.	
Unit 2 - Periodic Table & Atomic Structure				
1st Quarter	3 weeks	9-12.PS1.A.1	Use the organization of the periodic table to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	To be completed during the 2024-2025 school year.
		9-12.PS1.A.2	Construct and revise an explanation for the products 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.	
		9-12.PS1.C.1	Use symbolic representations 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.	
Unit 3 - Quantum Atomic Model				
2nd Quarter	4 weeks	9-12.PS1.A.2	Construct and revise an explanation for the products 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.	To be completed during the 2024-2025 school year.
		9-12.PS4.A.1	Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of wavetraveling in various media.	
		9-12.PS4.A.2	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 some situations one model is more useful than the others.	
Unit 4 - Covalent Bonding				
2nd Quarter	3/4 weeks	9-12.PS1.A.1	Use the organization of the periodic table to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	To be completed during the 2024-2025 school year.
		9-12.PS1.A.2	Construct and revise an explanation for the products 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.	
		9-12.PS1.A.3	Plan and conduct an investigation to gather evidence to compare physical and chemical properties of substances such as melting point, boiling point, vapor pressure, surface tension, and chemical reactivity to infer the relative strength of attractive forces between particles.	
Unit 5 - Ionic Bonding				
2nd Quarter - 3rd Quarter	3 weeks	9-12.PS1.A.1	Use the organization of the periodic table to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.	To be completed during the 2024-2025 school year.
		9-12.PS1.A.2	Construct and revise an explanation for the products 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.	
		9-12.PS1.A.3	Plan and conduct an investigation to gather evidence to compare physical and chemical properties of substances such as melting point, boiling point, vapor pressure, surface tension, and chemical reactivity to infer the relative strength of attractive forces between particles.	
Unit 6 - Chemical Reactions				
3rd Quarter	3 weeks	9-12.PS1.B.3	Use symbolic representations and mathematical calculations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	To be completed during the 2024-2025 school year.
		9-12.PS1.A.2	Construct and revise an explanation for the products 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.	
		9-12.PS1.B.2	Refine the design of a chemical system by specifying a change in conditions that would alter the amount of products at equilibrium.	
Unit 7 - Stoichiometry				
4th Quarter	4 weeks	9-12.PS1.B.3	Use symbolic representations and mathematical calculations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	To be completed during the 2024-2025 school year.
		9-12.PS1.A.2	Construct and revise an explanation for the products 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.	
		9-12.PS1.B.2	Refine the design of a chemical system by specifying a change in conditions that would alter the amount of products at equilibrium.	
Unit 8 - Solutions				
4th Quarter	3 weeks	9-12.PS1.A.3	Plan and conduct an investigation to gather evidence to compare physical and chemical properties of substances such as melting point, boiling point, vapor pressure, surface tension, and chemical reactivity to infer the relative strength of attractive forces between particles.	To be completed during the 2024-2025 school year.
		9-12.PS1.B.2	Refine the design of a chemical system by specifying a change in conditions that would alter the amount of products at equilibrium.	
		9-12.PS1.B.3	Use symbolic representations and mathematical calculations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.	
Unit 9 - Nuclear Chemistry				
4th Quarter	2 weeks	9-12.PS1.C.1	Use symbolic representations 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.	To be completed during the 2024-2025 school year.