Gwinnett’s curriculum for grades K–12 is called the Academic Knowledge and Skills (AKS). The AKS for each grade level spells out the essential things students are expected to know and be able to do in that grade or subject. The AKS offers a solid base on which teachers build rich learning experiences. Teachers use curriculum guides, technology, and instructional resources to teach the AKS and to make sure every student is learning to his or her potential.

The Academic Knowledge and Skills was developed by our teachers, with input from our parents and community, in response to Gwinnett County Public Schools’ mission statement:

The mission of Gwinnett County Public Schools is to pursue excellence in academic knowledge, skills, and behavior for each student resulting in measured improvement against local, national, and world-class standards.
Kindergarten Science

Science

A - Life Science

- obtain, evaluate, and communicate information to describe patterns of what plants and animals need to survive
- obtain, evaluate, and communicate information about how organisms and human activity cause changes to the local environment

B - Earth Science

- obtain, evaluate, and communicate observations about time patterns (i.e., day-to-night and night-to-day) and objects (i.e., sun, moon, stars) in the day and night sky
- obtain, evaluate, and communicate information to describe the physical attributes of Earth materials (i.e., soil, rocks, water, and air)

C - Physical Science

- obtain, evaluate, and communicate information to compare and describe different types of motion
Science Grade K Enrich

A - Content

• plan and carry out an investigation to predict and observe whether objects, based on their physical attributes, will sink or float

• plan and carry out an investigation to determine the relationship between an object’s physical attributes and its resulting motion (e.g., straight, circular, back and forth, fast and slow, and motionless) when a force is applied (e.g., toss, drop, push, and pull)

• develop a model to communicate the earth’s rotation and the changes that occur in the sky during the day, as day turns into night, during the night, and as night turns into day using pictures and words

• present the ways for how rocks can be grouped by physical attributes (e.g., size, weight, texture, and color) and explain why using evidence

• develop a model to represent how a set of organisms and nonliving objects are sorted into groups based on their attributes

• present the ways for how animals can be grouped according to their features and explain why using evidence
Kindergarten Science

STEM Exploratory/Grade K

A - Technology, Programming, and Robotics

- create algorithms, or series of ordered steps, to solve problems
- demonstrate dispositions amenable to open-ended problem solving and programming (e.g., comfort with complexity, persistence, brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge)
- use hands-on learning and the physical environment to explore computing concepts
- write programs using block-based programming languages
- locate and debug errors in a program
- implement problem solutions using a programming language, including sequence

B - Science

- obtain, evaluate, and communicate information to describe objects in terms of the materials they are made of and their physical attributes
- obtain, evaluate, and communicate information to compare and describe different types of motion
- obtain, evaluate, and communicate information to describe the physical attributes of Earth materials (e.g., soil, rocks, water, and air)
- obtain, evaluate, and communicate information to compare the similarities and differences in groups of organisms

C - Math

- count objects by stating number names in the standard order, pairing each object with one and only one, number name and each number name with one, and only one, object (i.e., one to one correspondence)
- classify objects into given categories; count the numbers of objects in each category and sort the categories by count (i.e., limit category counts to be less than or equal to 10)
- directly compare two objects on the basis of length (i.e., longer/shorter), capacity (i.e., more/less), height (i.e., taller/shorter), and weight (i.e., heavier/lighter) and describe the difference (e.g., directly compare the heights of two children and describe one child as taller/shorter)
- describe several measurable attributes of an object, such as length or weight (e.g., an object may be described as heavy or light or long or short)
1st Grade Science

Science

A - Life Science
• obtain, evaluate, and communicate information about the basic needs of plants and animals

B - Physical Science
• obtain, evaluate, and communicate information to investigate light and sound
• obtain, evaluate, and communicate information to demonstrate the effects of magnets on other magnets and other objects

C - Earth Science
• obtain, evaluate, and communicate weather data to identify weather patterns
1st Grade Science

Science Grade 1 Enrich

A - Content

• develop a model to identify the parts of a plant (i.e., root, stem leaf, and flower)
• design a solution to ensure that a particular need of a plant or animal is met
• plan and carry out an investigation of shadows by placing objects at various points from a source of light
• plan and carry out an investigation to observe that vibrating materials can make sound and that sound can make materials vibrate
• design a signal that can serve as an emergency alert using light and/or sound
• plan and carry out investigations to demonstrate the effect of magnets on common objects
• identify and describe different types of weather and the characteristics of each type
• plan and carry out investigations on current weather conditions by observing and measuring with simple weather instruments (i.e., thermometer, wind vane, and rain gauge)
• analyze data to identify seasonal patterns of change
A - Technology, Programming, and Robotics

- classify objects into given categories; count the numbers of objects in each category and sort the categories by count (i.e., limit category counts to be less than or equal to 10)
- decompose a problem, into smaller, more manageable parts
- demonstrate dispositions amenable to open-ended problem solving and programming (e.g., comfort with complexity, persistence, brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge)
- use hands-on learning and the physical environment to explore computing concepts
- write programs using visual block-based programming languages
- locate and debug errors in a program
- implement problem solutions using a programming language, including sequence and iteration (i.e., simple loops)

B - Science

- obtain, evaluate, and communicate information about the basic needs of plants and animals
- obtain, evaluate, and communicate information to investigate light and sound
- obtain, evaluate, and communicate weather data to identify weather patterns

C - Math

- organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another
- express the length of an object as a whole number of length units, by laying multiple copies of a shorter object (i.e., the length unit) end to end; understand that the length measurement of an object is the number of same-size length units that span it with no gaps or overlaps
- compose two-dimensional shapes (e.g., rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (e.g., cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape and to compose new shapes from the composite shape; this is important for the future development of spatial relations which later connects to developing understanding of area, volume and fractions
2nd Grade Science

Science

A - Physical Science
• obtain, evaluate, and communicate information about the properties of matter and changes that occur in objects
• obtain, evaluate, and communicate information to demonstrate changes in speed and direction using a force (a push or a pull)

B - Earth Science
• obtain, evaluate, and communicate information about stars having different sizes and brightness
• obtain, evaluate, and communicate information to develop an understanding of the patterns of the sun and the moon and the sun's effect on Earth
• obtain, evaluate, and communicate information about how weather and humans cause changes to the environment
• obtain, evaluate, and communicate information about how plants and animals cause changes to the environment

C - Life Science
• obtain, evaluate, and communicate information about the life cycles of different living organisms
A - Content

• provide evidence from observations to construct an explanation that some changes in matter caused by heating or cooling can be reversed and some changes are irreversible

• plan and carry out an investigation to demonstrate how pushing and pulling on an object affects the motion of the object

• design a device to change the speed or direction of an object

• record and analyze data to decide if a design solution works as intended to change the speed or direction of an object with a force (i.e., a push or a pull)

• observe the effect of the position of the sun in relation to a fixed object on Earth at various times of the day

• design and build a structure that demonstrates how shadows change throughout the day

• observe and describe the life cycle of a plant by growing a plant from a seed by recording changes over a period of time

• develop a simple model that depicts an animal’s role in dispersing seeds or in the pollination of plants
2nd Grade Science

STEM Exploratory/Grade 2

A - Technology, Programming, and Robotics

• create algorithms, or series of ordered steps, to solve problems

• decompose a problem, into smaller, more manageable parts

• collect, analyze, and represent data effectively

• demonstrate dispositions amenable to open-ended problem solving and programming (e.g., comfort with complexity, persistence brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge)

• use hands-on learning and the physical environment to explore computing concepts

• write programs using block-based programming languages

• locate and debug errors in a program

• read a program and translate it into English; explain how a particular program functions

• modify and create animations, and present work to teammates

• implement problem solutions using a programming language, including sequence and iteration (i.e., simple loops)

B - Science

• obtain, evaluate, and communicate information about the properties of matter and changes that occur in objects

• obtain, evaluate, and communicate information to demonstrate changes in speed and direction using a force (i.e., a push or a pull)

• obtain, evaluate, and communicate information to develop an understanding of the patterns of the sun and the moon and the Sun’s effect on Earth

• obtain, evaluate, and communicate information about the life cycles of different living organisms

C - Math

• draw a picture graph and a bar graph (i.e., with single-unit scale) to represent a data set with up to four categories; solve simple put-together, take-apart, and compare problems using information presented in a bar graph
2nd Grade Science

C - Math  *(continued)*

- generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object; show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units
- measure length by determining, selecting and using an appropriate tool (e.g., rulers, yardsticks, meter sticks, measuring tapes) and unit (e.g., in., ft., yd., cm, m)
- estimate lengths using units of inches, feet, yards, centimeters, and meters, then measure to determine if estimations were reasonable
- compare and explain the relationship of inches, feet, yards, centimeters, and meters by measuring an object twice using different units; understand the relative size of units in different systems of measurement; for example, an inch is longer than a centimeter; but students are not expected to convert between systems of measurement
- generate measurement data by measuring lengths of several objects to the nearest whole unit, or by making repeated measurements of the same object; show the measurements by making a line plot, where the horizontal scale is marked off in whole-number units
3rd Grade Science

Science

A - Physical Science
• obtain, evaluate, and communicate information about the ways heat energy is transferred and measured

B - Earth Science
• obtain, evaluate, and communicate information about the physical attributes of rocks, minerals, and soils
• obtain, evaluate, and communicate information on how fossils provide evidence of past organisms

C - Life Science
• obtain, evaluate, and communicate information about the similarities and differences between plants, animals, and habitats (mountains, piedmont, marsh/swamp, coast, Atlantic Ocean) found within geographic regions (Blue Ridge Mountains, Appalachian Plateau, Valley and Ridge, Piedmont, Coastal Plains) of Georgia
• obtain, evaluate, and communicate information about the effects of pollution (air, land, and water) and humans on the environment
3rd Grade Science

Science Grade 3 Enrich

A - Content

• plan and carry out an investigation to gather data using thermometers to produce tables and charts that illustrate the effect of sunlight on various objects
• use tools and everyday materials to design and construct a device/structure that will increase/decrease the warming effects of sunlight on various materials
• plan and carry out investigations to describe properties of soils (i.e., color, texture, capacity to retain water, and ability to support growth of plants) and soil types (i.e., sand, clay, loam)
• make observations of the local environment to construct an explanation of how water and wind have made changes to soil and rocks over time
• construct an explanation to describe the relationship between the types of pollution and the impact of humans on the environment
• explore, research, and communicate solutions, such as conservation of resources and recycling materials, to protect plants and animals of Georgia
• construct an explanation using evidence of how external features and adaptations (i.e., camouflage, use of hibernation, protection, migration, mimicry) of animals allow them to survive in their habitat
• use evidence to construct an explanation of why some organisms can thrive in one habitat and not in another
• construct an explanation to communicate what will happen to an organism if a habitat is manipulated or changed (e.g., destruction of forests, advancement of technology, effects of migration)
3rd Grade Science

STEM Exploratory/Grade 3

A - Technology, Programming, and Robotics

• create algorithms, or series of ordered steps, to solve problems

• decompose a problem, into smaller, more manageable parts

• collect, analyze, and represent data effectively

• demonstrate dispositions amenable to open-ended problem solving and programming (e.g., comfort with complexity, persistence brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge)

• use hands-on learning and the physical environment to explore computing concepts

• write programs using block-based programming languages

• locate and debug errors in a program

• read a program and translate it into ordinary language; explain how a particular program functions

• modify and create animations, and present work to teammates

• implement problem solutions using a programming language, including sequence, iteration (i.e., simple and nested loops), and conditional statements

B - Science

• obtain, evaluate, and communicate information about the ways heat energy is transferred and measured

• obtain, evaluate, and communicate information about the physical attributes of rocks, minerals, and soils

• obtain, evaluate, and communicate information about the effects of pollution (e.g., air, land, and water) and humans on the environment

C - Math

• apply multiplication and division within 100 (products or dividends 0-100) to solve word problems in situations involving equal groups, arrays and measurement quantities (e.g., by using drawings and equations with a symbol for the unknown number to represent the problem)

• draw a scaled picture graph and a scaled bar graph to represent a data set with several categories; solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs (e.g., draw a bar graph in which each square in the bar graph might represent five pets)
3rd Grade Science

C - Math  (continued)

- solve two-step word problems using the four operations; represent these problems using equations with a letter standing for the unknown quantity; assess the reasonableness of answers using mental computation and estimation strategies including rounding; this standard is limited to problems posed with whole numbers and having whole number answers; students should know how to perform operations in the conventional order where there are no parentheses to specify a particular order (order of operations)
4th Grade Science

Science

A - Physical Science

• obtain, evaluate, and communicate information about the nature of light and how light interacts with objects
• obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces
• obtain, evaluate, and communicate information about how sound is produced and changed and how sound and/or light can be used to communicate

B - Life Science

• obtain, evaluate, and communicate information about the roles of organisms and the flow of energy within an ecosystem

C - Earth Science

• obtain, evaluate, and communicate information to demonstrate the water cycle
• obtain, evaluate, and communicate information using weather charts/maps and collect weather data to predict weather events and infer weather patterns
• obtain, evaluate, and communicate information to compare and contrast the physical attributes of stars and planets
• obtain, evaluate, and communicate information to model the effects of the position and motion of Earth and the moon in relation to the sun as observed from Earth
Science Grade 4 Enrich

A - Content

- communicate a scenario to demonstrate the effect of a change on an ecosystem
- develop a model using data illustrating and describing changes to the flow of energy in an ecosystem when plants or animals become scarce, extinct, or over-abundant
- plan and carry out an investigation on the effects of balanced and unbalanced forces on an object and communicate the results
- plan and carry out investigations to observe the flow of energy in water as it changes states from solid (i.e., ice) to liquid (i.e., water) to gas (i.e., water vapor) and changes from gas to liquid to solid
- interpret data from weather maps to identify fronts (i.e., warm, cold, and stationary), temperature, and precipitation to make an informed prediction about tomorrow’s weather
- construct a model of how Earth’s tilt and consistent orbit affects seasonal changes
- evaluate strengths and limitations of models of our solar system in describing relative size, order, appearance and composition of planets and the sun
- plan and carry out investigations to observe and record how light interacts with various materials to classify them as opaque, transparent, or translucent
- plan and carry out an investigation utilizing everyday materials to explore examples of when light is refracted
- plan and carry out an investigation utilizing everyday objects to produce sound and predict the effects of changing the strength or speed of vibrations
- design, construct, and explain how a device can communicate across a distance using light and/or sound
A - Technology, Programming, and Robotics

- create algorithms, or series of ordered steps, to solve problems
- decompose a problem, into smaller, more manageable parts
- collect, analyze, and represent data effectively
- demonstrate an understanding of how information is represented, stored, and processed by a computer
- demonstrate dispositions amenable to open-ended problem solving and programming (e.g., comfort with complexity, persistence brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge)
- use hands-on learning and the physical environment to explore computing concepts
- write programs using block-based programming languages
- locate and debug errors in a program
- read a program and translate it into English; explain how a particular program functions
- modify and create animations, and present work to teammates
- design, code, test, and execute a program that corresponds to a set of specifications
- implement problem solutions using a programming language, including sequence, iteration (i.e., simple and nested loops), and conditional statements

B - Science

- obtain, evaluate, and communicate information about the roles of organisms and the flow of energy within an ecosystem
- obtain, evaluate, and communicate information about the relationship between balanced and unbalanced forces
- obtain, evaluate, and communicate information to model the effects of the position and motion of Earth and the moon in relation to the sun as observed from Earth
- obtain, evaluate, and communicate information about the nature of light and how light interacts with objects
4th Grade Science

C - Math

• read and write multi-digit whole numbers using base-ten numerals, number names, and expanded form; compare two multi-digit numbers based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons

• solve multiplication and division word problems involving multiplicative comparison using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison

• solve multi-step word problems with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted; represent these problems using equations with a symbol or letter standing for the unknown quantity; assess the reasonableness of answers using mental computation and estimation strategies, including rounding

• generate a number or shape pattern that follows a given rule; identify apparent features of the pattern that were not explicit in the rule itself; explain informally why the numbers will continue to alternate in this way (e.g., given the rule “ADD 3” and the starting number 1, generate terms in the resulting sequence and observe that the terms appear to alternate between odd and even numbers)

• recognize angles as geometric shapes that are formed wherever two rays share a common endpoint and understand concepts of angle measurement

• classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size; recognize right triangles as a category, and identify right triangles

• recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts; identify line-symmetric figures and draw lines of symmetry
5th Grade Science

Science

A - Earth Science

• obtain, evaluate, and communicate information to identify surface features on Earth caused by constructive and/or destructive processes

B - Physical Science

• obtain, evaluate, and communicate information to investigate electricity

• obtain, evaluate, and communicate information about magnetism and its relationship to electricity

• obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change

C - Life Science

• obtain, evaluate, and communicate information about how microorganisms benefit or harm larger organisms

• obtain, evaluate, and communicate information to group organisms using scientific classification procedures

• obtain, evaluate, and communicate information to compare and contrast the parts of plant and animal cells

• obtain, evaluate, and communicate information showing that some characteristics of organisms are inherited and other characteristics are acquired
A - Content

- construct a model to explain the function of plant and animal organelles (i.e., cell membrane, cell wall, cytoplasm, nucleus, and chloroplasts)
- develop a model that illustrates how animals are sorted into groups (i.e., vertebrate and invertebrate) and how vertebrates are further sorted into groups (i.e., fish, amphibians, reptile, bird, and mammal) using data from multiple sources
- develop a model that illustrates how plants are sorted into groups (i.e., vascular and nonvascular) and how vascular plants are further sorted into groups (i.e., seed producers and non-seed producers) using data from multiple sources
- construct an explanation to compare and contrast inherited and acquired physical traits
- plan and carry out investigations by manipulating, separating, and mixing dry and liquid materials and communicate collected data to demonstrate physical changes
- plan and carry out an investigation to determine if a chemical change occurred based on observable evidence (i.e., color, gas, temperature change, odor, and/or new substances produced)
- construct an argument supported by scientific evidence to identify surface features (e.g., deltas, sea arches, sand dunes, mountains, canyons, and volcanoes) as being caused by constructive and/or destructive processes (e.g., plate movement, deposition, weathering, erosion, impact of organisms)
- develop simple, interactive models to collect data that illustrate how changes in surface features are/were caused by constructive and/or destructive processes
- design a complete, simple electric circuit, and explain all necessary components
- plan and carry out an investigation to test common materials to determine if they are insulators or conductors of electricity
- plan and carry out an investigation to observe the interaction between a magnet and a magnetic object on opposite sides of various materials such as wood, paper, glass, metal, and rocks
A - Technology, Programming, and Robotics

• create algorithms, or series of ordered steps, to solve problems
• decompose a problem, into smaller, more manageable parts
• collect, analyze, and represent data effectively
• demonstrate an understanding of how information is represented, stored, and processed by a computer
• optimize an algorithm for execution by a computer
• demonstrate dispositions amenable to open-ended problem solving and programming (e.g., comfort with complexity, persistence brainstorming, adaptability, patience, propensity to tinker, creativity, accepting challenge)
• use hands-on learning and the physical environment to explore computing concepts
• write programs using block-based programming languages
• locate and debug errors in a program
• read a program and translate it into English; explain how a particular program functions
• modify and create animations, and present work to teammates
• design, code, test, and execute a program that corresponds to a set of specifications
• implement problem solutions using a programming language, including sequence, iteration (i.e., simple and nested loops), and conditional statements

B - Science

• obtain, evaluate, and communicate information to compare and contrast the parts of plant and animal cells
• obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change
• obtain, evaluate, and communicate information to identify surface features on Earth caused by constructive and/or destructive processes

C - Math

• compare two decimals to thousandths based on meanings of the digits in each place, using >, =, and < symbols to record the results of comparisons
5th Grade Science

C - Math (continued)

- recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left
- make a line plot to display a data set of measurements in fractions of a unit (e.g., 1/2, 1/4, 1/8) and solve problems using the line plot data (e.g., given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally)
- solve word problems involving addition and subtraction of fractions including cases of unlike denominators (e.g., by using visual fraction models or equations to represent the problem); use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers (e.g., recognize an incorrect result 2/5 + 1/2 = 3/7, by observing that 3/7 < 1/2)
Earth Science 6 Connection

A - Content

• obtain, evaluate, and communicate information about the uses and conservation of various natural resources and how they impact Earth
• obtain, evaluate, and communicate information to show how Earth's surface is formed
• obtain, evaluate, and communicate information to recognize the significant role of water in Earth processes
• obtain, evaluate, and communicate information about how the sun, land, and water affect climate and weather
• obtain, evaluate, and communicate information about current scientific views of the universe and how those views evolved
• obtain, evaluate, and communicate information about the effects of the relative positions of the sun, Earth, and moon
6th Grade Science

Science

A - Earth Science

• obtain, evaluate, and communicate information about the uses and conservation of various natural resources and how they impact Earth
• obtain, evaluate, and communicate information to show how Earth’s surface is formed
• obtain, evaluate, and communicate information to recognize the significant role of water in Earth processes
• obtain, evaluate, and communicate information about how the sun, land, and water affect climate and weather
• obtain, evaluate, and communicate information about current scientific views of the universe and how those views evolved
• obtain, evaluate, and communicate information about the effects of the relative positions of the sun, Earth, and moon
7th Grade Science

Life Science 7 Connection

A - Content

• obtain, evaluate, and communicate information to construct scientific explanations to describe how cell structures interact to maintain the basic needs of organisms

• obtain, evaluate, and communicate information to construct scientific explanations to describe how cells, tissues, organs, and organ systems interact to maintain the basic needs of organism

• obtain, evaluate, and communicate information to explain how organisms reproduce either sexually or asexually and transfer genetic information to determine the traits of their offspring

• obtain, evaluate, and communicate information from multiple sources to explain the theory of evolution of living organisms through inherited characteristics

• obtain, evaluate, and communicate information to investigate the diversity of living organisms and how they can be compared scientifically

• obtain, evaluate, and communicate information to examine the interdependence of organisms with one another and their environments
A - Content

- obtain, evaluate, and communicate information to construct scientific explanations to describe how cell structures interact to maintain the basic needs of organisms
- obtain, evaluate, and communicate information to construct scientific explanations to describe how cells, tissues, organs, and organ systems interact to maintain the basic needs of organisms
- obtain, evaluate, and communicate information to explain how organisms reproduce either sexually or asexually and transfer genetic information to determine the traits of their offspring
- obtain, evaluate, and communicate information from multiple sources to explain the theory of evolution through natural selection of inherited characteristics
- obtain, evaluate, and communicate information to investigate the diversity of living organisms and how they can be compared scientifically
- obtain, evaluate, and communicate information to examine the interdependence of organisms with one another and their environments
8th Grade Science

Physical Science 8 Connection

A - Content

• obtain, evaluate, and communicate information about the Law of Conservation of Energy to develop arguments that energy can transform from one form to another within a system (e.g., heat/thermal, light/radiant, chemical, nuclear, mechanical - kinetic and potential, sound, and electrical)

• obtain, evaluate, and communicate information to support the claim that electromagnetic (e.g., light) waves behave differently than mechanical (e.g., sound) waves

• obtain, evaluate, and communicate information about the phenomena of gravity, electricity, and magnetism as major forces acting in nature

• analyze and interpret data to identify patterns in the relationships between speed and distance and velocity and acceleration

• obtain, evaluate, and communicate information about the structure and properties of matter
A - Content

• obtain, evaluate, and communicate information about the structure and properties of matter

• obtain, evaluate, and communicate information about the Law of Conservation of Energy to develop arguments that energy can transform from one form to another within a system (forms of energy include, but are not limited to, heat/thermal, light/radiant, chemical, nuclear, mechanical - kinetic and potential, sound, and electrical)

• obtain, evaluate, and communicate information about cause-and-effect relationships between force, mass, and the motion of objects

• obtain, evaluate, and communicate information to support the claim that electromagnetic (e.g., light, microwave, and radio) waves behave differently than mechanical (e.g., sound and vibration) waves

• obtain, evaluate, and communicate information about the phenomena of gravity, electricity, and magnetism as major forces acting in nature
A - Content

- obtain, evaluate, and communicate information to analyze the nature of the relationships between structures and functions in living cells
- obtain, evaluate, and communicate information to analyze the role of cellular transport in maintaining homeostasis
- obtain, evaluate, and communicate information to analyze the role of the cell cycle in maintaining genetic continuity
- ask questions to investigate and provide explanations on the role of photosynthesis and cellular respiration in the energy exchange of organisms, examining their function in the cycling of matter and the flow of energy in ecosystems
- obtain, evaluate, and communicate information to analyze how genetic information is expressed in cells
- obtain, evaluate, and communicate information regarding processes that result in heritable genetic variation
- obtain, evaluate, and communicate information to analyze how biological traits are passed on to successive generations
- obtain, evaluate, and communicate information about how genetic engineering techniques can manipulate DNA and lead to advancements in society
- obtain, evaluate, and communicate information to explore the theory of evolution
- obtain, evaluate, and communicate information regarding the mechanisms through which populations evolve
- obtain, evaluate, and communicate information on how changes in the environment have contributed to speciation and biodiversity
- obtain, evaluate, and communicate information to illustrate the organization of interacting systems within single celled and multi-celled organisms
- obtain, evaluate, and communicate information to assess the interdependence of all organisms on one another and their environment
A - Content

- obtain, evaluate, and communicate information about the chemical and physical properties of matter resulting from the ability of atoms to form bonds
- plan and carry out appropriate safety practices for equipment used for all classroom laboratory and field experiences
- obtain, evaluate, and communicate information about the use of the modern atomic theory and periodic law to explain the characteristics of atoms and elements
- obtain, evaluate, and communicate information about how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions
- obtain, evaluate, and communicate information about the Kinetic Molecular Theory to model atomic and molecular motion in chemical and physical processes
- obtain, evaluate, and communicate information about the properties that describe solutions and the nature of acids and bases
- obtain, evaluate, and communicate information about how to refine the design of a chemical system by applying engineering principles to manipulate the factors that affect a chemical reaction
High School Science

Physics

A - Content

• obtain, evaluate, and communicate information about the relationship between distance, displacement, speed, velocity and acceleration as functions of time for one-dimensional motion
• obtain, evaluate, and communicate information about the relationship between distance, displacement, speed, velocity and acceleration as functions of time for two-dimensional motion
• obtain, evaluate, and communicate information about the importance of law of conservation of energy in predicting the behavior of physical systems
• obtain, evaluate, and communicate information about how forces affect the motion of objects
• obtain, evaluate, and communicate information to identify the force or force component responsible for causing an object to move along a circular path
• obtain, evaluate, and communicate information about electrical and magnetic force interactions
• obtain, evaluate, and communicate information about electrical circuits
• obtain, evaluate, and communicate information about electrical force interactions
• obtain, evaluate, and communicate information about the importance of Law of Conservation of Linear Momentum in predicting the behavior of physical systems
• plan and carry out investigations, using lenses and mirrors, to identify the behavior of light
• obtain, evaluate, and communicate information about nuclear changes of matter and related technological applications
• obtain, evaluate, and communicate information about the properties and applications of electromagnetic waves
• obtain, evaluate, and communicate information about the properties and applications of mechanical waves and sound
A - Content

• obtain, evaluate, and communicate information from the Periodic Table to explain the relative properties of elements based on patterns of atomic structure
• obtain, evaluate, and communicate information to explain how atoms bond to form stable compounds
• obtain, evaluate, and communicate information to support the Law of Conservation of Mass/Law of Conservation of Matter
• obtain, evaluate, and communicate information to explain the changes in nuclear structure as a result of fission, fusion, and radioactive decay
• obtain, evaluate, and communicate information to compare and contrast the phases of matter as they relate to atomic and molecular motion
• obtain, evaluate, and communicate information to explain the properties of and relationships between electricity and magnetism
• obtain, evaluate, and communicate information to explain transformations and flow of energy within a system
• obtain, evaluate, and communicate information to explain the relationships among force, mass, and motion
• obtain, evaluate, and communicate information to explain the properties of waves
• obtain, evaluate, and communicate information to explain the properties of solutions
A - Characteristics of Science

• read scientific materials to establish context for subject matter, to develop vocabulary, and to be aware of current research

• discuss the importance of curiosity, honesty, openness, and skepticism in science and exhibit these traits in efforts to understand how the world works

• design and conduct scientific investigations

• use valid critical assumptions to draw conclusions

• apply computation and estimation skills necessary for analyzing data and developing conclusions

• communicate scientific information, ideas, and arguments clearly

• apply standard safety practices for all classroom laboratory and field investigations

• use technology to collect, observe, measure, and analyze data and report findings

B - Academic Knowledge

• explain recombinant DNA technology

• explain Mendelian genetics

• explain gene expression

• explain the regulation of gene expression in bacteria, bacteriophages, and eukaryotes

• identify genetic changes, including DNA mutation and repair, human genetic diseases, and the detection of mutations

• explain the genetics of populations, including genotypic frequencies and allelic frequencies, Hardy-Weinberg, variation in natural populations, and forces that change gene frequencies

• understand genes and their functions

• examine the ethical and legal issues arising from the application of bioengineering
High School Science

Advanced Physics and Robotics

A - Characteristics of Science

• identify, develop and investigate questions/problems that can be answered through scientific inquiry
• follow correct procedures for use of scientific apparatus (GPS)
• develop and use systematic procedures for recording and organizing information (GPS)
• develop reasonable conclusions based on data collected (GPS)
• determine the source of large disparities between estimated and calculated results (GPS)
• write clear, coherent laboratory reports related to scientific investigations (GPS)
• read grade-level appropriate text (both informational and fictional) from a variety of genres and modes of discourse (GPS)

B - Mathematical Skills

• apply mathematical skills and processes to analyze and solve scientific problems

C - Content Knowledge

• explore the relationships between work, power, torque, and kinetic energy (using narrative and mathematical descriptions) and be able to apply these relationships to realistic situations
• investigate fluid power systems (pneumatic and hydraulic) and apply the scientific laws that govern each
• build electric circuits and will use Ohm's Law and Kirchhoff's Laws to explore the relationships between concepts such as current, voltage, resistance, capacitance and electrical power
• use a text-based programming language such as RobotC required to control robotic systems
• explain the history of robotics along with the significant technology that has resulted over the last 2,000 years
• collaborate as a team to optimize a design solution that involves the engineering design process in which solutions are systematically tested and refined
Anatomy and Physiology

A - Content

• obtain, evaluate, and communicate information regarding the structure and function of the muscular system
• obtain, evaluate, and communicate information regarding the function of cardiovascular and respiratory system in the transport and exchange of materials throughout the body
• obtain, evaluate, and communicate the relationship between anatomical structure and physiological processes
• obtain, evaluate, and communicate information regarding the function of integumentary system
• obtain, evaluate, and communicate information regarding the structure and function of the skeletal system
• obtain, evaluate, and communicate information regarding the structure and function of the reproductive system
• obtain, evaluate, and communicate information regarding the structure and function of the nervous system
• obtain, evaluate, and communicate information regarding the structure and function of the endocrine system
• obtain, evaluate, and communicate the interdependence of the systems of the body
• obtain, evaluate, and communicate information regarding the structure and function of the digestive system and the excretory system
Astronomy

A - Content

• obtain, evaluate, and communicate information about Earth and the moon system
• obtain, evaluate, and communicate information about the terrestrial planets
• obtain, evaluate, and communicate information about non-planetary solar system objects
• obtain, evaluate, and communicate information about physical characteristics of the sun
• obtain, evaluate, and communicate information about physical characteristics of stars
• obtain, evaluate, and communicate information about stellar evolution
• obtain, evaluate, and communicate information about the methods of observing the universe
• obtain, evaluate, and communicate information about the gas giants
• obtain, evaluate, and communicate information about the Milky Way and other galaxies
• obtain, evaluate, and communicate information about cosmology and our place in the universe
High School Science

Bioengineering/Scientific Research III

A - Content

- obtain, evaluate, and communicate information on employing the use of Standard Laboratory Operating Procedures (SLOP) throughout the course
- obtain, evaluate, and communicate information focused on the ethical and legal issues arising from the application of bioengineering
- obtain, evaluate, and communicate information about career opportunities in the field of bioscience
- obtain, evaluate, and communicate information regarding the bioengineering field and its application in society
- obtain, evaluate, and communicate information about the development and delivery of biotechnology and bioengineering to the marketplace
- obtain, evaluate, and communicate information about how basic chemistry concepts affect living organisms
- obtain, evaluate, and communicate information on applying technologies used in the life science industry
High School Science

Chemistry II

A - Content

• plan and carry out appropriate safety practices for equipment used for all classroom laboratory and field experiences
• obtain, evaluate, and communicate information about the chemical and physical properties of matter resulting from the ability of atoms to form bonds
• obtain, evaluate, and communicate information about the use of the modern atomic theory to explain the characteristics of atoms and molecules
• obtain, evaluate, and communicate information about how thermodynamically favored reactions are more likely to take place
• obtain, evaluate, and communicate information about the properties that describe solutions and the nature of acids and bases
• obtain, evaluate, and communicate information about the Kinetic Molecular Theory to model atomic and molecular motion in chemical and physical processes
• obtain, evaluate, and communicate information about the properties of biochemical molecules
Earth Systems

A - Content

• obtain, evaluate, and communicate information to investigate the composition and formation of Earth systems, including Earth's place in the solar system
• obtain, evaluate, and communicate information to understand how plate tectonics create certain geologic features, landforms, Earth materials, and geologic hazards
• obtain, evaluate, and communicate information to explore the actions of water, wind, ice, and gravity as they relate to landscape change
• obtain, evaluate, and communicate information to understand how rock relationships and fossils are used to reconstruct Earth's past
• obtain, evaluate, and communicate information to investigate the interaction of solar energy and Earth's systems to produce weather and climate
• obtain, evaluate, and communicate information about how life on Earth responds to and shapes Earth's systems
Ecology

A - Content

• obtain, evaluate, and communicate information for how biotic and abiotic factors interact to affect the distribution of species and the diversity of life on Earth
• obtain, evaluate, and communicate information to investigate how the stability of an ecosystem depends on energy flow
• obtain, evaluate, and communicate information to investigate how matter cycles in and out of an ecosystem
• obtain, evaluate, and communicate information to investigate how organisms interact as individuals and as populations
• obtain, evaluate, and communicate information to explore how populations grow in predictable patterns
• obtain, evaluate, and communicate information on how succession occurs following a disturbance to an ecosystem
• obtain, evaluate, and communicate information to identify and describe Earth’s major aquatic and terrestrial biomes
• obtain, evaluate, and communicate information to investigate the impact of continued human population growth on the demand for Earth’s resources
• obtain, evaluate, and communicate information to investigate the impact of humans to global ecosystems
• obtain, evaluate, and communicate information about how air and water quality affect ecosystems on a global level
• obtain, evaluate, and communicate information regarding threats to biodiversity worldwide
Environmental Science

A - Content

• obtain, evaluate, and communicate information to investigate the flow of energy and cycling of matter within an ecosystem
• obtain, evaluate, and communicate information to construct explanations of stability and change in Earth's ecosystems
• obtain, evaluate and communicate information about the effects of human population growth, activities, and technology on global ecosystems
• obtain, evaluate, and communicate information to analyze how humans impact land resources and construct explanations of the potential effects of habitat destruction, erosion, pollution and depletion of soil fertility as a result of human activities
• obtain, evaluate, and communicate information to analyze human impact on water
• obtain, evaluate, and communicate information to analyze human impact on the atmosphere
• obtain, evaluate, and communicate information to analyze human impact on the conservation of biodiversity
• obtain, evaluate, and communicate information regarding the use and conservation of the various forms of energy resources
Forensic Science

A - Content

- obtain, evaluate, and communicate information about how forensic science is the application of science to the law
- obtain, evaluate, and communicate information about the proper techniques to search, isolate, collect, and record physical and trace evidence at a crime scene
- obtain, evaluate, and communicate information regarding how the body is used as evidence, including the use of models to determine time of death
- obtain, evaluate, and communicate information regarding physical evidence used in forensic investigations
- obtain, evaluate, and communicate information regarding trace evidence
- obtain, evaluate, and communicate information regarding the role of ballistics, fingerprints and other impressions evidence in forensic investigations
- obtain, evaluate, and communicate information used to investigate how document examiners analyze questioned documents involved in forensic investigation
- obtain, evaluate, and communicate information identifying and analyzing the use of toxins and drugs in forensic investigations
- obtain, evaluate, and communicate information identifying and analyzing the use of serology in forensic investigations
- obtain, evaluate, and communicate information identifying and analyzing the use of DNA in forensic investigations
- obtain, evaluate, and communicate information used to investigate evidence involving arson and explosives
- obtain, evaluate, and communicate information as it pertains to cybercrimes in forensic investigations
Microbiology

A - Content

• obtain, evaluate, and communicate information showing the impact of the invention of the microscope on the field of microbiology
• obtain, evaluate, and communicate information to discriminate between abiogenisis and biogenesis
• obtain, evaluate, and communicate information in order to investigate the germ theory
• obtain, evaluate, and communicate proper microscopic techniques when preparing microscope slides
• obtain, evaluate, and communicate information about how to identify and control variables in order to maintain pure bacterial cultures
• obtain, evaluate, and communicate information about the effectiveness of physical and chemical agents on controlling bacterial growth
• obtain, evaluate, and communicate information about common microbial diseases
• obtain, evaluate, and communicate information about different aseptic techniques
• obtain, evaluate, and communicate information about cellular differences that are used in the classification of microbes
• obtain, evaluate, and communicate information about the characteristics of viruses
• obtain, evaluate, and communicate information about the societal and economic impact of viruses
• obtain, evaluate, and communicate disease terminology
• obtain, evaluate, and communicate information regarding major industrial processes involving foods
• obtain, evaluate, and communicate information regarding the different methods of food-processing and storage and how these processes might relate to microbial growth
• obtain, evaluate, and communicate the role of microorganisms in agriculture
• obtain, evaluate, and communicate the role of microorganisms play to water quality and wastewater treatment
• obtain, evaluate, and communicate information about the molecular mechanisms involved in gene expression in microbes
High School Science

Oceanography

A - Content

• obtain, evaluate, and communicate data on atmosphere's greenhouse effect and implications of this effect for the future
• obtain, evaluate, communicate information regarding the characteristics of a wave and relate those characteristics to ocean phenomena
• obtain, evaluate, and communicate information about how nonliving components of marine habitats determine the biological diversity of coastal water, estuaries, lagoons and marginal seas
• obtain, evaluate, and communicate information regarding the cycling of matter and the flow of energy among organisms in marine ecosystems
• obtain, evaluate, and communicate information regarding the identification and characteristics of marine organisms found in the pelagic and benthic ocean
• obtain, evaluate, and communicate information regarding different types of marine sediments
• obtain, evaluate, and communication information regarding the properties of water
• obtain, evaluate, and communicate information regarding the chemical characteristics of seawater (pH, density, and dissolved oxygen)
• obtain, evaluate, and communicate information regarding light and sound movement through water
• obtain, evaluate, and communicate information regarding the interaction of the atmosphere and seawater
• obtain, evaluate, and communicate information regarding models that explain the origin of Earth and oceans
• obtain, evaluate, and communicate information regarding the theory of global plate tectonics
High School Science

Science Research I

A - Content

- engage in scientific inquiry in biology topics by asking or responding to scientifically oriented questions, collecting and analyzing data, giving priority to evidence, formulating explanations based on evidence, connecting explanations to scientific knowledge, and communicating and justifying explanations

- engage in inquiry by asking or responding to biological oriented challenges and problems, collecting and analyzing data, giving priority to evidence, developing solutions based on evidence, connecting solutions to scientific knowledge, and communicating solutions

- analyze and interpret data to demonstrate if a hypothesis is supported by the data, or if a proposed engineering solution is viable

- plan and carry out investigations to test a biological hypothesis or evaluate a solution to a biological problem

- construct explanations regarding the relationship between structure and function in living systems at a variety of organizational levels, and recognize living systems' dependence on natural selection

- develop and use models to explain and illustrate with examples how living systems interact with the biotic and abiotic environment

- construct explanations regarding how various organisms grow, develop, and differentiate during their lifetimes based on an interplay between genetics and their environment
A - Content

• engage in scientific inquiry in chemistry topics by asking or responding to scientifically oriented questions, collecting and analyzing data, giving priority to evidence, formulating explanations based on evidence, connecting explanations to scientific knowledge, and communicating and justifying explanations

• engage in inquiry by asking or responding to chemistry oriented challenges and problems, collecting and analyzing data, giving priority to evidence, developing solutions based on evidence, connecting solutions to scientific knowledge, and communicating solutions

• analyze and interpret data to demonstrate if a hypothesis is supported by the data, or if a proposed engineering solution is viable

• plan and carry out investigations to test a chemistry-based hypothesis or evaluate a solution to a chemistry problem

• construct explanations to demonstrate an understanding of atomic and molecular structure to explain the properties of matter, and predict outcomes of chemical and nuclear reactions

• plan and carry out an investigation to determine and use data to justify that a new chemical has formed by identifying indicators of a chemical reaction (i.e., precipitate formation, gas evolution, color change, water production, and changes in energy to system)

• plan and carry out an investigation to gather evidence to compare the physical and chemical properties at the macroscopic scale to infer the strength of intermolecular and intramolecular forces; the investigation may include melting point, state of matter, solubility, viscosity, and conductivity

• plan and carry out an investigation to demonstrate the conceptual principle of limiting reactants

• plan and carry out an investigation to evaluate the factors that affect the rate at which a solute (i.e., solid or gas) dissolves in a specific solvent

• plan and carry out an investigation to explore acid-base neutralization

• plan and carry out an investigation to calculate the amount of heat absorbed or released by chemical or physical processes
A - Characteristics of Science

• design and conduct scientific investigations
• apply standard safety practices for all classroom laboratory and field investigations
• use technology to collect, observe, measure, and analyze data and report findings
• use valid critical assumptions to draw conclusions
• apply computation and estimation skills necessary for analyzing data and developing conclusions
• read scientific materials to establish context for subject matter, to develop vocabulary, and to be aware of current research
• communicate scientific information, ideas, and arguments clearly

B - Academic Knowledge

• using knowledge obtained from scientific literature, design an ethical research-based experimental project that investigates questions or problems that can be answered through scientific inquiry
• conduct a complete, research-based scientific investigation including obtaining and documenting accurate data, performing data analysis, critiquing and modifying experimental protocols, and report findings
• clearly communicate the results and conclusions of a research-based scientific investigation
• explore the scope of funding, professional development, and collaboration within the scientific research community
• use collaborative skills to inquire and explore research and career opportunities in science
• read credible, peer-reviewed scientific literature to recognize and understand the elements of ethical scientific research; develop vocabulary and subject-related content knowledge; and become familiar with current research in the field, as well as the implications of the research