

North Carolina Curriculum Matrix for Science (Standard Course of Study Adopted: 2004)

North Carolina Science Strands/Goals/Objectives Grade 5	National Essential Skills Study (NESS) Rankings Rank		EOG Pilot Test 2006-07	NESS	Priority
Strands: Nature of Science, Science as Inquiry, Science and Technology, Science in Personal and Social Perspectives.					
COMPETENCY GOAL 1: The learner will conduct investigations to build an understanding of the interdependence of plants and animals.					
1.01 Describe and compare several common ecosystems (communities of organisms and their interaction with the environment).	S16	Employ knowledge of ecology to study the interactions, relationships, and interdependence of organisms with their living and nonliving environments (e.g., ecosystems, communities, and populations).	H	H	H
1.02 Identify and analyze the functions of organisms within the population of the ecosystem: <ul style="list-style-type: none"> • Producers. • Consumers. • Decomposers. 	S16	Employ knowledge of ecology to study the interactions, relationships, and interdependence of organisms with their living and nonliving environments (e.g., ecosystems, communities, and populations).	H	H	H
	S50	Examine the characteristics and roles of simple organisms (bacteria, fungi, algae, and protozoa) and their possible interactions with complex living organisms (i.e., plants and animals).			
	S51	Follow the flow of energy through an ecosystem from photosynthetic organisms to herbivores to carnivores to decomposers and examine the recycling of matter through nature via the carbon and nitrogen cycles.			
1.03 Explain why an ecosystem can support a variety of organisms.	S16	Employ knowledge of ecology to study the interactions, relationships, and interdependence of organisms with their living and nonliving environments (e.g., ecosystems, communities, and populations).	H	H	H
	S34	Know the survival requirements of animals and plants and the history, dynamics, and implications of population growth.			

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1.04 Discuss and determine the role of light, temperature, and soil composition in an ecosystem's capacity to support life.	S51	Follow the flow of energy through an ecosystem from photosynthetic organisms to herbivores to carnivores to decomposers and examine the recycling of matter through nature via the carbon and nitrogen cycles.	H	L	M
	S58	Identify and compare the components of soil and other factors that influence soil texture, fertility, and resistance to erosion (e.g., plant roots and debris, bacteria, fungi, worms, and rodents).			
1.05 Determine the interaction of organisms within an ecosystem.	S16	Employ knowledge of ecology to study the interactions, relationships, and interdependence of organisms with their living and nonliving environments (e.g., ecosystems, communities, and populations).	H	H	H
1.06 Explain and evaluate some ways that humans affect ecosystems. <ul style="list-style-type: none"> • Habitat reduction due to development. • Pollutants. • Increased nutrients. 	S5	Examine how natural events cause environmental change and impact populations.	H	H	H
	S7	Examine how humans, through technology, cause environmental change by disrupting the equilibrium or balance of nature. Critique ways to improve environmental protection through education, research, laws, and conservation and judge the effectiveness of conservation practices and preservation techniques on environmental quality.			
	S10	Understand that science and technology merge to meet the needs of society and that technology can often have unforeseen impacts on people and the environment that may be complicated to correct.			
1.07 Determine how materials are recycled in nature.	S51	Follow the flow of energy through an ecosystem from photosynthetic organisms to herbivores to carnivores to decomposers and examine the recycling of matter through nature via the carbon and nitrogen cycles.	H	L	M

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COMPETENCY GOAL 2: The learner will make observations and conduct investigations to build an understanding of landforms.					
2.01 Identify and analyze forces that cause change in landforms over time including. <ul style="list-style-type: none"> Water and Ice. Wind. Gravity. 	S54	Understand the weathering process, identify factors that contribute to various rates of weathering, and explain how soil is formed as a result of weathering.	M	L	M
	S60	Know the properties of the Earth's crust and interior (e.g., solid and liquid zones, compositions, density, temperature, and pressure) and examine evidence of crustal movement from deformed rock strata, displaced fossils, geosynclines, vertical movements, sea floor spreading, and continental drift.			
	S85	Know characteristics of the erosional-depositional system by differentiating between an erosional process and a depositional process.			
2.02 Investigate and discuss the role of the water cycle and how movement of water over and through the landscape helps shape land forms.	S8	Explain the processes involved in the water cycle (evaporation, condensation, precipitation, transpiration, surface runoff, percolation, etc.).	M	H	H
	S85	Know characteristics of the erosional-depositional system by differentiating between an erosional process and a depositional process.			
2.03 Discuss and consider the wearing away and movement of rock and soil in erosion and its importance in forming: <ul style="list-style-type: none"> Canyons. Valleys. Meanders. Tributaries. 	S85	Know characteristics of the erosional-depositional system by differentiating between an erosional process and a depositional process.	M	L	M
2.04 Describe the deposition of eroded material and its importance in establishing landforms including: <ul style="list-style-type: none"> Deltas. Flood Plains. 	S85	Know characteristics of the erosional-depositional system by differentiating between an erosional process and a depositional process.	M	L	M
2.05 Discuss how the flow of water and the slope of the land affect erosion.	S71	Observe, measure, and examine various landscape characteristics (e.g., hill slopes, stream patterns, and soil associations) and the relationship of characteristics between landscape regions.	M	L	M
	S85	Know characteristics of the erosional-depositional system by differentiating between an erosional process and a depositional process.			

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2.06 Identify and use models, maps, and aerial photographs as ways of representing landforms.	S44	Describe or measure positions on the Earth's surface using coordinate systems (e.g., lines of latitude and longitude) and topographic maps.	M	M	M
2.07 Discuss and analyze how humans influence erosion and deposition in local communities, including school grounds, as a result of: <ul style="list-style-type: none"> • Clearing land. • Planting vegetation. • Building dams. 	S7	Examine how humans, through technology, cause environmental change by disrupting the equilibrium or balance of nature. Critique ways to improve environmental protection through education, research, laws, and conservation and judge the effectiveness of conservation practices and preservation techniques on environmental quality.	M	H	H
	S10	Understand that science and technology merge to meet the needs of society and that technology can often have unforeseen impacts on people and the environment that may be complicated to correct.			
COMPETENCY GOAL 3:					
The learner will conduct investigations and use appropriate technology to build an understanding of weather and climate.					
3.01 Investigate the water cycle including the processes of: <ul style="list-style-type: none"> • Evaporation. • Condensation. • Precipitation. • Run-off. 	S8	Explain the processes involved in the water cycle (evaporation, condensation, precipitation, transpiration, surface runoff, percolation, etc.).	M	H	H
3.02 Discuss and determine how the following are affected by predictable patterns of weather: <ul style="list-style-type: none"> • Temperature. • Wind direction and speed. • Precipitation. • Cloud cover. • Air pressure. 	S35	Understand weather prediction as a probability of occurrence by examining atmospheric variables (e.g., temperature, pressure, moisture, wind, and storm tracks) and the factors that produce change in these variables.	M	M	M
3.03 Describe and analyze the formation of various types of clouds and discuss their relation to weather systems.	S39B	Identify and comprehend factors that affect climate patterns such as latitude, elevation, large water bodies and ocean currents, mountain barriers, and wind belts.	M	M	M
	S48A	Understand that weather and climate involve energy transfer in and out of the atmosphere by means of conduction, convection, and radiation.			

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3.04 Explain how global atmospheric movement patterns affect local weather.	S35	Understand weather prediction as a probability of occurrence by examining atmospheric variables (e.g., temperature, pressure, moisture, wind, and storm tracks) and the factors that produce change in these variables.	M	M	M
3.05 Compile and use weather data to establish a climate record and reveal any trends.	S39B	Identify and comprehend factors that affect climate patterns such as latitude, elevation, large water bodies and ocean currents, mountain barriers, and wind belts.			
3.06 Discuss and determine the influence of geography on weather and climate: <ul style="list-style-type: none"> • Mountains • Sea breezes • Water bodies. 	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.	M	H	H
	S39B	Identify and comprehend factors that affect climate patterns such as latitude, elevation, large water bodies and ocean currents, mountain barriers, and wind belts.	M	M	M
COMPETENCY GOAL 4:					
The learner will conduct investigations and use appropriate technologies to build an understanding of forces and motion in technological designs.					
4.01 Determine the motion of an object by following and measuring its position over time.	S17	Investigate and apply Newton’s three laws of motion to determine the relationships between the forces acting on a body and the resulting motion of the body.	H	H	H
	S61	Understand and apply kinematics (i.e., the mathematical methods of describing motion, including velocity, acceleration, and displacement, without regard to the forces that produce it) to solve problems.			
	S63	Understand and apply statics (the relation between forces acting on an object at rest) and dynamics (the relation between the forces acting on an object and the resulting motion) to solve problems.			
	S79	Analyze two-dimensional motion and trajectories by separating the motion of a projectile or object into x and y components of the vector quantities of displacement, velocity, and acceleration (including acceleration due to gravity). Analyze centripetal acceleration and force of an object in uniform circular motion.			

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4.02 Evaluate how pushing or pulling forces can change the position and motion of an object.	S17	Investigate and apply Newton’s three laws of motion to determine the relationships between the forces acting on a body and the resulting motion of the body.	H	H	H
	S61	Understand and apply kinematics (i.e., the mathematical methods of describing motion, including velocity, acceleration, and displacement, without regard to the forces that produce it) to solve problems.			
	S63	Understand and apply statics (the relation between forces acting on an object at rest) and dynamics (the relation between the forces acting on an object and the resulting motion) to solve problems.			
	S79	Analyze two-dimensional motion and trajectories by separating the motion of a projectile or object into x and y components of the vector quantities of displacement, velocity, and acceleration (including acceleration due to gravity). Analyze centripetal acceleration and force of an object in uniform circular motion.			
4.03 Explain how energy is needed to make machines move. <ul style="list-style-type: none"> • Moving air. • Gravity. 	S6	Understand the concepts of force and motion as they apply to simple machines (e.g., levers and pulleys).	H	H	H

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4.04 Determine that an unbalanced force is needed to move an object or change its direction.	S17	Investigate and apply Newton’s three laws of motion to determine the relationships between the forces acting on a body and the resulting motion of the body.	H	H	H
	S61	Understand and apply kinematics (i.e., the mathematical methods of describing motion, including velocity, acceleration, and displacement, without regard to the forces that produce it) to solve problems.			
	S63	Understand and apply statics (the relation between forces acting on an object at rest) and dynamics (the relation between the forces acting on an object and the resulting motion) to solve problems.			
	S79	Analyze two-dimensional motion and trajectories by separating the motion of a projectile or object into x and y components of the vector quantities of displacement, velocity, and acceleration (including acceleration due to gravity). Analyze centripetal acceleration and force of an object in uniform circular motion.			
4.05 Determine factors that affect motion including: <ul style="list-style-type: none"> • Force • Friction. • Inertia. • Momentum 	S17	Investigate and apply Newton’s three laws of motion to determine the relationships between the forces acting on a body and the resulting motion of the body.	H	H	H
	S61	Understand and apply kinematics (i.e., the mathematical methods of describing motion, including velocity, acceleration, and displacement, without regard to the forces that produce it) to solve problems.			
	S63	Understand and apply statics (the relation between forces acting on an object at rest) and dynamics (the relation between the forces acting on an object and the resulting motion) to solve problems.			
	S79	Analyze two-dimensional motion and trajectories by separating the motion of a projectile or object into x and y components of the vector quantities of displacement, velocity, and acceleration (including acceleration due to gravity). Analyze centripetal acceleration and force of an object in uniform circular motion.			

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4.06 Build and use a model to solve a mechanical design problem. <ul style="list-style-type: none"> Devise a test for the model. Evaluate the results of test. 	Rank	S12 Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.	H	H	H
	S15	Plan and apply real or hypothetical models and constructions to facilitate short- and long-term investigation, learning, and solutions to practical problems, including experimental design that incorporates variables and a method for collecting fair and adequate data.			
4.07 Determine how people use simple machines to solve problems.	Rank	S6 Understand the concepts of force and motion as they apply to simple machines (e.g., levers and pulleys).	H	H	H
	S15	Plan and apply real or hypothetical models and constructions to facilitate short- and long-term investigation, learning, and solutions to practical problems, including experimental design that incorporates variables and a method for collecting fair and adequate data.			

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Strands: The Nature of Science, Science as Inquiry, Science and Technology, Science in Personal and Social Perspectives Strands provide the context for content goals.					
COMPETENCY GOAL 1: The learner will design and conduct investigations to demonstrate an understanding of scientific inquiry.					
1.01 Identify and create questions and hypotheses that can be answered through scientific investigations.	S1	Know and apply the principles of scientific inquiry for generating knowledge, including prediction, estimation, developing hypotheses, drawing conclusions, evaluation, and following ethical principles and professional procedures.	H	H	H
1.02 Develop appropriate experimental procedures for: <ul style="list-style-type: none"> • Given questions. • Student generated questions. 	S1	Know and apply the principles of scientific inquiry for generating knowledge, including prediction, estimation, developing hypotheses, drawing conclusions, evaluation, and following ethical principles and professional procedures.	H	H	H
	S3	Use the Scientific Method to collect data and draw conclusions. Understand that all scientific conclusions and theories are subject to modification as new data are collected and reviewed publicly by peers and that all scientific ideas must satisfy common criteria including the ability to be tested.			
	S15	Plan and apply real or hypothetical models and constructions to facilitate short- and long-term investigation, learning, and solutions to practical problems, including experimental design that incorporates variables and a method for collecting fair and adequate data.			
1.03 Apply safety procedures in the laboratory and in field studies: <ul style="list-style-type: none"> • Recognize potential hazards. • Safely manipulate materials and equipment. • Conduct appropriate procedures. 	S18	Recognize and demonstrate safe laboratory procedures and behavior.	H	H	H

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1.04 Analyze variables in scientific investigations: <ul style="list-style-type: none"> Identify dependent and independent. Use of a control. Manipulate. Describe relationships between. Define operationally. 	S1	Know and apply the principles of scientific inquiry for generating knowledge, including prediction, estimation, developing hypotheses, drawing conclusions, evaluation, and following ethical principles and professional procedures.	H	H	H
1.05 Analyze evidence to: <ul style="list-style-type: none"> explain observations. make inferences and predictions. develop the relationship between evidence and explanation. 	S4	Make observations and accurate and precise measurements using senses, tools, and technology.	H	H	H
	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.			
1.06 Use mathematics to gather, organize, and present quantitative data resulting from scientific investigations: <ul style="list-style-type: none"> Measurement. Analysis of data. Graphing. Prediction models. 	S4	Make observations and accurate and precise measurements using senses, tools, and technology.	H	H	H
	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.			
1.07 Prepare models and/or computer simulations to: <ul style="list-style-type: none"> Test hypotheses. Evaluate how data fit. Make predictions. 	S3	Use the Scientific Method to collect data and draw conclusions. Understand that all scientific conclusions and theories are subject to modification as new data are collected and reviewed publicly by peers and that all scientific ideas must satisfy common criteria including the ability to be tested.	H	H	H
	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.			
	S15	Plan and apply real or hypothetical models and constructions to facilitate short- and long-term investigation, learning, and solutions to practical problems, including experimental design that incorporates variables and a method for collecting fair and adequate data.			

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1.08 Use oral and written language to: <ul style="list-style-type: none"> • Communicate findings. • Defend conclusions of scientific investigations. • Describe strengths and weaknesses of claims, arguments, and/or data 	S1	Know and apply the principles of scientific inquiry for generating knowledge, including prediction, estimation, developing hypotheses, drawing conclusions, evaluation, and following ethical principles and professional procedures.	H	H	H
	S3	Use the Scientific Method to collect data and draw conclusions. Understand that all scientific conclusions and theories are subject to modification as new data are collected and reviewed publicly by peers and that all scientific ideas must satisfy common criteria including the ability to be tested.			
	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.			
1.09 Use technologies and information systems to: <ul style="list-style-type: none"> • Research. • Gather and analyze data. • Visualize data. • Disseminate findings to others. 	S4	Make observations and accurate and precise measurements using senses, tools, and technology.	H	H	H
	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.			
1.10 Analyze and evaluate information from a scientifically literate viewpoint by reading, hearing, and/or viewing: <ul style="list-style-type: none"> • Scientific text. • Articles. • Events in the popular press. 	S4	Make observations and accurate and precise measurements using senses, tools, and technology.	H	H	H
	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.			
COMPETENCY GOAL 2: The learner will demonstrate an understanding of technological design.					
2.01 Explore evidence that "technology" has many definitions. <ul style="list-style-type: none"> • Artifact or hardware. • Methodology or technique. • System of production. • Social-technical system. 	S10	Understand that science and technology merge to meet the needs of society and that technology can often have unforeseen impacts on people and the environment that may be complicated to correct.	H	H	H
	S42	Identify individual, cultural, and technological contributions to scientific knowledge that have had an impact on the history of human society and the quality of life worldwide.			

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2.02 Use information systems to: <ul style="list-style-type: none"> • Identify scientific needs, human needs, or problems that are subject to technological solution. • Locate resources to obtain and test ideas. 	S10	Understand that science and technology merge to meet the needs of society and that technology can often have unforeseen impacts on people and the environment that may be complicated to correct.	H	H	H
	S15	Plan and apply real or hypothetical models and constructions to facilitate short- and long-term investigation, learning, and solutions to practical problems, including experimental design that incorporates variables and a method for collecting fair and adequate data.			
2.03 Evaluate technological designs for: <ul style="list-style-type: none"> • Application of scientific principles. • Risks and benefits. • Constraints of design. • Consistent testing protocols. 	S3	Use the Scientific Method to collect data and draw conclusions. Understand that all scientific conclusions and theories are subject to modification as new data are collected and reviewed publicly by peers and that all scientific ideas must satisfy common criteria including the ability to be tested.	H	H	H
	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.			
	S15	Plan and apply real or hypothetical models and constructions to facilitate short- and long-term investigation, learning, and solutions to practical problems, including experimental design that incorporates variables and a method for collecting fair and adequate data.			
2.04 Apply tenets of technological design to make informed consumer decisions about: <ul style="list-style-type: none"> • Products. • Processes. • Systems. 	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.	H	H	H
	S15	Plan and apply real or hypothetical models and constructions to facilitate short- and long-term investigation, learning, and solutions to practical problems, including experimental design that incorporates variables and a method for collecting fair and adequate data.			

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COMPETENCY GOAL 3: The learner will conduct investigations and utilize appropriate technologies and information systems to build an understanding of the hydrosphere.					
3.01 Analyze the unique properties of water including: <ul style="list-style-type: none"> • Universal solvent. • Cohesion and adhesion. • Polarity. • Density and buoyancy. • Specific heat. 	S19	Know and apply the relationship among mass, volume, and density for a substance and compare these properties between different substances.	H	H	H
	S53	Understand the historical development of the Periodic Table. Apply the principles inherent in its development, including the properties and atomic structure of elements and resultant chemical compounds and the forces acting between and among atoms.			
3.02 Explain the structure of the hydrosphere including: <ul style="list-style-type: none"> • Water distribution on earth. • Local river basin. • Local water availability. 	S24	Explain the concepts involving the Earth's water (ground and surface water) and identify possible or potential sources, types, concentration, and long-range effects of pollution.	H	H	H
	S71	Observe, measure, and examine various landscape characteristics (e.g., hill slopes, stream patterns, and soil associations) and the relationship of characteristics between landscape regions.			
3.03 Evaluate evidence that Earth's oceans are a reservoir of nutrients, minerals, dissolved gases, and life forms: <ul style="list-style-type: none"> • Estuaries. • Marine ecosystems. • Upwelling. • Behavior of gases in the marine environment. • Value and sustainability of marine resources. • Deep ocean technology and understandings gained. 	S16	Employ knowledge of ecology to study the interactions, relationships, and interdependence of organisms with their living and nonliving environments (e.g., ecosystems, communities, and populations).	H	H	H
	S24	Explain the concepts involving the Earth's water (ground and surface water) and identify possible or potential sources, types, concentration, and long-range effects of pollution.			

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3.04 Describe how terrestrial and aquatic food webs are interconnected.	S16	Employ knowledge of ecology to study the interactions, relationships, and interdependence of organisms with their living and nonliving environments (e.g., ecosystems, communities, and populations).	H	H	H
	S21B	Examine the processes related to metabolic activity in cells which help plants and animals maintain life (e.g., transport of materials throughout the organism, gas exchange, excretion, chemical regulation, and reaction to stimuli).			
3.05 Analyze hydrospheric data over time to predict the health of a water system including: <ul style="list-style-type: none"> • Temperature. • Dissolved oxygen. • pH. • Nitrates. • Turbidity. • Bio-indicators. 	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.	H	H	H
	S36	Analyze and evaluate the concepts and theories of acids and bases, including pH and alkalinity.			
3.06 Evaluate technologies and information systems used to monitor the hydrosphere.	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.	H	H	H
3.07 Describe how humans affect the quality of water: <ul style="list-style-type: none"> • Point and non-point sources of water pollution in North Carolina. • Possible effects of excess nutrients in North Carolina waters. • Economic trade-offs. • Local water issues. 	S7	Examine how humans, through technology, cause environmental change by disrupting the equilibrium or balance of nature. Critique ways to improve environmental protection through education, research, laws, and conservation and judge the effectiveness of conservation practices and preservation techniques on environmental quality.	H	H	H
	S10	Understand that science and technology merge to meet the needs of society and that technology can often have unforeseen impacts on people and the environment that may be complicated to correct.			
	S24	Explain the concepts involving the Earth's water (ground and surface water) and identify possible or potential sources, types, concentration, and long-range effects of pollution.			

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3.08 Recognize that the good health of environments and organisms requires: <ul style="list-style-type: none"> • Monitoring of the hydrosphere. • Water quality standards. • Methods of water treatment. • Maintaining safe water quality. • Stewardship. 	S7	Examine how humans, through technology, cause environmental change by disrupting the equilibrium or balance of nature. Critique ways to improve environmental protection through education, research, laws, and conservation and judge the effectiveness of conservation practices and preservation techniques on environmental quality.	H	H	H
	S16	Employ knowledge of ecology to study the interactions, relationships, and interdependence of organisms with their living and nonliving environments (e.g., ecosystems, communities, and populations).			
	S34	Know the survival requirements of animals and plants and the history, dynamics, and implications of population growth.			
COMPETENCY GOAL 4: The learner will conduct investigations and utilize technology and information systems to build an understanding of chemistry.					
4.01 Understand that both naturally occurring and synthetic substances are chemicals.	S31	Recognize that chemical reactions take place all around us, both in living and nonliving systems, and that they always result in the formation of new substances. Identify the factors that affect reaction rate.	H	H	H
4.02 Evaluate evidence that elements combine in a multitude of ways to produce compounds that account for all living and nonliving substances.	S53	Understand the historical development of the Periodic Table. Apply the principles inherent in its development, including the properties and atomic structure of elements and resultant chemical compounds and the forces acting between and among atoms.	H	L	M
	S62	Examine the definitions and characteristics of organic compounds and functional groups. Understand and apply organic reactions involving substitution, addition, fermentation, oxidation, polymerization, etc.			
	S77	Examine the chemical reactions involved in cell functions and the role of enzymes in facilitating the breakdown and synthesis of molecules.			

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4.03 Explain how the periodic table is a model for: <ul style="list-style-type: none"> Classifying elements . Identifying the properties of elements. 	S20	Classify matter as an element, compound, or mixture.	H	H	H
	S53	Understand the historical development of the Periodic Table. Apply the principles inherent in its development, including the properties and atomic structure of elements and resultant chemical compounds and the forces acting between and among atoms.			
4.04 Describe the suitability of materials for use in technological design: <ul style="list-style-type: none"> Electrical Conductivity. Density. Magnetism. Solubility. Malleability. 	S19	Know and apply the relationship among mass, volume, and density for a substance and compare these properties between different substances.	H	H	H
	S41	Investigate electric current (i.e., the flow of electric charge) and apply it to voltage, conductivity, amperage, resistance, and circuits in parallel and series.			
	S62	Examine the definitions and characteristics of organic compounds and functional groups. Understand and apply organic reactions involving substitution, addition, fermentation, oxidation, polymerization, etc.			
4.05 Identify substances based on characteristic physical properties: <ul style="list-style-type: none"> Density. Boiling/Melting points. Solubility. Chemical reactivity. Specific heat. 	S19	Know and apply the relationship among mass, volume, and density for a substance and compare these properties between different substances.	H	H	H
	S20	Classify matter as an element, compound, or mixture.			
	S53	Understand the historical development of the Periodic Table. Apply the principles inherent in its development, including the properties and atomic structure of elements and resultant chemical compounds and the forces acting between and among atoms.			

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4.06 Describe and measure quantities related to chemical/physical changes within a system: <ul style="list-style-type: none"> • Temperature. • Volume. • Mass. • Precipitate. • Gas production. 	S13	Measure or estimate physical properties using dimensional quantities (e.g., time, length, mass, pressure, volume, acceleration, temperature) and use significant figures correctly when estimating, measuring, and calculating these quantities.	H	H	H
	S19	Know and apply the relationship among mass, volume, and density for a substance and compare these properties between different substances.			
	S27	Analyze physical change (e.g., change of phase between gases, liquids, and solids) and chemical change (e.g., conservation of mass-energy).			
	S74	Use stoichiometry (the math behind the chemistry) to compute quantitative relationships implied by chemical formulas and chemical equations (i.e., solve mass-mass, mass-volume, and volume-volume problems).			
4.07 Identify evidence supporting the law of conservation of matter. <ul style="list-style-type: none"> • During an ordinary chemical reaction matter cannot be created or destroyed. • In a chemical reaction, the total mass of the reactants equals the total mass of the products mass of the products. 	S27	Analyze physical change (e.g., change of phase between gases, liquids, and solids) and chemical change (e.g., conservation of mass-energy).	H	H	H
	S31	Recognize that chemical reactions take place all around us, both in living and nonliving systems, and that they always result in the formation of new substances. Identify the factors that affect reaction rate.			
	S74	Use stoichiometry (the math behind the chemistry) to compute quantitative relationships implied by chemical formulas and chemical equations (i.e., solve mass-mass, mass-volume, and volume-volume problems).			

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4.08 Identify evidence that some chemicals may contribute to human health conditions including: <ul style="list-style-type: none"> • Cancer. • Autoimmune disease. • Birth defects. • Heart disease. • Diabetes. • Learning and behavioral disorders. • Kidney disease. • Asthma. 	S10	Understand that science and technology merge to meet the needs of society and that technology can often have unforeseen impacts on people and the environment that may be complicated to correct.	H	H	H
	S42	Identify individual, cultural, and technological contributions to scientific knowledge that have had an impact on the history of human society and the quality of life worldwide.			
	S47	Know the history and assess the benefits and drawbacks of modern technologies (e.g., nanotechnology, biotechnology, and information technology).			
4.09 Describe factors that determine the effects a chemical has on a living organism including: <ul style="list-style-type: none"> • Exposure. • Potency. • Dose and the resultant concentration of chemical in the organism. • Individual susceptibility. • Possible means to eliminate or reduce effects. 	S21B	Examine the processes related to metabolic activity in cells which help plants and animals maintain life (e.g., transport of materials throughout the organism, gas exchange, excretion, chemical regulation, and reaction to stimuli).	H	H	H
	S31	Recognize that chemical reactions take place all around us, both in living and nonliving systems, and that they always result in the formation of new substances. Identify the factors that affect reaction rate.			
	S62	Examine the definitions and characteristics of organic compounds and functional groups. Understand and apply organic reactions involving substitution, addition, fermentation, oxidation, polymerization, etc.			
	S77	Examine the chemical reactions involved in cell functions and the role of enzymes in facilitating the breakdown and synthesis of molecules.			

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4.10 Describe risks and benefits of chemicals including: <ul style="list-style-type: none"> • Medicines. • Food preservatives. • Crop yield. • Sanitation. 	S31	Recognize that chemical reactions take place all around us, both in living and nonliving systems, and that they always result in the formation of new substances. Identify the factors that affect reaction rate.	H	H	H
S42	Identify individual, cultural, and technological contributions to scientific knowledge that have had an impact on the history of human society and the quality of life worldwide.				
S47	Know the history and assess the benefits and drawbacks of modern technologies (e.g., nanotechnology, biotechnology, and information technology).				
COMPETENCY GOAL 5: The learner will conduct investigations and utilize appropriate technologies and information systems to build an understanding of evidence of evolution in organisms and landforms.					
5.01 Interpret ways in which rocks, fossils, and ice cores record Earth's geologic history and the evolution of life including: <ul style="list-style-type: none"> • Geologic Time Scale. • Index Fossils. • Law of Superposition. • Unconformity. • Evidence for climate change. • Extinction of species. • Catastrophic events. 	S60	Know the properties of the Earth's crust and interior (e.g., solid and liquid zones, compositions, density, temperature, and pressure) and examine evidence of crustal movement from deformed rock strata, displaced fossils, geosynclines, vertical movements, sea floor spreading, and continental drift.	M	L	M
S75	Understand how to sequence and correlate geologic events in Earth's history by analyzing the layers of rock, faults, joints, and folds, fossil evidence, volcanic time markers, etc.				
S83	Determine geologic history and age by examining the rock record and/or fossil sequencing and understand the technique of measuring geologic ages by absolute dating of rocks/fossils using known decay rates of radioactive isotopes.				

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5.02 Correlate evolutionary theories and processes: <ul style="list-style-type: none"> • Biological. • Geological. • Technological. 	S26	Understand the interdisciplinary nature of physical, life, Earth, and space sciences and make connections among the unifying concepts and processes of science.	M	H	H
	S48B	Examine evolution as it relates to the origin of life. Understand the evidence for evolution as explained and supported by the fossil record and the genetic code.			
	S55	Research and evaluate scientific theories about the origins of the universe, the solar system, and life on Earth based upon available evidence.			
5.03 Examine evidence that the geologic evolution has had significant global impact including: <ul style="list-style-type: none"> • Distribution of living things. • Major geological events. • Mechanical and chemical weathering. 	S26	Understand the interdisciplinary nature of physical, life, Earth, and space sciences and make connections among the unifying concepts and processes of science.	M	H	H
	S48B	Examine evolution as it relates to the origin of life. Understand the evidence for evolution as explained and supported by the fossil record and the genetic code.			
	S55	Research and evaluate scientific theories about the origins of the universe, the solar system, and life on Earth based upon available evidence.			
5.04 Analyze satellite imagery as a method to monitor Earth from space: <ul style="list-style-type: none"> • Spectral analysis. • Reflectance curves. 	S12	Explain, interpret, and classify observations and data in a logical way. Present information using scientific vocabulary, mathematical relationships, and technology.	M	H	H
5.05 Use maps, ground truthing and remote sensing to make predictions regarding: <ul style="list-style-type: none"> • Changes over time. • Land use. • Urban sprawl. • Resource management. 	S9	Differentiate between renewable and non-renewable resources (e.g., water, land, soil, minerals, and air) and understand the value of resource management, such as the reintroduction of wildlife, ocean fisheries management, and fire ecology. Determine energy sources and uses, including distribution, energy conversion, and energy costs and depletion.	M	H	H
	S44	Describe or measure positions on the Earth's surface using coordinate systems (e.g., lines of latitude and longitude) and topographic maps.			

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COMPETENCY GOAL 6: The learner will conduct investigations, use models, simulations, and appropriate technologies and information systems to build an understanding of cell theory.					
6.01 Describe cell theory: <ul style="list-style-type: none"> • All living things are composed of cells. • Cells provide structure and carry on major functions to sustain life. • Some organisms are single cell; other organisms, including humans, are multi-cellular. • Cell function is similar in all living things. 	S21B	Examine the processes related to metabolic activity in cells which help plants and animals maintain life (e.g., transport of materials throughout the organism, gas exchange, excretion, chemical regulation, and reaction to stimuli).	M	H	H
	S30	Recognize the cell as a common unit between living systems and examine cell structure and function.			
	S32	Know that every cell nucleus contains DNA molecules that specify how proteins are assembled to regulate cells. Know the chemical and structural properties of DNA and its role in specifying the genetic characteristics of an organism. Understand the process of polypeptide synthesis.			
	S50	Examine the characteristics and roles of simple organisms (bacteria, fungi, algae, and protozoa) and their possible interactions with complex living organisms (i.e., plants and animals).			
	S67	Know the Linnean classification system into which organisms are separated and grouped based on common characteristics. From largest to smallest, the classification groups include kingdom, phylum, class, order, family genus, and species.			

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6.02 Analyze structures, functions, and processes within animal cells for: <ul style="list-style-type: none"> • Capture and release of energy. • Feedback information. • Dispose of wastes. • Reproduction. • Movement. • Specialized needs. 	S11	Explain an organism's need for food and a nutritious diet and describe the processes of ingestion, digestion, and egestion and how disease represents changes/imbalance in normal functioning.	M	H	H
	S14	Examine the foundations of genetics involving heredity and inherited traits passed on through generations, understand the gene-chromosome concept, and apply classical genetic studies (Mendelian genetics).			
	S21B	Examine the processes related to metabolic activity in cells which help plants and animals maintain life (e.g., transport of materials throughout the organism, gas exchange, excretion, chemical regulation, and reaction to stimuli).			
	S30	Recognize the cell as a common unit between living systems and examine cell structure and function.			
	S32	Know that every cell nucleus contains DNA molecules that specify how proteins are assembled to regulate cells. Know the chemical and structural properties of DNA and its role in specifying the genetic characteristics of an organism. Understand the process of polypeptide synthesis.			
6.03 Compare life functions of protists: <ul style="list-style-type: none"> • Euglena. • Amoeba. • Paramecium. • Volvox. 	S50	Examine the characteristics and roles of simple organisms (bacteria, fungi, algae, and protozoa) and their possible interactions with complex living organisms (i.e., plants and animals).	M	M	M
	S67	Know the Linnean classification system into which organisms are separated and grouped based on common characteristics. From largest to smallest, the classification groups include kingdom, phylum, class, order, family genus, and species.			

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6.04 Conclude that animal cells carry on complex chemical processes to balance the needs of the organism. <ul style="list-style-type: none"> • Cells grow and divide to produce more cells. • Cells take in nutrients to make the energy for the work cells do. • Cells take in materials that a cell or an organism needs. 	S21B	Examine the processes related to metabolic activity in cells which help plants and animals maintain life (e.g., transport of materials throughout the organism, gas exchange, excretion, chemical regulation, and reaction to stimuli).	M	H	M
	S30	Recognize the cell as a common unit between living systems and examine cell structure and function.			
	S32	Know that every cell nucleus contains DNA molecules that specify how proteins are assembled to regulate cells. Know the chemical and structural properties of DNA and its role in specifying the genetic characteristics of an organism. Understand the process of polypeptide synthesis.			
	S51	Follow the flow of energy through an ecosystem from photosynthetic organisms to herbivores to carnivores to decomposers and examine the recycling of matter through nature via the carbon and nitrogen cycles.			
	S52	Understand and compare energy transformations in living systems, geological systems, and artificial systems constructed by humans.			
COMPETENCY GOAL 7: The learner will conduct investigations, use models, simulations, and appropriate technologies and information systems to build an understanding of microbiology.					
7.01 Compare and contrast microbes: <ul style="list-style-type: none"> • Size, shape, structure. • Whether they are living cells. 	S50	Examine the characteristics and roles of simple organisms (bacteria, fungi, algae, and protozoa) and their possible interactions with complex living organisms (i.e., plants and animals).	L	M	M
7.02 Describe diseases caused by microscopic biological hazards including: <ul style="list-style-type: none"> • Viruses. • Bacteria. • Parasites. • Contagions. • Mutagens. 	S11	Explain an organism's need for food and a nutritious diet and describe the processes of ingestion, digestion, and egestion and how disease represents changes/imbalance in normal functioning.	L	H	M
	S50	Examine the characteristics and roles of simple organisms (bacteria, fungi, algae, and protozoa) and their possible interactions with complex living organisms (i.e., plants and animals).			

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7.03 Analyze data to determine trends or patterns to determine how an infectious disease may spread including: <ul style="list-style-type: none"> • Carriers. • Vectors. • Conditions conducive to disease. • Calculate reproductive potential of bacteria. 	S50	Examine the characteristics and roles of simple organisms (bacteria, fungi, algae, and protozoa) and their possible interactions with complex living organisms (i.e., plants and animals).	L	M	M
7.04 Evaluate the human attempt to reduce the risk of and treatments for microbial infections including: <ul style="list-style-type: none"> • Solutions with anti-microbial properties. • Antibiotic treatment. • Research. 	S42	Identify individual, cultural, and technological contributions to scientific knowledge that have had an impact on the history of human society and the quality of life worldwide.	L	M	M
	S47	Know the history and assess the benefits and drawbacks of modern technologies (e.g., nanotechnology, biotechnology, and information technology).			
7.05 Investigate aspects of biotechnology including: <ul style="list-style-type: none"> • Specific genetic information available. • Careers. • Economic benefits to North Carolina. • Ethical issues. • Impact for agriculture. 	S42	Identify individual, cultural, and technological contributions to scientific knowledge that have had an impact on the history of human society and the quality of life worldwide.	L	M	M
	S47	Know the history and assess the benefits and drawbacks of modern technologies (e.g., nanotechnology, biotechnology, and information technology).			