

# Science Virginia Essentialized Standards of Learning (VESOL) Crosswalk

## How to Use this Document

This document contains two different science Virginia Essentialized Standards of Learning crosswalks for each applicable grade level. The first crosswalk lists correlations to retired Virginia Aligned Standards of Learning (ASOL) and ASOL sample activities so that special educators can see linkages between the VESOL and previously taught ASOL content and activities. The second crosswalk lists VESOL correlations to associated Virginia Standards of Learning (SOL) and Applied Studies Curriculum map competencies so that special educators can readily access curriculum frameworks and resources for instruction.

The Table of Contents (TOC) includes all sections of the document and is organized by crosswalk and grade levels. **Educators can use the hyperlinks in the TOC to bypass unrelated sections and navigate directly to the sections of the document most relevant to them.**

The intent of the crosswalks is to provide a resource that will enhance collaboration between special and general educators and link teachers to multiple resources to support effective VESOL instruction.

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# Science Crosswalks

## 5<sup>th</sup> Grade Science VESOL to ASOL Crosswalk

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
<b>Living Systems and Ecosystem Interactions (LSEI)</b>	S-5 1	Recognize that plants need light, air, and water to grow.	5S-LPS 1	The student will investigate and understand basic plant anatomy and life processes. Key concepts include a) the structures of typical plants and the function of each structure; b) processes and structures involved with plant reproduction; c) photosynthesis; d) adaptations allow plants to satisfy life needs and respond to the environment	<a href="#">A-MAZE-ing Race</a> <a href="#">Color Changing Flowers</a> <a href="#">Photostatic Overview</a> <a href="#">Plant Scavenger Hunt</a>	Classification (SCI-CLASS)
<b>Living Systems and Ecosystem Interactions (LSEI)</b>	S-5 2	Recognize that living organisms have unique structures that help them obtain what they need to grow and survive.	5S-LPS 1	The student will investigate and understand basic plant anatomy and life processes. Key concepts include a) the structures of typical plants and the function of each structure; b) processes and structures involved with plant reproduction; c) photosynthesis; d) adaptations allow plants to satisfy life needs and respond to the environment	<a href="#">A-MAZE-ing RACE</a> <a href="#">Color Changing Flowers</a> <a href="#">Photostatic Overview</a> <a href="#">Plants Parts Scavenger Hunt</a>	Classification (SCI-CLASS)
<b>Living Systems and Ecosystem Interactions (LSEI)</b>	S-5 3	Recognize ways in which living organisms interact with other living organisms and non-living parts of an ecosystem.	5S-LPS 2	The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include a) plant and animal adaptations; b) organization of populations, communities, and ecosystems and how they interrelate; c) flow of energy through food webs; d) habitats and niches;	<a href="#">Predator and Prey Freeze Tag</a> <a href="#">Food Chains and Food Webs</a> <a href="#">Ecosystems: What's the Issue?</a>	Classification (SCI-CLASS)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
Earth/Space Systems and Earth Resources (ESSER)	S-5 4	Recognize different types of weather conditions and their characteristics.	5S-ESS 1	The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include a) weather phenomena; b) weather measurements and meteorological tools; c) use of weather measurements and weather phenomena to make weather predictions	<a href="#">Characteristics of Weather</a> <a href="#">Severe Weather Alert</a> <a href="#">Twisting Tornadoes</a> <a href="#">Understanding Common Storms</a> <a href="#">Design and Build Your Own Turbine</a>	Weather (SCI-WEA)
Earth/Space Systems and Earth Resources (ESSER)	S-5 5	Recognize and compare objects in the solar system and their features.	5S-ESS 2	The student will investigate and understand the organization of the solar system. Key concepts include a) the planets in the solar system; b) the order of the planets in the solar system; c) the relative sizes of the planets.	<a href="#">Solar System Model</a>	None
Earth/Space Systems and Earth Resources (ESSER)	S-5 6	Recognize the relationships between Earth, the moon, and the sun.	5S-ESS 3	The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include a) the motions of Earth, the moon, and the sun; b) the causes for Earth's seasons; c) the causes for the phases of the moon; d) the relative size, position, age, and makeup of Earth, the moon, and the sun;	None	None
Earth/Space Systems and Earth Resources (ESSER)	S-5 7	Recognize that the sun provides the Earth with light and energy.	5S-ESS 3	The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include a) the motions of Earth, the moon, and the sun; b) the causes for Earth's seasons; c) the causes for the phases of the moon; d) the relative size, position, age, and makeup of Earth, the moon, and the sun;	None	None
Earth/Space Living Systems and Ecosystem Interactions (LSEI)	S-5 8	Recognize oceans and identify the organisms that live in them.	5-ESS 5	The student will investigate and understand characteristics of the ocean environment. Key concepts include a) geological characteristics; b) physical characteristics; c) ecological characteristics.	None	None

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<b>Earth/Space Systems and Earth Resources (ESSER)</b>	S-5 9	Recognize natural resources, including those important in Virginia, in connection with their common use and origin.	5S-ESS 4	The student will investigate and understand important Virginia natural resources. Key concepts include a) watershed and water resources; c) minerals, rocks, ores, and energy sources; d) forests, soil, and land	<a href="#">Colorful Crayon</a> <a href="#">Rock Cycle</a>	Ecology (SCI-ECO)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 10	Recognize objects in motion and changes in motion due to force.	5S-FME 1	The student will investigate and understand characteristics and interactions of moving objects. Key concepts include a) motion is described by an object's direction and speed; b) changes in motion are related to force and mass; c) friction is a force that opposes motion; d) moving objects have kinetic energy.	<a href="#">Become A Scientist</a> <a href="#">The Friction Grand Prix</a>	None
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 11	Recognize electricity as a form of energy with everyday uses, applications, and sources.	5S-FME 2	The student will investigate and understand the characteristics of electricity. Key concepts include a) conductors and insulators; b) basic circuits; c) static electricity; d) the ability of electrical energy to be transformed into light and motion, and to produce heat; e) simple electromagnets and magnetism; f) historical contributions in understanding electricity.	<a href="#">Squishy Circuits</a> <a href="#">The Static Electric Slide</a> <a href="#">Let's Stick Together</a>	Safety (SCI-SAFETY)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 12	Recognize sound as a form of energy with everyday uses, applications, and sources.	5S-FME 3	The student will investigate and understand how sound is created and transmitted, and how it is used. Key concepts include a) compression waves; b) vibration, compression, wavelength, frequency, amplitude; c) the ability of different media (solids, liquids, and gases) to transmit sound; d) uses and applications of sound waves.	<a href="#">Chicken in a cup</a>	Classification (SCI-CLASS)

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<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 13	Recognize light as a form of energy with everyday uses, applications, and sources.	5S-FME 5	The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include a) traverse waves; b) the visible spectrum; c) opaque, transparent, and translucent; d) reflection of light from reflective surfaces; e) refraction of light through water and prisms.	<a href="#">Visible Light</a>	Classification (SCI-CLASS)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 14	Recognize that objects, animals, and plants are made of smaller parts and identify various parts visible to the naked eye.	5S-FME 5	The student will investigate and understand that matter is anything that has mass and takes up space; and occurs as a solid, liquid, or gas. Key concepts include a) distinguishing properties of each phase of matter; b) the effect of temperature on the phases of matter; c) atoms and elements; d) molecules, and compounds; e) mixtures including solutions	<a href="#">Can You Eat Matter?</a> <a href="#">Excavation Station Force, Motion, Energy and Matter</a>	Chemical reactions (SCI-CHEM)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 15	Recognize when substances are mixed.	5S-FME 5	The student will investigate and understand that matter is anything that has mass and takes up space; and occurs as a solid, liquid, or gas. Key concepts include a) distinguishing properties of each phase of matter; b) the effect of temperature on the phases of matter; c) atoms and elements; d) molecules, and compounds; e) mixtures including solutions	<a href="#">Oobleck, Solid, Liquid</a> <a href="#">Puking Pumpkins</a>	Chemical reactions (SCI-CHEM)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 16	Recognize and compare the physical properties of matter in different phases.	5S-FME 5	The student will investigate and understand that matter is anything that has mass, and takes up space; and occurs as a solid, liquid, or gas. Key concepts include a) distinguishing properties of each phase of matter; b) the effect of temperature on the phases of matter; c) atoms and elements; d) molecules, and compounds; e) mixtures including solutions.	<a href="#">Can You Eat Matter?</a> <a href="#">Excavation Station States of Matter Collage</a> <a href="#">Force, Motion, Energy and Matter</a> <a href="#">The Electron Shuffle</a>	Chemical reactions (SCI-CHEM)

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<b>Earth/Space Systems and Earth Resources (ESSER)</b>	S-5 17	Recognize common features of Earth's systems, simple interactions between those features, and the processes that shape Earth.	5S-ESS 6	The student will investigate and understand how Earth's surface is constantly changing. Key concepts include a) identification of rock types; b) the rock cycle and how transformations including between rocks occur; c) Earth history and fossil evidence; d) the basic structure of Earth's interior; e) changes in Earth's crust due to plate tectonics;	<a href="#">Colorful Crayon</a> <a href="#">Rock Cycle</a> <a href="#">Fantastic Fossils</a> <a href="#">Rock Cycles and Transformations</a> <a href="#">Dig Your Way to China</a> <a href="#">Modeling Earth's Interior</a>	Ecology (SCI-ECO)
<b>Earth/Space Systems and Earth Resources (ESSER)</b>	S-5 18	Recognize ways in which people and communities protect Earth's environment and conserve natural resources.	5S-LPS 2f	The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include f) influences of human activity on ecosystems.	<a href="#">Force, Motion, Energy and Matter</a>	Ecology (SCI-ECO)

#### 5<sup>th</sup> Grade Science VESOL to SOL Crosswalk

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Living Systems and Ecosystem Interactions (LSEI)</b>	S-5 1	Recognize that plants need light, air, and water to grow.	4.2a-c	The student will investigate and understand that plants and animals have structures that distinguish (them from one another and play vital roles in their ability to survive). Key ideas include a) the survival of plants and animals depends on photosynthesis; b) plants and animals have (different) structures and processes for obtaining energy; and c) plants and animals have (different) structures and processes for creating offspring.	Classification (SCI-CLASS)
<b>Living Systems and Ecosystem Interactions (LSEI)</b>	S-5 2	Recognize that living organisms have unique structures that help them obtain what they need to grow and survive.	4.2a-c	The student will investigate and understand that plants and animals have structures that distinguish (them from one another and play vital roles in their ability to survive). Key ideas include a) the survival of plants and animals depends on photosynthesis; b) plants and animals have (different) structures and processes for obtaining energy; and c) plants and animals have (different) structures and processes for creating offspring.	Classification (SCI-CLASS)

<b>Reporting Category</b>	<b>VESOL ID</b>	<b>Virginia Essentialized Standard of Learning</b>	<b>SOL ID</b>	<b>Virginia Standard of Learning</b>	<b>Applied Studies Competencies</b>
<b>Living Systems and Ecosystem Interactions (LSEI)</b>	S-5 3	Recognize ways in which living organisms interact with other living organisms and non-living parts of an ecosystem.	4.3a-d	The student will investigate and understand that organisms, including humans, interact with one another and with the nonliving components in the ecosystem. Key ideas include a) interrelationships exist in populations, communities, and ecosystems; b) food webs show the flow of energy within an ecosystem; c) changes in an organism's niche and habitat may occur at various stages in its life cycle; and d) classification can be used to identify organisms.	Weather (SCI-WEA)
<b>Earth/Space Systems and Earth Resources (ESSER)</b>	S-5 4	Recognize different types of weather conditions and their characteristics.	4.4a-c	The student will investigate and understand that weather conditions and phenomena affect ecosystems and can be predicted. Key ideas include a) weather measurements create a record that can be used to make weather predictions; b) common and extreme weather events affect ecosystems; and c) long-term seasonal weather trends determine the climate of a region.	None
<b>Earth/Space Systems and Earth Resources (ESSER)</b>	S-5 5	Recognize and compare objects in the solar system and their features.	4.5a-c	The student will investigate and understand that the planets have characteristics and a specific place in the solar system. Key ideas include a) planets rotate on their axes and revolve around the sun; b) planets have characteristics and a specific order in the solar system; and c) the sizes of the sun and planets can be compared to one another.	None
<b>Earth/Space Systems and Earth Resources (ESSER)</b>	S-5 6	Recognize the relationships between Earth, the moon, and the sun.	4.6a-d	The student will investigate and understand that there are relationships among Earth, the moon, and the sun. Key relationships include a) the motions of Earth, the moon, and the sun; b) the causes for Earth's seasons; c) the causes for the four major phases of the moon and the relationship to the tide cycles; and d) the relative size, position, age and makeup of Earth, the moon, and the sun.	None



<b>Reporting Category</b>	<b>VESOL ID</b>	<b>Virginia Essentialized Standard of Learning</b>	<b>SOL ID</b>	<b>Virginia Standard of Learning</b>	<b>Applied Studies Competencies</b>
<b>Earth/Space Systems and Earth Resources (ESSER)</b>	S-5 7	Recognize that the sun provides the Earth with light and energy.	4.6a-d	The student will investigate and understand that there are relationships among Earth, the moon, and the sun. Key relationships include a) the motions of Earth, the moon, and the sun; b) the causes for Earth's seasons; c) the causes for the four major phases of the moon and the relationship to the tide cycles; and d) the relative size, position, age and makeup of Earth, the moon, and the sun.	None
<b>Earth/Space Living Systems and Ecosystem Interactions (LSEI)</b>	S-5 8	Recognize oceans and identify the organisms that live in them.	4.7a-c	The student will investigate and understand that the ocean environment has characteristics. Key characteristics include a) geology of the ocean floor; b) physical properties and movement of ocean water; and c) interaction of organisms in the ocean.	Ecology (SCI-ECO)
<b>Earth/Space Systems and Earth Resources (ESSER)</b>	S-5 9	Recognize natural resources, including those important in Virginia, in connection with their common use and origin.	4.8a-d	The student will investigate and understand that Virginia has important natural resources. Key resources include a) watersheds and water; b) plants and animals; c) minerals, rocks, and ores; and d) forests, soil, and land.	None
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 10	Recognize objects in motion and changes in motion due to force.	5.3a-e	The student will investigate and understand that there is a relationship between force and energy of moving objects. Key ideas include a) moving objects have kinetic energy; b) motion is described by an object's direction and speed; c) changes in motion are related to net force and mass; d) when objects collide, the contact forces transfer energy and can change objects' motion; and e) friction is a force that opposes motion	Chemical reactions (SCI-CHEM)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 11	Recognize electricity as a form of energy with everyday uses, applications, and sources.	5.4a-e	The student will investigate and understand that electricity is transmitted and used in daily life. Key ideas include a) electricity flows easily through conductors but not insulators; b) electricity flows through closed circuits; c) static electricity can be generated by rubbing certain materials together; d) electrical energy can be transformed into radiant, mechanical, and thermal energy; and e) a current flowing through a wire creates a magnetic field.	Safety (SCI-SAFETY)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 12	Recognize sound as a form of energy with everyday uses, applications, and sources.	5.5a-d	The student will investigate and understand that sound can be produced and transmitted. Key ideas include a) sound is produced when an object or substance vibrates; b) sound is the transfer of energy; c) different media transmit sound differently; and d) sound waves have many uses and applications.	Classification (SCI-CLASS)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 13	Recognize light as a form of energy with everyday uses, applications, and sources.	5.6a-d	The student will investigate and understand that visible light has certain characteristics and behaves in predictable ways. Key ideas include a) visible light is radiant energy that moves in transverse waves; b) the visible spectrum includes light with different wavelengths; c) matter influences the path of light; and d) radiant energy can be transformed into thermal, mechanical, and electrical energy.	Classification (SCI-CLASS)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 14	Recognize that objects, animals, and plants are made of smaller parts and identify various parts visible to the naked eye.	5.7a-c	The student will investigate and understand that matter has properties and interactions. Key ideas include a) matter is composed of atoms; b) substances can be mixed together without changes in their physical properties; and c) energy has an effect on the phases of matter.	Chemical reactions (SCI-CHEM)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 15	Recognize when substances are mixed.	5.7a-c	The student will investigate and understand that matter has properties and interactions. Key ideas include a) matter is composed of atoms; b) substances can be mixed together without changes in their physical properties; and c) energy has an effect on the phases of matter.	Chemical reactions (SCI-CHEM)

<b>Reporting Category</b>	<b>VESOL ID</b>	<b>Virginia Essentialized Standard of Learning</b>	<b>SOL ID</b>	<b>Virginia Standard of Learning</b>	<b>Applied Studies Competencies</b>
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-5 16	Recognize and compare the physical properties of matter in different phases.	5.7a-c	The student will investigate and understand that matter has properties and interactions. Key ideas include a) matter is composed of atoms; b) substances can be mixed together without changes in their physical properties; and c) energy has an effect on the phases of matter.	Ecology (SCI-ECO)
<b>Earth/Space Systems and Earth Resources (ESSER)</b>	S-5 17	Recognize common features of Earth's systems, simple interactions between those features, and the processes that shape Earth.	5.8a-e	The student will investigate and understand that Earth constantly changes. Key ideas include a) Earth's internal energy causes movement of material within the Earth; b) plate tectonics describe movement of the crust; c) the rock cycle models the transformation of rocks; d) processes such as weathering, erosion, and deposition change the surface of the Earth; and e) fossils and geologic patterns provide evidence of Earth's change.	Ecology (SCI-ECO)
<b>Earth/Space Systems and Earth Resources (ESSER)</b>	S-5 18	Recognize ways in which people and communities protect Earth's environment and conserve natural resources.	5.9a-c	The student will investigate and understand that the conservation of energy resources is important. Key ideas a) include some sources of energy are considered renewable and others are not; b) individuals and communities have means of conserving both energy and matter; and c) advances in technology improve the ability to transfer and transform energy.	Classification (SCI-CLASS)

8<sup>th</sup> Grade Science VESOL to ASOL Crosswalk

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
Earth and Space Systems (ESS)	S-8 1	Recognize and compare objects in the solar system and their features.	8S-ESS 5	The student will investigate and understand the organization of the solar system and the interactions among the various bodies that comprise it. Key concepts include a) the sun, moon, Earth, other planets and their moons, dwarf planets, meteors, asteroids, and comets; b) relative size of and distance between planets; c) the role of gravity; d) revolution and rotation; e) the mechanics of day and night and the phases of the moon; f) the unique properties of Earth as a planet g) the relationship of Earth's tilt and the seasons; h) the cause of tides; i) the history and technology of space exploration.	<a href="#">Convection Currents and Thermal Energy</a>	Ecology (SCI-ECO)
Earth and Space Systems (ESS)	S-8 2	Recognize that gravity influences the way objects move on Earth and in space.	8S-ESS 5	The student will investigate and understand the organization of the solar system and the interactions among the various bodies that comprise it. Key concepts include a) the sun, moon, Earth, other planets and their moons, dwarf planets, meteors, asteroids, and comets; b) relative size of and distance between planets; c) the role of gravity; d) revolution and rotation; e) the mechanics of day and night and the phases of the moon; f) the unique properties of Earth as a planet g) the relationship of Earth's tilt and the seasons; h) the cause of tides; i) the history and technology of space exploration.	<a href="#">Energy Transformations</a>	Ecology (SCI-ECO)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
<b>Earth and Space Systems (ESS)</b>	S-8 3	Recognize that the sun provides Earth with light and energy.	8S-ESS 5	The student will investigate and understand the organization of the solar system and the interactions among the various bodies that comprise it. Key concepts include a) the sun, moon, Earth, other planets and their moons, dwarf planets, meteors, asteroids, and comets; b) relative size of and distance between planets; c) the role of gravity; d) revolution and rotation; e) the mechanics of day and night and the phases of the moon; f) the unique properties of Earth as a planet; g) the relationship of Earth's tilt and the seasons; h) the cause of tides; and i) the history and technology of space exploration.	<a href="#">Cloud Formation</a>	Ecology (SCI-ECO)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 4	Recognize temperature as a measure of how hot or cold matter is and that thermal energy is transferable.	8S-FME1	The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include a) potential and kinetic energy; b) the role of the sun in the formation of most energy sources on Earth; c) nonrenewable energy sources; d) renewable energy sources; and e) energy transformations.	<a href="#">Modeling the Atom</a>	Ecology (SCI-ECO)

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<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 5	Recognize water phases and how water changes its phase through the water cycle.	8S-ESS 3	The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include a) water as the universal solvent; b) the properties of water in all three phases; c) the action of water in physical and chemical weathering; d) the ability of large bodies of water to store thermal energy and moderate climate; e) the importance of water for agriculture, power generation, and public health; and f) the importance of protecting and maintaining water resources.	<a href="#">Solar System Model</a>	Ecology (SCI-ECO)
<b>Earth and Space Systems (ESS)</b>	S-8 6	Recognize different types of weather conditions and their characteristics.	8S-ESS 4	The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. Key concepts include a) air as a mixture of gaseous elements and compounds; b) pressure, temperature, and humidity; c) atmospheric changes with altitude; d) natural and human-caused changes to the atmosphere and the importance of protecting and maintaining air quality; e) the relationship of atmospheric measures and weather conditions; and f) basic information from weather maps, including fronts, systems, and basic measurements.	<a href="#">Water Quality</a>	Ecology (SCI-ECO)

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<b>Life Systems and Ecosystems (LSE)</b>	S-8 7	Recognize common features of watersheds and why they are important in Virginia.	8S-ECO 1	The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include a) the health of ecosystems and the abiotic factors of a watershed; b) the location and structure of Virginia's regional watershed systems; c) divides, tributaries, river systems, and river and stream processes; d) wetlands; e) estuaries; f) major conservation, health, and safety issues associated with watersheds; g) water monitoring and analysis using field equipment including hand-held technology.	None	Ecology (SCI-ECO)
<b>Earth and Space Systems (ESS)</b>	S-8 8	Recognize ways in which people and communities use and impact Earth's environment and resources.	8S-ESS 6	The student will investigate and understand public policy decisions relating to the environment. Key concepts include a) management of renewable resources; b) management of nonrenewable resources; c) the mitigation of land-use and environmental hazards through preventive measures; and d) cost/benefit tradeoffs in conservation policies.	<a href="#">Conservation and Environmental Agencies</a>	Ecology (SCI-ECO)
<b>Earth and Space Systems (ESS)</b>	S-8 9	Recognize different materials humans use that come from Earth's natural resources.	8S-ESS 6	The student will investigate and understand public policy decisions relating to the environment. Key concepts include a) management of renewable resources; b) management of nonrenewable resources; c) the mitigation of land-use and environmental hazards through preventive measures; and d) cost/benefit tradeoffs in conservation policies.	<a href="#">Conservation of Water</a>	Ecology (SCI-ECO)

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Life Systems and Ecosystems (LSE)	S-8 10	Recognize that animals and plants have characteristics related to different functions which can be used to tell these organisms apart.	8S-LS 2	The student will investigate and understand that living things show patterns of cellular organization. Key concepts include a) cells, tissues, organs, and systems; and b) patterns of cellular organization and their relationship to life processes in living things.	<a href="#">Levels of Cellular Organization</a>	Classification (SCI-CLASS)
Life Systems and Ecosystems (LSE)	S-8 11	Recognize that plants need light, air, and water to grow through a process called photosynthesis.	8S-LS 4	The student will investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plant and animal life. Key concepts include a) energy transfer between sunlight and chlorophyll; b) transformation of water and carbon dioxide into sugar and oxygen; and c) photosynthesis as the foundation of virtually all food webs.	<a href="#">Classification of Organisms</a>	Classification (SCI-CLASS)
Life Systems and Ecosystems (LSE)	S-8 12	Recognize that living organisms need food to obtain energy and grow.	8S-LS 4	The student will investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plant and animal life. Key concepts include a) energy transfer between sunlight and chlorophyll; b) transformation of water and carbon dioxide into sugar and oxygen; and c) photosynthesis as the foundation of virtually all food webs.	<a href="#">Animal Phyla and Plant Divisions</a>	Classification (SCI-CLASS)
Life Systems and Ecosystems (LSE)	S-8 13	Recognize ways in which living organisms interact with other living organisms and non-living parts of an ecosystem.	8S-ECO 3	The student will investigate and understand that interactions exist among members of a population. Key concepts include a) competition, cooperation, social hierarchy, territorial imperative; and b) influence of behavior on a population.	<a href="#">Freshwater Food Chains</a>	Classification (SCI-CLASS)



Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
Life Systems and Ecosystems (LSE)	S-8 14	Recognize traits that help living organisms adapt and survive.	8S-ECO 5	The student will investigate and understand how organisms adapt to biotic and abiotic factors in an ecosystem. Key concepts include a) differences between ecosystems and biomes; b) characteristics of land, marine, and freshwater ecosystems; and c) adaptations that enable organisms to survive within a specific ecosystem.	<a href="#">A Salt Marsh Ecosystem</a>	Ecology (SCI-ECO)
Life Systems and Ecosystems (LSE)	S-8 15	Recognize living organisms in an ecosystem, the resources available in that ecosystem, and how changes in resources (i.e., food, water, shelter, habitat) affect the growth of their population.	8S-ECO 6	The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. Key concepts include a) phototropism, hibernation, and dormancy; b) factors that increase or decrease population size; and c) eutrophication, climate changes, and catastrophic disturbances.	<a href="#">A Designed Organism</a>	None
Life Systems and Ecosystems (LSE)	S-8 16	Recognize that reproduction produces offspring with similar though varied traits.	8S-LS 5	The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key concepts include a) the structure and role of DNA; b) the function of genes and chromosomes; c) genotypes and phenotypes; d) characteristics that can and cannot be inherited; e) genetic engineering and its applications; and f) historical contributions and significance of discoveries related to genetics.	<a href="#">A-Mazing Plants</a>	None

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
<b>Life Systems and Ecosystems (LSE)</b>	S-8 17	Recognize anatomically similar organisms.	8S-LS 5	The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key concepts include a) the structure and role of DNA; b) the function of genes and chromosomes; c) genotypes and phenotypes; d) characteristics that can and cannot be inherited; e) genetic engineering and its applications; and f) historical contributions and significance of discoveries related to genetics.	<a href="#">Changes in Ecosystems</a>	None
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 18	Recognize that objects, animals, and plants are made of smaller parts and identify various seen and unseen parts.		The student will investigate and understand the modern and historical models of atomic structure. Key concepts include a) the contributions of Dalton, Thomson, Rutherford, and Bohr in understanding the atom; and b) the modern model of atomic structure.	<a href="#">The Particle Theory of Matter</a>	None
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 19	Recognize and measure the physical and chemical properties of matter including before or after a physical or chemical change occurs.	8S-FME 5	The student will investigate and understand the nature of matter. Key concepts include a) the particle theory of matter; b) elements, compounds, mixtures, acids, bases, and salts; c) solids, liquids, and gases; d) physical properties; e) chemical properties; and f) characteristics of types of matter based on physical and chemical properties.	<a href="#">Historical Models of Atoms</a>	None
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 20	Recognize basic forms of energy and that energy is transferred and transformed.	8S-ESS 1	The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include b) the role of the sun in the formation of most energy sources on Earth c) nonrenewable energy sources d) renewable energy sources	<a href="#">Wind Turbine</a>	Safety (SCI-Safety)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 21	Recognize objects in motion involving actions and reactions.	8S-FME 1	The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include a) potential and kinetic energy e) energy transformations.	<a href="#">Become a Scientist</a> <a href="#">Electron shuffle</a>	None
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 22	Recognize that the force, mass, and motion of objects are related and comparable.	8S-FME 1	The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include a) potential and kinetic energy e) energy transformations.	<a href="#">Become a Scientist</a>	None

### 8<sup>th</sup> Grade Science VESOL to SOL Crosswalk

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Earth and Space Systems (ESS)</b>	S-8 1	Recognize and compare objects in the solar system and their features.	6.2a-d	The student will investigate and understand that the solar system (is organized and the various bodies in the solar system interact) Key ideas include a) matter (is distributed throughout) the solar system; b) planets (have different sizes and) orbit at (different distances from the sun); c) gravity (contributes to) orbital motion; and d) the understanding of the solar system has developed over time.	Ecology (SCI-ECO)
<b>Earth and Space Systems (ESS)</b>	S-8 2	Recognize that gravity influences the way objects move on Earth and in space.	6.2a-d	The student will investigate and understand that the solar system (is organized and the various bodies in the solar system interact) Key ideas include a) matter (is distributed throughout) the solar system; b) planets (have different sizes and) orbit at (different distances from the sun); c) gravity (contributes to) orbital motion; and d) the understanding of the solar system has developed over time.	Ecology (SCI-ECO)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Earth and Space Systems (ESS)</b>	S-8 3	Recognize that the sun provides Earth with light and energy.	6.3a-e	The student will investigate and understand that there is a relationship between the sun, Earth, and the moon. Key ideas include a) Earth has unique properties; b) the rotation of Earth (in relationship to the sun causes) day and night; c) the movement of Earth and the moon in relationship to the sun causes phases of the moon; d) Earth's tilt as it revolves around the sun causes the seasons; and e) the relationship between Earth and the moon (is the primary cause of) tides.	Ecology (SCI-ECO)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 4	Recognize temperature as a measure of how hot or cold matter is and that thermal energy is transferable.	6.4a-d	The student will investigate and understand that there are basic sources of energy, and that energy can be transformed. Key ideas include a) the sun is (important in the formation of most) energy sources on Earth; b) Earth's energy budget relates to living systems and Earth's processes; c) radiation, conduction, and convection distribute energy; and d) energy transformations are important in energy usage.	Ecology (SCI-ECO)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 5	Recognize water phases and how water changes its phase through the water cycle.	6.6a-f	The student will investigate and understand that water has (unique physical properties and has a role) in the natural and human-made environment. Key ideas include a) water is referred to as the universal solvent; b) water has specific properties; c) thermal energy has a role in phase changes; d) water has a role in weathering; e) large bodies of water moderate climate; and f) water (is important for) agriculture, power generation, and public health.	Ecology (SCI-ECO)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Earth and Space Systems (ESS)</b>	S-8 6	Recognize different types of weather conditions and their characteristics.	6.7a-f	The student will investigate and understand that air has properties and that Earth's atmosphere has (structure and is dynamic). Key ideas include a) air is a mixture of gaseous elements and compounds; b) the atmosphere has physical characteristics; c) properties of the atmosphere change with altitude; d) there is a relationship between air movement, thermal energy, and weather conditions; e) atmospheric measures are used to predict weather conditions; and f) weather maps give basic information about fronts, systems, and weather measurements.	Ecology (SCI-ECO)
<b>Life Systems and Ecosystems (LSE)</b>	S-8 7	Recognize common features of watersheds and why they are important in Virginia.	6.8a-d	The student will investigate and understand that land and water have roles in watershed systems. Key ideas include a) a watershed is composed of the land that drains into a body of water; b) Virginia is composed of multiple watershed systems which have specific features; c) the Chesapeake Bay is an estuary that has many important functions; and d) natural processes, human activities, and biotic and abiotic factors influence the health of a watershed system.	Ecology (SCI-ECO)
<b>Earth and Space Systems (ESS)</b>	S-8 8	Recognize ways in which people and communities use and impact Earth's environment and resources.	6.9a-f	The student will investigate and understand that humans impact the environment and individuals can influence public policy decisions related to energy and the environment. Key ideas include a) natural resources are important to (protect and maintain); b) renewable and nonrenewable (resources can be managed); c) major health and safety issues (are associated with) air and water quality; d) major health and safety (issues are related to different forms of energy); e) preventive measures can protect land-use and reduce environmental hazards; and f) there are cost/benefit tradeoffs in conservation policies.	Ecology (SCI-ECO)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Earth and Space Systems (ESS)</b>	S-8 9	Recognize different materials humans use that come from Earth's natural resources.	6.9a-f	The student will investigate and understand that humans impact the environment and individuals can influence public policy decisions related to energy and the environment. Key ideas include a) natural resources are important to (protect and maintain); b) renewable and nonrenewable (resources can be managed); c) major health and safety issues (are associated with) air and water quality; d) major health and safety (issues are related to different forms of energy); e) preventive measures can protect land-use and reduce environmental hazards; and f) there are cost/benefit tradeoffs in conservation policies.	Ecology (SCI-ECO)
<b>Life Systems and Ecosystems (LSE)</b>	S-8 10	Recognize that animals and plants have characteristics related to different functions which can be used to tell these organisms apart.	LS.3a-c	The student will investigate and understand that there are levels of structural organization in living things. Key ideas include a) patterns of cellular organization support life processes; b) unicellular and multicellular organisms have comparative structures; and c) similar characteristics determine the classification of organisms.	Classification (SCI-CLASS)
<b>Life Systems and Ecosystems (LSE)</b>	S-8 11	Recognize that plants need light, air, and water to grow through a process called photosynthesis.	LS.4a-b	The student will investigate and understand that there are chemical processes of energy transfer which are important for life. Key ideas include a) photosynthesis is the foundation of virtually all food webs; and b) photosynthesis and cellular respiration support life processes.	Classification (SCI-CLASS)
<b>Life Systems and Ecosystems (LSE)</b>	S-8 12	Recognize that living organisms need food to obtain energy and grow.	LS.4a-b	The student will investigate and understand that there are chemical processes of energy transfer which are important for life. Key ideas include a) photosynthesis is the foundation of virtually all food webs; and b) photosynthesis and cellular respiration support life processes.	Classification (SCI-CLASS)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
Life Systems and Ecosystems (LSE)	S-8 13	Recognize ways in which living organisms interact with other living organisms and non-living parts of an ecosystem.	LS.6a-d	The student will investigate and understand that populations in a biological community interact and are interdependent. Key ideas include a) relationships exist between predators and prey and these relationships are modeled in food webs; b) the availability and use of resources may lead to competition and cooperation; c) symbiotic relationships support the survival of different species; and d) the niche of each organism supports survival.	Classification (SCI-CLASS)
Life Systems and Ecosystems (LSE)	S-8 14	Recognize traits that help living organisms adapt and survive.	LS.7a-b	The student will investigate and understand that adaptations support an organism's survival in an ecosystem. Key ideas include a) biotic and abiotic factors define land, marine, and freshwater ecosystems; and b) physical and behavioral characteristics enable organisms to survive within a specific ecosystem.	Ecology (SCI-ECO)
Life Systems and Ecosystems (LSE)	S-8 15	Recognize living organisms in an ecosystem, the resources available in that ecosystem, and how changes in resources (i.e., food, water, shelter, habitat) affect the growth of their population.	LS.8a-c	The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic and change over time. Key ideas include a) organisms respond to daily, seasonal, and long-term changes; b) changes in the environment may increase or decrease population size; and c) large-scale changes such as eutrophication, climate changes, and catastrophic disturbances affect ecosystems.	None
Life Systems and Ecosystems (LSE)	S-8 16	Recognize that reproduction produces offspring with similar though varied traits.	LS.10a-c	The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key ideas include a) DNA has a role in making proteins that determine organism traits; b) the role of meiosis is to transfer traits to the next generation; and c) Punnett squares are mathematical models used to predict the probability of traits in offspring.	None

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Life Systems and Ecosystems (LSE)</b>	S-8 17	Recognize anatomically similar organisms.	LS.10a-c	The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key ideas include a) DNA has a role in making proteins that determine organism traits; b) the role of meiosis is to transfer traits to the next generation; and c) Punnett squares are mathematical models used to predict the probability of traits in offspring.	None
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 18	Recognize that objects, animals, and plants are made of smaller parts and identify various seen and unseen parts.	PS.2a-c	The student will investigate (and understand that) matter is composed of atoms. Key ideas include a) our understanding (of atoms) has developed (over time); b) the periodic table (can be used to) predict (the chemical and physical) properties of matter; and c) the kinetic molecular theory (is used to) predict and explain matter interactions.	None
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 19	Recognize and measure the physical and chemical properties of matter including before or after a physical or chemical change occurs.	PS.3a-d	The student will investigate and understand that matter has properties and is conserved in chemical and physical processes. Key ideas include a) pure substances can be identified based on their chemical and physical properties; b) pure substances can undergo physical and chemical changes that may result in a change of properties; c) compounds form through ionic and covalent bonding; and d) balanced chemical equations model the conservation of matter.	None
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 20	Recognize basic forms of energy and that energy is transferred and transformed.	PS.5a-c	The student will investigate and understand that energy is conserved. Key ideas include a) energy can be stored in different ways; b) energy is transferred and transformed; and c) energy can be transformed to meet societal needs.	Safety (SCI-SAFETY)
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 21	Recognize objects in motion involving actions and reactions.	PS.8a-b	The student will investigate and understand that work, force, and motion are related. Key ideas include a) motion can be described using position and time; and b) motion is described by Newton's laws.	None
<b>Force, Motion, Energy, and Matter (FMEM)</b>	S-8 22	Recognize that the force, mass, and motion of objects are related and comparable.	PS.8a-b	The student will investigate and understand that work, force, and motion are related. Key ideas include a) motion can be described using position and time; and b) motion is described by Newton's laws.	None



High School Science VESOL to ASOL Crosswalk

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
Life at the Molecular/ Cellular and Systems/ Organisms Levels (LMCSOL)	S-HS 1	Recognize that humans and animals need oxygen to breathe, water to drink, and food to eat in order to grow and obtain energy	8S-LS 2 extended	The student will investigate and understand that living things show patterns of cellular organization. Key concepts include a) cells, tissues, organs, and systems; b) patterns of cell organization and their relationship to life processes in living things	<a href="#">Life Systems: Animals Vs. Plants</a>	Classification (SCI-CLASS)
Life at the Molecular/ Cellular and Systems/ Organisms Levels (LMCSOL)	S-HS 2	Recognize that plants need light, air, and water to grow and create energy through photosynthesis.	8S-LS 4 extended	The student will investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plant and animal life. Key concepts include a) energy transfer between sunlight and chlorophyll; b) transformation of water and carbon dioxide into sugar and oxygen; c) photosynthesis as the foundation of virtually all food webs	<a href="#">Photostatic Overview</a>	Classification (SCI-CLASS)
Life at the Molecular/ Cellular and Systems/ Organisms Levels (LMCSOL)	S-HS 3	Recognize that bacteria and viruses have an impact on human health and that people can take simple steps to support health and wellness.	None	None	None	Safety and Health (IND-SAFETY)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
<b>Life at the Molecular/ Cellular and Systems/ Organisms Levels (LMCSOL)</b>	S-HS 4	Recognize that reproduction produces offspring with similar, though varied, traits.	8S-LS 5	The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key concepts include a) the structure and role of DNA; b) the function of genes and chromosomes; c) genotypes and phenotypes; d) characteristics that can and cannot be inherited; e) genetic engineering and its applications; f) historical contributions and significance of discoveries related to genetics.	None	None
<b>Life at the Molecular/ Cellular and Systems/ Organisms Levels (LMCSOL)</b>	S-HS 5	Recognize and compare plants and animals and the ways in which their unique structures and behaviors are connected to their functions.	8S-LS 3 extended	The student will investigate and understand how organisms can be classified. Key concepts include a) the distinguishing characteristics of domains of organisms; b) the distinguishing characteristics of kingdoms of organisms; c) the distinguishing characteristics of major animal phyla and plant divisions; d) the characteristics that define a species	<a href="#">Classroom Categorization</a>	Classification (SCI-CLASS)
<b>Interactions of Life Forms and Ecosystem Dynamics (ILFED)</b>	S-HS 6	Recognize that animals have traits that help them reproduce and survive and those with advantageous traits are more likely to reproduce and survive.	8S-LS 6	The student will investigate and understand that populations of organisms change over time. Key concepts include a) the relationships of mutation, adaptation, natural selection, and extinction.	<a href="#">Adaptation and Evolution</a>	Ecology (SCI-ECO)
<b>Interactions of Life Forms and Ecosystem Dynamics (ILFED)</b>	S-HS 7	Recognize ways in which living organisms' traits help them adapt to and survive their environment.	8S-ESS 7	The student will investigate and understand that populations of organisms change over time. Key concepts include b) evidence of evolution of different species in the fossil record; c) how environmental influences, as well as genetic variation, can lead to diversity of organisms.	<a href="#">Adaptation and Evolution</a>	Ecology (SCI-ECO)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
<b>Interactions of Life Forms and Ecosystem Dynamics (ILFED)</b>	S-HS 8	Recognize resources and factors that affect living organisms and how living organisms respond to changes within their ecosystem.	8S-ECO 2	The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include a) the carbon, water, and nitrogen cycles; b) interactions resulting in a flow of energy and matter throughout the system; c) complex relationships within terrestrial, freshwater, and marine ecosystems; d) energy flow in food webs and energy pyramids.	<a href="#">Succession</a>	Ecology (SCI-ECO)
<b>Interactions of Life Forms and Ecosystem Dynamics (ILFED)</b>	S-HS 9	Recognize ways in which living organisms interact with other living and non-living parts of environments and ecosystems, and how interactions might change under different conditions.	8S-ECO 4	The student will investigate and understand interactions among populations in a biological community. Key concepts include a) the relationships among producers, consumers, and decomposers in food webs; b) the relationship between predators and prey; c) competition and cooperation; d) symbiotic relationships; e) niches.	<a href="#">Succession</a>	Ecology (SCI-ECO)

#### High School Science VESOL to SOL Crosswalk

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Life at the Molecular/ Cellular and Systems/ Organisms Levels (LMCSOL)</b>	S-HS 1	Recognize that humans and animals need oxygen to breathe, water to drink, and food to eat in order to grow and obtain energy.	BIO.2a-e	The student will investigate and understand that chemical and biochemical processes are essential for life. Key ideas include a) water chemistry has an influence on life processes; b) macromolecules have roles in maintaining life processes; c) enzymes have a role in biochemical processes; d) protein synthesis is the process of forming proteins which influences inheritance and evolution; and e) the processes of photosynthesis and respiration include the capture, storage, transformation, and flow of energy.	Classification (SCI-CLASS)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Life at the Molecular/ Cellular and Systems/ Organisms Levels (LMCSOL)</b>	S-HS 2	Recognize that plants need light, air, and water to grow and create energy through photosynthesis.	BIO.2a-e	The student will investigate and understand that chemical and biochemical processes are essential for life. Key ideas include a) water chemistry has an influence on life processes; b) macromolecules have roles in maintaining life processes; c) enzymes have a role in biochemical processes; d) protein synthesis is the process of forming proteins which influences inheritance and evolution; and e) the processes of photosynthesis and respiration include the capture, storage, transformation, and flow of energy.	Classification (SCI-CLASS)
<b>Life at the Molecular/ Cellular and Systems/ Organisms Levels (LMCSOL)</b>	S-HS 3	Recognize that bacteria and viruses have an impact on human health and that people can take simple steps to support health and wellness.	BIO.4a-e	The student will investigate and understand that bacteria and viruses have an effect on living systems. Key ideas include a) viruses depend on a host for metabolic processes; b) the modes of reproduction/replication can be compared; c) the structures and functions can be compared; d) bacteria and viruses have a role in other organisms and the environment; and e) the germ theory of infectious disease is supported by evidence.	Safety and Health (IND-SAFETY)
<b>Life at the Molecular/ Cellular and Systems/ Organisms Levels (LMCSOL)</b>	S-HS 4	Recognize that reproduction produces offspring with similar, though varied, traits.	BIO.5a-b	The student will investigate and understand that there are common mechanisms for inheritance. Key ideas include a) DNA has structure and is the foundation for protein synthesis; b) the structural model of DNA has developed over time; c) the variety of traits in an organism are the result of the expression of various combinations of alleles; d) meiosis has a role in genetic variation between generations; and e) synthetic biology has biological and ethical implications.	None

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Life at the Molecular/ Cellular and Systems/ Organisms Levels (LMCSOL)</b>	S-HS 5	Recognize and compare plants and animals and the ways in which their unique structures and behaviors are connected to their functions.	BIO.6a-f	The student will investigate and understand that modern classification systems can be used as organizational tools for scientists in the study of organisms. Key ideas include a) organisms have structural and biochemical similarities and differences; b) fossil record interpretation can be used to classify organisms; c) developmental stages in different organisms can be used to classify organisms; d) Archaea, Bacteria, and Eukarya are domains based on characteristics of organisms; e) the functions and processes of protists, fungi, plants, and animals allow for comparisons and differentiation within the Eukarya kingdoms; and f) systems of classification are adaptable to new scientific discoveries.	Classification (SCI-CLASS)
<b>Interactions of Life Forms and Ecosystem Dynamics (ILFED)</b>	S-HS 6	Recognize that animals have traits that help them reproduce and survive and those with advantageous traits are more likely to reproduce and survive.	BIO.7a-d	The student will investigate and understand that populations change through time. Key ideas include a) evidence is found in fossil records and through DNA analysis; b) genetic variation, reproductive strategies, and environmental pressures affect the survival of populations; c) natural selection is a mechanism that leads to adaptations and may lead to the emergence of new species; and d) biological evolution has scientific evidence and explanations.	Ecology (SCI-ECO)
<b>Interactions of Life Forms and Ecosystem Dynamics (ILFED)</b>	S-HS 7	Recognize ways in which living organisms' traits help them adapt to and survive their environment.	BIO.7a-d	The student will investigate and understand that populations change through time. Key ideas include a) evidence is found in fossil records and through DNA analysis; b) genetic variation, reproductive strategies, and environmental pressures affect the survival of populations; c) natural selection is a mechanism that leads to adaptations and may lead to the emergence of new species; and d) biological evolution has scientific evidence and explanations.	Ecology (SCI-ECO)

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	SOL ID	Virginia Standard of Learning	Applied Studies Competencies
<b>Interactions of Life Forms and Ecosystem Dynamics (ILFED)</b>	S-HS 8	Recognize resources and factors that affect living organisms and how living organisms respond to changes within their ecosystem.	BIO.8a-d	The student will investigate and understand that there are dynamic equilibria within populations, communities, and ecosystems. Key ideas include a) interactions within and among populations include carrying capacities, limiting factors, and growth curves; b) nutrients cycle with energy flow through ecosystems; c) ecosystems have succession patterns; and d) natural events and human activities influence local and global ecosystems and may affect the flora and fauna of Virginia.	Ecology (SCI-ECO)
<b>Interactions of Life Forms and Ecosystem Dynamics (ILFED)</b>	S-HS 9	Recognize ways in which living organisms interact with other living and non-living parts of environments and ecosystems, and how interactions might change under different conditions.	BIO.8a-d	The student will investigate and understand that there are dynamic equilibria within populations, communities, and ecosystems. Key ideas include a) interactions within and among populations include carrying capacities, limiting factors, and growth curves; b) nutrients cycle with energy flow through ecosystems; c) ecosystems have succession patterns; and d) natural events and human activities influence local and global ecosystems and may affect the flora and fauna of Virginia.	Ecology (SCI-ECO)