Diocese of Boise: Catholic Curriculum Standards for Science, Grades K-8

Basic Principles underlying All Standards to be used for the Planning of Curriculum for the Diocese of Boise

Basic principles which inform all Catholic education in the Schools of the Diocese of Boise:

- All knowledge, in some way, reflects God's Truth, Beauty and Goodness.
- Curriculum and instruction enable deeper incorporation of the children into the Church, the formation of community within the school; and respect for the uniqueness and dignity of each person as created in the image of God.
- Education fosters growth in Christian virtue and contributes to development and formation of the whole person in light of his/her ultimate end and the good of the society of which he/she is a member.
- Each subject is to be examined in the context of the Catholic faith and is to be illuminated by Gospel values.
- Learning and formation occur in the Catholic school without separation as does the development of each student on both the natural and supernatural levels.
- Curriculum and instruction seeks to promote a synthesis of faith, life and culture and to form students as disciples of Jesus.

DIOCESE OF BOISE
CATHOLIC SCHOOL
STANDARDS FOR SCIENCE

Science is a gift of human intellect, which is given to us by God to help us understand His Creation. Science is the study of interdependent relations in our earth's systems and structures that reflect God's truth, beauty, and goodness. These standards are directed toward life, earth, and physical aspects that enable deeper incorporation of children into the Church, the formation of community within the school, and respect for the uniqueness and dignity of each person as created in the image of God recognizing that scientific knowledge is a call to serve.

Life, Earth, and Physical Science foster growth in Christian virtue and develop an appreciation for God's creation and the good of society. Science is developing our stewardship and relationship in all aspects of our faith and Gospel values.

By the very nature of creation, material being is endowed with its own stability, truth and excellence, its own order and laws. We must respect these truths as we recognize the methods proper to every science and technique. *Gaudium et Spes, #36*

In a Catholic school, curricular formation….

1. Involves the integral formation of the whole person, body, mind and spirit, in light of his or her ultimate end and the good of society.
2. Promotes human virtues and the dignity of human person, as created in the image and likeness of God and modeled on the person of Jesus Christ.
3. Seeks to know and understand objective reality which includes transcendent Truth, is knowable by reason and faith, and finds its origin, unity, and end in God.
4. Develops a Catholic worldview and enables a deeper incorporation of the student into the heart of the Catholic Church.
5. Encourages a synthesis of faith, life, and culture.

Kindergarten

CATHOLIC STANDARDS:

- Explain how God created the world and all matter out of nothing and how it manifests His wisdom, glory and purpose. CSIS1
- Exhibit care and concern for each human person at all stages of life as an image and likeness of God. CSGS1
- Realize a sense of wonder and delight about the natural universe and its beauty. CSDS1

Domain	Kindergarten Science Standards
Life ~ From Modules to Organisms: Structures and Processes	• CS IS2: Describe the relationships, elements underlying order, harmony, and meaning in God's creation. • CSIS4: Discuss and give examples of the beauty evident in God's creation • CSIS6: Describe God' relationship with man and nature. • LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive. (Similarities and differences among plants and animals)
Earth & Space Earth's Systems Earth and Human Activity	**Systems** • CSDS2: Share concern and care for the environment as part of God's creation. • CSIS4: Discuss and give examples of the beauty evident in God's creation • CSIS5: Discuss processes of conservation, preservation, overconsumption, and stewardship of creation as caring for that which God has given us to sustain us. • CSIS6: Describe God' relationship with man and nature. • ESS2-1: Use and share observations of local weather conditions to describe patterns over time. • ESS2-2: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs. **Human Activity** • ESS3-1: Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live. • ESS3-2: Communicate solutions that will reduce the impact of humans on land, water air, and/or other living things in the local environment • ESS3-2: Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.
Physical ~ Motion and Stability: Forces and Interactions	**Forces and Interactions** • CSDS3: Realize that nature should not be manipulated simply at man's will or only viewed as a thing to be used, but that man must cooperate with God's plan for himself and for nature. • PS2-1: Plan and conduct an investigation to compare the effects of different strengths or different

Energy	directions of pushes and pulls on the motion of an object. • PS2-2: Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull. **Energy** • CSIS5: Discuss processes of conservation, preservation, overconsumption, and stewardship of creation as caring for that which God has given us to sustain us. • PS3-1: Make observations to determine the effect of sunlight on Earth's surface. • PS3-2: Use tools and materials to design and build a structure that will reduce the global warming effect of sunlight on an area.
Engineering	**Engineering Design**
	• CSIS7: Describe how science and technology should always be at the service of humanity, and ultimately, to God in harmony with His purposes. • CSIS8: Investigate how science properly limits its focus to how things physically exist and is not designed to answer issues of the meaning, the value of things, or the mysteries of the human person. • ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. • ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. • ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

First Grade Science Standards

CATHOLIC STANDARDS:

- Explain how God created the world and all matter out of nothing and how it manifests His wisdom, glory and purpose. CSIS1
- Exhibit care and concern for each human person at all stages of life as an image and likeness of God. CSGS1
- Realize a sense of wonder and delight about the natural universe and its beauty. CSDS1

Domain	First Grade Science Standards
Life ~ From Modules to Organisms: Structures and Processes	**Structures and Processes** • CS IS2: Describe the relationships, elements underlying order, harmony, and meaning in God's creation. • CSIS4: Discuss and give examples of the beauty evident in God's creation • CSIS6: Describe God' relationship with man and nature. • LS1-1: Use observations to describe patterns of what plants and animals (including humans) need to survive. (Similarities and differences among plants and animals) • LS1-1: Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs. • LS1-2: Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. • CSIS3: Explain how creation is an outward sign of God's love and goodness and, therefore, is "sacramental" in nature.
Life ~ Heredity: Inheritance and Variation of Traits	**Inheritance and Variation of Traits** • LS3-1: Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
Earth & Space Earth's Place in the Universe	**Earth's Place in the Universe** • CSIS2: Describe the relationships, elements underlying order, harmony, and meaning in God's creation. • CSIS6: Describe God' relationship with mankind and nature. • ESS1-1: Use observations of the sun, moon, and stars to describe patterns that can be predicted. • ESS1-2: Make observations at different times of year to relate the amount of daylight to the time of year.

Physical ~ Waves and their Applications in Technologies for Information Transfer	**Waves** ● CSIS7: Describe how science and technology should always be at the service of humanity, and ultimately, to God in harmony with his purposes. ● PS4-1: Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate. ● PS4-2: Make observations to construct an evidence-based account that objects can be seen only when illuminated. ● PS4-3: Plan and conduct an investigation to determine the effect of placing objects made with different materials in the path of a beam of light. ● PS4-4: Use tools and materials to design and build a device that uses light or sound to solve the problem of communicating over a distance.
Engineering	**Engineering Design**
	● CSIS7: Describe how science and technology should always be at the service of humanity, and ultimately, to God in harmony with His purposes. ● CSIS8: Investigate how science properly limits its focus to how things physically exist and is not designed to answer issues of the meaning, the value of things, or the mysteries of the human person. ● ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. ● ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Second Grade Science Standards

CATHOLIC STANDARDS:

- Explain how God created the world and all matter out of nothing and how it manifests His wisdom, glory and purpose. CSIS1
- Exhibit care and concern for each human person at all stages of life as an image and likeness of God. CSGS1
- Display a sense of wonder and delight about the natural universe and its beauty. CSDS1

Domain	Second Grade Science Standards
Life ~ Ecosystems: Interactions, Energy, and Dynamics	**Structures and Processes** • CSIS2: Describe the relationships, elements underlying order, harmony, and meaning in God's creation. • CSIS4: Discuss the beauty evident in God's creation • LS2-1: Plan and conduct an investigation to determine if plants need sunlight and water to grow. • LS2-2: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
Life ~ Life: Interdependent Biology Evolution: Unity and Diversity (Plants and Animals)	**Interdependent Biology Unity and Diversity (Plants and Animals)** • CSIS6: Describe God' relationship with man and nature. • LS4-1: Make observations of plants and animals to compare the diversity of life in different habitats.
Earth & Space Earth's Place in the Universe	**Earth's Place in the Universe** • CSDS2: Share concern and care for the environment as part of God's creation. • CSIS5: Discuss processes of conservation, preservation, overconsumption, and stewardship of creation as caring for that which God has given us to sustain us. • ESS1-1: Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
Earth & Space ~ Earth's Systems	**Earth's Systems** • ESS2-1: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land. • ESS2-2: Develop a model to represent the shapes and kinds of land and bodies of water in an

	area. ● ESS2-3: Obtain information to identify where water is found on Earth and that it can be solid or liquid.
Physical ~ Matter and its Interactions	**Matter** ● CSIS7: Describe how science and technology should always be at the service of humanity, and ultimately, to God in harmony with His purposes. ● CSIS8: Investigate how science properly limits its focus to "how" things physically exist and is not designed to answer issues of meaning, the value of things, or the mysteries of the human person. ● PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. ● PS1-2: Analyze data obtained from testing different materials to determine which material share the properties that are the best suited for an intended purpose. ● PS1-3: Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. ● PS1-4: Construct an argument with evidence that some changes caused by heating and cooling can be reversed and some cannot.
Engineering	**Engineering Design**
	● CSIS7: Describe how science and technology should always be at the service of humanity, and ultimately, to God in harmony with His purposes. ● CSIS8: Investigate how science properly limits its focus to how things physically exist and is not designed to answer issues of the meaning, the value of things, or the mysteries of the human person. ● ETS1-1: Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. ● ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem. ● ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs. ● new or improved object or tool. ● ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

	● ETS1-3: Analyze data from tests of two objects designed to solve the same problem to compare the strengths and weaknesses of how each performs.

Third Grade Science Standards

CATHOLIC STANDARDS:

- Explain how God created the world and all matter out of nothing and how it manifests His wisdom, glory and purpose. CSIS1
- Exhibit care and concern for each human person at all stages of life as an image and likeness of God. CSGS1
- Display a sense of wonder and delight about the natural universe and its beauty. CSDS1

Domain	Third Grade Science Standards
Life ~ Biological from Modules to Organisms: Structures and Processes	**Structures and Processes** • CSIS3: Explain how creation is an outward sign of God's love and goodness and, therefore, is "sacramental" in nature. • CSIS4: Discuss and give examples of the beauty evident in God's creation • CSIS6: Describe God's relationship with mankind and nature. • LS1-1. Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
Life ~ Ecosystems: Interactions, Energy, and Dynamics	**Interactions, Energy, and Dynamics** • LS2-1. Construct an argument that some animals form groups that help members survive.
Life ~ Heredity: Inheritance and Variation of Traits	**Inheritance and Variation of Traits** • LS3-1. Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits inherited from parents and that variation of these traits exists in a group of similar organisms.
Life ~ Biological Evolution: Unity and Diversity	**Unity and Diversity** • CSIS2: Describe the relationships, elements, underlying order, harmony, and meaning in God's creation. • CSIS6: Describe God's relationship with mankind and nature. • LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. • LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and

	reproducing. ● LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. ● LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
Earth & Space~ Earth's Systems **Earth & Space ~ Earth & Space~** Earth and Human Activity	**Earth's Systems** ● CSDS2: Share concern and care for the environment as part of God's creation. ● CSIS5: Discuss processes of conservation, preservation, overconsumption, and stewardship of creation as caring for that which God has given us to sustain us. ● ESS2-1. Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. ● ESS2-2. Obtain and combine information to describe climates in different regions of the world. **Earth and Human Activity** ● ESS3-1: Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.
Physical ~ Forces and Interactions	**Forces and Interactions** ● CSIS8: Investigate how science properly limits its focus to "how" things physically exist and is not designed to answer issues of meaning, the value of things, or the mysteries of the human person. ● PS1-1: Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties. ● PS1-2: Analyze data obtained from testing different materials to determine which material share the properties that are the best suited for an intended purpose. ● PS1-3: Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object. ● PS1-4: Construct an argument with evidence that some changes caused by heating and cooling can be reversed and some cannot.
Engineering	**Engineering Design**
	● CSIS7: Describe how science and technology should always be at the service of humanity, and ultimately, to God in harmony with His purposes. ● CSIS8: Investigate how science properly limits its focus to how things physically exist and is not designed to answer issues of the meaning, the value of things, or the mysteries of the

	human person. ● - ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. ● ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Fourth Grade Science Standards

CATHOLIC STANDARDS:

- Explain how God created the world and all matter out of nothing and how it manifests His wisdom, glory and purpose. CSIS1
- Exhibit care and concern for each human person at all stages of life as an image and likeness of God.CSGS1
- Describe how the use of the scientific method to explore and understand nature, differs yet complements, theological questions one asks in order to understand God and His works. CSIS9
- Display a sense of wonder and delight about the natural universe and its beauty CSDS1
- Accept that scientific knowledge is a call to serve and not simply a means to gain power, material prosperity, or success. CSDS4

Domain	Fourth Grade Science Standards
Life ~From Molecules to Organisms: Structures and Processes	**Structures and Processes** • CSIS3: Explain how creation is an outward sign of God's love and goodness and, therefore, is "sacramental" in nature. • CSIS4: Discuss and give examples of the beauty evident in God's creation • CSIS6: Describe God's relationship with mankind and nature. • LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. • LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
Earth & Space~ Earth's Place in the Universe **Earth & Space ~** Earth's Systems	**Earth's Place in the Universe** • CSDS2: Share concern and care for the environment as part of God's creation. • CSIS2: Describe the relationships, elements, underlying order, harmony, and meaning in God's creation. • CSIS5: Discuss processes of conservation, preservation, overconsumption, and stewardship of creation as caring for that which God has given us to sustain us. • ESS1-1. Identify evidence from patterns in rock formations and fossils in rock layers to support an explanation for changes in a landscape over time. **Earth's Systems** • ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. • ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features.

Earth & Space ~ Earth and Human Activity	• ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment. • ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
Physical ~ Energy **Physical ~ Waves:** Waves and Information	**Energy** • CSIS8: Investigate how science properly limits its focus to "how" things physically exist and is not designed to answer issues of meaning, the value of things, or the mysteries of the human person. • PS3-1. Use evidence to construct an explanation relating the speed of an object to the energy of that object. • PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat, and electric currents. • PS3-3. Ask questions and predict outcomes about the changes in energy that occur when objects collide. • PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another. **Waves and Information** • CSIS2: Describe the relationships, elements, underlying order, harmony, and meaning in God's creation. • PS4-1. Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move. • PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allow objects to be seen. • PS4-3. Generate and compare multiple solutions that use patterns to transfer information.
Engineering	**Engineering Design**
	• CSIS7: Describe how science and technology should always be at the service of humanity, and ultimately, to God in harmony with His purposes. • CSIS8: Investigate how science properly limits its focus to how things physically exist and is not designed to answer issues of the meaning, the value of things, or the mysteries of the human person. • ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

	● ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. ● ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Fifth Grade Science Standards

CATHOLIC STANDARDS:

- Explain how God created the world and all matter out of nothing and how it manifests His wisdom, glory and purpose. CSIS1
- Exhibit care and concern for each human person at all stages of life as an image and likeness of God. CSGS1
- Describe how the use of the scientific method to explore and understand nature, differs yet complements, theological questions one asks in order to understand God and His works. CSIS9
- Display a sense of wonder and delight about the natural universe and its beauty. CSDS1
- Value that scientific knowledge is a call to serve and not simply a means to gain power, material prosperity, or success. CSDS4

Domain	Fifth Grade Science Standards
Life ~From Molecules to Organisms: Structures and Processes	**Structures and Processes** • CSIS4: Discuss and give examples of the beauty evident in God's creation • CSIS6: Describe God's relationship with mankind and nature. • LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.
Life ~ Ecosystems: Interactions Energy, and Dynamics	**Interactions Energy, and Dynamics** • CSIS2: Describe the relationships, elements, underlying order, harmony, and meaning in God's creation. • LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
Earth & Space~ Earth's Place in the Universe	**Earth's Place in the Universe** • CSDS2: Share concern and care for the environment as part of God's creation. • CSIS2: Describe the relationships, elements, underlying order, harmony, and meaning in God's creation. • ESS1-1. Support an argument that differences in the apparent brightness of the sun compared to other stars is due to their relative distances from Earth. • ESS1-2. Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
Earth & Space ~ Earth's Systems	**Earth's Systems** • CSIS2: Describe the relationships, elements, underlying order, harmony, and meaning in God's

Earth & Space ~ Earth and Human Activity	creation. • ESS2-1. Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact. • ESS2-2. Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth. **Earth and Human Activity** • CSIS5: Discuss processes of conservation, preservation, overconsumption, and stewardship of creation as caring for that which God has given us to sustain us. • ESS3-1. Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
Physical ~Matter and Its Interactions **Physical ~ Motion and Stability:** Forces and Interactions **Physical ~ Energy**	**Matter and Its Interactions** • CSIS8: Investigate how science properly limits its focus to "how" things physically exist and is not designed to answer issues of meaning, the value of things, or the mysteries of the human person. • PS1-1. Develop a model to describe that matter is made of particles too small to be seen. • PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved. • PS1-3. Make observations and measurements to identify materials based on their properties. • PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances. **Forces and Interactions** • CSIS6: Describe God' relationship with mankind and nature • PS2-1. Support an argument that the gravitational force exerted by Earth on objects is directed down. **Energy** • PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.
Engineering	**Engineering Design**
	• CSIS7: Describe how science and technology should always be at the service of humanity,

	and ultimately, to God in harmony with His purposes. ● CSIS8: Investigate how science properly limits its focus to how things physically exist and is not designed to answer issues of the meaning, the value of things, or the mysteries of the human person. ● ETS1-1: Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. ● ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. ● ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

GRADES 6-8 Science Standards

CATHOLIC STANDARDS:

- Exhibit care and concern for each human person at all stages of life as an image and likeness of God. CSGS1
- Explore and promote the unity of faith and reason with confidence that no contradiction exists between the God of nature and the God of faith. CSGS2
- Internalize that the body is the temple of the Holy Spirit CSGS3
- Share how the beauty and goodness of God is reflected in the natural sciences. CSGS4
- Explain how the use of the scientific method to explore and understand nature, differs yet complements, theological questions one asks in order to understand God and His Works.CSIS9
- Research the basic contributions of significant Catholic scientists such as Copernicus, Galileo, Mendel, DaVinci, Bacon, Pasteur, St. Albert the Great, and others. CSIS11
- Discuss the false assumptions of some who believe science can replace our faith. CSIS10
- Display a deep sense of wonder and delight about the natural universe. CSDS1

Domain	Grades 6-8 Grade Science Standards
Life Science ~From Molecules to Organisms: Structures and Processes	**Structures and Processes** • CSIS2: Display confidence in human reason and in one's ability to know the truth about God creation. • CSIS4: Discuss how the search for truth, even when it concerns a finite reality of the natural world or of man, is never-ending, but always points beyond to something higher. • CSIS10: Understand and discuss the limitations of science (the scientific method and constraints of the physical world) to know and understand God. • MS-LS1-1. Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells. • MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. • MS-LS1-3. Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells. • MS-LS1-4. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively. • MS-LS1-5. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. • MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in

	the cycling of matter and flow of energy into and out of organisms. • MS-LS1-7. Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism. • MS-LS1-8. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.
Life Science ~ Ecosystems: Interactions Energy, and Dynamics	**Interactions, Energy, and Dynamics** • CSIS2: Describe the relationships, elements, underlying order, harmony, and meaning in God's creation. • CSIS5: Discuss processes of conservation, preservation, overconsumption and stewardship of creation as caring for that which God has given us to sustain us. • MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. • MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. • MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. • MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. • MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
Life Science ~ Heredity: Inheritance and Variations of Traits	**Inheritance and Variations of Traits** • CSIS6: Discuss the relationship between God, man, and nature, and one's proper role in the totality of being and creation. • CSIS7: Describe humanity's natural situation in, and dependence upon, physical reality and how we carry out our role as a cooperator with God • CSIS17: Demonstrate an understanding of the moral issues involving cellular research and human experimentation and what the Church teaches regarding work in these areas. • MS-LS3-1. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. • MS-LS3-2. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with

Life Science ~ Biological Evolution: Unity and Diversity	genetic variation. **Unity and Diversity** ● CSIS12: Examine and discuss the Church's approach to the theory of evolution. ● CSIS13: Discuss how the human soul is specifically created by God for each human being and does not evolve from lesser matter, nor is it inherited from our parents. ● MS-LS4-1. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. ● MS-LS4-2. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. ● MS-LS4-3. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. ● MS-LS4-4. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. ● MS-LS4-5. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. ● MS-LS4-6. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.
Earth & Space ~ Earth's Place in the Universe	**Earth's Place in the Universe** ● CSIS6: Discuss the relationship between God, man, and nature, and one's proper role in the totality of being and creation. ● MS-ESS1-1. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. ● MS-ESS1-2. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. ● MS-ESS1-3. Analyze and interpret data to determine scale properties of objects in the solar system. ● MS-ESS1-4. Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6- billion-year-old history.

Earth & Space ~ Earth's Systems	**Earth's Systems** • CSIS2: Describe the relationships, elements, underlying order, harmony, and meaning in God's creation. • MS-ESS2-1. Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process. • MS-ESS2-2. Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales. • MS-ESS2-3. Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions. • MS-ESS2-4. Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity. • MS-ESS2-5. Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions. • MS-ESS2-6. Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
Earth & Space ~ Earth and Human Activity	**Earth and Human Activity** • CSIS5: Discuss processes of conservation, preservation, over consumption, and stewardship of creation as caring for that which God has given us to sustain us. • CSAD4: Value and care for the environment as part of God's creation. • MS-ESS3-1. Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geosciences processes. • MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. • MS-ESS3-3. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. • MS-ESS3-4. Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. • MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.
Physical Science Catholic Standards	• CSIS9: Distinguish the difference between the use of the scientific method (as the primary cause) and the use of theological inquiry (as the secondary cause) to know and understand God's creation and universal truth. • CSDS3: Adhere to the idea of simultaneous complexity and simplicity of physical reality.

Physical ~Matter and Its Interactions	**Matter and Its Interactions** ● MS-PS1-1. Develop models to describe the atomic composition of simple molecules and extended structures. ● MS-PS1-2. Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred. ● MS-PS1-3. Gather and make sense of information to describe that synthetic materials come from natural resources and impact society. ● MS-PS1-4. Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed. ● MS-PS1-5. Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. ● MS-PS1-6. Undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.
Physical ~ Motion and Stability: Forces and Interactions	**Forces and Interactions** ● MS-PS2-1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. ● MS-PS2-2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. ● MS-PS2-3. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. ● MS-PS2-4. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. ● MS-PS2-5. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.
Physical ~ Energy	**Energy** ● MS-PS3-1. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. ● MS-PS3-2. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. ● MS-PS3-3. Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer. ● MS-PS3-4. Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as

Physical ~ Waves: Their Applications in Technologies for Information Transfer	measured by the temperature of the sample. ● MS-PS3-5. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. **Waves: Applications in Technologies for Information Transfer** ● MS-PS4-1. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. ● MS-PS4-2. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials ● MS-PS4-3. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals.
Engineering	**Engineering Design**
Engineering Design	● CSIS7: Describe how science and technology should always be at the service of humanity, and ultimately, to God in harmony with His purposes. ● CSIS8: Investigate how science properly limits its focus to how things physically exist and is not designed to answer issues of the meaning, the value of things, or the mysteries of the human person. ● MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions ● MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem ● MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. ● MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.