# Spearfish School District Curriculum Pacing Guide 2023-2024
# Science: Grade 11-12: 2nd Semester Biology II

## Science and Engineering Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

## Cross Cutting Concepts

- Patterns
- Scale, Proportion, and Quantity
- Systems and System Models
- Cause and Effect
- Energy and Matter
- Stability and Change
- Structure and Function

## Disciplinary Core Ideas

**The Core ideas of the Kindergarten standards include:**

- Motion and Stability: Forces and Interactions
- Energy
- From Molecules to Organisms: Structures and Processes
- Earth's Systems
- Earth and Human Activity

**The Core ideas of the First Grade standards include:**

- Waves and Their Applications in Technologies for Information Transfer
- From Molecules to Organisms: Structures and Processes
- Heredity: Inheritance and Variation of Traits
- Earth's Place in the Universe

**The Core ideas of the Second Grade standards include:**

- Matter and Its Interactions
- Ecosystems: Interactions, Energy, and Dynamics
- Biological Unity and Diversity
- Earth's Place in the Universe
- Earth's Systems

**The Core ideas of the Third Grade standards include:**

- Motion and Stability: Forces and Interactions
- From Molecules to Organisms: Structures and Processes
- Ecosystems: Interactions, Energy, and Dynamics
- Heredity: Inheritance and Variation of Traits
- Biological Unity and Diversity
- Earth's Systems
- Earth and Human Activity

**The Core ideas of the Fourth Grade standards include:**

- Energy
- Waves and Their Applications in Technologies for Information Transfer
- From Molecules to Organisms: Structures and Processes
- Earth's Place in the Universe
- Earth's Systems
- Earth and Human Activity

**The Core ideas of the Fifth Grade standards include:**

- Matter and Its Interactions
- Motion and Stability: Forces and Interactions
- Energy
- From Molecules to Organisms: Structures and Processes
- Ecosystems: Interactions, Energy, and Dynamics
- Earth's Place in the Universe
- Earth's Systems
- Earth and Human Activity

**The Core ideas of the Middle School Physical Science standards include:**

- Matter and Its Interactions
- Motion and Stability: Forces and Interactions
- Energy

Waves and Their Applications in Technologies for Information Transfer

**The Core ideas of the Middle School Life Science standards include:**

- From Molecules to Organisms: Structures and Processes
- Ecosystems: Interactions, Energy, and Dynamics
- Heredity: Inheritance and Variation of Traits
- Biological Unity and Diversity

**The Core ideas of the Middle School Earth and Space Science standards include:**

- Earth's Place in the Universe
- Earth's Systems
- Earth and Human Activity

**The Core ideas of the High School Physical Science standards include:**

- Matter and Its Interactions
- Motion and Stability: Forces and Interactions
- Energy
- Waves and Their Applications in Technology for Information Transfer

**The Core ideas of the High School Life Science standards include:**

- From Molecules to Organisms: Structures and Processes
- Ecosystems: Interactions, Energy, and Dynamics
- Heredity: Inheritance and Variation of Traits
- Biological Unity and Diversity

**The Core ideas of the High School Earth and Space Science standards include:**

- Earth's Place in the Universe
- Earth's Systems
- Earth and Human Activity

# South Dakota Science Standards

## High School Physical Science (Grades 9-12)

| High School Physical Science Standards (Grades9-12) | |
|---|---|
| HS-PS1-1 | Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. (SEP: 2; DCI: PS1.A, PS2.B; CCC: Patterns) |
| HS-PS1-2 | Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties. (SEP: 6; DCI: PS1.A, PS1.B; CCC: Patterns) |
| HS-PS1-3 | Plan and carry out an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. (SEP: 3; DCI: PS1.A, PS2.B; CCC: Patterns) |
| HS-PS1-4 | Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. (SEP: 2; DCI: PS1.A, PS1.B; CCC: Energy/Matter) |
| HS-PS1-5 | Construct an explanation based on evidence about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. (SEP: 6; DCI: PS1.B; CCC: Patterns) |
| HS-PS1-6 | Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.* (SEP: 6; DCI: PS1.B, ETS1.C; CCC: Stability/Change) |
| HS-PS1-7 | Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. (SEP: 5; DCI: PS1.B; CCC: Energy/Matter, Nature of Science/Consistency) |

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|---|---|
| HS-PS1-8 | Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. (SEP: 2; DCI: PS1.C; CCC: Energy/Matter) |
| HS-PS2-1 | Analyze data to support the claim that Newton's Second Law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration. (SEP: 4; DCI: PS2.A; CCC: Cause/Effect ) |
| HS-PS2-2 | Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system. (SEP: 5; DCI: PS2.A ; CCC: Systems) |
| HS-PS2-3 | Design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision.* (SEP: 6; DCI: PS2.A, ETS1.A, ETS1.C; CCC: Cause/Effect ) |
| HS-PS2-4 | Use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. (SEP: 5; DCI: PS2.B; CCC: Patterns) |
| HS-PS2-5 | Plan and carry out an investigation to provide evidence that an electric current can produce a magnetic field and that a changing magnetic field can produce an electric current. (SEP: 3; DCI: PS2.B, PS3.A; CCC: Cause/Effect) |
| HS-PS2-6 | Communicate scientific and technical information about why the molecular-level structure is important in the functioning of designed materials.* (SEP: 8; DCI: PS1.A, PS2.B; CCC: Structure/Function) |
| HS-PS3-1 | Create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. (SEP: 5; DCI: PS3.A, PS3.B ; CCC: Systems) |
| HS-PS3-2 | Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles (objects) and energy associated with the relative position of particles (objects). (SEP: 2 ; DCI: PS3.A; CCC: Energy/Matter) |
| HS-PS3-3 | Design, build, and refine a device that works within given constraints to convert one form of energy into another form of energy. (SEP: 6; DCI: PS3.A, PS3.D, ETS1.A; CCC: Energy/Matter, Technology) |
| HS-PS3-4 | Plan and carry out an investigation to provide evidence that the transfer of thermal energy when |
| | two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (Second Law of Thermodynamics). (SEP: 3; DCI: PS3.B, PS3.D; CCC: Systems) |

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| HS-PS3-5 | Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction. (SEP: 2; DCI: PS3.C; CCC: Cause/Effect) |
| HS-PS4-1 | Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. (SEP: 5; DCI: PS4.A; CCC: Cause/Effect) |
| HS-PS4-2 | Evaluate questions about the advantages of using a digital transmission and storage of information. (SEP: 1; DCI: PS4.A; CCC: Stability/Change, Technology) |
| HS-PS4-3 | Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. (SEP: 7; DCI: PS4.A, PS4.B; CCC: Systems) |
| HS-PS4-4 | Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. (SEP: 8; DCI: PS4.B; CCC: Cause/Effect) |
| HS-PS4-5 | Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.* (SEP: 8; DCI: PS3.D, PS4.A, PS4.B, PS4.C; CCC: Cause/Effect, Technology) |

## High School Life Science (Grades 9-12)

| High School Life Science Standards (Grades 9-12) | |
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| HS-LS1-1 | Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. (SEP: 6; DCI: LS1.A; CCC: Structure/Function) |
| HS-LS1-2 | Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (SEP: 2; DCI: LS1.A; CCC: Systems) |
| HS-LS1-3 | Plan and carry out an investigation to provide evidence that feedback mechanisms maintain homeostasis. (SEP: 3; DCI: LS1.A; CCC: Stability/Change) |
| HS-LS1-4 | Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. (SEP: 2; DCI: LS1.B; CCC: Systems) |
| HS-LS1-5 | Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. (SEP: 2; DCI: LS1.C; CCC: Systems, Energy/Matter) |
| HS-LS1-6 | Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbonbased molecules. (SEP: 6; DCI: LS1.C; CCC: Energy/Matter) |
| HS-LS1-7 | Use a model of the major inputs and outputs of cellular respiration (aerobic and anaerobic) to exemplify the chemical process in which the bonds of food molecules are broken, the bonds of new compounds are formed, and a net transfer of energy results. (SEP: 2; DCI: LS1.C; CCC: Energy/Matter) |
| HS-LS2-1 | Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales. (SEP: 5; DCI: LS2.A; CCC: Scale/Prop.) |
| HS-LS2-2 | Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales. (SEP: 5; DCI: LS2.A, LS2.C; CCC: Scale/Prop.) |
| HS-LS2-3 | Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. (SEP:6; DCI: LS2.B; CCC: Energy/Matter ) |
| HS-LS2-4 | Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. (SEP: 5; DCI: LS2.B; CCC: Energy/Matter) |
| HS-LS2-5 | Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. (SEP: 2; DCI: LS2.B, PS3.D; CCC: Systems) |

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| HS-LS2-6 | Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms under stable conditions; however, moderate to extreme fluctuations in conditions may result in new ecosystems. (SEP: 7; DCI: LS2.C; CCC: Stability/Change) |
| HS-LS2-7 | Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.* (SEP: 6; DCI: LS2.C, LS4.D, ETS1.B; CCC: Stability/Change) |
| HS-LS2-8 | Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. (SEP: 7; DCI: LS2.D; CCC: Cause/Effect) |
| HS-LS3-1 | Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. (SEP: 1; DCI: LS1.A, LS3.A; CCC: Cause/Effect) |
| HS-LS3-2 | Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. (SEP: 7; DCI: LS3.B; CCC: Cause/Effect) |
| HS-LS3-3 | Apply concepts of statistics and probability to explain the variation and distribution of expressed |
| | traits in a population. (SEP: 4; DCI: LS3.B; CCC: Scale/Prop.) |
| HS-LS4-1 | Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. (SEP: 8; DCI: LS4.A; CCC: Patterns) |
| HS-LS4-2 | Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment. (SEP: 6; DCI: LS4.B, LS4.C; CCC: Cause/Effect) |
| HS-LS4-3 | Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait. (SEP: 4; DCI: LS4.B, LS4.C; CCC: Patterns) |
| HS-LS4-4 | Construct an explanation based on evidence for how natural selection leads to adaptation of populations. (SEP: 6; DCI: LS4.C ; CCC: Cause/Effect) |
| HS-LS4-5 | Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. (SEP: 7; DCI: LS4.C; CCC: Cause/Effect) |
| HS-LS4-6 | Use a simulation to research and analyze possible solutions for the adverse impacts of human activity on biodiversity. (SEP: 5; DCI: LS4.C, LS4.D, ETS1.B; CCC: Cause/Effect) |

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| HS-LS4-7 | 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. (SEP: 4; DCI: LS4.A ; CCC: Patterns) |

# High School Earth and Space Science (Grades 9-12)

| High School Earth and Space Science Standards (Grades 9-12) | |
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| HS-ESS1-1 | Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation. (SEP: 2; DCI: ESS1.A, PS3.D; CCC: Scale/Prop.) |
| HS-ESS1-2 | Construct an explanation of the Big Bang Theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe. (SEP: 6; DCI: PS4.B, ESS1.A; CCC: Energy/Matter, Technology) |
| HS-ESS1-3 | Communicate scientific ideas about the way stars, over their life cycle, produce elements. (SEP: 8; DCI: ESS1.A; CCC: Energy/Matter) |
| HS-ESS1-4 | Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. (SEP: 5; DCI: ESS1.B; CCC: Scale/Prop., Technology) |
| HS-ESS1-5 | Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. (SEP: 7; DCI: ESS1.C, ESS2.B, PS1.C; CCC: Patterns) |
| HS-ESS1-6 | Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history. (SEP: 6; DCI: ESS1.C, PS1.C; CCC: Stability/Change) |
| HS-ESS2-1 | Analyze geoscience data to make the claim that one change to Earth's surface can create feedback that cause changes to other Earth systems. (SEP: 2; DCI: ESS2.A, ESS2.B; CCC: Stability/Change) |
| HS-ESS2-2 | Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection. (SEP: 4; DCI: ESS2.A, ESS2.D; CCC: Stability/Change, Technology) |
| HS-ESS2-3 | Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate. (SEP: 2; DCI: ESS2.A, ESS2.B, PS4.A; CCC: Energy/Matter, Technology) |
| HS-ESS2-4 | Plan and carry out an investigation of the properties of water and its effects on Earth materials and surface processes. (SEP: 2; DCI: ESS1.B, ESS2.A, ESS2.D; CCC: Cause/Effect) |
| HS-ESS3-1 | Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. (SEP: 6; DCI: ESS3.A, ESS3.B ; CCC: Cause/Effect, Technology) |

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| HS-ESS3-2 | Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.* (SEP: 7; DCI: ESS3.A, ETS1.B; CCC: Technology) |
| HS-ESS3-3 | Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. (SEP: 5; DCI: ESS3.C; CCC: Stability/Change, Technology) |
| HS-ESS3-4 | Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.* (SEP: 6; DCI: ESS3.C, ETS1.B; CCC: Stability/Change, Technology) |
| HS-ESS3-5 | Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. (SEP: 4; DCI: ESS3.D; CCC: Stability/Change) |
| HS-ESS3-6 | Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity. (SEP: 5; DCI: ESS2.D, ESS3.D; CCC: Systems) |

# Spearfish School District Curriculum Pacing Guide 2023-2024
# Science: Grade 11-12: 2nd Semester Biology II

| Instructional Focus | Focus Summary |
|---|---|
| 1<br><br>Levels of Organization<br>:Introduction to Human Anatomy & Physiology<br>:Tissues<br><br>**Suggested Time Frame: 2 week** | The study of the human body has a long and eventful history. Early studies focused on anatomy and over time moved to more of an understanding of physiology. As with many content areas learning the "language of the content" is necessary for meaningful communication. There is a need to know what is necessary to sustain life and how that is accomplished. The human body is organized and organization is needed in the understanding of the human body. |

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| 2<br>Support and Movement<br>:Integumentary System<br>:Skeletal System<br>:Muscular System<br>**Suggested Time Frame: 5 weeks** | Support and movement of the human body occurs both internally and externally. The integumentary provides for the external support while the skeleton provides internally. Movement is defined by the type of muscle involved. The muscle can be divided by control and/or by structure. |
| 3<br>Absorption and Excretion<br>:Digestive System<br>:Respiratory System<br>:Urinary System<br>:Reproductive System<br>**Suggested Time Frame: 6 weeks** | Living organisms must acquire energy and materials from their environments. Humans initiate this process by ingesting materials. These materials are broken down into smaller units that can be absorbed. The smaller units are delivered to the cells where oxygen is used to release energy and then it is converted to a usable form. The human body is not 100% efficient so the need for processes to eliminate wastes is necessary. Due to proximity and the multiple functions that organs have the reproductive process is viewed and studied at this time. |
| 4<br>Transport<br>:Blood<br>:Cardiovascular System<br>**Suggested Time Frame: 5 weeks** | The movement of the absorbed materials throughout the body is the next step in the process of the organism receiving these materials, water and having waste products removed. Blood, the vessels and the pump are equally important in meeting this goal. By investigating and learning about the components of blood one can then understand its function. The heart and vascular tissue of the circulatory system are the structures responsible for the circulation of the blood. The heart generates the pressure necessary for the blood to flow throughout the circulatory vessels. |

# Spearfish School District Curriculum Pacing Guide 2023-2024
# Science: Grade 11-12: 2nd Semester Biology II

| Instructional Focus<br><br>Unit 1 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS \| LS \| ESS \| ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
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| **Suggested time frame:** 2 week<br><br>Levels of Organization:<br>-Introduction to Human Anatomy & Physiology<br>-Tissues | ☐Patterns<br>☐Scale, Proportion, and Quantity<br>☒Systems and System Models<br>☐Cause and Effect<br>☐Energy and Matter<br>☒Stability and Change<br>☒Structure and Function<br><br>**☒Structure and function LS1.A**<br>**☒Growth and development of organisms LS1.B**<br>**☐Organization for matter and energy flow in organisms LS1.C**<br>**☒Information and processing LS1.D**<br>**☐Interdependent relationships in ecosystems LS2.A**<br>**☐Cycles of matter and energy transfer in ecosystems LS2.B**<br>**☐Ecosystem dynamics, functioning, and resilience LS2.CC**<br>**☐Social interactions and group behavior LS2.D** | HS-LS1-2<br>HS-LS1-3<br>HS-LS1-4 | • Students will explain the relatedness of anatomy and physiology<br>• The student will list and describe the major characteristics of life with regards to humans<br>• Students will list and describe the major requirements of organisms<br>• Students will explain and provide examples of homeostatic mechanisms<br>• The student will list the organs found in each of the major body cavities<br>• The student will apply the appropriate terminology in each of the aforementioned learning goals<br>• The student will list the four major tissues types<br>• Student will provide the general characteristics and functions of each of the four tissue types<br>• The student will provide examples of each of the four tissue types | Anatomy<br>Physiology<br>Metabolism<br>Homeostasis<br>Homeostatic mechanism<br>Enzyme<br>Epithelial tissue<br>Simple and stratified<br>Squamous<br>Cuboidal<br>Columnar<br>Exocrine gland<br>Merocrine<br>Apocrine<br>holocrine<br>Endocrine gland<br>Connective tissue<br>Muscle tissue<br>Nervous tissue | Hole's "Essentials of Human Anatomy and Physiology" HS 2nd edition<br>Chapter notes<br>Test 1<br>Chapter 1<br>Chapter 5<br>Chapter 6<br>Study Guides<br>Laboratory practices<br>*Dissection #1 |

| Instructional Focus<br><br>Unit 1 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS LS ESS ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
|---|---|---|---|---|---|
| | ☐Inheritance of traitsLS3.A<br><br>☐Variation of traits LS3.B<br><br>☐Evidence of common ancestry and diversity LS4.A<br><br>☐Natural selection LS4.B<br><br>☒Adaptation LS4.C<br><br>☐Biodiversity and humans LS4.D<br><br>☐1. Asking questions (for science) and defining problems (for engineering)<br><br>☒2. Developing and using models<br><br>☒3. Planning and carrying out investigations<br><br>☐4. Analyzing and interpreting data<br><br>☐5. Using mathematics and computational thinking | | | | |

| Instructional Focus<br><br>Unit 1 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS \| LS \| ESS \| ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
|---|---|---|---|---|---|
| | ☐6. Constructing explanations (for science) and designing solutions (for engineering)<br><br>☐7. Engaging in argument from evidence<br>☐8. Obtaining, evaluating, and communicating information | | | | |

**Assessments:** How do my students demonstrate their understanding and how do I measure their learning?

Formative: Quizzes, study guide, chapter questions, lab work, and class discussion

Summative: Chapter Tests that are inclusive of performance tasks.
Performance Tasks: diagraming, mathematical computations, describing, comparing and/or substantiating an answer with scientific evidence
Practical Tests: using models, diagrams and/or specimens

# Spearfish School District Curriculum Pacing Guide 2023-2024
# Science: Grade 11-12: 2nd Semester Biology II

| Instructional Focus<br><br>Unit 2 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS \| LS \| ESS \| ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
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| **Suggested time frame: 5 weeks**<br><br>Support and Movement:<br>-Integumentary System<br>-Skeletal System<br>-Muscular System | ☐Patterns<br><br>☐Scale, Proportion, and Quantity<br><br>☒Systems and System Models<br><br>☒Cause and Effect<br><br>☐Energy and Matter<br><br>☒Stability and Change<br><br>☒Structure and Function<br><br>**☒Structure and function LS1.A**<br><br>**☒Growth and development of organisms LS1.B**<br><br>**☐Organization for matter and energy flow in organisms LS1.C**<br><br>**☒Information and processing LS1.D**<br><br>**☐Interdependent relationships in ecosystems LS2.A**<br><br>**☐Cycles of matter and energy transfer in ecosystems LS2.B**<br><br>**☐Ecosystem dynamics, functioning, and resilience LS2.CC**<br><br>**☐Social interactions and group behavior LS2.D** | HS-LS1-2<br>HS-LS1-3<br>HS-LS1-4 | • The student will list the general functions of the skin<br>• Students will describe anatomy and physiology of the skin<br>• The student will describe the anatomy and physiology of the skin accessory organs<br>• The student explain the development and growth of bone<br>• The student will describe the macroscopic and microscopic structure of a long bone<br>• Students will list and explain the various functions of bone<br>• The student will locate and identify the bones in the axial and appendicular skeleton<br>• The student will list and provide examples of the six types synovial joints<br>• The student will apply the necessary terms to explain movements at joints<br>• The student will list the major functions of muscle<br>• The student will identify and label major parts of skeletal muscle | Integumentary<br>Epidermis<br>Dermis<br>Cutaneous<br>Subcutaneous<br>Keratinization<br>Melanin<br>Eccrine gland<br>Apocrine gland<br>Inflammation<br>Hematoma<br><br>Epiphysis<br>Diaphysis<br>Periosteum<br>Compact bone<br>Spongy bone<br>Intramembranous bone<br>Endochondral bone<br>Osteocytes<br>Osteoblasts<br>Osteoclasts<br>Lever<br>Hematopoiesis<br>Axial<br>Appendicular<br><br>Epimysium<br><br>Perimysium<br>Endomysium<br>Myofibrils<br>Myosin<br>Actin<br>Sarcomere | Hole's "Essentials of Human Anatomy and Physiology" HS 2nd edition<br>Study Guides<br>Laboratory practices<br>*Dissection #2<br>*Dissection #3 |

| Instructional Focus<br><br>Unit 2 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS LS ESS ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
|---|---|---|---|---|---|
| | ☐Inheritance of traitsLS3.A<br><br>☒Variation of traits LS3.B<br><br>☐Evidence of common ancestry and diversity LS4.A<br><br>☐Natural selection LS4.B<br><br>☒Adaptation LS4.C<br><br>☐Biodiversity and humans LS4.D<br><br>☒1. Asking questions (for science) and defining problems (for engineering)<br><br>☒2. Developing and using models<br><br>☒3. Planning and carrying out investigations<br><br>☐4. Analyzing and interpreting data<br><br>☐5. Using mathematics and | | • The student will distinguish between a twitch, recruitment and a sustained contraction<br>• The student will explain the relation between the skeletal and muscular systems<br>• Students will identify and locate the major muscles of the various body regions | Motor neurons<br>Synapse<br>Neuromuscular junction<br>Synaptic cleft<br>Neurotransmitter<br>Oxygen dept<br>Threshold stimulus<br>Summation<br>Recruitment<br>Origin<br>Insertion<br>Agonists<br>Synergists<br>Antagonists<br>Flexion<br>Extension<br>Adduct<br>Abduct<br>Pronation<br>Supination | |

| Instructional Focus<br><br>Unit 2 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS LS ESS ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
|---|---|---|---|---|---|
| | computational thinking<br><br>☒6. Constructing explanations (for science) and designing solutions (for engineering)<br><br>☐7. Engaging in argument from evidence<br>☒8. Obtaining, evaluating, and communicating information | | | | |

**Assessments:** How do my students demonstrate their understanding and how do I measure their learning?

Formative: Quizzes, study guide, chapter questions, lab work, and class discussion

Summative: Chapter Tests that are inclusive of performance tasks.
Performance Tasks: diagraming, mathematical computations, describing, comparing and/or substantiating an answer with scientific evidence
Practical Tests: using models, diagrams and/or specimens

# Spearfish School District Curriculum Pacing Guide 2023-2024
# Science: Grade 11-12: 2nd Semester Biology II

| Instructional Focus<br><br>Unit 3 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS \| LS \| ESS \| ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| **Suggested time frame:** 6 weeks<br><br>Absorption and Excretion:<br>-Digestive System<br>-Respiratory System<br>-Urinary System<br>-Reproductive System | ☐Patterns<br>☐Scale, Proportion, and Quantity<br>☒Systems and System Models<br>☒Cause and Effect<br>☒Energy and Matter<br>☒Stability and Change<br>☒Structure and Function<br><br>**☒Structure and function LS1.A**<br>**☐Growth and development of organisms LS1.B**<br>**☒Organization for matter and energy flow in organisms LS1.C**<br>**☒Information and processing LS1.D**<br>**☐Interdependent relationships in ecosystems LS2.A**<br>**☐Cycles of matter and energy transfer in ecosystems LS2.B**<br>**☐Ecosystem dynamics, functioning, and resilience LS2.CC**<br>**☐Social interactions and group behavior LS2.D** | HS-LS1-2<br>HS-LS1-3<br>HS-LS1-4<br>HS-LS3-1 | • The student will describe the general function of the digestive system<br>• Students will name and identify the major organs of the digestive system<br>• The student will describe the mechanism of swallowing<br>• The student will identify and describe the function of the enzymes associated with the digestive system<br>• The student will identify the general functions of the respiratory system<br>• The student will identify, locate and describe the function the organs of the respiratory system<br>• The student will explain the functions of inspiration and expiration<br>• The student will explain the relationship of the respiratory and the cardiovascular systems<br>• The student will list and identify the major organs and structures of the urinary system<br>• Students will explain the general function of the urinary system | Mechanical digestion<br>Chemical digestion<br>Peristalsis<br>Alimentary canal<br>Bolus<br>Sphincter<br>Chyme<br>Emulsification<br>Enzyme<br><br>Respiration<br>Breathing<br>External respiration<br>Internal respiration<br>Cellular respiration<br>Atmospheric pressure<br><br>Renal<br>Nephron<br>Urea<br>Uric acid<br>Micturition<br><br>Sperm<br>Oocytes<br>Emission<br>Ejaculation<br>Ovulation<br>Contraceptives<br>Surgical sterilization | Hole's "Essentials of Human Anatomy and Physiology" HS 2nd edition<br>Study Guides<br>Laboratory practices<br>*Dissection #4<br>*Dissection #5<br>*Dissection #6 |

| Instructional Focus<br><br>Unit 3 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS LS ESS ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
|---|---|---|---|---|---|
| | ☐Inheritance of traitsLS3.A<br><br>☐Variation of traits LS3.B<br><br>☐Evidence of common ancestry and diversity LS4.A<br><br>☐Natural selection LS4.B<br><br>☒Adaptation LS4.C<br><br>☐Biodiversity and humans LS4.D<br><br>☒1. Asking questions (for science) and defining problems (for engineering)<br><br>☐2. Developing and using models<br><br>☒3. Planning and carrying out investigations<br><br>☐4. Analyzing and interpreting data<br><br>☐5. Using mathematics and | | • The student will explain process of micturition | STI: sexually transmitted infection | |

| Instructional Focus<br><br>Unit 3 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS LS ESS ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
|---|---|---|---|---|---|
| | computational thinking<br><br>☒6. Constructing explanations (for science) and designing solutions (for engineering)<br><br>☐7. Engaging in argument from evidence<br>☒8. Obtaining, evaluating, and communicating information | | | | |

**Assessments:** How do my students demonstrate their understanding and how do I measure their learning?

Formative: Quizzes, study guide, chapter questions, lab work, and class discussion

Summative: Chapter Tests that are inclusive of performance tasks.
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# Spearfish School District Curriculum Pacing Guide 2023-2024
# Science: Grade 11-12: 2nd Semester Biology II

| Instructional Focus<br><br>Unit 4 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS \| LS \| ESS \| ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| **Suggested time frame:** 5 weeks<br><br>Transport:<br>-Blood<br>-Cardiovascular System | ☐Patterns<br><br>☒Scale, Proportion, and Quantity<br><br>☒Systems and System Models<br><br>☒Cause and Effect<br><br>☒Energy and Matter<br><br>☒Stability and Change<br><br>☒Structure and Function<br><br>**☒Structure and function LS1.A**<br><br>**☐Growth and development of organisms LS1.B**<br><br>**☒Organization for matter and energy flow in organisms LS1.C**<br><br>**☒Information and processing LS1.D**<br><br>**☐Interdependent relationships in ecosystems LS2.A**<br><br>**☐Cycles of matter and energy transfer in ecosystems LS2.B**<br><br>**☐Ecosystem dynamics, functioning, and resilience LS2.CC**<br><br>**☐Social interactions and group behavior LS2.D** | HS-LS1-2<br>HS-LS1-3<br>HS-LS1-4 | • The student will describe the general characteristics of blood, and discuss its major functions.<br>• The student will distinguish among the formed elements and liquid portion of blood.<br>• The student will explain the significance of blood cell counts.<br>• The student will distinguish between and explain the difference of antigens and antibodies.<br>• The student will be able to name and identify the structures composing the cardiovascular system.<br>• The student will trace the pathway of blood through the heart<br>• The student will distinguish between the pulmonary and systemic circuits.<br>• The student will describe the cardia cycle and the cardiac conduction system.<br>• The student will explain the differences between arteries and veins. They will include reasons why the differences exist. | Erythrocytes<br>Leukocytes<br>Thrombocytes<br>Plasma<br>Hemoglobin<br>Hematopoietic stem cells<br>Erythropoietin<br>Granulocytes<br>Agranulocytes<br>Leukocytosis<br>Leukopenia<br>Hemostasis<br><br>Atria<br>Ventricles<br>Septum<br>Chordae tendineae<br>Coronary<br>Pulmonary<br>Systole<br>Diastole<br>Cardiac conduction<br>Resistor<br>Vasoconstriction<br>Vasodilation<br>viscosity | Hole's "Essentials of Human Anatomy and Physiology", HS 2nd edition<br>Study Guides<br>Laboratory practices<br>*Dissection #7<br>*Dissection #8 |

| Instructional Focus<br><br>Unit 4 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS LS ESS ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
|---|---|---|---|---|---|
| | ☐Inheritance of traitsLS3.A<br><br>☐Variation of traits LS3.B<br><br>☐Evidence of common ancestry and diversity LS4.A<br><br>☐Natural selection LS4.B<br><br>☒Adaptation LS4.C<br><br>☐Biodiversity and humans LS4.D<br><br>☒1. Asking questions (for science) and defining problems (for engineering)<br><br>☐2. Developing and using models<br><br>☒3. Planning and carrying out investigations<br><br>☐4. Analyzing and interpreting data<br><br>☐5. Using mathematics and | | • The student will explain how blood pressure is produced, controlled and influenced. | | |

| Instructional Focus<br><br>Unit 4 | Dimensions<br>Cross Cutting Concepts<br>Disciplinary Core Ideas<br>Science and Engineering Practices | Targeted Standards based Essential Skills & Concepts<br>PS LS ESS ED | Learning Goals / Essential Questions For Instructional Focus | Essential Vocabulary | Resources |
|---|---|---|---|---|---|
| | computational thinking<br><br>☒6. Constructing explanations (for science) and designing solutions (for engineering)<br><br>☐7. Engaging in argument from evidence<br>☒8. Obtaining, evaluating, and communicating information | | | | |

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Full-Year Cumulative Final