**Virginia Discovery Education Science Experience-Biology**

Overall Rating of Standards

| **Standard** | **Determined Rating** |
| --- | --- |
| BIO.1 The student will demonstrate an understanding of the scientific and engineering practices. | This standard was evaluated in the context of the content standards. |
| BIO.2 The student will investigate and understand that chemical and biochemical processes are essential for life. | Adequate |
| BIO.3 The student will investigate and understand that cells have structure and function. | Adequate |
| BIO.4 The student will investigate and understand that bacteria and viruses have an effect on living systems. | Adequate |
| BIO.5 The student will investigate and understand that there are common mechanisms for inheritance. | Adequate |
| BIO.6 The student will investigate and understand that modern classification systems can be used as organizational tools for scientists in the study of organisms. | Adequate |
| BIO.7 The student will investigate and understand that populations change through time. | Adequate |
| BIO.8 The student will investigate and understand that there are dynamic equilibria within populations, communities, and ecosystems. | Adequate |

Overall Rating for Instructional Design and Support

| **Instructional Design and Support** | **Determined Rating** |
| --- | --- |
| Materials emphasize the use of effective instructional practices and learning theory. | Adequate |
| The science content is significant and accurate. | Adequate |
| Materials present content in an accurate, unbiased manner. | Adequate |

Review of Standards with Curriculum Framework

| Standard | Expectation |
| --- | --- |
| BIO.1 The student will demonstrate an understanding of the scientific and engineering practices by:   1. asking questions and defining problems 2. planning and carrying out investigations 3. interpreting, analyzing, and evaluating data 4. constructing and critiquing conclusions and explanations 5. developing and using models 6. obtaining, evaluating, and communicating information. | The expectation of the 2018 *Science Standards of Learning* is that the scientific and engineering practices are embedded into the instruction of content standards.  The rating for an individual standard includes the evaluation of standard 1 as it pertained to that standard.  For specific grade level/course expectations for standard 1, see the Standards of Learning and the Curriculum Framework. |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| BIO.2 The student will investigate and understand that chemical and biochemical processes are essential for life. Key ideas include |  |  |  |
| 1. water chemistry has an influence on life processes; | X |  |  |
| 1. macromolecules have roles in maintaining life processes; | X |  |  |
| 1. enzymes have a role in biochemical processes; | X |  |  |
| 1. protein synthesis is the process of forming proteins which influences inheritance and evolution; and | X |  |  |
| 1. the processes of photosynthesis and respiration include the capture, storage, transformation, and flow of energy. |  | X |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| BIO.3 The student will investigate and understand that cells have structure and function. Key ideas include |  |  |  |
| 1. the cell theory is supported by evidence; | X |  |  |
| 1. structures in unicellular and multicellular organisms work interdependently to carry out life processes; | X |  |  |
| 1. cell structures and processes are involved in cell growth and division; | X |  |  |
| 1. the structure and function of the cell membrane support cell transport; and | X |  |  |
| 1. specialization leads to the development of different types of cells. |  | X |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| BIO.4 The student will investigate and understand that bacteria and viruses have an effect on living systems. Key ideas include |  |  |  |
| 1. viruses depend on a host for metabolic processes; | X |  |  |
| 1. the modes of reproduction/replication can be compared; | X |  |  |
| 1. the structures and functions can be compared; | X |  |  |
| 1. bacteria and viruses have a role in other organisms and the environment; and | X |  |  |
| 1. the germ theory of infectious disease is supported by evidence. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| BIO.5 The student will investigate and understand that there are common mechanisms for inheritance. Key ideas include |  |  |  |
| 1. DNA has structure and is the foundation for protein synthesis; | X |  |  |
| 1. the structural model of DNA has developed over time; | X |  |  |
| 1. the variety of traits in an organism are the result of the expression of various combinations of alleles; | X |  |  |
| 1. meiosis has a role in genetic variation between generations; and | X |  |  |
| 1. synthetic biology has biological and ethical implications. |  | X |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| BIO.6 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 |  |  |  |
| 1. organisms have structural and biochemical similarities and differences; | X |  |  |
| 1. fossil record interpretation can be used to classify organisms; | X |  |  |
| 1. developmental stages in different organisms can be used to classify organisms; |  | X |  |
| 1. Archaea, Bacteria, and Eukarya are domains based on characteristics of organisms; | X |  |  |
| 1. the functions and processes of protists, fungi, plants, and animals allow for comparisons and differentiation within the Eukarya kingdoms; and | X |  |  |
| 1. systems of classification are adaptable to new scientific discoveries. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| BIO.7 The student will investigate and understand that populations change through time. Key ideas include |  |  |  |
| 1. evidence is found in fossil records and through DNA analysis; | X |  |  |
| 1. genetic variation, reproductive strategies, and environmental pressures affect the survival of populations;; | X |  |  |
| 1. natural selection is a mechanism that leads to adaptations and may lead to the emergence of a new species; and | X |  |  |
| 1. biological evolution has scientific evidence and explanations. | X |  |  |

| Standard | Adequate | Limited | No Evidence |
| --- | --- | --- | --- |
| BIO.8 The student will investigate and understand that there are dynamic equilibria within populations, communities, and ecosystems. Key ideas include |  |  |  |
| 1. interactions within and among populations include carrying capacities, limiting factors, and growth curves; | X |  |  |
| 1. nutrients cycle with energy flow through ecosystems; | X |  |  |
| 1. ecosystems have succession patterns; and | X |  |  |
| 1. natural events and human activities influence local and global ecosystems and may affect the flora and fauna of Virginia. |  | X |  |

Rubric for Instructional Design and Support

| **Adequate** | **Limited** | **No Evidence** |
| --- | --- | --- |
| 1. Materials emphasize the use of effective instructional practices and learning theory. | | |
| * 1. Students are guided through critical thinking and problem-solving approaches. | | |
| Materials consistently include content promoting use of critical thinking and problem-solving approaches. | Materials inconsistently include content promoting use of critical thinking and problem-solving approaches. | Materials do not include content promoting use of critical thinking and problem-solving approaches. |
| * 1. Concepts are introduced through concrete experiences that incorporate the scientific and engineering practices. | | |
| Materials consistently promote the introduction of concepts through concrete experiences. | Materials inconsistently promote the introduction of concepts through concrete experiences. | Materials do not promote the introduction of concepts through concrete experiences. |
| * 1. Multiple opportunities are provided for students to develop and apply concepts through scientific and engineering practices. | | |
| Materials consistently provide development and application of concepts through appropriate technologies. | Materials inconsistently provide development and application of concepts through appropriate technologies. | Materials do not provide development and application of concepts through appropriate technologies. |
| * 1. Students use a variety of representations (graphical, numerical, symbolic, verbal, and physical) to connect science concepts. | | |
| Materials provide consistent use of a variety of representations of science content and concepts. | Materials provide inconsistent use of a variety of representations of science content and concepts. | Materials do not provide use of a variety of representations of science content and concepts. |
| 1. The science content is significant and accurate. | | |
| * 1. Materials are presented in an organized, logical manner which represents the current thinking on how students learn science. | | |
| Materials consistently support the balanced use of conceptual and procedural approaches. | Materials inconsistently support the balanced use of conceptual and procedural approaches. | Materials do not support a balanced use of conceptual and procedural approaches. |
| * 1. Materials are organized appropriately within and among units of study. | | |
| Materials are consistently organized within and among units of study. | Materials are inconsistently organized within and among units of study. | Materials are inappropriately organized within and among units of study. |
| * 1. Format design includes titles, subheadings, and appropriate cross-referencing for ease of use. | | |
| Materials consistently use formatting that is user-friendly. | Materials inconsistently use formatting that is user-friendly. | Materials do not use formatting that is user-friendly. |
| * 1. Writing style, length of sentences, vocabulary, graphics, and illustrations are appropriate. | | |
| Materials consistently include writing and visuals that are appropriate for the grade level. | Materials inconsistently include writing and visuals that are appropriate for the grade level. | Materials do not include writing and visuals that are appropriate for the grade level. |
| * 1. Level of abstraction is appropriate, and practical/real-life examples, including careers, are provided. | | |
| Materials consistently provide the appropriate level of abstraction and appropriate practical/real-life examples. | Materials inconsistently provide the appropriate level of abstraction and appropriate practical/real-life examples. | Materials do not provide the appropriate level of abstraction and appropriate practical/real-life examples. |
| * 1. Sufficient applications are provided to promote depth of application. | | |
| Materials consistently provide sufficient applications to promote depth of application and are appropriate for the grade level. | Materials inconsistently provide sufficient applications to promote depth of application and are appropriate for the grade level. | Materials do not provide sufficient applications to promote depth of application and are not appropriate for the grade level. |
| 1. Materials present content in an accurate, unbiased manner. | | |
| Materials consistently present content in an accurate, unbiased manner. | Materials inconsistently present content in an accurate, unbiased manner. | Materials do not present content in an accurate, unbiased manner. |