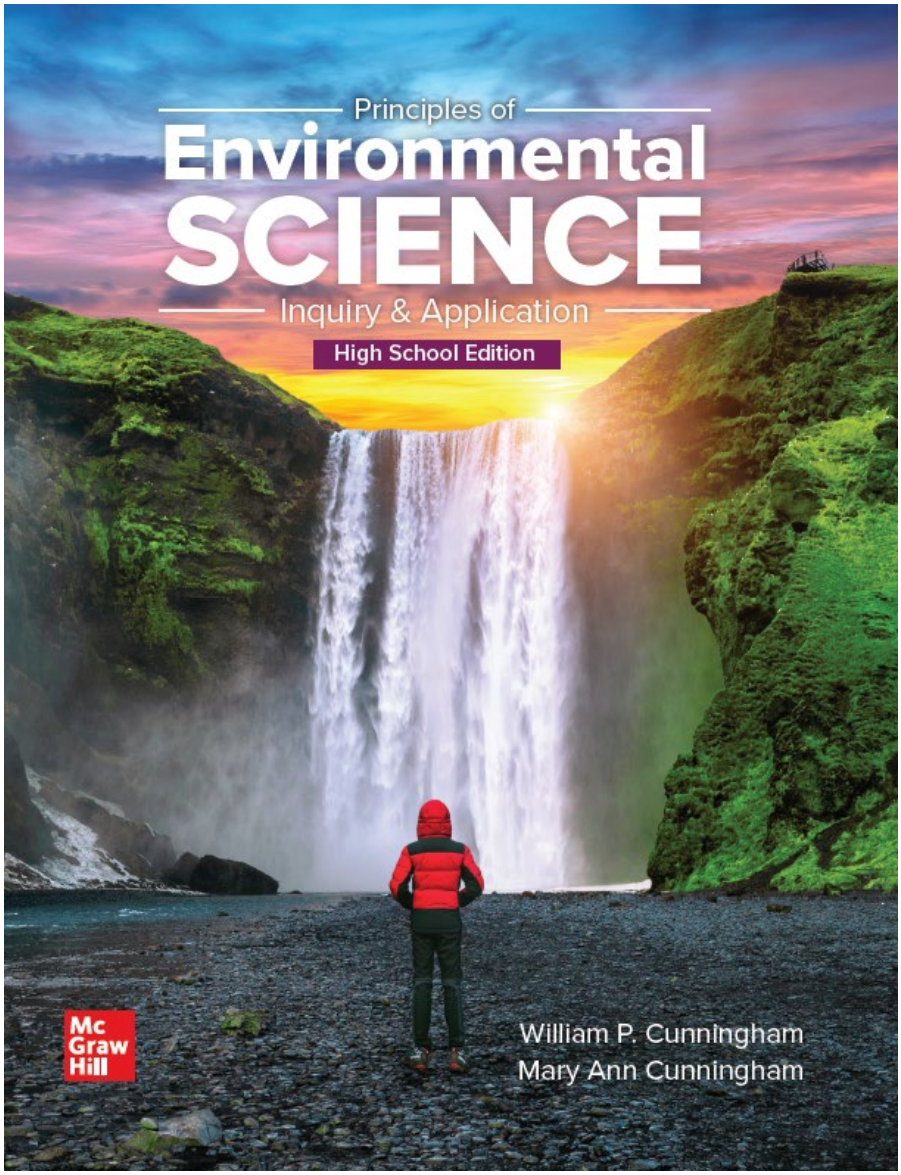
Next Generation Science Standards: Life Science Performance Expectations CORRELATION GUIDE

for *Principles of Environmental Science: Inquiry and Application*



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Correlation of Next Generation Science Standards,
Life Science Performance Expectations to
Principles of Environmental Science: Inquiry and Application
by William Cunningham and Mary Ann Cunningham

Next Generation Science Standards Life Science Performance Expectations	**Principles of Environmental Science: Inquiry and Applications ©2023**
HS-LS1 From Molecules to Organisms: Structures and Processes	
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.	80-81 *Exploring Science* 570-571 *Review Questions* 105 (#3)
HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	72
HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	72
HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	NA
HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	87-90 *Critical Thinking* 106 (#4) *Section Review* 90 (#1, #2)

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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 carbon-based molecules.	79-81 *Review Questions* 105 (#2)
HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.	89-90 *Critical Thinking* 106 *Review Questions* 105 (#4)
HS-LS2 Ecosystems: Interactions, Energy, and Dynamics	
HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	149-153, 158-160 *Math Connection* 151 *Review Questions* 183 (#2)
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.	45, 130-131, 150-153, 174-176, 212-213, 216-225 *Section Review* 153 (#2)
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.	47-48, 70-71, 84-90, 91, 94. 96, 97-103, 318-324, 343, 376 *Case Study* 68-69 *Data Analysis Lab* 106 *Key Concepts 92-93* *Review Questions 105 (#6, #7)* *Section Review* 74 (#1), 103 (#1-#3)324 (#1) *Use the Practices* 84, 97
HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	*97* *Data Analysis Lab* 65, 106 *Key Concepts* 92-93 *Review Questions* 105 (#5) *Use the Practices* 91
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.	90, 98-99, 376 *Section Review* 103 (#2)
HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	72, 137-142, 343 *Case Study* 68-69, 185-186 *Critical Thinking* 145 (#5) *Section Review* 142 (#1-#3) *Use the Practices* 137

Next Generation Science Standards Life Science Performance Expectations	Principles of Environmental Science: Inquiry and Applications ©2023
HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.	176-179, 225, 227-234, 283-284, 297-298, 310-312, 335-337, 361-364, 376-377, 385, 390-399, 401-402, 473-475, 512-517 *Case Study* 146-147 *Critical Thinking* 237 (#5), 314 (#3, #5) *Exploring Science* 226, 400-401, 608 *Healthy Environment, Go Online* 3, 67 *Key Concepts* 358-359, 518-519 *Section Review* 234 (#2), 312 (#1) *What Do You Think?* 168 *Use the Practices* 174, 310
HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.	Can be incorporated into the following: 155-162, 172-174, 176-179 *Case Study* 146-147
HS-LS3 Heredity: Inheritance and Variation of Traits	
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.	110 *Exploring Science* 570-571
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.	110
HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	*Exploring Science* 154
HS-LS4 Biological Evolution: Unity and Diversity	
HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.	109-110, 119-120 *Case Study* 107-108 *Data Analysis Lab* 145 *Key Concepts* 116-117
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.	109-110 *Critical Thinking* 145 (#2) *Key Concepts* 116-117

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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.	109-110, 123-124 *Case Study* 107-108 *Data Analysis Lab* 145 *Exploring Science* 154 *Key Concepts* 116-117 *Use the Practices* 109
HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.	109-110, 123-124 *Case Study* 107-108 *Data Analysis Lab* 145 *Key Concepts* 116-117
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.	115, 118-119, 137-142, 212-213 *Critical Thinking* 145 (#5) *Exploring Science* 154 *Key Concepts* 116-117 *Use the Practices* 109, 137
HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.	*Healthy Environment: Go Online* 537

Next Generation Science Standards Crosscutting Concepts	Principles of Environmental Science: Inquiry and Applications ©2023
1. Patterns. Observed patterns of forms and events guide organization and classification, and they prompt questions about relationships and the factors that influence them.	75-78, 119-120, 131-134, 187-199, 199-204 *Critical Thinking* 237 (#1) *Data Analysis Lab* 34, 65 *Exploring Science* 10-11
2. Cause and effect: Mechanism and explanation. Events have causes, sometimes simple, sometimes multifaceted. A major activity of science is investigating and explaining causal relationships and the mechanisms by which they are mediated. Such mechanisms can then be tested across given contexts and used to predict and explain events in new contexts.	250-252, 263, 266, 299-301, 580-581 *Case Study* 240-241, 406-407, 613-614, 654-655 *Critical Thinking* 106 (#5), 485 (#1) *Data Analysis Lab* 145, 184 *Exploring Science* 95, 262, 294, 470 *Key Concepts* 264-265 *Section Review* 303 (#1-#3) *Use the Practices* 318
3. Scale, proportion, and quantity. In considering phenomena, it is critical to recognize what is relevant at different measures of size, time, and energy and to recognize how changes in scale, proportion, or quantity affect a system's structure or performance.	73-74, 248-252, 458-459, 560-561 *Exploring Science* 95, 127 *Key Concepts* 558-559
4. Systems and system models. Defining the system under study—specifying its boundaries and making explicit a model of that system—provides tools for understanding and testing ideas that are applicable throughout science and engineering.	47-48, 70-74. 187, 242-248, 318-324, 360, 455-459 *Case Study* 4-5, 35-36, 107-108, 453-454, 538-539, 631-634 *Critical Thinking* 278 (#1) *Data Analysis Lab* 106 *Key Concepts* 92-93, 358-359 *Section Review* 324 (#1) *Use the Practices* 70
5. Energy and matter: Flows, cycles, and conservation. Tracking fluxes of energy and matter into, out of, and within systems helps one understand the systems' possibilities and limitations.	84-91, 94, 96-103, 250-252, 319, 343, 360, 376, 431, 434-437, 460-461, 555-556, 560-561 *Case Study* 68-69 *Critical Thinking* 106 (#5), 278 (#2) *Data Analysis Lab* 106 *Key Concepts* 92-93, 358-359, 558-559 *Life-Cycle Analysis* 587 *Section Review* 90 (#1, #2), 103 (#1-#3), 252 (#3) *Use the Practices* 84, 91, 97
6. Structure and function. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.	80-81, 109, 242-246, 509-511, 517, 520-521, 525-527 *Section Review* 512 (#3), 522 (#1, #2)
7. Stability and change. For natural and built systems alike, conditions of stability and determinants of rates of change or evolution of a system are critical elements of study.	70-74, 134-142, 253-263, 266, 376, 455-459 *Case Study* 68-69, 146-147, 185-186, 240-241, 280-281, 316-317, 368-369, 486-487 *Critical Thinking* 145 (#5) *Data Analysis Lab* 106, 184 *Key Concepts* 264-265 *Section Review* 74 (#1-#3), 137 (#1), 142 (#1-#3), 459 (#1) *Use the Practices* 130, 137

Next Generation Science Standards Science and Engineering Practices	Principles of Environmental Science: Inquiry and Applications ©2023
1. Asking questions (for science) and defining problems (for engineering)	18-19 *Get It?* 18 *Use the Practices* 6, 130, 199, 253, 282, 339, 390, 438, 465, 507, 638, 677
2. Developing and using models	20, 148-149, 150-153, 170-171, 174-175 *Critical Thinking* 184 (#1, #2), 404 (#4) *Get It?* 402 *Health Environment: Go Online* 537 *Life-Cycle Analysis* 587 *Review Questions* 183 (#1) *Use the Practices* 24, 70, 84, 164, 205, 298, 354, 431, 527, 555, 584, 615, 665
3. Planning and carrying out investigations	9, 12-13 20-21 *Assessing Toxins* 567 *Get It?* 21 *Use the Practices* 37, 109, 227, 349, 412, 688
4. Analyzing and interpreting data	21-22 *Data Analysis Lab* 34, 65, 106, 145, 184, 237, 279, 314-315, 367, 404-405, 451-452, 485, 535, 579, 612, 653, 656, 693 *Key Concepts* 214-215, 594-595 *Math Connection* 200 *Key Concepts* 162-163 *Use the Practices* 74, 208, 248, 418, 512
5. Using mathematics and computational thinking	11-12, 22, 111, 148-149, 150-153, 490-491, 638-641 *Critical Thinking* 535 (#1) *Exploring Science* 10-11, 642-643 *Math Connection* 12, 43, 134, 151, 157, 190, 255, 288, 323, 372, 411, 424, 488, 508, 574, 592, 640 *Use the Practices* 41, 91, 148, 155, 324, 564
6. Constructing explanations (for science) and designing solutions (for engineering)	19-20 *Health Environment, Go Online* 239 *Use the Practices* 47, 97, 172, 269, 304, 318, 370, 408, 459, 522, 540, 622, 661
7. Engaging in argument from evidence	23 *Section Review* 23 (#3), 312 (#2) *Use the Practices* 27, 137, 174, 212, 292, 361, 442, 475, 499, 600, 631 *What Do You Think?* 273, 395, 400-401, 501, 600
8. Obtaining, evaluating, and communicating information	23 *A Personal Hazardous Waste Inventory* 602 *Environment, Science, and Policy in Your Community* 660 *Key Concepts* 669 *Use the Practices* 17, 56, 179, 187, 242, 310, 328, 386, 423, 455, 492, 551, 582, 644, 673