

BIOLOGY

SCOPE AND SEQUENCE



SCOPE AND SEQUENCE WITH PACING



Use the relative times shown as one tool to help prioritize segments of your course instruction and homework assignments. Timing is based on 50-minute periods or 90-minute blocks with consideration given to the amount and depth of the content presentation and the NGSS addressed.

As you allocate time, consider your students' backgrounds and their available resources. Many activities require very simple or no materials or advance preparation and may be assigned as homework, such as the Looking at the Data activities, Case Study/Tying It All Together activities, and many of the Minilabs.

Assessment tools such as the Section Reviews, Chapter Reviews, and Chapter Assessments are not included in this scope and sequence as their application varies widely with teacher discretion. Also excluded are the National Geographic Explorer and Photographer features, which give students avenues to explore STEM careers on their own.

The Investigations and Performance Tasks listed after this scope and sequence offer ways to assess NGSS that may require in-class time. Choose among these based on how you want to promote understanding of various concepts and your available laboratory equipment.

CONTENTS

Chapters / Sections	1
Chapter Investigations	15
Virtual Investigations	20
Performance Tasks	20



CHAPTERS / SECTIONS

TITLE	PERIODS	BLOCKS	NGSS
CHAPTER 1 <i>Introduction to Biology</i>			HS-ETS1-1, HS-ETS1-2
1.1 The Study of Life (pp. 4–8)	0.75	0.3	LS1.A, LS4.A, LS4.B, LS4.C SEP: Constructing Explanations and Designing Solutions; Scientific Knowledge Is Open to Revision in Light of New Evidence CCC: Structure and Function
Minilab Extracting DNA from Fruit (p. 8)	0.6	0.3	LS3.A CCC: Patterns

TITLE	PERIODS	BLOCKS	NGSS
1.2 Constructing Explanations about the Natural World (pp. 9–17)	1.0	0.5	LS1.A, ETS1.B SEP: Engaging in Argument from Evidence; Scientific Investigations Use a Variety of Methods; Scientific Knowledge Is Based on Empirical Evidence; Scientific Knowledge Is Open to Revision in Light of New Evidence; Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena CCC: Patterns; Systems and System Models
1.3 Using Biology to Develop Solutions (pp. 18–25)	0.75	0.4	ETS1.A, ETS1.B, ETS1.C SEP: Constructing Explanations and Designing Solutions CCC: Science Is a Human Endeavor; Influence of Science, Engineering, and Technology on Society and the Natural World
Looking at the Data Mass Distribution of Mammals (p. 22)	0.5	0.3	SEP: Analyzing and Interpreting Data; Using Mathematics and Computational Thinking; Engaging in Argument from Evidence CCC: Patterns; Scale, Proportion, and Quantity
Case Study / Tying It All Together (p. 3, p. 25)	0.5	0.3	LS2.D SEP: Asking Questions and Defining Problems; Constructing Explanations and Designing Solutions; Scientific Investigations Use a Variety of Methods; Scientific Knowledge Is Based on Empirical Evidence; Science Is a Human Endeavor
Total Chapter 1	6.1	3.1	

TITLE	PERIODS	BLOCKS	NGSS
UNIT 1: RELATIONSHIPS IN ECOSYSTEMS	1.0	0.5	LS2.C
CHAPTER 2 <i>Energy and Matter in Ecosystems</i>			HS-LS2-2, HS-LS2-3, HS-LS2-4, HS-LS2-5, HS-LS2-6
2.1 Ecological Systems (pp. 34–37)	0.75	0.3	LS2.B SEP: Using Mathematics and Computational Thinking CCC: Patterns
2.2 Modeling the Transfer of Energy and Matter (pp. 38–41)	1.0	0.5	LS2.B, LS2.C SEP: Asking Questions and Defining Problems; Developing and Using Models CCC: Energy and Matter
2.3 Modeling Energy and Matter Distribution (pp. 43–47)	0.75	0.4	LS2.B SEP: Using Mathematics and Computational Thinking CCC: Energy and Matter
Minilab Model a Biomass Pyramid (p. 48)	0.6	0.3	LS2.B SEP: Using Mathematics and Computational Thinking; Constructing Explanations and Designing Solutions CCC: Scale, Proportion, and Quantity
2.4 Cycling of Matter (pp. 49–55)	1.0	0.3	LS2.A, LS2.B, LS2.C SEP: Developing and Using Models; Using Mathematics and Computational Thinking
Looking at the Data Biomagnification of Mercury (p. 56)	0.5	0.3	HS-LS2-4 SEP: Developing and Using Models; Analyzing and Interpreting Data; Engaging in Argument from Evidence; Constructing Explanations and Designing Solutions

TITLE	PERIODS	BLOCKS	NGSS
Case Study / Tying It All Together (p. 33, p. 57)	0.5	0.3	LS2.A, LS2.B SEP: Asking Questions and Defining Problems; Developing and Using Models; Planning and Carrying Out Investigations; Using Mathematics and Computational Thinking; Constructing Explanations and Designing Solutions CCC: Scale, Proportion, and Quantity
Total Chapter 2	5.1	2.4	

CHAPTER 3 <i>Biodiversity and Ecosystem Stability</i>			HS-LS2-1, HS-LS2-2, HS-LS2-6, HS LS2 7
3.1 Ecological Relationships (pp. 62–64)	0.75	0.3	LS2.A, LS2.C SEP: Asking Questions and Defining Problems CCC: Stability and Change
3.2 Biodiversity (pp. 66–70)	0.75	0.35	LS2.C, LS4.C, LS4.D SEP: Planning and Carrying Out Investigations; Constructing Explanations and Designing Solutions; Scientific Knowledge Is Based on Empirical Evidence; Scientific Knowledge Is Open to Revision in Light of New Evidence
Looking at the Data The Biodiversity Conservation Paradox (p. 71)	0.5	0.3	LS2.C SEP: Using Mathematics and Computational Thinking CCC: Stability and Change
3.3 Ecosystem Stability and Change (pp. 72–77)	1.0	0.5	LS2.C LS4.D CCC: Patterns; Cause and Effect; Stability and Change
Minilab Observing Biodiversity in Pond Water (p. 78)	0.6	0.3	LS2.C SEP: Engaging in Argument from Evidence; Obtaining, Evaluating, and Communicating Information CCC: Stability and Change

TITLE	PERIODS	BLOCKS	NGSS
Case Study / Tying It All Together (p. 60, p. 79)	0.5	0.3	LS2.C, ESS2.C, ESS2.E SEP: Obtaining, Evaluating, and Communicating Information; Engaging in Argument from Evidence; Scientific Knowledge Is Open to Revision in Light of New Evidence CCC: Stability and Change
Total Chapter 3	4.1	2.1	

CHAPTER 4 <i>Population Measurement and Growth</i>			HS-LS2-1, HS-LS2-2, HS-LS2-7, HS ETS1 3
4.1 Measuring Populations (pp. 84–87)	0.75	0.4	LS2.A, LS2.C SEP: Using Mathematics and Computational Thinking CCC: Planning and Carrying Out Investigations
Minilab Mark–Recapture Sampling (p. 88)	0.6	0.3	LS2.C SEP: Analyzing and Interpreting Data; Using Mathematics and Computational Thinking CCC: Science Is a Human Endeavor
4.2 Modeling Population Growth Patterns (pp. 89–93)	1.0	0.5	LS2.A, LS2.C SEP: Using Mathematics and Computational Thinking
4.3 Factors that Limit Population Growth (pp. 95–101)	0.75	0.3	LS2.A, LS2.C SEP: Using Mathematics and Computational Thinking
Looking at the Data Invasive Species Population Growth (p. 102)	0.5	0.3	LS2.C SEP: Using Mathematics and Computational Thinking CCC: Scale, Proportion, and Quantity
Case Study / Tying It All Together (p. 83, p. 103)	0.5	0.3	LS2.A, LS2.C SEP: Asking Questions and Defining Problems
Total Chapter 4	4.1	2.1	
Unit 1 Activity (p. 107)	1.0	0.5	HS-LS2-3

TITLE	PERIODS	BLOCKS	NGSS
UNIT 2: CELL SYSTEMS	1.0	0.5	CCC: Structure and Function
CHAPTER 5 <i>Molecules in Living Systems</i>			HS-LS1-6
5.1 Elements and Compounds (pp. 114–120)	1.0	0.5	LS1.C, PS1.A
5.2 Water (pp. 121–125)	1.0	0.5	PS1.A, PS2.B
Minilab Polar vs. Nonpolar Molecules (p. 125)	0.6	0.3	PS1.A, PS2.B SEP: Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions CCC: Cause and Effect; Structure and Function
5.3 Carbon-Based Molecules (pp. 126–136)	1.5	0.8	LS1.C PS2.B
5.4 Chemical Reactions (pp. 137–145)	1.5	0.8	LS1.C PS1.A PS2.B
Looking at the Data Digestive Enzymes and pH (p. 144)	0.5	0.3	LS1.C SEP: Analyzing and Interpreting Data; Using Mathematics and Computational Thinking
Case Study / Tying It All Together (p. 113, p. 145)	0.5	0.3	SEP: Asking Questions and Defining Problems; Obtaining, Evaluating, and Communicating Information; Engaging in Argument from Evidence CCC: Structure and Function
Total Chapter 5	6.6	3.5	

CHAPTER 6 <i>Cell Structure and Function</i>			HS-LS1-5, HS-LS1-7, HS-LS2-3, HS LS2 5
6.1 Cell Structures (pp. 150–161)	3.0	1.5	LS1.A, LS2.C
Looking at the Data Microbiota of the Human Body (p. 159)	0.5	0.3	LS1.A SEP: Using Mathematics and Computational Thinking
6.2 Cell Membranes (pp. 162–168)	2.0	1.0	LS1.A CCC: Energy and Matter; Stability and Change
Minilab Selectively Permeable Membranes (p. 168)	0.6	0.3	LS1.A SEP: Asking Questions and Defining Problems
6.3 Photosynthesis and Cellular Respiration (p. 169–177)	2.5	1.2	LS1.C SEP: Developing and Using Models

TITLE	PERIODS	BLOCKS	NGSS
Case Study / Tying It All Together (p. 149, p. 177)	0.5	0.3	LS1.C SEP: Asking Questions and Defining Problems
Total Chapter 6	9.1	4.6	

CHAPTER 7 <i>Cell Growth</i>			HS-LS1-1, HS-LS1-4
7.1 Cell Cycles (pp. 182–187)	2.0	1.0	LS1.A, LS1.B SEP: Developing and Using Models; Constructing Explanations and Designing Solutions CCC: Systems and System Models
Looking at the Data Identifying Gene Mutations in Cancer Cells (p. 187)	0.5	0.3	LS3.A SEP: Analyzing and Interpreting Data
7.2 Mitosis (pp. 188–192)	1.5	0.8	LS1.B , LS3.A SEP: Constructing Explanations and Designing Solutions CCC: Structure and Function
Minilab Modeling Mitosis (p. 192)	0.6	0.3	LS1.B SEP: Developing and Using Models; Constructing Explanations and Designing Solutions
7.3 Cell Differentiation (pp. 193–197)	1.5	0.7	LS1.A, LS1.B SEP: Asking Questions and Defining Problems CCC: Structure and Function
Case Study / Tying It All Together (p. 181, p. 199)	0.5	0.3	LS1.A, S1.B SEP: Developing and Using Models; Constructing Explanations and Designing Solutions
Total Chapter 7	6.6	3.4	
Unit 2 Activity (p. 203)	1.0	0.5	HS-LS1-2, HS-LS2-3

TITLE	PERIODS	BLOCKS	NGSS
UNIT 3: INTERACTIONS IN LIVING SYSTEMS	1.0	0.5	LS2.B CCC: Stability and Change
CHAPTER 8 <i>Diversity of Living Systems</i>			HS-LS1-2
CHAPTER OR SECTION TITLE	PERIODS	BLOCKS	NGSS
8.1 Bacteria and Archaea (pp. 210–17)	1.3	0.7	LS1.A SEP: Asking Questions and Defining Problems; Obtaining, Evaluating, and Communicating Information; Constructing Explanations and Designing Solutions; Sci-entific Investigations Use a Variety of Methods; Scientific Knowledge Is Open to Revision in Light of New Evidence CCC: Structure and Function
8.2 Protists (pp. 218–225)	1.2	0.6	LS2.C SEP: Scientific Investigations Use a Variety of Methods; Scientific Knowledge Is Open to Revision in Light of New Evi-dence
Minilab Features of Paramecium and Euglena (p. 226)	0.6	0.3	SEP: Constructing Explanations and Designing Solutions CCC: Structure and Function
8.3 Fungi (pp. 227–233)	1.0	0.5	LS2.C SEP: Constructing Explanations and Designing Solutions CCC: Structure and Function
Looking at the Data The C-Value Enigma (p. 234)	0.5	0.3	LS1.A SEP: Analyzing and Interpreting Data; Using Mathematics and Computa-tional Thinking; Constructing Explanations and Designing Solutions CCC: Patterns; Scale, Proportion, and Quantity
8.4 Viruses (pp. 236–243)	1.5	0.8	

TITLE	PERIODS	BLOCKS	NGSS
Case Study / Tying It All Together (p. 209, p. 245)	0.5	0.3	SEP: Developing and Using Models; Obtaining, Evaluating, and Communicating Information; Scientific Investigations Use a Variety of Methods CCC: Structure and Function
Total Chapter 8	6.6	3.5	

CHAPTER 9 <i>Plant Systems</i>			HS-LS1-2, HS-LS1-3
9.1 Plant Origins (pp. 250–255)	0.75	0.4	LS1.A
Minilab Investigating Leaf Stomata (p. 256)	0.6	0.3	LS1.A
9.2 Transport in Plants (p. 257–262)	1.0	0.5	LS1.A CCC: Stability and Change
9.3 Plant Growth and Reproduction (pp. 263–269)	0.75	0.3	LS1.A, LS1.B, LS1.C
9.4 Plant Responses to the Environment (pp. 271–275)	1.0	0.3	LS1.A
Looking at the Data Bud Burst and Flowering in a Changing Climate (p. 276)	0.5	0.3	LS2.C CCC: Systems and System Models
Case Study / Tying It All Together (p. 249, p. 277)	0.5	0.3	LS2.C SEP: Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena CCC: Systems and System Models
Total Chapter 9	5.1	2.4	

CHAPTER 10 <i>Animal Systems</i>			HS-LS1-2, HS-LS1-3, HS-LS2-8, HS-ETS1-3
10.1 Animal Diversity (pp. 282–285)	0.5	0.3	LS1.A, LS4.A CCC: Structure and Function
10.2 Defining Animal Systems (pp. 286–290)	1.0	0.5	LS1.A SEP: Developing and Using Models CCC: Systems and System Models
Minilab Comparing Reaction Speed (p. 291)	0.6	0.3	SEP: Developing and Using Models; Engaging in Argument from Evidence CCC: Patterns
10.3 Maintaining Homeostasis (pp. 292–294)	1.0	0.5	LS1.A CCC: Stability and Change

TITLE	PERIODS	BLOCKS	NGSS
Looking at the Data Thermoregulation (p. 295)	0.5	0.2	LS1.A CCC: Patterns; Cause and Effect
10.4 Animal Behavior (pp. 296–305)	2.0	1.0	LS1.A, LS2.D, LS4.B
Case Study / Tying It All Together (p. 281, p. 307)	0.5	0.3	SEP: Asking Questions and Defining Problems; Developing and Using Models; Constructing Explanations and Designing Solutions; Obtaining, Evaluating, and Communicating Information; Scientific Knowledge Is Open to Revision in Light of New Evidence CCC: Structure and Function
Total Chapter 10	6.1	3.1	
Unit 3 Activity (p. 311)	1.0	0.5	1.G, 5.C, 13.A

UNIT 4: GENETICS	1.0	0.5	ETS1.A, SEP: Asking Questions and Defining
CHAPTER 11 DNA, RNA and Proteins			HS-LS1-1, HS-LS3-1
11.1 Genetic Information (pp. 318–325)	3.0	1.5	LS1.A, LS3.A SEP: Asking Questions and Defining Problems CCC: Structure and Function
11.2 Replication, Transcription, and Translation (pp. 326–333)	2.5	1.2	LS1.A, LS3.A
Minilab Extracting DNA from Fruit (p. 334)	0.6	0.3	LS3.A SEP: Developing and Using Models CCC: Systems and System Models
11.3 Regulating Gene Expression (pp. 335–341)	2.5	1.3	LS1.A, LS3.A
Looking at the Data Decay of mRNA Molecules (p. 342)	0.5	0.3	LS3.A
Case Study / Tying It All Together (p. 317, p. 343)	0.5	0.3	HS-LS1-1 LS1.A, LS3.A SEP: Asking Questions and Defining Problems CCC: Systems and System Models
Total Chapter 11	9.6	4.9	

TITLE	PERIODS	BLOCKS	NGSS
CHAPTER 12 <i>Genetic Variation and Heredity</i>			HS-LS3-2, HS-LS3-3
12.1 Meiosis (pp. 348–46)	3.0	1.5	LS3.A, LS3.B
12.2 Mutations (pp. 358–63)	1.5	0.8	LS3.B CCC: Cause and Effect
12.3 Mendelian Inheritance (pp. 364–69)	2.0	1.0	LS3.B SEP: Analyzing and Interpreting Data CCC: Scale, Proportion, and Quantity
Looking at the Data Blood Type Compatibility (p. 370)	0.5	0.3	LS3.B SEP: Analyzing and Interpreting Data; Using Mathematics and Computational Thinking
12.4 Other Patterns of Inheritance (pp. 371–375)	2.0	1.0	LS3.B SEP: Analyzing and Interpreting Data CCC: Patterns
Minilab Modeling Inheritance (p. 376)	0.6	0.3	LS3.B SEP: Developing and Using Models; Analyzing and Interpreting Data
Case Study / Tying It All Together (p. 347, p. 377)	0.5	0.3	HS-LS3-2, HS-LS3-3 LS3.B SEP: Asking Questions and Defining Problems; Developing and Using Models; Analyzing and Interpreting Data CCC: Cause and Effect; Scale, Proportion, and Quantity
Total Chapter 12	11.6	5.2	

CHAPTER 13 <i>Genetic Technologies</i>			HS-LS2-7, HS-ETS1-3
13.1 Tools in Genetic Technology (pp. 382–391)	1.5	0.7	LS11.A SEP: Constructing Explanations and Designing Solutions; Scientific Investigations Use a Variety of Methods

TITLE	PERIODS	BLOCKS	NGSS
13.2 Applications in Genetic Engineering (pp. 404–405)	1.5	0.8	ETS1.A, ETS1.B SEP: Constructing Explanations and Designing Solution; Engaging in Argument from Evidence; Scientific Investigations Use a Variety of Methods CCC: Science Addresses Questions About the Natural and Material World
Looking at the Data Genetic Therapy Clinical Trials (pp. 404–405)	0.5	0.3	ETS1.A, ETS1.B SEP: Using Mathematics and Computational Thinking; Engaging in Argument from Evidence CCC: Patterns; Influence of Science, Engineering, and Technology on Society and the Natural World
13.3 Vaccine Development (pp. 406–415)	2.0	1.0	ETS1.A, ETS1.B SEP: Asking Questions and Defining Problems CCC: Patterns; Structure and Function; Science Addresses Questions About the Natural and Material World; Influence of Science, Engineering, and Technology on Society and the Natural World
Minilab Herd Immunity (p. 416)	0.6	0.3	SEP: Developing and Using Models; Engaging in Argument from Evidence
Case Study / Tying It All Together (p. 381, p. 417)	0.5	0.3	HS-LS2-7 LS2.C, ETS1.A, ETS1.B SEP: Asking Questions and Defining Problems; Developing and Using Models; Constructing Explanations and Designing Solutions; Scientific Investigations Use a Variety of Methods CCC: Cause and Effect; Science Is a Human Endeavor; Science Addresses Questions About the Natural and Material World
Total Chapter 13	6.6	3.4	
Unit 4 Activity (p. 421)	1.0	0.5	ETS.A, ETS1.B SEP: Engaging in Argument from Evidence

TITLE	PERIODS	BLOCKS	NGSS
UNIT 5: EVOLUTION AND CHANGING ENVIRONMENTS	1.0	0.5	LS4.C
CHAPTER 14 <i>Evidence for Evolution</i>			HS-LS3-1, HS-LS4-1
15.1 Developing the Theory of Evolution by Natural Selection (pp. 458–466)	2.5	1.2	LS4.B, LS4.C SEP: Constructing Explanations and Designing Solutions ; Scientific Investigations Use a Variety of Methods; Scientific Knowledge Is Based on Empirical Evidence; Scientific Knowledge Is Open to Revision in Light of New Evidence CCC: Patterns; Cause and Effect; Scientific Knowledge Assumes an Order and Consistency in Natural Systems
Minilab Hawks and Mice (p. 466)	0.6	0.3	LS4.B; LS4.C SEP: Engaging in Argument from Evidence
15.2 Evolution in Populations (pp. 467–475)	2.0	1.0	LS3.B, LS4.A, LS4.B, LS4.C SEP: Analyzing and Interpreting Data CCC: Patterns; Cause and Effect
Looking at the Data Tracking Evolution (pp. 474)	0.5	0.3	LS4.B, LS4.C SEP: Developing and Using Models; Analyzing and Interpreting Data; Engaging in Argument from Evidence CCC: Cause and Effect
15.3 Other Patterns in Population Genetics (pp. 476–481)	1.5	0.8	LS3.B, LS4.A SEP: Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions CCC: Cause and Effect
Case Study / Tying It All Together (p. 457, p. 481)	0.5	0.3	LS4.B, LS4.C SEP: Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions
Total Chapter 14	7.6	3.9	

TITLE	PERIODS	BLOCKS	NGSS
CHAPTER 15 <i>The Theory of Evolution</i>			HS-LS3-3, HS-LS4-2, HS-LS4-3, HS LS4 4
15.2 Evolution in Populations (pp. 467–475)	2.0	1.0	LS3.B, LS4.A, LS4.B, LS4.C SEP: Analyzing and Interpreting Data CCC: Patterns; Cause and Effect
Looking at the Data Tracking Evolution (pp. 474)	0.5	0.3	LS4.B, LS4.C SEP: Developing and Using Models; Analyzing and Interpreting Data; Engaging in Argument from Evidence CCC: Cause and Effect
15.3 Other Patterns in Population Genetics (pp. 476–481)	1.5	0.8	LS3.B, LS4.A SEP: Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions CCC: Cause and Effect
Case Study / Tying It All Together (p. 457, p. 481)	0.5	0.3	LS4.B, LS4.C SEP: Asking Questions and Defining Problems; Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions
Total Chapter 15	7.6	3.9	

CHAPTER 16 <i>Survival in Changing Environments</i>			HS-LS2-7, HS-LS4-5, HS-LS4-6, HS ETS1-2, HS-ETS1-3, HS-ETS1-4
16.1 Speciation (pp. 486–491)	2.0	1.0	LS4.C, LS4.D SEP: Engaging in Argument from Evidence; Obtaining, Evaluating, and Communicating Information
16.2 Extinction (pp. 492–499)	2.0	1.0	LS2.C, LS4.C, LS4.D SEP: Constructing Explanations and Designing Solutions CCC: Cause and Effect; Scale, Proportion, and Quantity

TITLE	PERIODS	BLOCKS	NGSS
16.3 Human Impact on the Environment (pp. 500–509)	3.5	1.8	LS2.C, LS4.D, ESS2.D, ESS3.A SEP: Analyzing and Interpreting Data CCC: Cause and Effect; Scale, Proportion, and Quantity; Influence of Science, Engineering, and Technology on Society and the Natural World
Looking at the Data Biodiversity and Deforestation (p. 509)	0.5	0.3	LS4.C, LS4.D, ESS3.C SEP: Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions
16.4 Reducing Human Impact on the Environment (pp. 510–517)	2.5	1.3	LS4.D, ESS3.A, ESS3.C, ESS3.D, ETS1.A, ETS1.C
Minilab Modeling Human-Caused Changes in the Environment (p. 516)	0.6	0.3	LS4.C, LS4.D SEP: Developing and Using Models CCC: Systems and System Models
Case Study / Tying It All Together (p. 485, p. 517)	0.5	0.3	LS2.C, LS2.D, LS4.A, LS4.C, LS4.D SEP: Developing and Using Models; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence
Total Chapter 16	11.6	6.0	
Unit 5 Activity (p. 521)	1.0	0.5	
Total for all Chapters	123.6	63.1	

CHAPTER INVESTIGATIONS

CHAPTER INVESTIGATIONS	PERIODS	BLOCKS	NGSS
1A: Making Real-World Observations	1.0	0.5	SEP: Engaging in Argument from Evidence; Scale, Proportion, and Quantity CCC: Systems and System Models
1B: A Medicine Distribution Solution	2.0	1.0	HS-ETS1-1 ETS1.A SEP: Asking Questions and Defining Problems CCC: Cause and Effect

CHAPTER INVESTIGATIONS	PERIODS	BLOCKS	NGSS
2A: Salinity and Brine Shrimp Survival	3.0	1.5	HS-LS2-2 LS2.A SEP: Using Mathematics and Computational Thinking; Constructing Explanations and Designing Solutions CCC: Scale, Proportion, and Quantity
2B: Exploring Brine Shrimp Survival	4.0	2.0	HS-LS2-2 SEP: Using Mathematics and Computational Thinking; Constructing Explanations and Designing Solutions CCC: Scale, Proportion, and Quantity
3A: Measuring Biodiversity Using Ecological Sampling Methods	2.0	0.0	HS-LS2-2, HS-LS2-6 LS2.C SEP: Analyzing and Interpreting Data; Using Mathematics and Computational Thinking; Engaging in Argument from Evidence CCC: Systems and System Models
3B: Ecological Succession in an Aquatic Community	3.0	1.5	HS-LS2-6 LS2.C SEP: Analyzing and Interpreting Data; Engaging in Argument from Evidence CCC: Stability and Change; Science Addresses Questions About the Natural and Material World
4A: Population Growth of Duckweed	4.0	3.0	HS-LS2-2 LS2.A, LS2.C SEP: Using Mathematics and Computational Thinking CCC: Scale, Proportion, and Quantity
4B: Designing a Seed Trap	3.0	1.5	HS-ETS1-3 ETS1.B SEP: Constructing Explanations and Designing Solutions CCC: Influence of Science, Engineering, and Technology on Society and the Natural World

CHAPTER INVESTIGATIONS	PERIODS	BLOCKS	NGSS
5A: Converting Carbohydrates	1.0	0.5	HS-LS1-6 LS1.C SEP: Constructing Explanations and Designing Solutions CCC: Energy and Matter
5B: Crime Scene Cleaners	4.0	2.0	HS-LS1-5, HS-LS1-7 LS1.C SEP: Planning and Carrying Out Investigations; Constructing Explanations and Designing Solutions CCC: Energy and Matter
6A: Factors Affecting Cellular Respiration	2.0	1.0	HS-LS1-7
6B: Designing a Photobioreactor	4.0	2.0	HS-LS1-5, HS-ETS1-2
7A: Plant Growth through Mitosis	0.5	0.3	HS-LS1-4
7B: Cell Differentiation in Plant Leaves	1.0	0.5	HS-LS1-4
8A: Classification Systems	2.0	1.0	SEP: Engaging in Argument from Evidence; Scientific Knowledge Is Open to Revision in Light of New Evidence CCC: Patterns
8B: Effects of Antimicrobials	3.0	1.5	SEP: Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence CCC: Structure and Function
9A: Connecting Plant Structures with Their Functions	2.0	1.0	SEP: Developing and Using Models CCC: Systems and System Models; Stability and Change
9B: Homeostasis in Plants	3.0	1.5	SEP: Planning and Carrying Out Investigations CCC: Cause and Effect; Stability and Change
10A: The Effect of Exercise on Homeostasis	2.0	1.0	SEP: Developing and Using Models; Planning and Carrying Out Investigations; Scientific Investigations Use a Variety of Methods CCC: Cause and Effect: Systems and System Models
10B: Monitoring Animal Behavior	3.0	1.5	HS-LS2-8, HS-ETS1-3 LS2.D SEP: Engaging in Argument from Evidence

CHAPTER INVESTIGATIONS	PERIODS	BLOCKS	NGSS
11A: Investigating the Building Blocks of Life	1.0	0.5	HS-LS3-1 LS1.A SEP: Asking Questions and Defining Problems CCC: Cause and Effect
11B: Regulation of Gene Expression	2.0	1.0	HS-LS3-1 LS1.A SEP: Asking Questions and Defining Problems CCC: Cause and Effect
12A: Design an Organism	1.0	0.5	HS-LS3-3 SEP: Analyzing and Interpreting Data; Engaging in Argument from Evidence
12B: Mapping Fruit Fly Genes through Linkage	2.0	1.0	HS-LS3-3 LS3.B SEP: Analyzing and Interpreting Data; Engaging in Argument from Evidence
13A: DNA Evidence	2.0	1.0	HS-ETS1-3 ETS1.B SEP: Constructing Explanations and Designing Solutions CCC: Influence of Science, Engineering, and Technology on Society and the Natural World
13B: Fluorescent Genes	2.0	1.0	HS-ETS1-3 ETS1.B SEP: Constructing Explanations and Designing Solutions CCC: Influence of Science, Engineering, and Technology on Society and the Natural World
14A: Comparing Genetic Information Among Organisms	1.0	0.5	HS-LS4-1 LS4.A SEP: Obtaining, Evaluating, and Communicating Information; Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena CCC: Scientific Knowledge Assumes an Order and Consistency in Natural Systems

CHAPTER INVESTIGATIONS	PERIODS	BLOCKS	NGSS
14B: What Lived Here?	1.0	0.5	HS-LS4-1 LS1.A SEP: Obtaining, Evaluating, and Communicating Information; Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena CCC: Scientific Knowledge Assumes an Order and Consistency in Natural Systems
15A: Genetic Drift	1.0	0.5	HS-LS4-3 LS4.B SEP: Analyzing and Interpreting Data CCC: Patterns; Cause and Effect
15B: Evolution of Antibiotic Resistance in Bacteria	2.5	1.5	HS-LS4-2, HS-LS4-3, HS-LS4-4 LS4.B, LS4.C SEP: Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions CCC: Cause and Effect; Scientific Knowledge Assumes an Order and Consistency in Natural Systems
16A: Modeling Speciation	2.0	1.0	HS-LS4-5 LS4.C SEP: Analyzing and Interpreting Data; Constructing Explanations and Designing Solutions; Engaging in Argument from Evidence CCC: Cause and Effect; Scientific Knowledge Assumes an Order and Consistency in Natural Systems
16B: Wildlife Crossings and Corridors	2.0	1.0	HS-ETS1-2, HS-ETS1-3, HS-LS2-7, HS LS4 6 ETS1.B SEP: Constructing Explanations and Designing Solutions CCC: Systems and System Models
Total for all Chapter Investigations	69.0	34.8	

VIRTUAL INVESTIGATIONS

UNIT	VIRTUAL INVESTIGATIONS	PERIODS	BLOCKS	NGSS
1	Sea Pigs on the Abyssal Plain	2–4	1–2	HS-LS2-1, HS-LS2-6
2	Bacteria in the Digestive System	2–4	1–2	HS-LS1-4
3	Communication in the Rainforest	2–4	1–2	HS-LS2-8
4	Fighting a Viral Pandemic	2–4	1–2	HS-LS3-2, HS-ETS1-3
5	Hummingbirds on the Move	2–4	1–2	HS-LS4-3, HS-LS4-4, HS-LS4-5
Total for all Virtual Investigations		10–20	5–10	

PERFORMANCE TASKS

UNIT	PERFORMANCE TASKS	PERIODS	BLOCKS	NGSS
1	1: Why Should We Preserve Wetland Ecosystems?	3.0	1.5	HS-LS2-4, HS-LS2-5
	2: How Do Seasonal Changes Affect Organisms in a Freshwater Ecosystem?	3.0	1.5	HS-LS2-3, HS-LS2-4
	3: How Does a Sudden Disturbance Change a Rainforest Ecosystem?	3.0	1.5	HS-LS2-3, HS-LS2-4
	4: How Does Long-term Drought Change a Saltwater Ecosystem?	3.0	1.3	HS-LS2-2, HS-LS2-6
	5: What Is the Best Way to Restore Habitat for Endangered Bats?	1.0	0.5	HS-LS2-7, HS-ETS1-3
2	1: How Does Regenerative Medicine Reflect Nature?	3.0	1.5	HS-LS1-6
	2: What Are the Requirements for a Minimum Viable Ecosystem?	3.0	1.5	HS-LS1-5, HS-LS1-7
	3: How Are Complex Carbon-based Molecules Built from Simple Atoms?	2.0	1.0	HS-LS1-4
3	1: How Do Systems Interact to Maintain Homeostasis in Plants?	3.0	1.5	HS-LS1-2
	2: How Can We Test Systems that Interact to Maintain Homeostasis in Humans?	3.0	1.5	HS-LS1-2, HS-LS1-3
	3: How Important Is Group Behavior to the Survival of Individuals in a Population?	3.0	0.0	HS-LS2-8
4	1: How Does a Single-gene Trait Disappear and Reappear in a Subsequent Generation?	2.0	0.5	HS-LS3-1
	2: What Caused the Unusual Skin Discoloration in the People Living in a Rural Area?	2.0	1.0	HS-LS3-2
	3: What Are the Risks and Benefits of Genetically Engineered Food?	2.0	1.0	HS-LS3-3
	4: How Will We Curb the Spread of Mosquito-borne Disease?	3.0	1.5	HS-ETS1-2

UNIT	PERFORMANCE TASKS	PERIODS	BLOCKS	NGSS
5	1: How Can We Determine Evolutionary Relationships?	3.0	1.5	HS-LS4-1
	2: How Does Bacterial Evolution Affect Public Health Globally?	2.0	1.0	HS-LS4-2, HS-LS4-3
	3: How Is Climate Change Altering Species Evolution?	3.0	1.5	HS-LS4-4, HS-LS4-3
	4: How Do Human-induced Changes in the Environment Affect Different Species?	4.0	2.0	HS-LS4-5
	5: What Kind of Artificial Reef Is Most Effective at Preserving and Restoring Biodiversity?	2.0	1.0	HS-LS4-6, HS-ETS1-4
	Total for all Performance Tasks	53.0	24.3	