

Summary of BIOZONE's 3D Approach By Chapter

Science and Engineering Practices (SEPs), Crosscutting Concepts (CCCs), Disciplinary Core ideas (DCIs), and Performance Expectations (PEs) for Instructional Segments 1-6 of the CA NGSS (Three Course Model) are summarized below. A concluding basic skills chapter, which covers some of the background for Science and Engineering Practices, is also included. Performance Expectations are met within activities and/or the Summative Assessments concluding each Instructional Segment.

Page		Activity	Hub	SEP	DCI	CCC	PE
1		IS1: Ecosystem Interactions and Energy					
2	1	An Endless Swarm	✓	Anchoring phenomenon			
3	2	The Earth's Systems	✓	2	LS2.A	4	
5	3	Abiotic Factors Influence Distribution	✓	4, 5	LS2.A	2	
9	4	The Ecological Niche	✓	4, 6	LS2.A	2	
13	5	Populations Have Varied Distributions	✓	2	LS2.A		HS-LS2-1
15	6	Population Growth	✓	4, 5, 6	LS2.A	4, 7	HS-LS2-1, HS-LS2-2
20	7	Modeling Population Growth	✓	2	LS2.A	2, 7	HS-LS2-1, HS-LS2-2
22	8	The Carrying Capacity of an Ecosystem	✓	2, 4, 5	LS2.A	2, 3, 5, 7	HS-LS2-1, HS-LS2-2
26	9	Species Interactions Can Regulate Populations	✓		LS2.A	2	
28	10	Predation Can Control Some Populations	✓	4	LS2.A	2, 3, 5	
31	11	Organisms Compete for Limited Resources	✓	2, 4	LS2.A	2, 3, 5	
36	12	Human Activity Alters Populations	✓	6	LS2.C	2, 5	
39	13	Producers, Consumers, and Food Webs	✓	2	LS2.B	5	
45	14	Energy in Ecosystems	✓	2	LS2.B	5	HS-LS2-4
51	15	Nutrient Cycles	✓	5	LS2.B	5	HS-LS2-4
55	16	Humans Intervene in Nutrient Cycles	✓	8	LS2.C	5	
59	17	Group Behavior Improves Survival	✓	7	LS2.D	4, 5	HS-LS2-8
63	18	Individuals in Groups Often Cooperate	✓	7	LS2.D	4, 5	HS-LS2-8
70	19	An Endless Swarm Revisited					
71	20	Summative Assessment	✓	4, 7	LS2.A, LS2.B, LS2.C, LS2.D	2, 5	HS-LS2-2, HS-LS2-4, HS-LS2-8

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77		IS2: History of the Earth's Atmosphere: Photosynthesis and Respiration					
78	21	One of These Worlds is Not Like the Others	✓	Anchoring phenomenon			
79	22	Energy in the Cell	✓	2	LS1.C	5	
82	23	Photosynthesis	✓	2	LS1.C	5	HS-LS1-5, HS-LS1-6
89	24	Cellular Respiration	✓	6	LS1.C LS2.B	5	HS-LS1-6, HS-LS1-7, HS-LS2-3
95	25	Modeling Photosynthesis and Cellular Respiration	✓	2	LS1.C, LS2.B	5	HS-LS1-5, HS-LS1-7, HS-LS2-3, LS2-5
99	26	Putting Biological Processes To Work	✓	2, 6, 8	LS2.B, ETS1.B	5	HS-LS2-3
101	27	How Old is the Earth?	✓	6	ESS1.C	5, 7	HS-ESS1-6
105	28	The Coevolution of Earth's Systems	✓	7	ESS2.E	4, 7	HS-ESS2-7, HS-LS2-5
112	29	Carbon Cycling	✓	2, 3, 6	LS2.B, ESS2.D	2, 4, 5	LS2-5, HS-ESS2-6
115	30	Modeling the Carbon Cycle	✓	2, 3, 6	LS2.B, ESS2.D	2, 4, 5	LS2-5, HS-ESS2-6
118	31	How Carbon Dioxide Affects the Oceans	✓	6	LS2.A, LS2.B	2	Assessed in IS6
120	32	Fossil Fuels and the Environment	✓	2, 6	LS1.C	5, 7	HS-LS1-6
124	33	Revisiting Model Worlds	✓	2	LS2.B	3, 4	
125	34	Summative Assessment		2, 6	LS1.C, LS2.B, ESS1.C, ESS2.D	4, 5, 7	HS-LS1-5, LS1-6, HS-LS1-7, HS-LS2-3, HS-LS2-5, HS-ESS1-6, HS-ESS2-6

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130		IS3: Evidence of Common Ancestry and Diversity					
132	35	The Rise of the Tyrants	✓	Anchoring phenomenon			
133	36	What are Fossils and How Do They Form?	✓	4	LS4.A	2, 6, 7	
135	37	Erosion Shapes the Landscape	✓	1, 2, 3, 4, 6	ESS2.C ETS1.B	2,3,7	HS-ESS3-1, HS-ESS3-4, HS-ESS2-5, HS-ETS1-3
148	38	Evidence for Evolution	✓	7, 8	LS4.A	1, 2, 6	HS-LS4-1
156	39	All Life is Related	✓	7, 8	LS4.A	1, 6	HS-LS4-1
158	40	Natural Selection	✓	2, 3, 4, 6	LS4.B, LS4.C	1, 2, 7	HS-LS4-2, HS-LS4-3
171	41	Speciation	✓	6, 7	LS4.C	2, 7	HS-LS4-4, HS-LS4-5
177	42	Extinction	✓	7	LS4.C	2	HS-LS4-5
180	43	SNAPSHOT: Antibiotic Resistance	✓	2, 6, 7	LS4.C	7	HS-LS4-4, HS-LS4-5
184	44	SNAPSHOT: Human Evolution	✓	1, 2	LS4.C	2	HS-LS4-5
		EXPLORE: Climate change	✓	1, 4, 7, 8	ESS2.E, ESS3.D	7	HS-LS4-5
		EXPLORE: Physical changes in human evolution	✓	1, 4, 7, 8	LS1.A, LS4.A, ESS1.C	6	HS-LS4-5
		EXPLORE: Molecular evidence of human evolution	✓	1, 4, 7, 8	LS4.A	1	HS-LS4-5
		EXPLORE: Human cultural evolution	✓	1, 4, 7, 8	LS2.D	2	HS-LS4-5
194	45	Continental Drift	✓	2, 7	ESS2.B	2	HS-ESS1-5, HS-LS4-5
201	46	The Rise of the Tyrants Revisited	✓				
202	47	Summative Assessment	✓	4, 6, 7, 8	ESS1.C, ESS2.C, LS4.A, LS4.B, LS4.C, ETS1.B	1, 2, 6	HS-ESS1-5, HS-ESS2-5, HS-ESS3-1, HS-ETS1-3, HS-LS4-1, HS-LS4-2, HS-LS4-5

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209		IS4: Inheritance of Traits					
210	48	Pale and Interesting	✓	Anchoring phenomenon			
211	49	Experiments Showed DNA Carries the Code	✓	1, 8	LS1.A, LS3.A	2	HS-LS3-1
214	50	Modeling the Structure of DNA	✓	2	LS1.A, LS3.A	2	
219	51	Genome Studies	✓	1, 7	LS3.A, LS3.B	2	HS-LS3-2
222	52	Modern Genetics	✓	1, 8	LS3.A, ETS1.B	2	HS-LS3-1, HS-LS3-2
228	53	Variation	✓	6, 7	LS3.B	2	HS-LS3-2
231	54	Sexual Reproduction Produces Genetic Variation	✓	2, 6, 7	LS3.B	2	HS-LS3-2
238	55	Mutation Produces Variation	✓	7	LS3.B	2	HS-LS3-2, HS-LS4-2, HS-LS4-3
243	56	Mendelian Genetics	✓	2, 4, 5	LS3.B	3	HS-LS3-3
256	57	Pedigree Analysis	✓	2, 7	LS3.B	1	HS-LS3-1
259	58	Environment Influences Phenotype	✓	5, 7	LS3.B	2	HS-LS3-2
265	59	Natural Selection Acts on Phenotype	✓	4, 6	LS4.B, LS4.C	1, 2	HS-LS4-2, HS-LS4-3
267	60	Pale and Interesting Revisited	✓				
268	61	Summative Assessment	✓	1, 4, 6, 7	LS3.A, LS3.B, LS4.B, LS4.C	1, 2, 3	HS-LS3-1, HS-LS3-2, HS-LS3-3, HS-LS4-2, HS-LS4-3

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273		IS5: Structure, Function, and Growth (from Cells to Organisms)					
275	62	A Cancerous Creep	✓	Anchoring phenomenon			
276	63	What is Life?	✓	2, 6	LS1.A	6	
282	64	Cells, Tissues, and Organs	✓	2, 6	LS1.A, LS1.B	6	HS-LS1-2, HS-LS1-4
289	65	Interacting Systems	✓	2	LS1.A	6	HS-LS1-2
294	66	How Cells Make Proteins	✓	2, 6	LS1.A	6	HS-LS1-1
299	67	The Functions of Proteins	✓	2, 6	LS1.A	6	
302	68	Proteins are Part of Membranes	✓	2, 6	LS1.A, ETS1.B	5, 6	HS-ETS1-3
307	69	How Do We Know What Proteins Do?	✓	3, 6	LS1.A	2, 6	
313	70	DNA Replication	✓	2, 4	LS1.B	6	HS-LS1-4
318	71	Growth and Repair of Cells	✓	2, 4	LS1.B	6, 7	HS-LS1-4
320	72	The Cell Cycle	✓	2, 4	LS1.B	6, 7	HS-LS1-4
326	73	Keeping in Balance	✓	1, 2, 3, 6	LS1.A	4, 7	HS-LS1-3
335	74	Disease Affects Interactions	✓	2, 8	LS1.A	2, 7	HS-LS1-2
338	75	A Cancerous Creep Revisited					
339	76	Summative Assessment		2, 6	LS1.A, LS1.B	4, 5, 6	HS-LS1-1, HS-LS1-2, HS-LS1-4

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344		IS6: Ecosystem Stability and Response to Climate Change					
345	77	Weather Whiplash	✓	Anchoring phenomenon			
346	78	Ecosystem Dynamics	✓	7	LS2.C, LS4.C	7	HS-LS2-6, HS-LS4-5
352	79	Climate Change	✓	2, 4, 5	ESS3.C, ESS3.D	3, 7	HS-ESS3-5
358	80	Feedback Systems	✓	2, 3	ESS3.D	2, 4, 7	HS-ESS3-5
362	81	Models of Climate Change	✓	4, 7	LS4.C, ESS3.D, ETS1.B	2, 4, 7	HS-LS4-5, HS-ESS3-5
370	82	Solutions for Climate Change	✓	6	LS2.C, LS4.D, ESS3.C, ESS3.D, ETS1.A, ETS1.B, ETS1.C	4, 7	HS-LS2-7, HS-ESS3-4, HS-ETS1-1, ETS1-2, ETS1-3
373	83	Human Impact on Ecosystems	✓	5	LS2.C, LS4.D, ESS3.C, ESS3.D, ETS1.B	2, 4, 7	
381	84	Weather Whiplash Revisited					
382	85	Summative Assessment*	✓	4, 7	LS2.C, LS4.C, ESS3.D	2, 7	HS-LS2-6, HS-LS4-5, HS-ESS3-5

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386		SEPs: Basic Skills for Students in Life Science					
387	86	How Do we Do Science?	✓	1, 6, 7, 8		4	NA
388	87	Systems and System Models	✓	2, 5		4	NA
389	88	Observations, Hypotheses, and Assumptions	✓	1, 3			NA
390	89	Accuracy and Precision		3			NA
391	90	Working With Numbers		5			NA
392	91	Tallies, Percentages, and Rates		5			NA
393	92	Fractions and Ratios		5			NA
394	93	Dealing with Large Numbers	✓	5			NA
395	94	Apparatus and Measurement		2, 3, 6			NA
396	95	Types of Data	✓	3			NA
397	96	Variables and Controls		3			NA
398	97	Drawing Graphs	✓	4, 5			NA
400	98	Interpreting Line Graphs	✓	4, 5			NA
401	99	Mean, Median, and Mode	✓	4, 5			NA
403	100	What is Standard Deviation?	✓	4, 5			NA
404	101	Detecting Bias in Samples	✓	4, 5			NA