Louisiana Guide to Implementing Carolina OpenSciEd Biology

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Purpose

To assist teachers with implementing the Carolina OpenSciEd biology curriculum, this document provides guidance on how Carolina OpenSciEd biology units correlate with the Louisiana Student Standards for Science (LSSS). The Carolina OpenSciEd biology curriculum provides ample instructional guidance for teachers. This Louisiana Guide to Implementing Carolina OpenSciEd biology goes a step further to point out places in which teachers may need to make strategic decisions, considering student needs.

While the Carolina OpenSciEd biology curriculum may include performance expectations featured in other courses, these units are intentionally designed to provide students the opportunity to incrementally make sense of phenomena to build understanding and abilities over time through a coherent storyline. Modification to the sequence or content of lessons within these units could undermine the design and, therefore, should be approached with caution and careful consideration.

This guidance document is considered a 'living' document, reflecting the expectation that teachers and other educators will continue to identify opportunities for improvement as it is applied in practice. Please send feedback to STEM@la.gov so that the LDOE may incorporate your suggestions when updating this guide.

Sample Scope and Sequence

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5
Number of Lessons *(lessons vary in length from 1-5 class periods)*	11 lessons	12 lessons	12 lessons	11 lessons	9 lessons
Anchor Phenomenon Question	How do ecosystems work, and how can understanding them help us protect them?	What causes fires in ecosystems to burn, and how should we manage them?	Who gets cancer and why? What can we do about it?	How does urbanization affect non-human populations, and how can we minimize harmful effects?	What will happen to Arctic bear populations as their environment changes?
Louisiana Students Standards for Science[1]	HS-LS2-1 HS-LS2-6* HS-LS2-7* HS-ESS3-3	HS-LS1-5 HS-LS1-6[1] HS-LS1-7[1] HS-LS2-4 HS-ESS2-6†	HS-LS1-1 HS-LS1-2 HS-LS1-4 HS-LS3-1[1] HS-LS3-2 HS-LS3-3	HS-LS4-2* HS-LS4-3 HS-LS4-4* HS-LS4-5*	HS-LS1-3 HS-LS2-6* HS-LS2-7* HS-LS4-1 HS-LS4-2* HS-LS4-4* HS-LS4-5* HS-ESS2-7†
Unit Resources	Unit materials	Unit Materials	Unit Materials	Unit Materials	Unit Materials

*The performance expectation is addressed across multiple units.

†The performance expectation is addressed across the three-course sequence (Biology, Chemistry, Physics).

[1]HS-LS1-6, HS-LS1-7, HS-LS3-1 are partially addressed; HS-LS1-8 is a Louisiana-specific standard and is not addressed.

This table does not include performance expectations unique to the Next Generation Science Standards for Life Science.

Pacing and Unit Order Guidance

Modifying the lessons, even in the ways suggested here, should be carefully considered. Additional attention should be given to navigation in lessons where adjustments are made to maintain coherence from the student's perspective.

Unit	Relevant OpenSciEd Guidance for Teaching Units in a Different Sequence †	Relevant OpenSciEd Guidance for Condensing † (*Includes guidance directly from OpenSciEd*)

Unit 1
 	
B.1 Ecosystem Interactions & Dynamics
	• This is the first unit in the OpenSciEd Scope and Sequence and is intended for use at the beginning of biology. If this unit is taught later in the year, the following modifications would need to be made.
	  ○ Classroom community agreements need to be developed and supported.
	  ○ Introduction to the routine and purpose of transfer tasks, including the rubric structure.
	  ○ Scaffolded approach to developing individual and group models.
		• **Lesson 2:** Read the *History of Serengeti* aloud as a class instead of reading in small groups, and then discuss again as a class.
		• **Lesson 10**: Instead of having each group present their conservation profiles and plans to the class, a gallery walk of the presentations may help to streamline this portion of the lesson.

Unit 2
 	
B.2 Ecosystems: Matter & Energy
	• If taught before B.1, supplemental teaching of the following would be required:
	  ○ Teaching community agreements and setting up the Driving Question Board. These supports are built into the *B.1 Unit* and could be adapted accordingly for this unit if needed.
	  ○ Teaching about the components, interactions, and mechanisms between organisms in ecosystems and how to represent them may be required.
		• **Lesson 8:** Have students begin discussing how they will represent their data when developing directional hypotheses, so that developing them is quicker.
		• **Lesson 10:** Assign the investigation of a community of choice as part of the home learning. Students can complete the investigation with community members and discuss their findings when they return.
		• **Lesson 12:** Consider waiting to hand out *Nitrogen Pollution By State* until students reach that part of the assessment, or eliminate it entirely (and cross off or delete the text for question 12 that suggests using that reading).

Unit	Relevant OpenSciEd Guidance for Teaching Units in a Different Sequence †	Relevant OpenSciEd Guidance for Condensing † *(Includes guidance directly from OpenSciEd)*

Unit 3
 	
B.3 Inheritance & Variation of Traits
	• If taught before B.1 and B.2, supplemental teaching of the following would be required:
	  ○ B.3's placement as the third unit supports student sensemaking in B.4 and B.5, which follow directly. If students do not experience this unit in order, they will likely need additional support to review big ideas related to inheritance and variation of traits before engaging with evolution by natural selection and speciation.
	  ○ Teaching community agreements and setting up the Driving Question Board. These supports are built into the *B.1 Unit*.
		• **Lesson 8**: Reduce the number of times students interact with the pipe cleaner model to shorten the lesson.
		• **Lesson 9:** Reduce the time necessary for the investigation by providing students with sample data.
		• **Lesson Set 3:** While critical to supporting students in making sense of cancer treatments and causes, Lesson Set 3 reinforces core ideas developed earlier in the unit related to cell division and can be condensed.

Unit 4
 	
B.4 Natural Selection & Evolution of Populations
	• If taught before B.1, the following would be required:
	  ○ Supplemental teaching of biodiversity, resilience, group behavior, and carrying capacity will be required.
	  ○ Students will need additional scaffolding for transfer tasks and the practices of asking questions and defining problems, developing and using models, and using mathematics and computational thinking.
	• If taught before B.2, the following would be required:
	  ○ Supplemental scaffolding of the Practice of constructing explanations and Crosscutting
		• **Lesson 1:** Instead of taking students outside to look for examples of the effect of urbanization on nonhuman populations, have them take a virtual walk in another city.
		• **Lesson 2:** Model and collect all field/non-urban data together as a class, and then send students to complete the urban investigation in groups.
		• **Lesson 4:** Instead of having the students visit both locations in pairs using Google Earth, have the teacher do it as a demonstration that students watch and record what they see.

Unit	Relevant OpenSciEd Guidance for Teaching Units in a Different Sequence †	Relevant OpenSciEd Guidance for Condensing † *(Includes guidance directly from OpenSciEd)*
	Concepts of cause and effect will be helpful. ● If taught before B.3, the following would be required: ○ Supplemental teaching of inheritance, variation, and mutation will be required.	● **Lesson 10:** Remove the future transportation map from *Buckeye Development Designs* so there is less material for students to consider as they evaluate designs.
Unit 5 **B.5 Common Ancestry & Speciation**	● Due to its placement as the last unit in the course, several modifications would need to be made if taught earlier in the year. ○ Students' understanding of ecosystems, inheritance, trait variation, natural selection, and population evolution would need additional support.	● **Lesson 1:** Consider replacing the fishbowl discussion with a more typical class discussion format. ● **Lesson 2:** If students have demonstrated proficiency in DCI elements related to cellular respiration, consider modifying this portion of the lesson to condense it.

† Adapted from the OpenSciEd TeacherBackground Knowledge for “How will I need to modify the unit if taught out of sequence?” and “How do I shorten or condense the unit if needed? How can I extend the unit if needed?” for each unit.

LDOE Formative Assessment Resources

LDOE formative assessment resources include a library of Louisiana educator-created discrete items and sets, LEAP Practice Test Items, and LEAP Assessment Guide Items correlated to the Louisiana Student Standards for Science. These resources can be used alongside guidance from a high-quality curriculum to provide opportunities for students to showcase their learning.

Unit	Discrete Items	Sets
B.1 Ecosystem Interactions & Dynamics	***LDOE Formative Assessment Items* (Password- Educate2020):** • Mary's Goldfish, Nutria (HS-LS2-1) • Seawater Acidity (HS-LS2-6) • Salvinia (HS-LS2-7) ***Biology LEAP Practice Test Standalone Items*:** • 40 (HS-LS2-6) ***LEAP Assessment Guide Items*:** • N/A ***LEAP Science Released Items:*** • Item Set: Ebola Virus (HS-LS2-1)	***LDOE Formative Assessment Sets* (Password- Educate2020):** • Item Set: Wolves (HS-LS2-1 and HS-LS2-6) ***Biology LEAP Practice Test Sets*:** • Item Set: Kit Fox Ecology (HS-LS2-1 and HS-LS2-7) ***LEAP Assessment Guide Sets*:** • Item Set: Biodiversity in Longleaf Pine Ecosystems (HS-LS2-1 and HS-LS2-7) ***LEAP Science Released Items:*** • N/A
B.2 Ecosystems: Matter & Energy	***LDOE Formative Assessment Items* (Password- Educate2020):** • Elodea Lab (HS-LS1-5) • Carb Loading (HS-LS1-7) • Bald Eagle (HS-LS2-4) ***Biology LEAP Practice Test Standalone Items*:** • 14 (HS-LS1-5) • 21 (HS-LS-1-7) • 23 (HS-LS1-5) ***LEAP Assessment Guide Items*:** • Cellular Respiration (LS-LS1-1) ***LEAP Science Released Items:*** • N/A	***LDOE Formative Assessment Sets* (Password- Educate2020):** • N/A ***Biology LEAP Practice Test Sets*:** • Item Set: Alaskan Salmon (HS-LS1-6 and HS-LS1-4) • Item Set: TonewoodTrees (HS-LS1-5 and HS-LS2-4) ***LEAP Assessment Guide Sets*:** • N/A ***LEAP Science Released Items:*** • N/A

Unit	Discrete Items	Sets
B.3 Inheritance & Variation of Traits	***LDOE Formative Assessment Items* (Password- Educate2020):** • Sickle Cell Trait, Zygote (HS-LS1-1) • Runners (HS-LS1-2) • Dolly (HS-LS1-4) • Tay-Sachs Disease (HS-LS3-1) • Sandra Laing (HS-LS3-2) • Cystic Fibrosis (HS-LS3-3) ***Biology LEAP Practice Test Standalone Items*:** • 13 (HS-LS-3-1) • 22 (HS-LS3-1) • 34 (HS-LS-1-2) • 39 (HS-LS1-2) ***LEAP Assessment Guide Items*:** • Rabbit Muscle (LS-HS1-2) • Chickens (LS-HS3-3) ***LEAP Science Released Items:*** • Genetic Testing (HS-LS3-3)	***LDOE Formative Assessment Sets* (Password- Educate2020):** • Item Set: Stem and IPS Cells (HS-LS1-1, HS-LS-1-4, and HS-LS3-1) ***Biology LEAP Practice Test Sets*:** • Item Set: Primate Traits (HS-LS3-1, HS-LS3-2) ***LEAP Assessment Guide Sets*:** • Task Set: Bee Communication (HS-LS1-1 and HS-LS1-2) ***LEAP Science Released Items:*** • Task Set: Migration of Pink Salmon (HS-LS3-1, HS-LS3-2)
B.4 Natural Selection & Evolution of Populations	***LDOE Formative Assessment Items* (Password- Educate2020):** • Irish Lumper, Daphne Major Finches (HS-LS4-2) • Blue Gramma, Super Weeds, Elephants (HS-LS4-3) • Oil Spill (HS-LS4-4) ***Biology LEAP Practice Test Standalone Items*:** • 33 (HS-LS4-2) • 35 (HS-LS4-2) • 37 (HS-LS4-3) • 41 (HS-LS4-3)	***LDOE Formative Assessment Sets* (Password- Educate2020):** • Item Set: Adaptations I (HS-LS4-4, HS-LS4-5) • Item Set: Adaptations II (HS-LS4-4, HS-LS4-5) ***Biology LEAP Practice Test Sets*:** • N/A ***LEAP Assessment Guide Sets*:** • N/A

Unit	Discrete Items	Sets
B.4 *continued*	***LEAP Assessment Guide Items*:** • Reed Grasses (HS-LS4-4) ***LEAP Science Released Items:*** • Rainy Season (HS-LS4-4)	***LEAP Science Released Items:*** • N/A
B.5 Common Ancestry & Speciation	***LDOE Formative Assessment Items* (Password- Educate2020):** • Goldfish, Blood Sugar (HS-LS1-3) • Seawater Acidity (HS-LS2-6) • Salvinia (HS-LS2-7) • Arkansas Whale, Cytochrome C (HS-LS4-1) • Irish Lumper, Daphne Major Finches (HS-LS4-2) • Oil Spill (HS-LS4-4) ***Biology LEAP Practice Test Standalone Items*:** • 32 (HS-LS1-3) • 33 (HS-LS4-2) • 35 (HS-LS4-2) • 38 (HS-LS1-3) ***LEAP Assessment Guide Items*:** • Reed Grasses (HS-LS4-4) ***LEAP Science Released Items:*** • Costa Rica (HS-LS2-7)	***LDOE Formative Assessment Sets* (Password- Educate2020):** • Item Set: Adaptations I (HS-LS4-4, HS-LS4-5) • Item Set: Adaptations II (HS-LS4-4, HS-LS4-5) ***Biology LEAP Practice Test Sets*:** • Task Set: Banded Snails (HS-4-5, HS-LS4-4) • Item Set: Scales and Feathers (HS-LS4-1, HS-LS1-1) ***LEAP Assessment Guide Sets*:** • N/A ***LEAP Science Released Items:***
Additional Standards	***LDOE Formative Assessment Items* (Password- Educate2020):** • Bacteria & Penicillin (HS-LS1-8) ***Biology LEAP Practice Test Standalone Items*:** • 15 (HS-LS1-8) • 36 (HS-LS1-8) ***LEAP Assessment Guide Items*:** • N/A	***LDOE Formative Assessment Sets* (Password- Educate2020):** • N/A ***Biology LEAP Practice Test Sets*:** • N/A ***LEAP Assessment Guide Sets*:** • N/A

Unit	Discrete Items	Sets
Additional Standards *continued*	***LEAP Science Released Items:*** • N/A	***LEAP Science Released Items:*** • Task Set: Viruses Attack (HS-LS1-8, HS-LS1-4)*