Louisiana Guide to Piloting OpenSciEd: Biology

This document provides guidance regarding how OpenSciEd units correlate with the Louisiana Student Standards for Science (LSSS) to assist teachers with piloting the OpenSciEd biology curriculum. The OpenSciEd biology pilot provides ample instructional guidance for teachers. This Louisiana Guide for piloting OpenSciEd biology further points out where teachers may need to make strategic decisions considering student needs.

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

This guidance document is considered a "living" document because we believe that teachers and other educators will find ways to improve it as they use it. Please send feedback to STEM@la.gov so we can use your input when updating this guide.

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Overview of OpenSciEd

OpenSciEd is an effort among science educators, curriculum developers, teachers, and philanthropic foundations to improve the supply of and demand for high-quality K-12 science instructional materials by producing open-sourced, freely available instructional materials designed for college and career-ready science standards. OpenSciEd works with classroom educators, experienced science curriculum developers, individual school districts, education non-profits, and the science education community to create and pilot robust, research-based, open-source science instructional materials.

Field Testing and Release of Units

Ten partner states volunteered to join this effort, including California, Iowa, Louisiana, Massachusetts, Michigan, New Mexico, New Jersey, Oklahoma, Rhode Island, and Washington. After the initial development of the OpenSciEd units, the unit prototypes or field test units undergo rigorous external review and robust field testing in participating classrooms across partner states. The field test units are then revised based on the feedback and data collected and submitted to the NextGenScience Peer Review Panel before being made freely and openly available to the public upon earning a quality rating. The entire high school curriculum (16 units in total) is now available to download for free online.

Unit Design and Sample Scope and Sequence

The units in the OpenSciEd Sample Scope and Sequence include bundles of performance expectations that are built around an anchoring phenomenon. These units are intentionally designed to allow students to incrementally make sense of phenomena to build understanding and abilities over time through a coherent storyline. Modifying the sequence or content of lessons within these units could undermine the design and therefore is not recommended and should be approached with caution and careful consideration.

Contact

Systems interested in piloting should reach out to STEM@la.gov for direct support. For questions or requests for additional information on the OpenSciEd initiative and/or materials, contact info@openscied.org.

2024-2025 Sample Scope and Sequence Option 1 - Full Implementation

	Unit 1 Ecosystem Interactions & Dynamics	Unit 2 Ecosystems: Matter & Energy	Unit 3 Inheritance & Variation of Traits	Unit 4 Natural Selection & Evolution of Populations	Unit 5 Common Ancestry & Speciation
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 HS-LS1-7 HS-LS2-4 HS-ESS2-6†	HS-LS1-1 HS-LS1-2 HS-LS1-4 HS-LS3-1 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-LS1-8 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

Modification of the lessons, even in the ways suggested here, should be approached with careful consideration. Additional attention should be given to navigation in lessons where adjustments are made in order 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. The following modifications would need to be made if teaching this unit later in the year.
	  ○ Classroom community agreements would 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 a quicker transition.
		• **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

Unit	Relevant OpenSciEd Guidance for Teaching Units in a Different Sequence†	Relevant OpenSciEd Guidance for Condensing† (*Includes guidance directly from OpenSciEd*)
		assessment or eliminate it entirely (and cross off or delete the text for question 12 that suggests using that reading).

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 prior to 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 that 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
		• **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.

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

	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 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 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.
		• **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

Created by Louisiana educators to support formative assessment in the classroom, the LDOE has released a library of discrete items, and item sets correlated to the Louisiana Student Standards for Science. These items, along with LEAP 2025 Practice Test Items, may be used with guidance from high-quality curricula as opportunities for students to demonstrate what they have learned. LDOE Formative Assessment Resources can be found on the K-12 Science Resources web page.

Unit	Discrete Items	Item Sets and Practice Test Items
Unit 1 **B.1 Ecosystem Interactions & Dynamics**	Mary's Goldfish, Nutria (HS-LS2-1) Seawater Acidity (HS-LS2-6) Salvinia (HS-LS2-7)	Wolves (HS-LS2-1, HS-LS2-6) Kit Fox Ecology (HS-LS2-1, HS-LS2-7)
Unit 2 **B.2 Ecosystems: Matter & Energy**	Elodea Lab (HS-LS1-5) Carb Loading (HS-LS1-7) Bald Eagle (HS-LS2-4)	Alaskan Salmon (HS-LS1-6, HS-LS1-4) TonewoodTrees (HS-LS1-5, HS-LS2-4)
Unit 3 **B.3 Inheritance & Variation of Traits**	Sickle Cell Trait, Zygote (HS-LS1-1) Runners (HS-LS1-2) Dolly (HS-LS1-4) Tay Sachs (HS-LS3-1) Sandra Laing (HS-LS3-2) Cystic Fibrosis (HS-LS3-3)	Primate Traits (HS-LS3-1, HS-LS3-2) Stem and IPS Cells (HS-LS1-1, HS-LS-1-4 and HS-LS3-1)
Unit 4 ***B.4 Natural Selection & Evolution of Populations***	Irish Lumper, Daphne Major Finches (HS-LS4-2) Blue Gramma, Super Weeds, Elephants (HS-LS4-3) Oil Spill (HS-LS4-4)	Adaptations I (HS-LS4-4, HS-LS4-5) Adaptations II (HS-LS4-4, HS-LS4-5)

Unit	Discrete Items	Item Sets and Practice Test Items
Unit 5 ***B.5 Common Ancestry & Speciation***	Goldfish, Blood Sugar (HS-LS1-3) Arkansas Whale, Cytochrome C (HS-LS4-1) Irish Lumper, Daphne Major Finches (HS-LS4-2) Oil Spill (HS-LS4-4)	Adaptations I (HS-LS4-4, HS-LS4-5) Adaptations II (HS-LS4-4, HS-LS4-5) Banded Snails (HS-4-5, HS-LS4-4) Scales and Feathers (HS-LS4-1, HS-LS1-1)