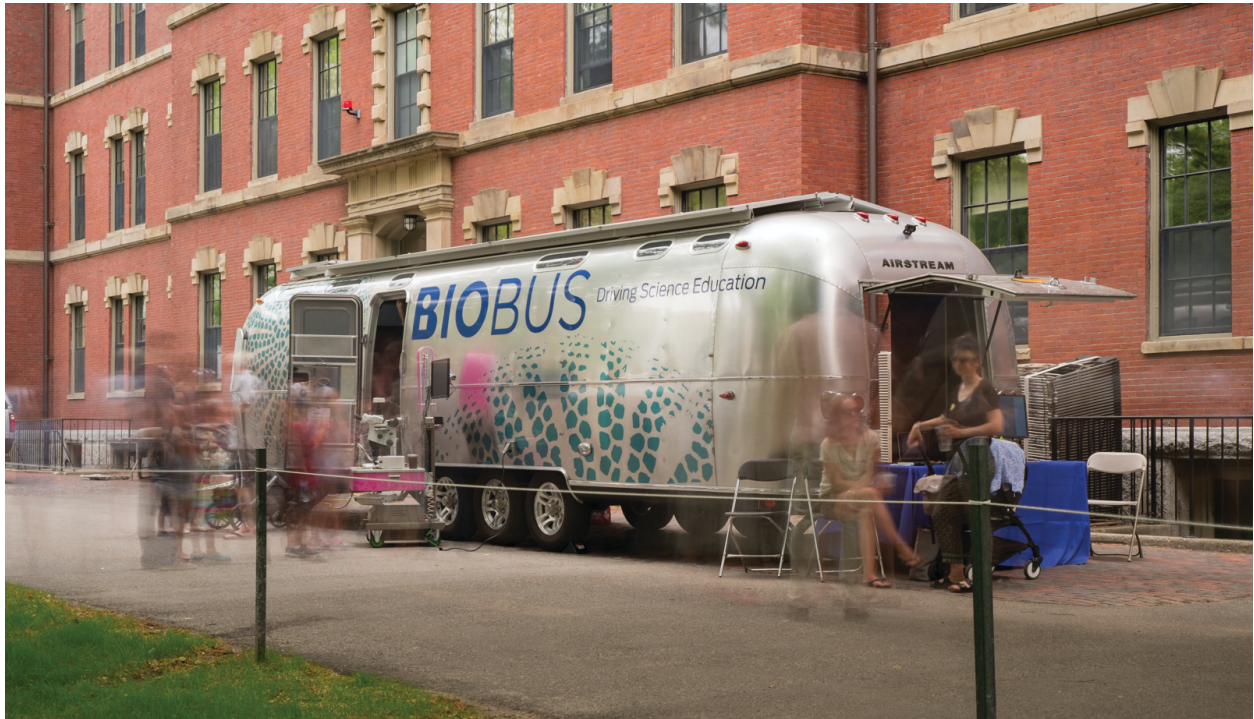


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BioBus New England Program and Curriculum Menu

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Program Formats

Mobile Laboratory Program

Onboard mobile labs parked at schools, students discover the excitement of science and take the first step on their scientific path. BioBus mobile labs are research-grade microscope labs built on a bus or trailer and outfitted with over \$100,000 of equipment. Mobile labs are staffed by professional scientists who guide students in pre-K through grade 12 through an inquiry-based class. BioBus mobile lab will visit during the school day.

Limited availability - visits will occur in Spring 2022

Program Duration: Up to 6 60-min classes per visit

Grades: pre-K-12

Students Served: Up to 180 per visit

Science Station Program

BioBus brings their equipment, curriculum, and scientists directly inside the classroom with highly adaptable science stations. Able to support the same curriculum developed for the mobile laboratories, science stations are a flexible and smaller scale alternative to a mobile laboratory visit.

Program Duration: Up to 4 60-min classes per visit

Grades: PreK-12

Students Served: Up to 120 per visit

In Situ After School Programs

BioBus *In Situ* After School Programs take place in the school building during school or after-school hours, bringing the best science tools and practices directly to students. With a variety of scientific topics, in situ programs are a great way to deepen student's interest in and experience with the scientific process.

Program Duration: Weekly; 5 60 minute sessions

Grades: 3-8

Students Served: Up to 15

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Microscopy Field Trip

Students will travel to meet scientists onsite at Northeastern's Chemical Imaging of Living Systems center. Students will hear from scientists about their research and use state of the art microscopes directly.

Program Duration: 60-min

Grades: 6-12

Students Served: Up to 30 per visit

Teacher Professional Development

BioBus Scientists are highly skilled science communicators with experience with hands-on, inquiry-based, informal STEAM programs. Our staff have successfully run professional development workshops around the world for teachers and scientists. During the workshops, teachers familiarize themselves with lesson plans, use original educational tools (such as the BioBus [Do-It-Yourself Microscope](#)), and online teaching resources developed by BioBus scientists.

BioBus will offer a full-day professional development to teachers. BioBus scientists will also be available after the course to support the teachers as they implement the *curriculum* in their classrooms, helping with customization, and answering technical and scientific questions.

Program Duration: 6 hours professional development, plus 20 hours of remote assistance

Teachers served: up to 25

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BioBus Program Curricula

Mobile Laboratory and Science Station Curricula

The complete list of BioBus Mobile Lab Programs Curricula is available at:

<https://www.biobus.org/programs/>

The complete list of BioBus Virtual Field Trip Curricula is available at:

<https://www.biobus.org/discover/faq/>

Scientific Unit	Curriculum Name	Grade	Description
Insects and Plants	Itty Bitty Bug Bodies *	PreK - 3	Many of our students think that bugs are fascinating – we do too! In this lesson, students will use microscopes to observe and compare familiar insects (and crustaceans) in an unfamiliar way. Under the microscope, bugs have hair and spines and a whole lot of other traits that are invisible to the naked eye. We ask our students what these traits are for and talk about how bugs can survive so well while staying so small.
Living Systems Living Environments	Microscopic Ecosystems*	4-12	Wriggling and tumbling, paramecia, amoeba and bacteria race across the screen of the BioBus video microscopes, revealing the diversity and complexity of single-celled organisms. Observing Daphnia, students discover how skin, muscle, nerve, and blood cells have evolved from these single-celled organisms to work together inside the ecosystem of a living animal, and how Daphnia interacts with the microscopic elements of its freshwater ecosystem.
Genetics	Cells Cells Cells	6-12	Uncover the incredible organization in all living organisms -- moving from organism to organs to cells to organelles -- in just one class period. Students will observe Daphnia, a transparent crustacean just a few millimeters long; under the microscope, they will easily see its organs and then, with another turn of the microscope knob,

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			the cells within those organs. They can compare Daphnia's cells to their own, which they can swab and see easily using the high-power BioBus microscopes. The organelles of your students' own cells are revealed in living color, along with the organelles of other animal cells and plant cells using powerful video microscopes.
Genetics	Invertebrate Diversity *	4-8	Observe, first hand, the remarkable results of 500 million years of evolution! Students will use microscopes to observe the form and function of several adaptations that have allowed arthropods (e.g. insects and crustaceans) to thrive and become the most diverse group of animals on earth. We will also discuss how an organism's ecosystem can impact the traits it evolves.

* These programs are also available as **Virtual Field Trips**

After School Program Curricula

Scientific Unit	BioBus Curriculum	Grade	Description
Insects and Plants	Tool Time: Urban Forestry	3-8	<p>4 Open Lab Sessions, 1 Field Trip</p> <p>During each open lab session, students will have access to tools used by scientists to study trees and through self guided learning they will prepare for a citizen science field trip.</p> <p>Tools used: Plant and Tree ID guides, DBH tape, Microscopes, NPK Soil Tests.</p> <p>During the field trip students will contribute to the Street Tree database by measuring the size and health of trees outside their school.</p>
	Tool Time: Urban Entomology	3-8	<p>4 Open Lab Sessions, 1 Field Trip</p> <p>During each open lab session, students will have access to tools used by scientists to study insects and through self guided learning they will prepare for a citizen science field trip.</p>

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			<p>Tools used: Species ID Guide/taxonomic key, Choice Chamber, Microscope, Soil hydrometer, Aspirator</p> <p>During the field trip students will identify local insects and share on inaturalist.</p>
Water and Climate	Tool Time: Weather	3-8	<p>4 Open Lab Sessions, 1 Field Trip</p> <p>During each open lab session, students will have access to tools used by scientists to study weather and through self guided learning they will prepare for a citizen science field trip.</p> <p>Tools used: Anemometer, Infrared Thermometer, Cloud ID Guide, Light meter.</p> <p>During the field trip students will submit data to the GLOBE Urban Heat Island database.</p>
Living Systems	Tool Time: Urban Marine Biology	3-8	<p>4 Open Lab Sessions, 1 Field Trip</p> <p>During each open lab session, students will have access to tools used by scientists to study marine biology and through self guided learning they will prepare for a citizen science field trip.</p> <p>Tools used: Species ID Guide/taxonomic key, microscopes, refractometer, calipers, bowline.</p> <p>During the field trip students will contribute to the inaturalist database.</p>
Neuroscience	Disease Detectives	6-8	<p>5 Lab Sessions</p> <p>Disease Detectives engages students in a series of interactive activities that unpack difficult topics, such as brain diseases, into simple structure and function exercises. Even the tools that scientists use to study the brain are broken down into their structural components, as students learn to make their own microscopes using a Do-It-Yourself optical kit.</p>
Art and Science	Art and Science: Explore	3-8	<p>5 or 6 Lab Sessions</p> <p>During 5 or 6 consecutive sessions, students</p>

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	STEAM *		explore the intersections of biology with other disciplines and work to dismantle the walls put up between STEM and art. They dive deep into the history of naturalism, bio-engineer paper airplanes, and study soundwaves produced by Madagascar Hissing Cockroaches. They use art to expand the boundaries of creativity, exploring the space where new ideas are born and exciting questions come to mind.
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* These programs are also available as **Virtual Laboratory Programs**

Teacher professional development

Building a Do-It-Yourself microscope

Microscopes are essential tools for research in every branch of science, as well as powerful tools for scientific education. In this workshop, we will explore the secrets of microscopy taking advantage of a Do-It-Yourself optical microscope developed by BioBus scientists. Teachers will learn how to build a microscope from scratch, and use it to image different types of samples. Support materials include worksheets, classroom lesson plans, and access to the BioBus Do-It-Yourself lending library.

Disease Detectives

This workshop will explore the interface between microscopy, neuroscience and medicine through a student-generated curriculum developed in collaboration with Harvard Medical School. Adapted for both online and in-person teaching, *Disease Detectives* engages the students in a series of interactive activities that unpack seemingly inaccessible topics, such as brain diseases, into simple structure and function exercises. Support materials include pre-recorded lessons, grade-appropriate disease encyclopedia, and access to the BioBus Do-It-Yourself lending library.

Oyster Dissection

This workshop will get you up to speed with the constantly developing field of urban marine ecology! We will cover the complexity and importance of urban marine environments and include a short history and biology of oyster restoration. Then we'll get hands-on as we walk you through an oyster dissection, share activities to do with your students, and provide lesson ideas for topics like water quality and biodiversity data collection.

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Thank You.

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