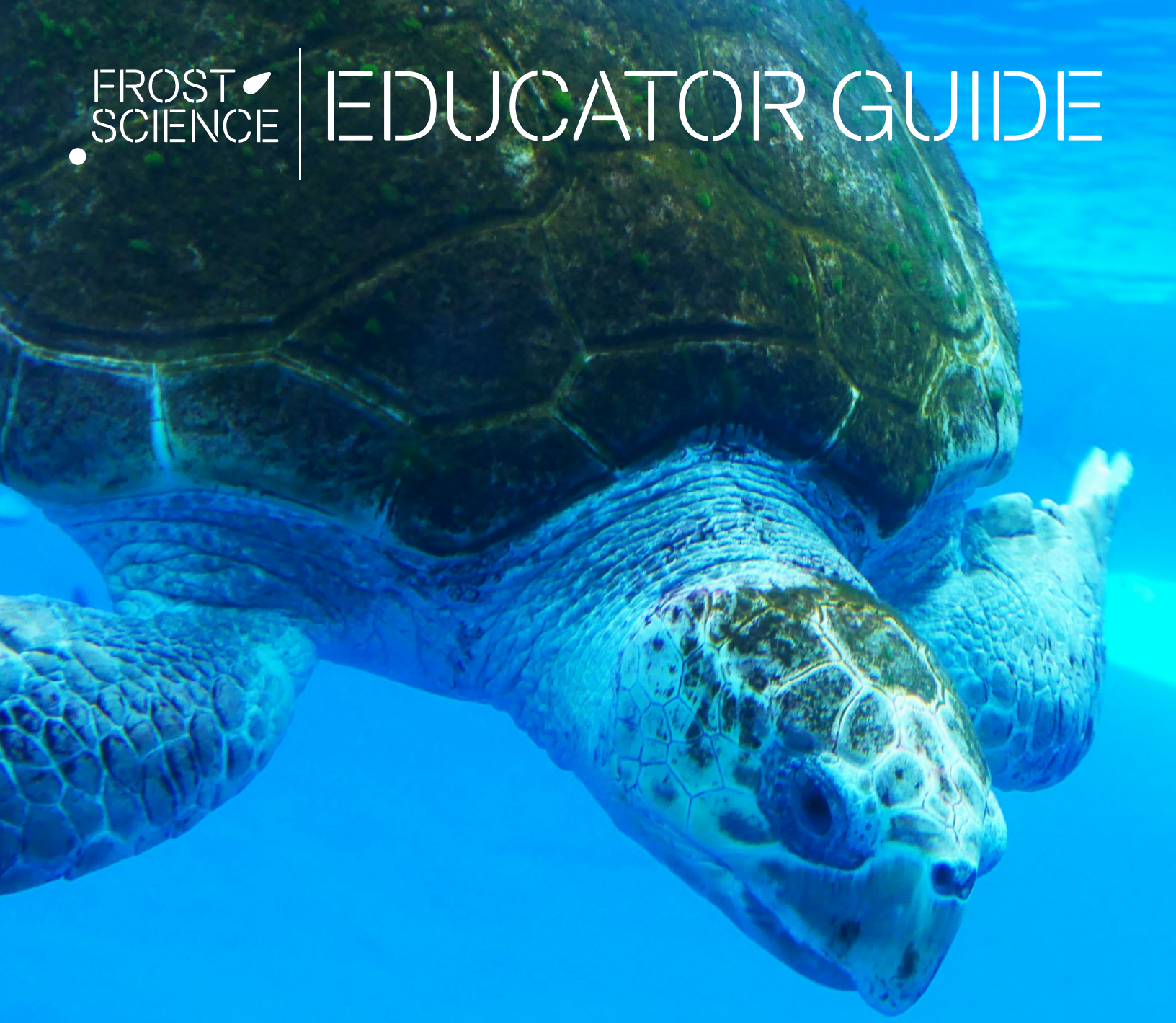
FROST SCIENCE | EDUCATOR GUIDE



In-person and Virtual: Field Trips and Outreach

2020 – 2021

Table of Contents

Message from the Knight VP of Education

Dear Educators,

As we venture into a year unlike any before, we at the Phillip and Patricia Frost Museum of Science want you to know that we are with you on this journey into a 'new normal.' Uncertainty is a fact of science, one that many scientists struggle with on an ongoing basis, but science also provides us with answers to important questions. Education and science together form a powerful force for helping us understand our world and ourselves.

We know that this year will come with new challenges, but we also know that as a community we can work together to solve those challenges one day at a time. Educators, just like doctors, nurses and so many other noble professions, are superheroes without capes. We value all the hard work and effort you put in daily to help those in our community be educated, critical thinking individuals. And we are here to help you in any way that we can.

Frost Science has now been open for over three years, and we've been fortunate to share our museum, programs and resources with thousands of students and educators like you. We hope that our visitors experience science in a new way, both at the museum and virtually from home. As one of the world's few planetarium, aquarium and science museum combinations with content that speaks to our community, we are looking forward to helping ignite an interest in science and technology in learners of all ages and abilities.

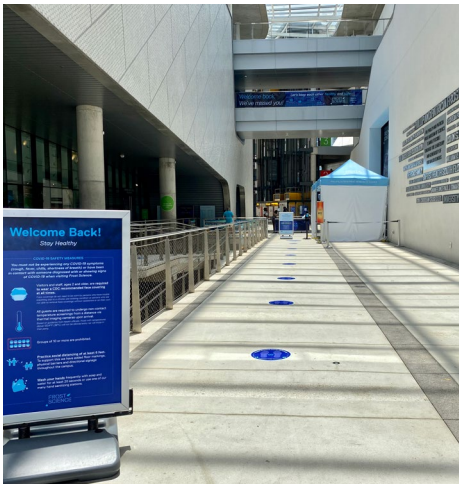
We are providing two types of offerings this year, virtual experiences as well as limited-capacity in-person experiences, in order to better serve the needs of our community. Both experiences offer chances for discovery and inquiry-based learning through the museum's many exhibitions, including our new permanent exhibition, *Power of Science*, and engaging demonstrations about key science concepts.

Frost Science is here to support your curriculum and serve as a resource in the education of your students. We thank you for your continued support and hope to see you soon (virtually or safely in-person)!

Angela Colbert, PhD
Knight VP of Education
Phillip and Patricia Frost Museum of Science

Field Trips @ Frost Science

Bring classroom science lessons to life through inclusive educational experiences with Frost Science. Beginning this academic year, we have two exciting ways to engage with students: **virtually and in-person**.



Safety First

The safety and health of students and staff is always the highest priority at Frost Science. We are employing best preventative practices regarding COVID-19 and will meet or exceed Miami-Dade County safety standards and operating guidelines. As a scientific institution committed to serving both South Florida and the greater community at large, we are committed to providing a welcoming, educational and—most importantly—safe space for students and educators. To learn more about our extensive safety measures, please visit frostscience.org/covid19safety.

Introducing
Virtual Field Trips

Explore the museum, ***virtually***, with our engaging virtual field trip. Each virtual field trip includes:

- One 30-minute interactive video tour experience of the museum's newest exhibition, *Power of Science*
- One 30-minute interactive video tour experience of the museum's *Feathers to the Stars* exhibition
- One 30-minute live guided tour of the museum's *Aquarium: Dive* level with marine creatures

Price: $250 per class of up to 30 students

Interactive video tours include access to two password protected 30-minute video experiences of the *Power of Science* and *Feathers to the Stars* exhibitions, with built-in stopping points for students to think critically about what they are exploring with accompanying worksheets and guided questions provided for educators. These videos will be available the business day prior and day of the scheduled field trip for use.

The guided tour includes a Frost Science Educator leading students on a journey through one of our most lively areas, the *Aquarium: Dive* level. Students will 'dive in' and be immersed in a world of marine life including friendly fish, colorful corals and sensational sharks. They will be able to directly ask questions to the educator during this exciting and engaging 30-minute experience. This experience must be scheduled in advance and will be confirmed five (5) business days prior.

Virtual outreach experiences or additional guided tours can be added on for an additional fee.

Virtual Outreach

Book a virtual outreach to bring a fun scientific experience to your classroom or group. All you need is an internet connection!

Frost Science is offering a selection of exciting and educational scientific demonstrations that are sure to get the neurons firing for science learners. All demonstrations are STEM-focused and aligned to K-8 science standards (available upon request).

Group demonstrations are approximately 30 minutes. Limited to 30 participants per demonstration.

Chemistry Curiosities

Spark a curiosity for the field of chemistry through fun-filled demonstrations! Explore chemical reactions that change color, overflow and even burn while learning about the basics of chemistry from catalysts to indicators!
Price: $200

Crocogators

Sink your teeth into the world of some of the oldest animals on Earth: crocodiles, alligators, caimans and gharials with this interactive demonstration! Go on a journey that follows the evolution of these remarkable reptiles while comparing and contrasting their unique adaptations with both crocodile and alligator skulls from our museum's collection.
Price: $125

Earth Formations

Investigate the geophysical phenomenon of tectonic plates and how they have continuously changed the surface of our planet from Pangea to Modern Earth in this dynamic lesson. Visualize and understand geologic plate motions through movement before observing and categorizing striking pieces of the museum's rock and mineral collection up close!
Price: $125

Virtual Outreach (continued)

Evolution of Light

Follow the flow of electrons from the late 1800s to today with this electrifying demonstration exploring the advances in engineering light bulbs for everyday use and beyond. Then explore the fourth state of matter, rarely seen naturally on Earth, with a plasma globe.
Price: $125

The Chill Zone

Explore physical reactions by freezing everyday objects with liquid nitrogen. Watch as balloons, flowers, and other objects undergo a physical change when exposed to extremely cold temperatures (-321°F to be exact). Make sure to stay for our grand finale as we create a simulated cloud (thunder and all!).
Price: $200

Squid Dissection

Dive into a slimy dissection that investigates the biology of one of the Earth's most highly developed invertebrates: squid. Examine and identify the special and unique features and adaptations these mollusks have developed over time to help them survive in this smell-free demonstration!
Price: $200

Who Glows There?

Uncover the hidden glow in minerals, shells, and household liquids with this illuminating demonstration that is sure to light up your curiosity for fluorescence. See how a special ultraviolet flashlight is used to reveal beautiful patterns and vibrant colors that are otherwise invisible to the naked eye and explore the science of how and why things glow.
Price: $125

In-Person Field Trips

Museum general admission allows you and your students to explore the museum through a self-guided experience. Free curriculum resources are available on the museum's website to assist you in connecting your visit to your classroom curriculum.

2020-2021 Pricing	General Admission*	Frost Planetarium Show	Enhanced Field Trip
August 31 – May 31	$12.95	$2.00	$5.00
June 1 - August 11	$14.95	$2.00	Not offered

**All prices are per student. Please note that the museum requires a ratio of 1 chaperone per every 9 students. These chaperones are free of charge. Additional chaperones pay the same rate as the students, but group sizes must not exceed 10 individuals per group. Frost Science membership or other discounts may not be used in conjunction with field trip and group rates. One additional chaperone designated as the contingency chaperone will be admitted free of charge. Please see the in-person field trip FAQ for more information at* frostscience.org/fieldtrips*.*

ADVISORY: *Please note that due to current social distancing and group gathering guidelines due to COVID-19, groups must remain in subgroups of 10 or less individuals (9 students for every 1 chaperone) for museum exploration, Frost Planetarium show and enhanced field trip offerings.*

Frost Planetarium Show

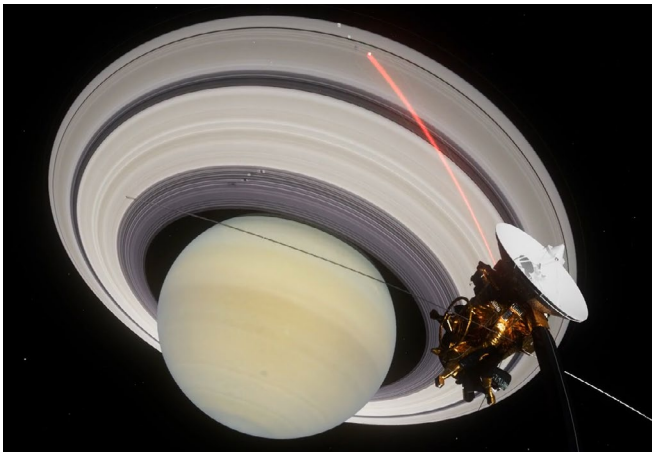
A Frost Planetarium show allows students to explore the world and universe through a state-of-the-art experience in this awe-inspiring venue. For more information about current shows, please visit frostscience.org/planetarium.

Please note that shows are filled on a first-come, first-served basis in terms of scheduling.

NEW: Introducing a new show!

Worlds Beyond Earth

Featuring immersive visualizations of distant worlds, groundbreaking space missions and breathtaking scenes depicting the evolution of our solar system, Worlds Beyond Earth, was created by the American Museum of Natural History in New York. The show, narrated by Academy Award winner Lupita Nyong'o, takes you on an exhilarating journey that reveals the surprisingly dynamic nature of the worlds that orbit our Sun and the unique conditions that make life on our planet possible.



Enhanced Field Trips

You and your students can dive deeper into science with a 45-minute facilitated, hands-on learning experience in our Knight Learning Center. Led by a museum educator, topics include marine science, earth science, space, and engineering themes with standards-aligned options for grades Pre-K through 12th. The experience can accommodate a maximum of 9 students per class and is subject to availability. Enhanced field trips are only available during the academic year.

**Please check with your reservation representative if you are interested in adding both an enhanced field trip and Frost Planetarium show*

Pre-K

Sea Life Sorting

Students will sort, classify and compare shells in this ocean and coastal themed experience that celebrates the biodiversity of life on Earth. Hands-on activities will teach students how to observe, investigate and categorize our diverse mollusk (shell) collection gathered over decades from all around the globe, ranging from rare finds to common Florida shells. Students will learn to recognize the similarities and differences in shapes, colors and sizes, and will be guided to match sea creatures needs with their environments and habitats.

Grades K-2

Crocogators

Young biologists will sink their teeth into the world of some of the oldest animals on Earth: crocodiles, alligators, caimans and gharials! Students will go on a journey that follows the evolution of these remarkable reptiles while exploring their unique adaptations through engaging activities, including a special viewing of both crocodile and alligator skulls from our museum's collection. Then, students will compare physical features of alligators and crocodiles and choose their favorite by making their own alligator or crocodile face mask.

Day and Night

Students will blast off into outer space to explore the key components for our planet, including our star, the sun, and our natural satellite, the moon. A facilitator will guide students to discover the key roles the sun and moon play in the repeating patterns that make day and night. Then they will explore how positions and rotations help to create the four seasons. Students will put together a planetary orbital model with a special focus on the positioning between the sun, moon and earth to uncover how these celestial bodies can result in solar and lunar eclipses.

Wind Tunnel Design

Students will get to apply their engineering skills and explore how they can make flying contraptions go higher, further and faster. Using a variety of materials—including everyday objects—they'll be encouraged to create their own flying contraptions and then given the opportunity to test them out in our own vertical wind tunnel. Their flying contraptions will go through different challenges, all encouraging design readjustments and trial and error—a friendly part of the engineering process.

Enhanced Field Trips *(continued)*

Grades 3-5

Building the Future

Students will have the chance to let their creativity flow as they prepare to become the next generation of problem solvers by exploring the fundamentals of engineering. This hands-on introduction to the engineering design process will encourage creative thinking, team work and perseverance while students tackle a bridge building challenge. Teams will plan, build and test how their designs respond to weight and length demands and then be challenged to redesign and retest to create the ultimate bridge.

Fingerprints of Light

Students will have the opportunity to jump into an astrophysicist's shoes as they study how light's properties and behavior are applied to astronomy and human space exploration. Students will experiment using tools like color filters, diffraction gratings and colorful spectrum gas tubes to note how gases (especially the ones we as humans need) emit light and have their own unique light pattern, or "fingerprint." Practicing the principles they've learned, they will then decide whether to pursue space exploration to different case planets by analyzing their light spectrums.

Motion of the Ocean

Students will gain a broader understanding of how ocean currents are a constantly moving, interconnected energy system powered by forces that play a key role on our planet. Drawing inspiration from a real-life serendipitous experiment with rubber ducky drifters, students will engage with a hands-on simulation model to observe how wind and landmasses affect movement for surface currents and plot data of paths taken as they monitor a drifter. They will then be introduced to how new technology can further aid science research by checking in on ocean drifters' tracks as part of the Global Ocean Observing System and apply their new knowledge to predict future drifter tracks.

Grades 6 – 8

Earth Formations

Students will investigate the geophysical phenomenon of tectonic plates and how they have continuously changed the surface of our planet from Pangea to Modern Earth. They will visualize movements through various props and puzzle pieces while learning how to interpret maps before making predictions based on information gathered as to where earth's topography may be going. As they uncover the different layers of the earth, they will also have the opportunity to observe and categorize striking pieces of the museum's rock and mineral collection and use tools to view them up-close to identify patterns within the rock cycle and how weathering and erosion play a part in their formation.

Enhanced Field Trips *(continued)*

Fluorescing Fish

Students will light up with curiosity as they explore the science of luminescence. Starting with an exploration of the properties of light and identifying examples of how luminescence exists in the natural world, students will then take a closer look at how fluorescence, a form of luminescence, is used as a scientific tool by exploring a real-world application in biology where genetically modified fluorescent fish are used to better understand genetics, including an illuminating introduction to Punnett Squares.

Squid Dissection

Students will dive into a slimy (and sometimes smelly!) dissection that investigates the biology of one of the earth's most highly developed invertebrates: squid. Students will examine and identify the special and unique features and adaptations these mollusks have developed over time to help them survive. They'll also analyze the squid's role in the marine food web along with the characteristics they share with their mollusk relatives. Don't worry, the smell comes off, with a little soap and water—but the memory lasts forever!

Grades 9 – 12

Water Quality Testing

Students will dive into a water chemistry-based experiment by comparing and contrasting variables such as temperature, acidity, salinity and nutrient balance from sources such as freshwater, local bay water and even water from our own aquarium. As they gather results, students will make inferences on what they mean for an aquatic system, especially for aquatic creatures to live and thrive. As they conclude their lesson, they will review real life studies that are responding to the changing climate and pollution including research at Frost Science that is working on increasing the heat tolerance of corals as ocean temperatures rise.

In-Person Outreach

Frost Science is on the go! Outreach with Frost Science brings hands-on learning directly to schools and communities. Each experience inspires the audience to investigate our world and universe through the lens of science.

Frost Science Outreach Programs include:

- STEM-focused, NGSSS-aligned curriculum (standards available upon request per grade)
- All hands-on activities and supplies needed for each program
- Two specially trained science educators to bring your outreach experience to life

Cost*:

- **Egg Drop Engineering Challenge** - $500 for four 30-min sessions
  Limited to nine (9) students per session.
- **Night Sky Telescope Viewing** - $1,000 for 2-hours for up to two telescopes
  Participants must keep a distance of 6 feet at all times and the experience capacity will depend on the location space.
- **Build Your Own Outreach** – Starting at $1,000 for 2-hours of programming
  Experience capacity will depend on the final program.

For more information and to reserve your Outreach with Frost Science, please visit: frostscience.org/outreach.

**Depending on distance and travel time from Frost Science to the outreach location, an additional travel fee may apply.*

Additional Educator Resources

Supporting Field Trip Materials

We know educators are incredibly busy. To help you prepare for your field trip—as well as reinforce the lessons learned at the museum back in your classroom—we've created standards-based pre- and post-visit materials for grades Pre-K - 8th that align with each of our exhibitions. These resources include activities to use before and after your visit, and provide insight into what you can expect during a Frost Science field trip.

Standards-aligned curriculum materials can be downloaded free of charge from frostscience.org/fieldtrips.

South Florida Educators Membership

Experiencing a field trip destination can be helpful in planning how to share the experience with students. Frost Science is committed to supporting educators in achieving this goal.

Educators in Miami-Dade County, Broward County, Palm Beach County and Monroe County can receive a complimentary, individual Educator Membership at Frost Science, valid for complimentary admission for one adult educator cardholder year-round, plus guest privileges for select member events and exhibition previews. Annual processing fee of $25 will apply. Proof of current school year employment is required. A school-issued photo I.D. and/or a current paycheck stub are acceptable forms of proof (additional verification may be required). School websites, health insurance cards or a class syllabus are NOT acceptable proofs. To receive the educator membership, please visit the Member and Guest Relations Desk at Frost Science or email a copy of your current school I.D. and/or paycheck stub to membership@frostscience.org.

Please note: the Educator Membership is valid for complimentary admission for the educator only; complimentary admission benefit does not extend to guests.

Please note: there is limited self-parking available in the museum garage during regular museum hours. This parking can fill up quickly. For a more economical option, you can also access the museum via public transportation. Detailed parking information, including current parking rates, can be found at frostscience.org/parking.

Field Trip FAQs

For more information regarding field trips, please review our virtual program FAQ and in-person field trip FAQ at frostscience.org/fieldtrips.

For more information or to reserve your field trip, please visit frostscience.org/fieldtrips.

For additional assistance, please email fieldtrips@frostscience.org or call 305-434-9564.

PHILLIP & PATRICIA FROST MUSEUM OF SCIENCE

1101 Biscayne Blvd, Miami, FL 33132 | 305-434-9600 @FROSTSCIENCE

The Phillip and Patricia Frost Museum of Science is supported by the Miami-Dade County Department of Cultural Affairs and the Cultural Affairs Council, the Miami-Dade County Mayor and Board of County Commissioners of Miami-Dade County. This project is supported by the Building Better Communities Bond Program and the City of Miami. Sponsored in part by the State of Florida, Department of State, Division of Cultural Affairs, and the Florida Council on Arts and Culture. The museum is accredited by the American Alliance of Museums, is an affiliate of the Smithsonian Institution and a member of the Association of Science and Technology Centers. Frost Science is an accessible facility.