

EDUCATOR GUIDE

Field Trips and Outreach:
In-Person and Virtual
2021-2022



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Welcome Letter

Dear Educators,

As we enter another school year filled with both uncertainty and hope, we at the Phillip and Patricia Frost Museum of Science want to reaffirm our dedication to educators everywhere in our mission to provide engaging programming and help students develop crucial skills in science and technology.

Last year, we were impressed with the tenacity and vision of educators like yourselves. Amid unpredictable circumstances, you provided your students with a safe and supportive environment to pursue science inquiry. Through our interactions with educators during the last school year, we saw teachers lead their students as they adapted to challenges and achieved success. Two ideas resonated with us from these experiences. The first is the growing relevance of basic science and the tools of scientific inquiry for helping students grapple with an ever-changing world full of misinformation. The second is the importance of science learning beyond the classroom, whether at home, with their peers or in informal learning centers like Frost Science. The resources in this guide represent our response to these shifting needs of today's students.

Frost Science is dedicated to reaching educators and their students where they are, wherever the year may find them. That's why we will continue to offer two types of programs this year: in-person experiences and facilitated virtual visits. Your students can watch a Frost Planetarium show at the Frost Science campus, engage with an in-person outreach specialist that visits their school, or ask live questions to our expert museum educators during a virtual trip to the aquarium. We are also excited to host state-of-the-art traveling exhibitions, such as *Skin: Living Armor, Evolving Identity* presented by Baptist Health's Miami Cancer Institute, that help students apply scientific inquiry skills to relevant questions in their own lives. We are committed to providing opportunities for discovery and inquiry-based learning that fit with the evolving needs of your school or organization.

In 2021, back-to-school may not yet be synonymous with back-to-normal, but through the hard work of educators like you, we've been able to show that science can withstand even this challenge. We hope you will join us at Frost Science this year, in person or virtually, to help us ignite your students' interests in science and technology!



A handwritten signature in black ink, reading "Angela Colbert".

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



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 guidelines for safely operating. 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 current safety measures, please visit frostsscience.org/covid19safety. For specific requirements for field trips, please visit frostsscience.org/fieldtrips or email us at fieldtrips@frostsscience.org.



Field Trips @ Frost Science

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



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.

2021-2022 Pricing	General Admission*	Frost Planetarium Show add-on	Enhanced Field Trip add-on
August 23 – June 2	\$12.95	\$2.00	\$5.00
June 3 - August 21	\$14.95	Not offered	Not offered

*All prices are per student. Please note that the museum requires a ratio of 1 chaperone per every 10 students. These chaperones are free of charge. Additional chaperones pay the same rate as the students. Frost Science membership or other discounts may not be used in conjunction with field trip and group rates. For questions regarding special needs groups, email fieldtrips@frostsscience.org. Please see the in-person field trip FAQ for more information at frostsscience.org/fieldtrips.

ADVISORY: Please note that due to the fluid nature of federal, state and local COVID-19 safety guidance, our requirements for field trip groups may change at any time. Visit our website at frostsscience.org/fieldtrips for the latest information.

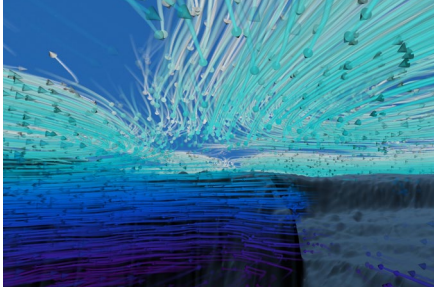




Frost Planetarium Shows

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

Please note that shows are filled on a first-come, first-served basis. Check with your reservation representative if you are interested in adding a planetarium show.



Dynamic Earth

Narrated by Liam Neeson, you'll ride along on swirling ocean currents, fly into roiling volcanoes and dive into the heart of a hurricane as you explore the inner workings of the Earth's climate system.

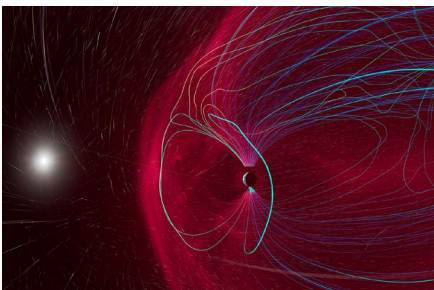
[Click here to view trailer.](#)



Phantom of the Universe: *The Hunt for Dark Matter*

From the Big Bang to the emergent cosmos, immerse yourself in the exciting exploration of dark matter in a journey across space and time narrated by Tilda Swinton.

[Click here to view trailer.](#)



Worlds Beyond Earth

Narrated by Academy Award-winner Lupita Nyong'o, take a journey and discover the story of the surprisingly dynamic nature of the worlds that share our solar system and the unique conditions that make life on Earth possible.

[Click here to view trailer.](#)



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 with standards-aligned options for grades Pre-K through 12th. Enhanced field trips are available throughout the academic year, subject to availability. Maximum class size will vary, depending on the latest COVID-19 guidelines. At least one chaperone must remain with the group at all times.

**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 of rare finds and Florida favorites. Students will learn to recognize the similarities and differences in shapes, colors and sizes, and 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. Students will complete their day by comparing the physical features of alligators and crocodiles and making a take-home face mask of their favorite.

Night and Day

Students will blast off into outer space to explore the key components of our planet, including our star, the sun, and our natural satellite, the moon. A facilitator will guide students in discovering the key roles the sun and moon play in the repeating patterns that make day and night. Students will then explore how the positions and rotations of the planet 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 create solar and lunar eclipses.

Wind Tunnel Design

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

Grades 3-5

Building the Future

Students will let their creativity flow as they 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 their designs to respond to weight and length demands, and then modify their designs 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 use tools like color filters, diffraction gratings, and colorful spectrum gas tubes to note how gases emit light and have their own unique light pattern or "fingerprint." Finally, students will analyze the light spectrums of different planets to determine which one to explore.

Motion of the Ocean

Students will learn about ocean currents, the 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 applying 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. Using various props and puzzles, they will learn how to interpret tectonic movement with maps, collect scientific data, and make predictions about the future of Earth's topography. 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.

Fluorescing Fish

Students will light up with curiosity as they explore the science of luminescence. Students will start by exploring light's properties and luminescence in the natural world. They will then examine how fluorescence, a form of luminescence, is used as a scientific tool through an experiment where genetically modified fluorescent fish are used to better understand genetics. This real-world biology application is 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 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 water chemistry by analyzing the temperature, acidity, salinity, and nutrient balance from various water sources – including 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 focused on increasing the heat tolerance of corals as ocean temperatures rise.

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 permanent 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 exclusive 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 to, 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 exciting 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 tour 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 experience to bring engaging science 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 of science learners firing! 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.

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

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 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 spark 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 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

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





Frost Science Exhibitions

NEW! Power of Science

Ocean Gallery, Supported by the University of Miami

Step into the shoes of researchers, explorers and innovators unlocking everything from the mysteries of the universe to those inside our bodies. In this new permanent exhibition at Frost Science, you'll dive into groundbreaking research and discoveries from the University of Miami and beyond. As you journey across four scientific frontiers, Our Oceans, Our Environment, Our Bodies and Our Universe, you'll encounter rare specimens, state-of-the-art scientific instruments and cutting-edge exhibits, including an interactive floor. As you learn about the *Power of Science*, these interactive exhibits and games will challenge you to think like a scientist and explore real-world solutions to issues such as major storms and threats to coral reefs.



Aquarium

A masterpiece of living science, the three-level Aquarium (Vista, Dive, Deep) carries you from the surface to the depths of South Florida's crucial aquatic ecosystems and beyond.

Royal Caribbean Vista

Level 4

A massive outdoor deck, the Vista level puts you at the surface of key South Florida ecosystems. In the 500,000-gallon Gulf Stream Aquarium, scalloped hammerhead sharks cruise the waters, while rehabilitated green herons navigate the spaces of the Mary M. and Sash A. Spencer Aviary. Red mangroves and a 22-foot gumbo limbo hold court just beyond the Florida Bay Touch Experience, where you can meet and touch gentle stingrays that thrive in our state's shallow backwaters.

Dive Level

Level 3

Throughout the Dive level, nearly 30 aquariums and interactive vessels offer an intimate view into the subtropical sea, where colorful damselfish dart through corals and predators search for their bait through mangrove forest shadows. At the Dive Bar, students will get an up-close encounter with some of our favorite marine invertebrates and learn about their unique features.

Deep Level

Level 2

With a revealing look at the mysterious and vast depths of the Gulf Stream, the lowest level of the aquarium is where drifters such as jellies reside. A one-of-a-kind 31-foot-wide oculus lens forms the bottom of the Gulf Stream Aquarium and gives you a direct view of the scalloped hammerhead sharks swimming overhead.





Frost Planetarium

One of the most advanced spaces like it in the United States, the 250-seat Frost Planetarium uses 16-million-color 8K projection, surround sound and a vast dome screen to take students on a visual joyride that both thrills and educates. The dome is tilted forward at 23.5 degrees, allowing its 67-foot span to fill viewers' field of vision and make it feel as if they're flying. Imagery comes in from above, below and around peripheral edges, creating a nearly 360-degree view of whatever world your students are exploring—from the depths of the ocean to our universe and beyond. Frost Planetarium also presents spellbinding laser light events, innovative live programming and is available for private presentations.



Feathers to the Stars

The Batchelor Foundation Gallery, Supported by Christine Allen

Discover the amazing story of how ancient evolution gave birth to animal flight and how humans used imagination and engineering to get airborne and travel to outer space. Students will come face-to-face with a 30-foot dinosaur, the *Yutyrannus huali*, while exploring interactive stations with handrails that reveal the secrets of birds' biomechanics. They'll meet the daredevil inventors who pioneered human aviation by risking their lives to figure out the aerodynamic principles of thrust, drag, weight and lift before building and launching their own air rockets in an exploration of the physical laws that guide rockets through the Earth's atmosphere.

MeLaß

Baptist Health South Florida Galleries

MeLaß guides students through the amazing ways the body and mind work together and how daily choices contribute to their health. In this exhibition, they'll get to challenge their brain with problem-solving tasks, stop a 'virtual virus' and more. Their partner in MeLaß is *beta*, a digital character they'll build as they answer questions in each learning zone. The more questions they answer, the more they'll customize *beta*, and learn about themselves.





River of Grass

William R. Kenan, Jr. Charitable Trust Gallery

The wet, wild and mysterious River of Grass provides young explorers with an interactive way to learn more about the Everglades through two related spaces. In the outdoor area, children see, feel and experiment with the physics of water, introducing them to the concepts that keep the 300-mile Everglades and all its creatures alive. Inside, children venture into an interactive virtual environment where animal characters come to life during a “day in the life” of the Everglades. They’ll chase otters, spot a panther using a flashlight, and by the end of the journey, learn that life in the Everglades is rich and worth protecting. This exhibition is specially designed for children 3-6 years of age.



The Sun Spot

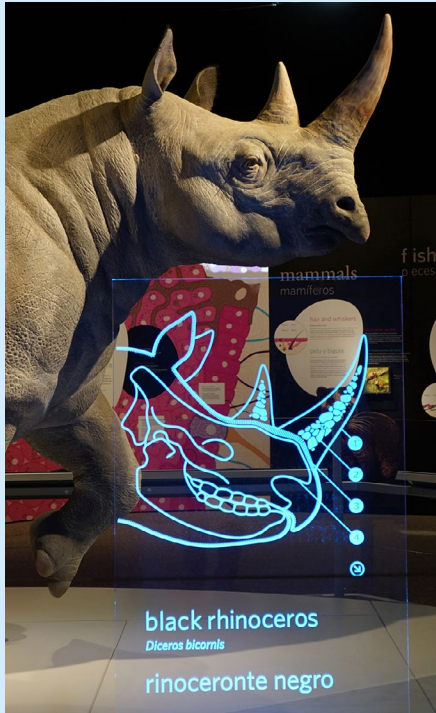
Florida Power & Light Company Solar Terrace

Experience the power of the sun as a renewable source of energy through several interactive solar-powered activities. Begin by feeling the power it takes to energize everyday objects with an outdoor bike or hand crank. Then, discover the science and engineering behind solar panels and explore the dynamic nature of the sun while safely viewing it with a Sunspotter. Students are also invited to get into the engineering mindset as they investigate why we need different types of renewable energies and explore why innovation in batteries may be the solution to the future of clean energy.



Special Exhibitions

Frost Science also has spaces dedicated to nationally touring temporary exhibitions. This ensures a regular rotation of topics and experiences for you and your students to explore.



Skin: Living Armor, Evolving Identity

October 8, 2021 – April 3, 2022 | Hsiao Family Special Exhibition Gallery

Uniquely personal yet universal, skin is the way we face our world. In *Skin: Living Armor, Evolving Identity* presented by Baptist Health's Miami Cancer Institute, guests are invited to dive deep into the shape-shifting, color-changing and ever-evolving science of skin. This multisensory, bilingual exhibition explores skin as both a complex organ that serves as a living interface between organisms and their environment and a culturally significant characteristic that shapes how humans view themselves, perceive others, and interact with one another in a modern world. The exhibition features dozens of scientific specimens from world-class research collections that showcase the incredibly adaptive properties of skin—including its remarkable ability to support and regenerate a variety of keratin-based structures like armored reptile scales, aerodynamic bird feathers and insulating mammal fur.

Skin: Living Armor, Evolving Identity is presented by Baptist Health's Miami Cancer Institute. The exhibition was created by the California Academy of Sciences and modified for travel and distributed by the Science Museum of Minnesota. The exhibition is generously supported by Susan and Nicholas Pritzker and Family.



X-Ray Vision: Fish Inside Out

October 8, 2021 – April 3, 2022 | Hsiao Family Special Exhibition Gallery

Fish are vertebrates—animals with backbones—and have bodies supported by a bony skeleton. Variations in the skeleton, such as the number of vertebrae or the position of fins, are documented with X-rays. The Smithsonian's National Collection of Fishes X-rays represent more than 70 percent of the world's fish specimens and is the largest and most diverse collection of its kind in the world. Although the X-rays featured in the national collection were made for research purposes, the strikingly elegant images demonstrate the natural union of science and art and are a visual retelling of the evolution of fish. *X-Ray Vision: Fish Inside Out*, an exhibition from the Smithsonian's National Museum of Natural History and the Smithsonian Institution Traveling Exhibition Service (SITES), will showcase these dramatic prints exposing the inner workings of the fish.

X-Ray Vision: Fish Inside Out is organized by the Smithsonian's National Museum of Natural History and the Smithsonian Institution Traveling Exhibition Service (SITES). It was inspired by the book *Ichthyo: The Architecture of Fish* (Chronicle Books in association with the Smithsonian Institution, 2008) by Stephanie Comer and Deborah Klockko.

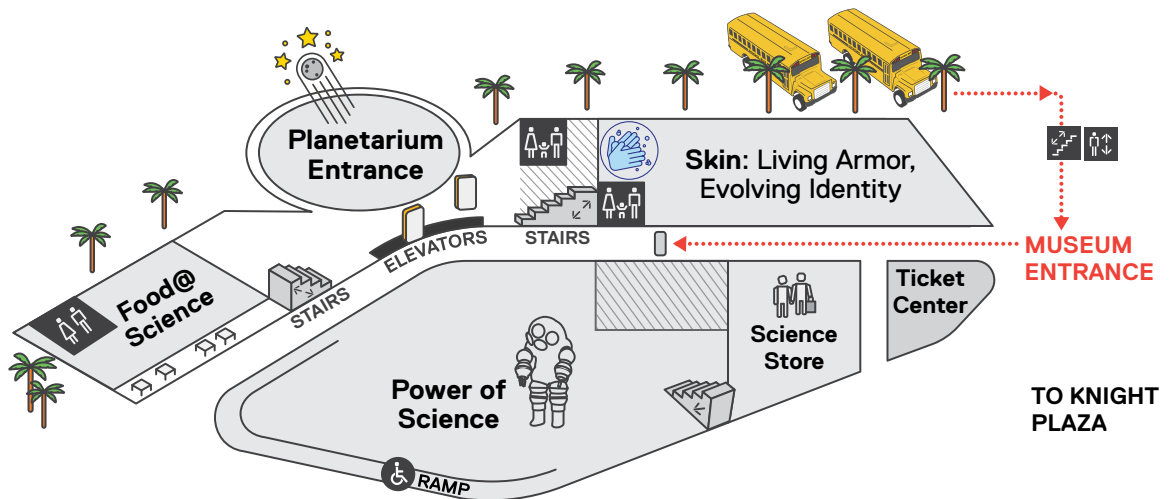
To see all current exhibitions, please visit frostscience.org/exhibition.

MUSEUM FLOOR PLAN



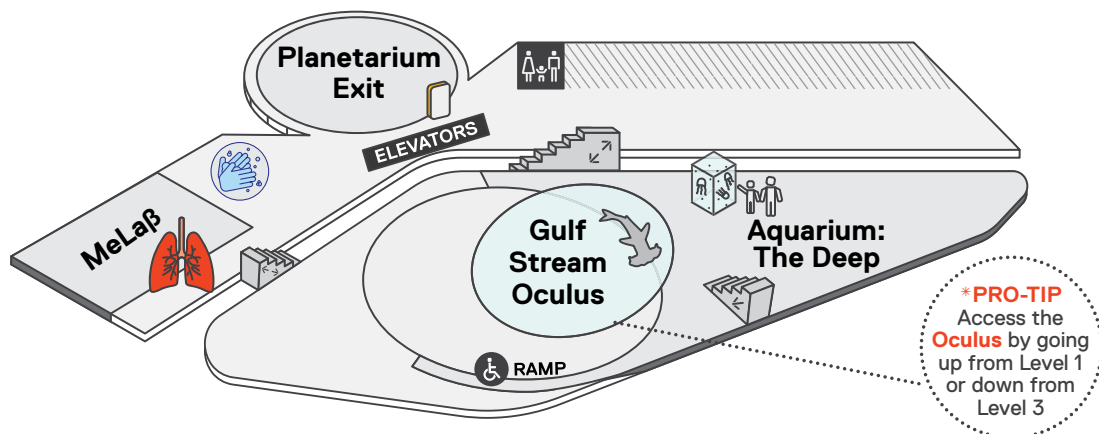
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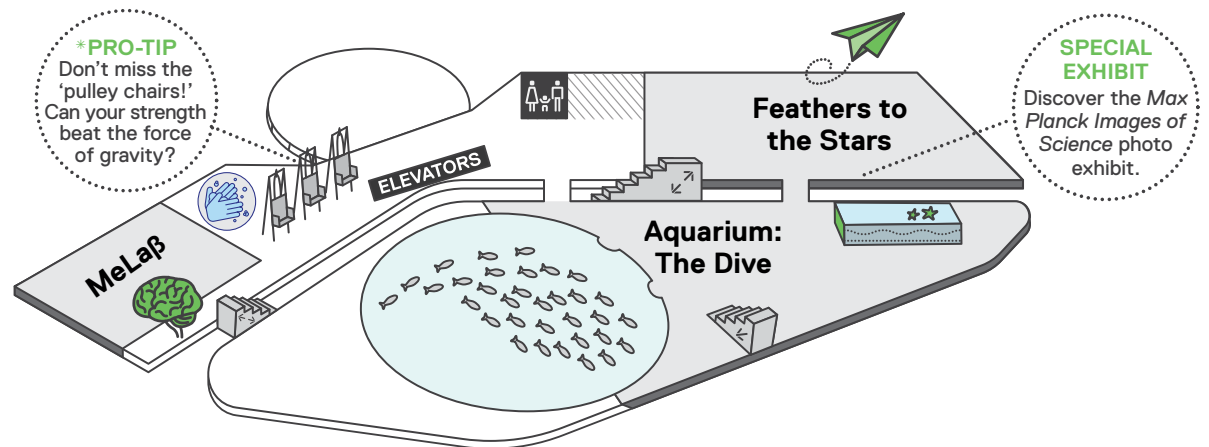
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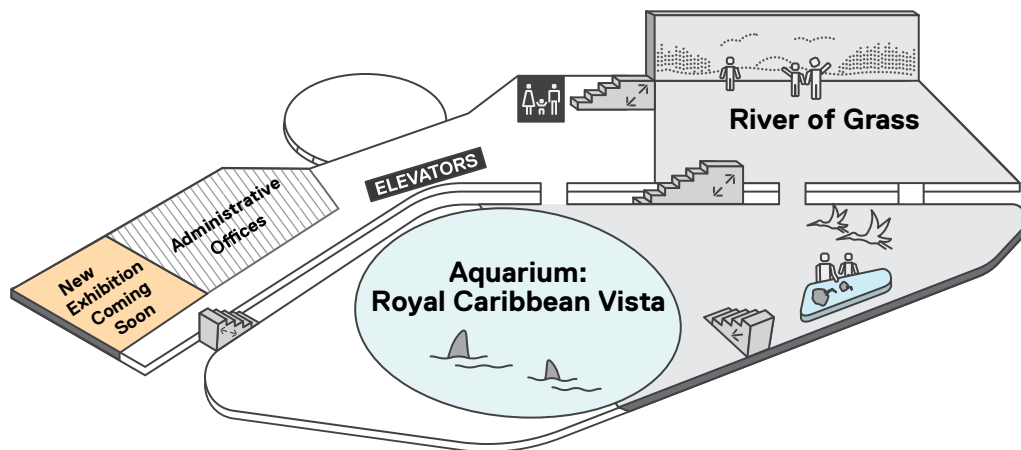
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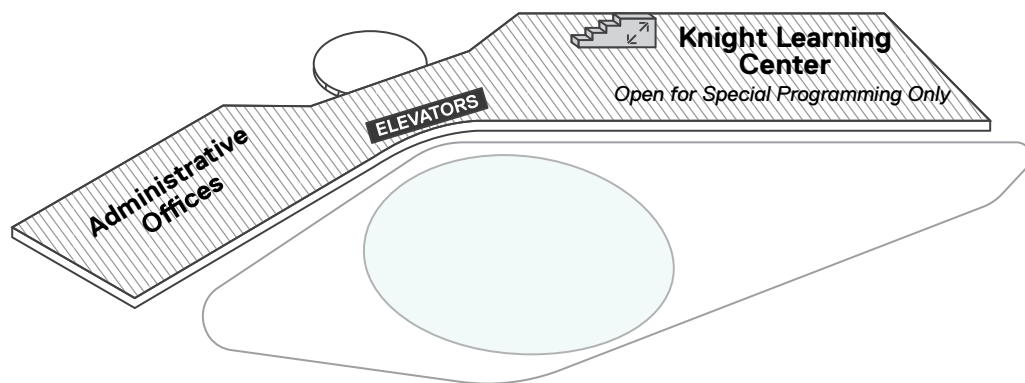
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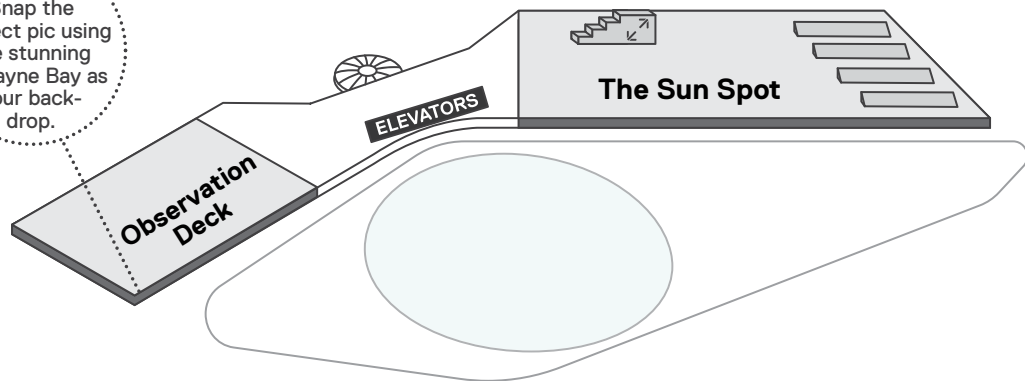
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LEVEL

6

***PRO-TIP**
Snap the perfect pic using the stunning Biscayne Bay as your back-drop.



For the safety of our animals and divers, please, no flash photography.



Food, drinks, gum and smoking are not allowed in museum galleries and exhibitions.



All galleries and exhibitions are wheelchair accessible.



Frost Science is a smoke-free facility. No smoking or vaping on property.

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 - 8 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 frostsscience.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.

K-12 private and public school teachers in Miami-Dade County, Broward County, Palm Beach County and Monroe County are eligible to apply for an individual Educator Membership at Frost Science, valid for one year of complimentary admission, access to Frost Planetarium shows, discounted parking, and invites to select member events throughout the year. 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 apply for the Educator Membership, please visit the onsite Ticket Center with your school-issued photo ID. For more information, please visit frostsscience.org/membership or email membership@frostsscience.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 frostsscience.org/parking.

Field Trip FAQs

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



Circulating Currents
The Gulf Stream and other major ocean currents are responsible for the distribution of heat around the world. They also play a key role in the global climate system. The Gulf Stream, for example, carries warm water from the Caribbean Sea northward along the eastern coast of North America. This warm water then moves back southward along the western coast of Europe, creating a cycle that helps regulate the Earth's temperature.

Corrientes que circulan
Las corrientes oceánicas principales son responsables de la distribución del calor alrededor del mundo. También juegan un papel clave en el sistema climático global. La corriente del Golfo, por ejemplo, transporta agua cálida desde el Mar Caribe hacia el norte a lo largo de la costa este de América del Norte. Este agua cálida luego se mueve de vuelta hacia el sur a lo largo de la costa oeste de Europa, creando un ciclo que ayuda a regular la temperatura de la Tierra.

"Science is much more than a body of knowledge. It is a way of thinking."



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

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

PHILLIP & PATRICIA FROST MUSEUM OF SCIENCE

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@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 Arts and Culture, 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.



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