School and Educator Guide
2017-2018
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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. All contents ©Phillip and Patricia Frost Museum of Science. All rights reserved.
Hello and Welcome

We at the Phillip and Patricia Frost Museum of Science are thrilled to share our new facility, programs and resources with students and educators like you. We know from research that field trips can make an impact on a child’s learning and look forward to being a destination for you and your class. From sharks gliding smoothly through the water, to the science behind creating the perfect paper airplane, Frost Science has something for science lovers of all ages. We have permanent exhibitions you can plan curriculum around from one year to the next, as well as a schedule of nationally touring temporary exhibitions that make sure there’ll always be something new for you to see at the museum. I still remember the first time my children came home talking about their field trip. In fact, I still remember my first field trip to the Miami Science Museum when I was 12 years old. It helped put me on the career path that led me to where I am today.

I speak for all of us here at Frost Science when I say how much we are looking forward to providing that same experience for youth, educators and family chaperones here in Miami. Whether you’re planning a field trip, visiting us using educator benefits, or taking advantage of our online learning resources, we’re here to support your science curriculum and the education of your students.

Phillip and Patricia Frost Museum of Science
Planning Your Visit to Frost Science

Time to put down your pens and pencils... and make your way to the Phillip and Patricia Frost Museum of Science! Our field trips engage students of all ages with numerous interactive and educational exhibitions that explore the world of science, technology, engineering and math (STEM) in a fun and novel way. You can make the museum your classroom as students learn about the science behind living systems, the biology of the human body and mind, the physics of flight, the Everglades and much more.
Organizing a field trip at Frost Science is easy!
You’ll need to:

- Plan your trip at least three weeks in advance.
- Confirm permission for the trip with your school administration.
- Pick three potential dates for your school trip that work with your school calendar.
- Confirm your school buses will be available on those days.
- Select your field trip program and go to frostscience.org/fieldtrips to begin the online registration process.
- Look out for an invoice and confirmation email after your reservation request has been submitted.
4 Field Trip Choices

There are four ways to visit Frost Science. For each experience, one adult chaperone is required for every 10 children. This adult receives free admission! Additional chaperones are required to pay admission as an “additional adult” according to the rates on the following pages.
1  
Museum Exploration

This option allows you and your students to explore all the areas of the museum. Free curriculum resources are available on the museum’s website to assist you in connecting your visit to your classroom curriculum. On the following pages, you can learn more about the different exhibitions waiting for you to explore.

The price for this experience is:

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2  
Museum Exploration + Frost Planetarium Show

In addition to exploring all the exhibitions the museum offers, you and your students will also get to enjoy a show in our state-of-the-art Frost Planetarium.

The price for this experience is:

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3

Museum Exploration + Private Facilitated Experience

This option allows you and your students to explore all exhibitions as well as participate in a 45-minute facilitated, hands-on learning experience in our Knight Learning Center. There are several topics to select from with experiences that are tailored to connect to kindergarten through 8th grade standards. This program can accommodate a maximum of 30 students per class and is subject to availability.

The price for this experience is:

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Experience options:

Exploring Marine Life
(Aligned with Aquarium Exhibition)

Grades K-2:
Sea Life Sorting
This ocean-and-coastal-themed experience celebrates the biodiversity on Earth and how scientists classify living organisms into groups based on physical characteristics. Hands-on activities will allow students 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 recognize similarities and differences in shapes, colors and sizes, and will be guided to identify and match each sea creature’s needs with their environment and habitat.

Grades 3-5:
Plankton Racing
Students will explore the variety of adaptations involved in helping marine creatures survive by focusing on the ocean’s most crucial organisms: plankton! Students will uncover the important role plankton play in food webs by examining a wide range of plankton preserves under a microscope, including some from our very own Biscayne Bay. They will then be challenged to construct their own plankton models to simulate how body shape affects movement through a complex ocean. Students will test their creations and then compete to see which of their designs fares best in the water.

Grades 6-8:
Squid Dissection
Participants will dive into a slimy (and sometimes smelly!) dissection to investigate the biology of one of the Earth’s most highly developed invertebrates: squid! Students will come face-to-face with this mollusk and be guided to examine and identify the special and unique features and adaptations they’ve 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!

Exploring Flight
(Aligned with Feathers to the Stars Exhibition)

Grades K-2:
Wind Tunnel Design
Young explorers will get to put their engineering skills to work as they investigate how to make flying contraptions go higher, further and faster. Using a variety of materials (including some everyday objects), students will be encouraged to imagine and create their own flying contraptions before testing them out in our vertical wind tunnel. Their flying contraptions will go through different challenges, all encouraging design readjustments and trial and error—a necessary part of the engineering process.

Grades 3-5:
Finger Prints of Light
Ever wondered how scientists look at different planets and figure out whether they could sustain human life? 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 begin by handling and investigating light sources like LEDs, neon lights, UV lamps and lasers. Then, they’ll experiment using tools like color filters, diffraction gratings and colorful spectrum gas tubes to note how gases (especially the ones humans need) emit light and have their own unique light pattern, or “fingerprint.” Practicing the principles they’ve learned, they will then be challenged to decide whether to pursue space exploration to different case planets by analyzing their light spectrums.
Museum Exploration + Frost Planetarium + Private Facilitated Experience

This option allows you and your students to explore all exhibitions as well as participate in a 45-minute facilitated, hands-on learning experience in our Knight Learning Center. A Frost Planetarium show that aligns with the day’s schedule is also included. Options for the classroom experience are described on page 9.

The price for this experience is:

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Field Trip Add-Ons

For your convenience, there are several pre-visit purchase opportunities to enhance your students’ experience, as noted in the list below. These can be ordered online in advance of your visit at frostscience.org/fieldtrips.

Field Trip Lunch
A pre-ordered meal can make lunchtime a little more convenient for you and your students. Options include your choice of sandwich, a bag of chips and bottled water.

Field Trip Lunch $6.00 per person

Goodie Bags
Pre-packaged goodie bags are an easy way for students to take home a memory of their visit without having to take time away from learning for a gift store visit. Goodie bags contain Frost Science branded items and are conveniently presented to you at the end of the visit, right before students board the bus.

Small Goodie Bag $5.00 per person ($6.36 value!)
- 25-ounce water bottle
- Pencil
- Eraser
- Ruler

Large Goodie Bag $10.00 per person ($14.83 value!)
- 25-ounce water bottle
- Pencil
- Eraser
- Ruler
- Drawstring Backpack
- Pencil Sharpener
- Set of 4 Crayons

Frequently Asked Questions

Questions? That’s quite alright! Here are answers to some of our most commonly asked ones. You can also find this information on the website at frostscience.org/fieldtrips.

How do I pay for my visit?
Field trip reservations are on a first-come/first-served basis. A non-refundable deposit of $75 or 20% of the total due (whichever is greater) must be received no later than three (3) weeks after your reservation has been confirmed to ensure your field trip date is secured. Reservations without paid deposits are subject to cancellation. Deposits can be made by credit card or check/money order. Please make checks or money orders payable to “Frost Science” and mail to:

Frost Science Reservations Department
1101 Biscayne Blvd., Miami, FL 33132

Purchase Orders (MDCPS ONLY) can also be submitted in lieu of a deposit.

Final payments are due the day of your scheduled field trip. The museum requires that one payment be made for all reservations. The lead teacher is responsible for collecting payment from additional chaperones attending the field trip prior to arrival. Any chaperones not included in the reservation and choosing to pay separately will pay the regular museum admission rate and will not be guaranteed seats in shows/activities scheduled for your field trip. Museum memberships are not valid for field trip entrance.

What time are field trips offered?
All field trips at Frost Science are three (3) hours in duration, typically beginning at 10:00 a.m. Groups are expected to arrive 15 minutes prior to their scheduled start time. NOTE: Late groups might miss scheduled activities, and will not have an opportunity to reschedule for later shows or receive a refund.
Plan for Success!

Prior to your visit
- Complete required school documentation (field trip permission forms, transportation forms, etc.)
- Secure chaperones for the field trip and ensure they are aware of arrival and departure times.
- Confirm your final head count.
- Place any special lunch or goodie bag orders with the reservations team. Lunch orders require a final count five (5) days prior to your field trip date or the original reserved number will be used.
- Review field trip learning resources located at www.frostscience.org/fieldtrips.

Day Before the Field Trip
- Designate a lead teacher and complete Required Teacher Admission Sheet.
- Assign student groups to chaperones (10 students per one chaperone required).
- Prepare final payment, which is due upon check in at Frost Science. Final payment is due in the form of a single check, cash or credit card via one transaction. No refunds will be issued after the payment has been received.
- If the school is not paying for additional chaperones, please ensure that the chaperones know which venues/shows they will need to purchase tickets for and that admission to the same venues/shows being attended by the students may not be available at the time of purchase. Chaperones cannot use a membership to enter with a group.
- Remind students of proper museum etiquette as outlined in the field trip confirmation documentation.

Day of Field Trip: Arrival
- Please arrive at least 15 minutes prior to your scheduled start time. Museum staff will direct bus drivers to the appropriate drop-off location, but we do not provide school bus or motor coach parking.
Visit www.miamiparking.com for bus parking options. (Paid automobile parking is available in the museum parking garage.)

- Field trip guests should remain on the buses for an orientation from a museum representative.
- After the orientation, the lead teacher will need to provide the Required Teacher Admission Sheet and go to ticketing to pay any remaining balance for the field trip.
- Lunches brought to the museum will be unloaded from the bus by the school and pre-collected in large bins, boxes or coolers (no large plastic bags or individual lunch bags/boxes) and must be clearly labeled with the school name and teacher’s name.
- If you are running late for any reason, please contact the reservations office at 305-434-9564.

**Day of Field Trip:**
**During Your Visit**

- All tours are self-guided; therefore, it is the chaperones’ responsibility to arrive to ticketed shows on time.
- Chaperones must remain with their students throughout the visit and are responsible for their group’s behavior.
- For everyone’s safety, no running or rough play is permitted. Please emphasize the importance of using inside voices while at the museum.
- If your group visits the museum’s gift store, please note that a maximum of 15 students (accompanied by a chaperone) are allowed at a time.

We want our visitors to enjoy their experience at Frost Science and expect all groups to respect other visitors. If these guidelines are not followed, you may be asked to leave the museum. If this occurs, there will be no refund for your visit.

**Cancellation**

If you must cancel your field trip, please send a written cancellation no less than 10 business days prior to your visit. Written cancellations must be sent via email (FieldTrips@FrostScience.org).

Please note that deposits are non-refundable. Deposits are transferable, however, and can be used towards a future field trip. This credit must be used within one (1) calendar year from the date paid. After this date, the non-refundable deposit will be donated to the Frost Science general fund.

For additional questions, please contact the reservations department at 305-434-9564 or fieldtrips@frostscience.org.
Funding to Support Your Visit

Frost Science and its generous supporters are committed to making field trips accessible for your students and have several programs in place to financially assist you.

Funding for General Admission:
Through the support of our donors, Frost Science is able to provide free or discounted admission to groups visiting from Title I schools and non-profit community-based organizations. This discounted or free admission is subject to the availability of funding. A limited amount of transportation funding is also available. Please visit www.frostscience.org/fieldtrips for more information.

Healthy Mind, Healthy Body: 4th Grade Field Trip
Fourth grade students attending Miami-Dade County Public Schools are invited to participate in a special field trip designed specifically for them—free of charge. This field trip, generously sponsored by Baptist Health South Florida, features a visit to the MeLaβ in the Baptist Health South Florida Gallery, where students will have an opportunity to learn about how everyday choices can impact one’s health and happiness. The field trip also includes an opportunity to visit a second exhibition in the museum (exhibition depends on time of year), as well as standards-based pre-and post-visit materials to help ensure your experience is well-connected to the classroom curriculum.

Title I schools are also eligible for funding to cover the cost of bus transportation based on availability.

The program is available Monday through Thursday on all regular MDCPS school days, excluding holidays and teacher planning days. The session is from 10:00 a.m. to 1:00 p.m. and includes time for students to break for lunch.

To learn more about the program, including registration and access to additional resources, please visit www.frostscience.org/melabfieldtrip.

Baptist Health South Florida
Time to Explore

Frost Science has an engaging roster of exhibitions that promise to spark wonder, investigation and discovery for students of all ages. From dinosaurs and the intricacies of the human body to the vibrant ecosystem of our Everglades, you’ll explore a variety of topics while at the museum. Learn more about each one and how they might connect to your classroom curriculum goals!
Our Exhibitions

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.

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 displays spellbinding laser light events, innovative live programming and is available for private presentations.

MeLaβ

Baptist Health South Florida Gallery

MeLaβ guides students through the amazing ways the body and mind work together and how daily choices contribute to our health. In this exhibition, they’ll get to challenge their brain with problem-solving tasks, stop a ‘virtual virus’ or learn how dance can be a healthy form of exercise. Their partner in MeLaβ is βeta, a digital character they’ll build as they answer questions in each learning zone. The more questions they answer, the more they’ll customize βeta, and learn about themselves.
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.
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.

Vista Level

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, mahi-mahi and scalloped hammerhead sharks cruise the waters, while rehabilitated green herons navigate the spaces of the Mary M. and Sasha 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 meet with scientists and curators as they share their observations about the ecosystems and animals they study.

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 and tuna swimming overhead.
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. Plans for the 2017-2018 school year include topics ranging from the science of the human brain to the mysteries of river science.

Brain: The Inside Story

**October 7 – April 15**

*Hsiao Family Special Exhibition Gallery*

Through imaginative art, vivid brain-scan imaging and dynamic interactive exhibits, *Brain* will give you a whole new perspective on your very own gray matter. Divided into seven sections, the exhibition invites students to walk through an installation that simulates the energetic activity of firing neurons, follow the brain of a Julliard student during an audition, put together visual puzzles, use their visual cortex to read Braille and examine the brain’s amazing ability to rewire itself in response to experience, disability, or trauma.

*Brain: The Inside Story* is organized by the American Museum of Natural History, New York in collaboration with Codice: Idee per la cultura, Torino Italy in association with Comune di Milano-Assessorato Cultura, Italy; Guangdong Science Center, Guangzhou, China; and Parque de las Ciencias, Granada, Spain.

Monster Fish: In Search of the Last River Giants

**October 28 – Spring 2018**

*West Wing*

Stunning life-size sculptures, video installations and evocative illustrations introduce students to more than 20 species of river dwelling fish—each measuring at least six feet long and weighing at least 200 pounds. They’ll embark on a global journey to storied river basins with explorer and ecologist Zeb Hogan on his quest to find, research and protect freshwater giants. This interactive exhibition tackles the big challenges facing these remarkable fish and their struggle to survive and thrive. Students will experience a replica of an interactive fish market, view fishing and cultural objects from around the world and engage with ecology topics through tactile and digital interactives.

Monster Fish is developed and traveled by the National Geographic Society.

The Mechanicals

**Now through Spring 2018**

*West Wing, 4th Floor*

The magical world of automata has captured the human imagination since ancient times. But what exactly are they? Automata are whimsical machines brought to life by intricate arrangements of handmade cams, cranks and other simple mechanisms. Twelve witty, beautifully hand-crafted automata are displayed alongside ten hands-on exhibits that reveal the basic mechanisms involved in making them work. Students will pull on levers, turn cranks and watch the mechanicals come to life while highlighting the basic principles behind drives, pulleys, ratchets and levers.
PLEASE NOTE: Frost Science is a smoke-free facility. No smoking or vaping on property.

LEVEL 4

1 The Mechanicals
2 River of Grass
   William R. Kenan, Jr. Charitable Trust Gallery
3 Aquarium: The Vista
   4 Everglades
   5 Florida Bay Touch Experience
   6 Mary M. and Sash A. Spencer Aviary
      Mangrove Forest & Sandy Shores
   7 Coral Reefs
   8 Gulf Stream Aquarium

LEVEL 5

Classrooms & Administrative Offices Only
1 Trish and Dan Bell Conference Suite
2 Knight Learning Center
   3 Inventors-in-Residence (Coming Soon)

LEVEL 6

ROOF
1 Lunar Terrace
2 Florida Power & Light Company Solar Terrace

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.

*PLEASE NOTE: Frost Science is a smoke-free facility. No smoking or vaping on property.
Additional Educator Resources

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 frostscience.org/fieldtrips.

Self-Guided Field Trips

River of Grass: Learning resources focused on pre-K through 2nd grade
Aquarium: Learning resources focused on kindergarten through 8th grade
MeLaβ: Learning resources focused on kindergarten through 8th grade
Feathers to the Stars: Learning resources focused on kindergarten through 8th grade

Enhanced Field Trips

Aquarium: Additional materials aligned with kindergarten through 8th grade
Feathers to the Stars: Additional materials aligned with kindergarten through 5th grade
MeLaβ: Additional materials aligned with 4th grade

Special Admission for Educators

Previewing 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.

Miami-Dade County Public Schools’ educators can receive free general admission for themselves on any regular admission day to Frost Science by showing a valid school ID. Educators from other districts and private schools can receive a 15% discount on general admission. Planetarium shows or special programs carry an additional fee.

Please note there is limited self-parking available in the museum garage during regular museum hours. This parking can fill up quickly. Rates are $8 for the first hour and $4 for each additional hour with a maximum daily rate of $40. For a more economical option, you can also access the museum via public transportation. Detailed parking information can be found at www.frostscience.org/parking.
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.