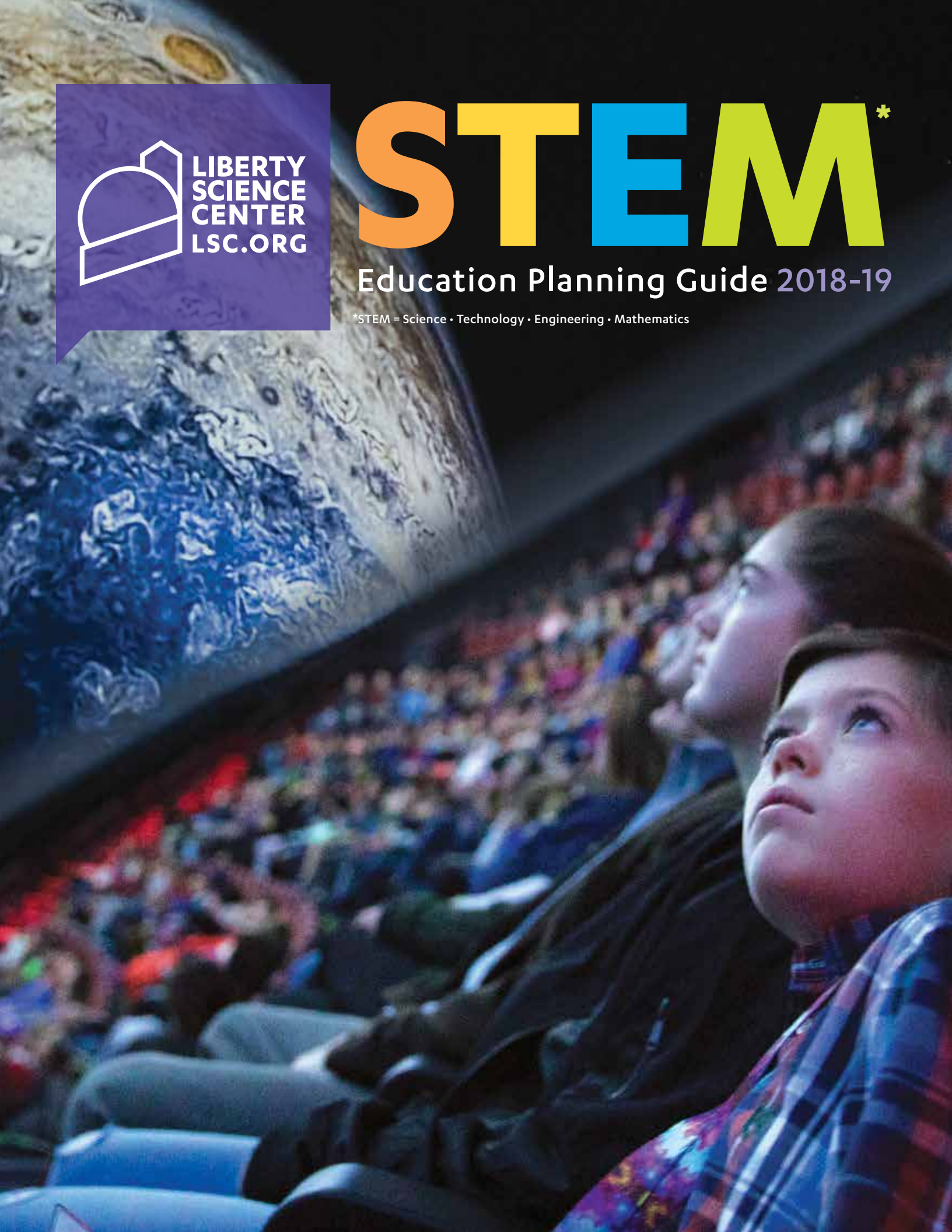



# STEM*

## Education Planning Guide 2018-19

*STEM = Science • Technology • Engineering • Mathematics

## A NEW, IMPROVED LSC STEM GUIDE

You talked, we listened. Now the Liberty Science Center **STEM Education Planning Guide** has an updated, teacher-friendly format. In response to research we conducted with educators like you, we have organized our program offerings by grade-level band so the experiences aligned with your curriculum are all in one place.

Don't miss the overview of experiences in the next few pages, because we have a lot of exciting new learning spaces, exhibitions, and programs. Then flip to the section appropriate for your learners' level, and see how much we have to offer that's just right for you!

Call or write us: sales@lsc.org or 201.253.1310. As always, we are here to answer any questions you have and to help you with the details of incorporating LSC programs into your classroom.

# LIBERTY SCIENCE CENTER

# WELCOME TO THE LIBERTY SCIENCE CENTER STEM EDUCATION PLANNING GUIDE

In the 21st Century, scientific and technological innovation are vitally important to the economy. It is imperative that we step up efforts to prepare students for careers in the STEM fields. There are over 3 million more STEM jobs than there are professionals trained to work in STEM fields in the U.S., where the average salary for such a position is $85,000. Here in New Jersey, there are 1.4 open STEM jobs for every unemployed person.

Improving engagement in the K-12 years is the first step toward building a 21st Century workforce. Research shows that children form opinions of science—whether good or bad—by age 7. Many quickly lose interest by age 15. To ignite the spark of scientific curiosity during this critical time and keep them interested in science, we must provide rich, engaging experiences to students and professional development support to their teachers.

As a regional leader in STEM Education, Liberty Science Center brings significant expertise to this effort. Our exciting hands-on workshops and programs support students in building proficiency towards mastering the NJSLS Performance Expectations. Extensive professional development options help teachers implement three-dimensional learning in the science classroom as they continue the transition to the NJSLS:S.

LSC's striking facility is a premier destination for science explorers. The Jennifer Chalsty Planetarium is the biggest planetarium in the Western Hemisphere. Under its 89-foot dome, students can experience the wonders of the universe in an astounding, immersive environment. Many of the NJSLS:S Space Systems Performance Expectations cover concepts that are difficult or even impossible to teach in the traditional classroom. The planetarium's visualization software brings comprehension of astronomical concepts down to Earth.

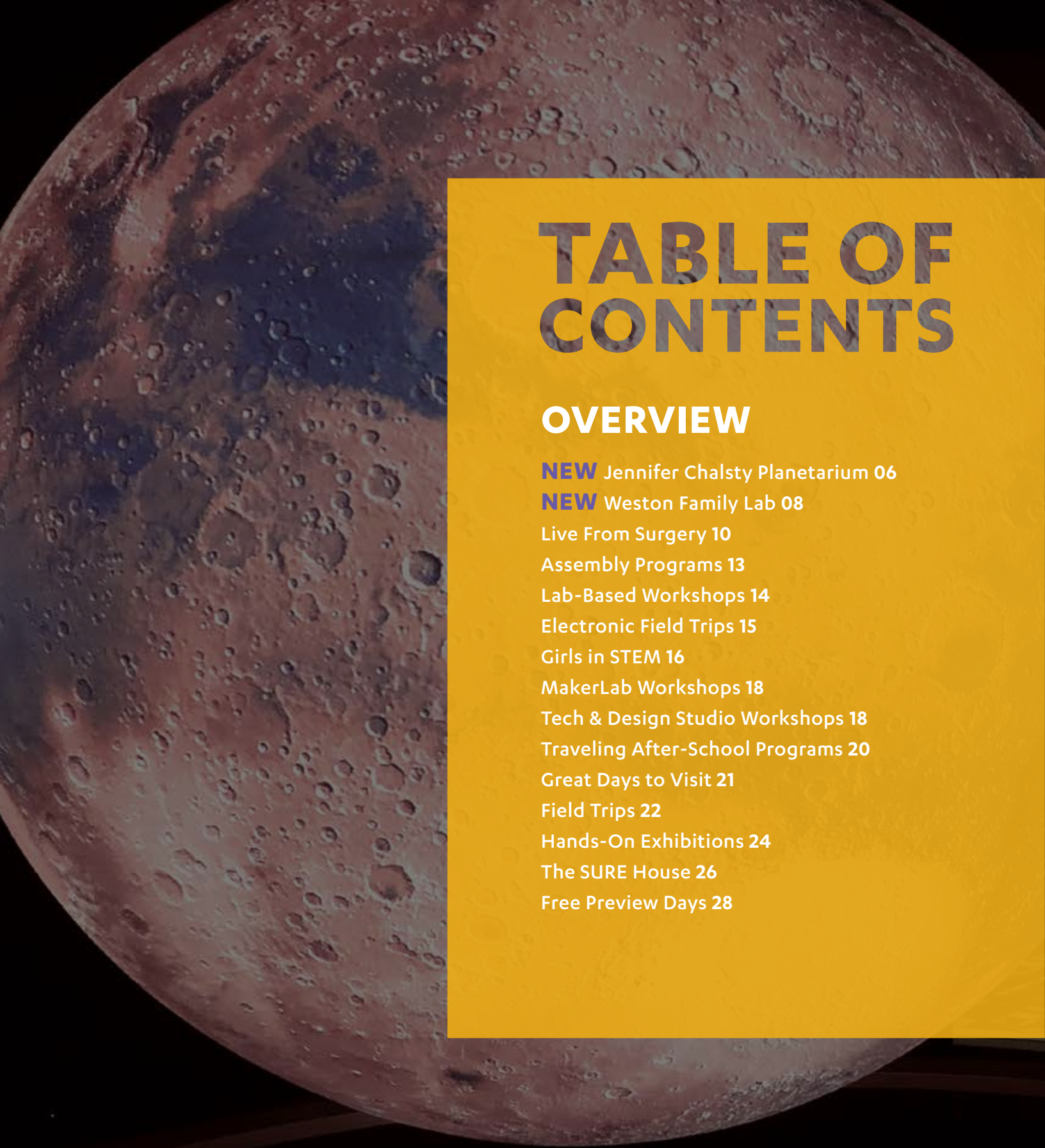
The new Weston Family Lab for Earth and Space Exploration allows students to explore the Earth's Systems Performance Expectations using real-world data. The lab's NOAA *Science on a Sphere* brings the Earth, Sun, and planets to life in great detail. Our STEM instructors display data of historic events as well as live observations on the six-foot spherical visualization globe, allowing students to explore earthquakes, hurricane tracks, sea surface temperatures, plate tectonics, weather patterns, and more.

The offerings in this year's STEM Education Planning Guide are organized by grade-level band with curriculum connections to the New Jersey Student Learning Standards: Science. We can also develop custom programs for you, upon request. It's all part of our mission to inspire the next generation of scientists and engineers and excite learners of all ages about the power, promise, and pure fun of science and technology.

Sincerely,

Patrick McQuillan
Vice President, STEM Education

**Liberty Science Center acknowledges the generous support of Josh Weston and Jennifer Chalsty. LSC is also grateful to the following donors for their support.**



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## OVERVIEW

# PROGRAMS BY GRADE

## GRADES PRE-K - 2



## GRADES 3 - 5



## GRADES 6 - 8



## GRADES 9 - 12



# TEACHERS



**LSC's programming has been revised to align with NJSLS (Science). Look for specific standards alignment below each program in this guide.**

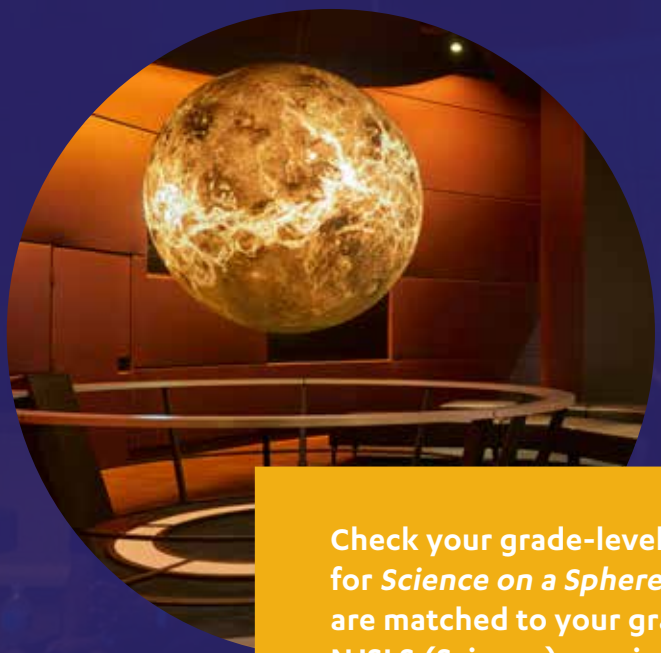
# NEW JENNIFER CHALSTY PLANETARIUM

**The Jennifer Chalsty Planetarium is the biggest planetarium in the Western Hemisphere.** It also is uniquely designed to display Earth and Space Systems phenomena in a way that's just not possible in the classroom. The 27-meter (89-foot) dome, coupled with an all-dome video and astronomical object database, provides an immersive environment in which to explore the Earth and Space Systems Performance Expectations of the NJSLS (Science). View astronomical objects and celestial phenomena from the surface of Earth, and then travel into space to truly understand these difficult concepts by flying up to, around, and through the objects. We can also speed up time in the planetarium, allowing you to make an entire year of space systems observations during one program—seasons, Moon phases, seasonal constellations, and more.

Check your grade-level band section for planetarium programs that are aligned with your grade-specific NJSLS (Science) requirements.

# NEW WESTON FAMILY LAB FOR EARTH AND SPACE EXPLORATION

The visually stunning Weston Family Lab allows students to explore Earth Systems Performance Expectations using authentic data. Experience the only publicly available NOAA *Science on a Sphere* in New Jersey, which allows detailed examination of the Earth, Sun, and planets. The six-foot spherical visualization globe allows students to explore earthquakes, hurricane tracks, sea surface temperatures, plate tectonics, weather patterns, and more. Under the guidance of an LSC Educator, students will see current conditions as well as historic global events in these 30-minute live programs.



**Check your grade-level band section for *Science on a Sphere* programs that are matched to your grade-specific NJSLS (Science) requirements.**

# LIVE FROM SURGERY

*Live From Surgery* brings the world of health care to the next generation of surgeons and biotechnology experts. Students can experience the dynamics of surgery, problem solving, and teamwork in a real operating room as they interact with the medical team during a surgical procedure. Your student will be able to handle the same tools that the medical team is using. Groups who choose robotic surgery can even use simulation software to manipulate a robot hand–and we have an actual surgical robot on site. We partner with the most prestigious hospitals across the region for this unforgettable experience.

## CHOOSE FROM:

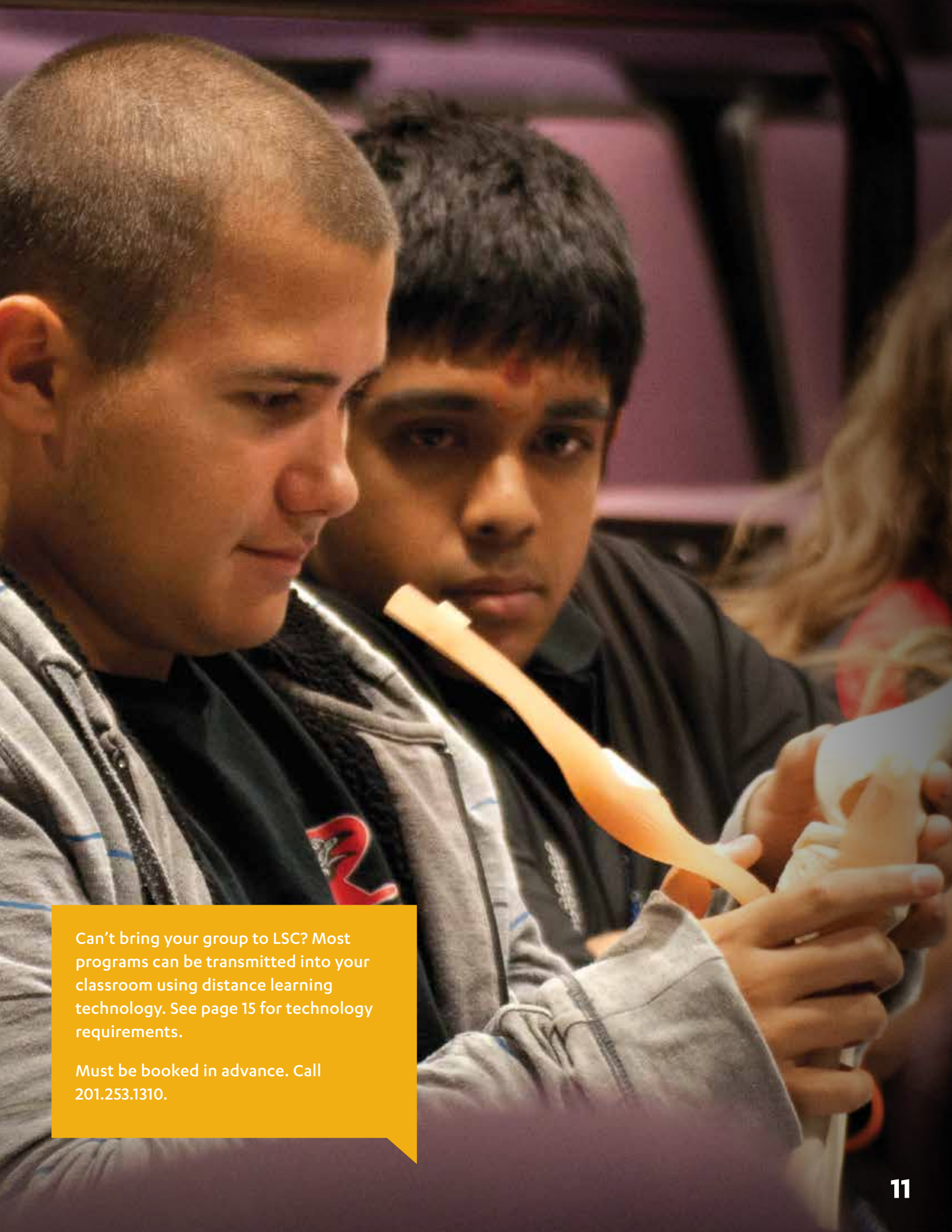
- **Live From Kidney Transplant**
  with RWJBarnabas Health | 2.5 hours
- **Live From Cardiac Surgery**
  with Morristown Medical Center | 2.5 hours
- **Live From Neurosurgery**
  with Overlook Hospital | 3 hours
- **Live From Robotic Surgery**
  with Hackensack Meridian UMC | 2.5 hours

Our *Live From Surgery* program also features three *Meet the Surgeon* sessions. Speak to the professionals face to face as you explore recent cases, understand each medical problem, examine the course of action, and review the outcomes. These sessions create an intimate environment in which surgeons can focus their attention on the students while narrating and showing a video of the surgical procedures.

## CHOOSE FROM:

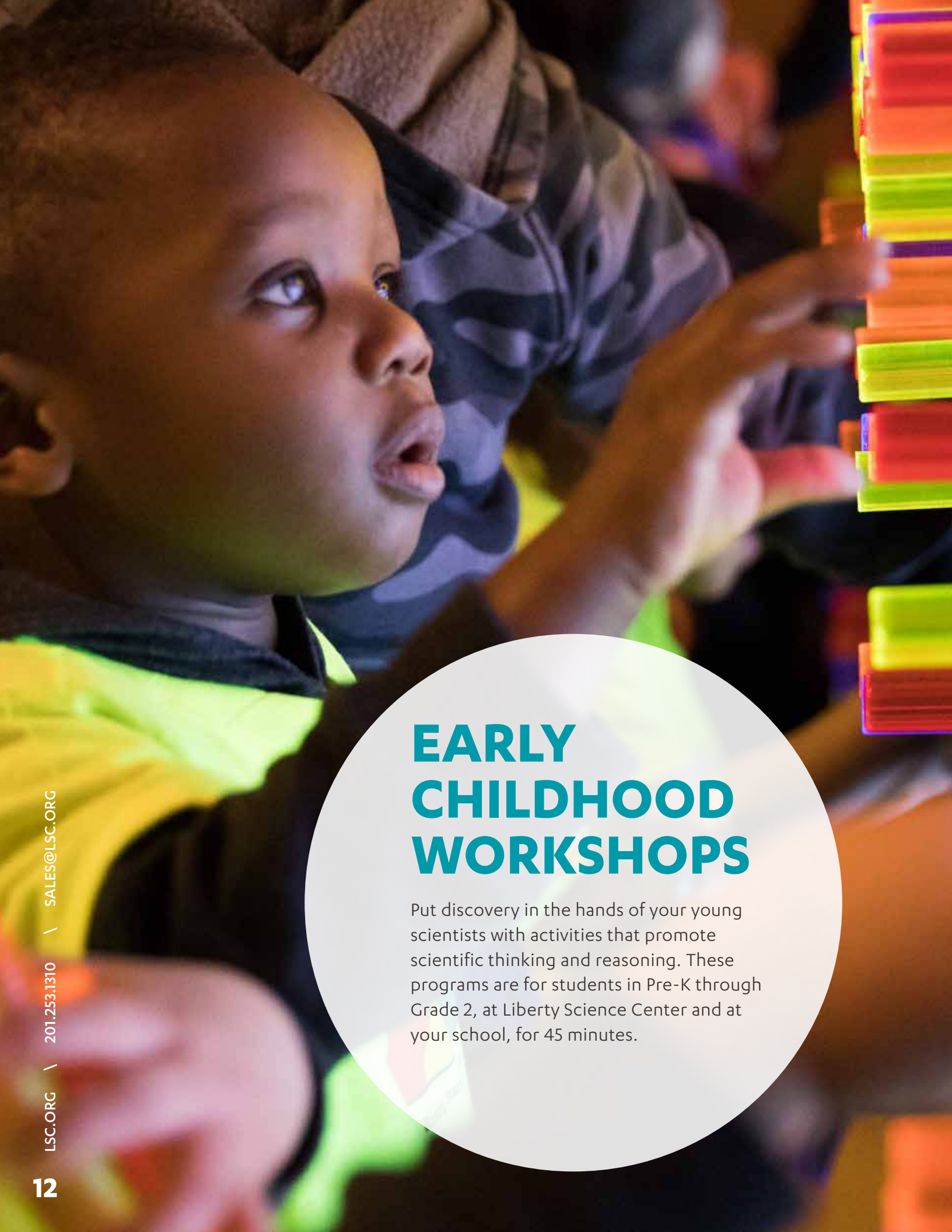
- **Meet the Surgeon: Heart Transplant**
  with Newark Beth Israel Medical Center | 2.5 hours
- **Meet the Surgeon: Pediatric Orthopedics**
  with Advocare the Orthopedic Center in Affiliation with Morristown Medical Center, Overlook Hospital | 2.5 hours
- **Meet the Surgeon: Neonatal Surgery**
  with the Bristol-Myers Squibb Children's Hospital at Robert Wood Johnson University Hospital | 2.5 hours

NJSLS (Science): Structure, Function and Information Processing: MS-LS1-3
Structure and Function: HS-LS1-2
NYCCLS: 1, 2, 3a, 3b, 5, 6 & 7
National Science Education Standards: M.C.1, M.C.1.f. & M.F.1.a.
National Health Education Standards: 1.12.4 & 7.12.1



Can't bring your group to LSC? Most programs can be transmitted into your classroom using distance learning technology. See page 15 for technology requirements.

Must be booked in advance. Call 201.253.1310.



# EARLY CHILDHOOD WORKSHOPS

Put discovery in the hands of your young scientists with activities that promote scientific thinking and reasoning. These programs are for students in Pre-K through Grade 2, at Liberty Science Center and at your school, for 45 minutes.

# ASSEMBLY PROGRAMS

Kick-start the school year with a science spectacular! Let us present our highly entertaining and science-rich assemblies at your school. These programs are appropriate for grades K - 8 for a maximum group of 300 students per show. Each assembly is up to 60 minutes of science fun.

# LABORATORY WORKSHOPS

## 45-Minute Workshops

Our 45-minute Laboratory Workshops offered at Liberty Science Center or at your school will reinforce learning through hands-on exploration. These labs often spark a lifelong interest in STEM fields. Programs are available for grades 3 - 12 and can accommodate up to 30 students.

## 90-Minute Workshops

Explore a subject more fully with our in-depth, 90-minute Laboratory Workshop. Access to all of our exhibitions is included, and your group is welcome to explore the Science Center before or after your session. Programs are available for grades 3 - 12.

**Add some hands-on science flair to your school science fair or special event! Our staff can lead a hands-on activity station that complements your theme. All programs must be booked in advance. They support curriculum standards and multiple learning styles, and can be configured to fit your needs. To book any program, please call our reservation line at 201.253.1310.**

# ELECTRONIC FIELD TRIPS

**Engaging students in high-quality science topics has never been so easy. Connect your classroom to exciting, interactive videoconferencing programs. These programs are typically 45 minutes long and taught by STEM Instructors using platforms such as FieldTripZoom or Google Hangouts. No permission slips required!**

### VIDEOCONFERENCE TECHNICAL REQUIREMENTS

IP or SIP Connection:

- Hardware: Videoconference Codec (Polycom, Tanberg/ Cisco, or Lifesize)
- Camera, microphone, speakers, display device
- IP address and meeting ID will be sent to you via email once a test connection date has been confirmed.

Internet Connection:

- Wired internet connection recommended, webcam, microphone, speakers, display device
- Internet web link will be sent to you via email once a test connection date has been confirmed.

# GIRLS IN STEM

A huge opportunity is on the horizon for young women entering STEM professions. According to the Bureau of Labor Statistics, women compose 47% of the U.S. workforce. However, overall, women hold just 25% of all STEM jobs. Also, the gender wage gap is smaller in STEM jobs than in non-STEM jobs. Women in STEM earn 33% more than women in non-STEM jobs; this is considerably higher than the STEM premium for men. The average salary for a career in a STEM field is $85,000.

Liberty Science Center is proud to pave the way for more girls to prepare for and enter vital, lucrative STEM fields. Our education staff develops and delivers unique STEM programming to girls, in both coed and single-gender settings. Our approach to these programs allows girls of all ages to explore STEM-based phenomena as they discover their passion and, perhaps, their future career. Contact us for further information.

# TECH SKILLS ARE IN DEMAND

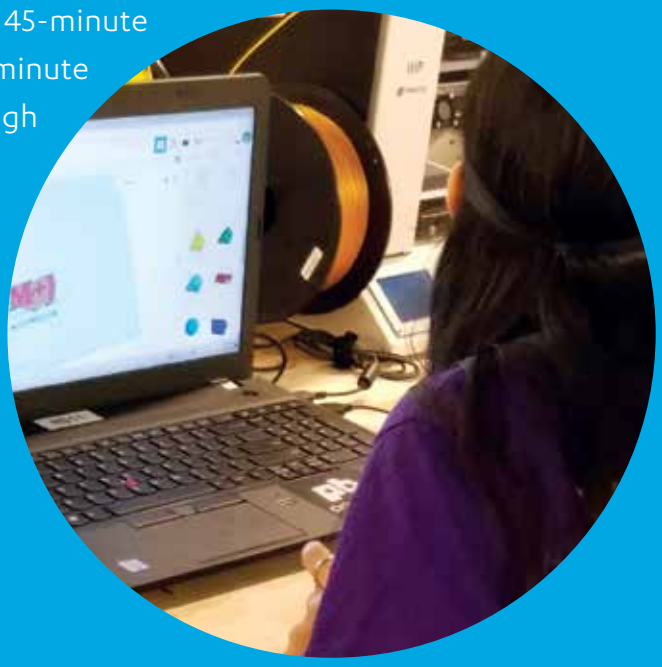
**According to the Bureau of Labor Statistics, computer-based occupations are projected to increase by 12.5% from 2014 to 2024, an uptick expected to result in nearly half a million new jobs—far more than any other STEM category. The occupation projected to add the second largest number of new jobs from 2014 to 2024 is engineering, with 65,000 new jobs. Liberty Science Center's programs introduce exciting technology skills that help you meet curriculum goals and reinforce new concepts with invaluable, hands-on experiences. Come for a few hours, a full day, or a series of workshops over the course of several weeks. Programs are aligned to the NJSLS (Science), ISTE standards, and/or Math Common Core Standards.**

## MakerLab Workshops

In these lab-based programs at Liberty Science Center, we celebrate and encourage the creative, curious, and inventive spirit that all students have. The maker culture is at the heart of this lab with a 1:1 student-to-3D-printer ratio, so every student works with a designated printer in our programs.

## Tech & Design Studio Workshops

Learn the latest technology skills in 45-minute workshops for grades 2 - 8 and 90-minute workshops for middle school and high school. Each student works on an individual laptop. These programs apply computational thinking and design principles to identify solutions or create dynamic projects.



**These workshops must be booked in advance. Please call our reservation line at 201.253.1310.**

# TRAVELING AFTER-SCHOOL PROGRAMS

LSC brings science learning to you! Take part in hands-on, science-based programs one hour per week at your location. A workshop series provides project-based learning supported by development of critical thinking, collaboration, innovation, and problem solving over an extended period of time. We offer several program formats to meet your needs. Choose one or multiple sessions and select a range of topics, or build on the same topic over several weeks.

Contact an LSC representative for assistance planning a unique and unforgettable after-school science program for your school: 201.253.1310.

**Grades: 1 - 12**

**Length: Single week or multi-week series**

## SOME POPULAR TOPICS INCLUDE:

### Forensic Science

Crack a case using the same techniques real forensic scientists use, such as checking for fingerprints, comparing fibers, DNA analysis, the science of ballistics, and more.

### Growing Into Science

Learn about a multitude of STEM career opportunities, and see how science fits into your future! We provide opportunities for exciting science learning using experiential, hands-on models that cannot always be replicated in the traditional school environment.

# GREAT DAYS TO VISIT

Before you book your trip, see if you can time it to coincide with special happenings at the Science Center that might be of unique interest to your learners. Below is a partial listing for this school year.

**September 22 - October 31: The Spider Maze**
Make your way through our autumn maze and discover eight species of spiders along the way.

**September 26 - 28: Picatinny Arsenal Demonstration**
Experience virtual reality, control a military robot, and learn more about cutting-edge defense technology.

**October 16: Young Learner Day**
A special day for our youngest guests, grades Pre-K through 3, to explore Liberty Science Center with other students their own age.

**November 8 - 9: Picatinny Arsenal Demonstration**
Experience virtual reality, control a military robot, and learn about cutting-edge defense technology.

**December 4: Special Needs Day**
An entire day of science learning for special needs classes, developed by an advisory team of special education teachers, healthcare professionals, museum staffers, and parents of special needs children. (Register in advance.)

**February 15 - 23: Engineers Week**
Explore a different engineering theme each day: biomedical, civil, defense, women in engineering, and more.

**February 19 - 22: Picatinny Arsenal Demonstration**
Experience virtual reality, control a military robot, and learn more about cutting-edge defense technology.

**March 8 - 17: Women in STEM Week**
Meet women in STEM fields and learn about their education and career path—so inspiring!

**April 8: Young Learner Day**
A special day for our youngest guests, grades Pre-K through 3, to explore Liberty Science Center with other students their own age during the national Week of the Young Child.

**April 9: Special Needs Day**
An entire day of science learning for special needs classes, developed by an advisory team of special education teachers, healthcare professionals, museum staffers, and parents of special needs children. (Register in advance.)

**April 19 - 28: Conservation Week**
Get up close to real birds of prey and massive snakes. Watch a live animal surgery performed by a veterinarian. Learn the importance of protecting the environment—especially animal habitats.

**April 19: Picatinny Arsenal Demonstration**
Experience virtual reality, control a military robot, and learn more about cutting-edge defense technology.

**Follow us on social media (#LibertyScienceCenter) and bookmark our website (lsc.org) to find out about more special visitors, events, and exhibitions as they are announced.**

# FIELD TRIPS TO LSC

**When your school or group visits LSC, you can witness actual surgery, explore science concepts in our lab workshops, take in a live Center Stage Science show, master new skills in our Tech & Design Studio or MakerLab, and enjoy all of the exhibits and shows that make the Science Center a prime destination for learners of all ages and abilities. We would love to help you plan your next LSC adventure.**

## FIELD TRIP ENHANCEMENTS

### Weston Family Lab for Earth and Space Exploration

This stunning new laboratory classroom on the second floor features *Science on a Sphere*, a six-foot suspended globe that uses HD images uploaded directly from NOAA and NASA. The STEM team at LSC leads programs exploring weather, climate change, the continents, plate tectonics, and more—all aligned to the K-12 NJSLS (Science).

### Jennifer Chalsty Planetarium and LSC Giant Dome Theater

Students can explore the night sky, travel deep into the cosmos, or investigate the Earth's natural and biological wonders under the colossal, immersive dome screen, the largest in the Western Hemisphere.

### Live Science Presentations

These interactive 20-25 minute presentations take place throughout the building, led by a STEM Educator with plenty of audience volunteers. Offerings vary each day but may include explorations of rocketry and flight, health and fitness, the states of matter, electricity, air power, and more

### Laboratory Workshops

Explore science and tech topics in our fully equipped, authentic laboratories. Workshops are tailored for learners from Pre-K through high school. Spend an hour, a morning, or a full day learning in the lab.

### Live From Surgery

Watch a real surgical operation and interact with the medical team through videoconference technology. Choose from an array of procedures and we will hook you up with our expert partners across the region.

### MakerLab and Technology & Design Studio

Learn coding, robotics, or game design in our Technology & Design Studio. Or explore our MakerLab, with a dedicated laptop and 3D printer for each student.

### Center Stage Science Shows

Our live theater shows bring science concepts to life and include audience participation. Each show aligns with core concepts from required science curricula.

## HANDS-ON EXHIBITIONS

Your students will have a blast on our four exhibition floors, with hands-on experiences for all ages and stages of learning. Our galleries bring a wide range of STEM topics to life, from the environment and Earth science to health and green energy choices. Access to our general admission exhibitions is included with our programs. Education staff and volunteers are happy to answer questions, assist with interactive features, and tell you more about what you're seeing.

## BEES TO BOTS

Explore the photography exhibit that lets you get up close to bees and learn how they are going high-tech with GPS tracking. Then learn how bees inform the design of nano flying robots. Watch a live colony of honey bees from just inches away as they go about their daily work. See bees collecting nectar and making honey, and get close enough to hear them buzz. Can you spot the queen?

## COMMUNICATION

Discover how humans have exchanged ideas, from neolithic hand prints to sign language. Try a new way of speaking at Language Karaoke, see your electronic voice waves, and leave your mark on the digital Graffiti Wall.

## DREAM MACHINE

Explore different emotions in this interactive, sensory adventure! The Dream Machine, created by multimedia artist Emilie Baltz, debuted at New York's Panorama Festival, and now it has a permanent home at LSC. Use bicycle pumps to produce combinations of colors, sounds, and scents—some pleasant, some unpleasant.

## EAT AND BE EATEN

Learn how creatures evolved to catch prey and avoid being captured in our live animal exhibition. Study beautiful examples of camouflage. See mammals, insects, reptiles, amphibians, birds, and fish—and marvel at nature's complexity. Don't miss the incredibly adorable family of critically endangered cotton-top tamarins, the colony of industrious leaf-cutter ants, or the growing community of naked mole rats!

## ENERGY QUEST

Drill for oil, locate uranium, discover the power in ocean waves and dams, and explore renewable energy: solar, geothermal, and wind.

## HOBERMAN SPHERE: ART & ENGINEERING

Learn the history and engineering ingenuity behind the fascinating expanding and contracting sphere.

## I EXPLORE

Interactive exhibits and themed play experiences exclusively for learners ages 2 - 5.

## INFINITY CLIMBER

Explore this two-story climbing structure suspended 35 feet above the Center's atrium floor. Can you make it to the top?

## MICROBES RULE!

Learn about the amazing world of microbes, the tiny living organisms all around us, in our former *Infection Connection* gallery. We have upgraded the space to include the positive, wondrous things microbes can do!

## NANO MINI-EXHIBITION

Learn about nanoscience—the science of the super small—in this collection of hands-on exhibits.

## OUR HUDSON HOME

Get acquainted with the creatures that live in the Hudson River at our Touch Tank and in our enormous aquariums, including 80-pound drum fish, terrapins, sea stars, and sea urchins. Then unload a virtual cargo ship, dredge a river channel, and try a real hands-on lab experiment.

## PIXEL ART

Rotate 952 pixel dials to make an illuminated work of art on the wall.

## PIXELPALOOZA

Play an active, multi-user game and learn about computer vision.

## SKYSCRAPER!

Enter a cityscape of towers and discover what it takes to design and build the world's tallest skyscrapers. Walk on an 18-foot-high I-beam just like a construction worker does, see what it's like to test a building in a wind tunnel, operate an electromagnetic crane, learn about careers in construction and architecture, and see artifacts from the World Trade Center.

## SURE HOUSE

Take a tour of this storm-resistant, energy-efficient beach house designed by Stevens Institute of Technology students and winner of the 2015 Scholar Decathlon sponsored by the US Department of Energy.

## THE TOUCH TUNNEL

Take an 80-foot crawl through a pitch-black tunnel using only your sense of touch. It's one of our most popular experiences, so visit early or late in the day to avoid a wait.

## WONDER WHY

Experiment with air in motion, make a six-foot-wide soap bubble, scramble up our fossil-studded rock climbing wall, and more.

## FEATURED EXHIBITIONS

We host several exciting exhibitions each year that relate to topics in science and technology, and incorporate pop culture and entertainment. This school year, exhibitions will include:

***Doc McStuffins: The Exhibit***
**October 6, 2018 - January 27, 2019**

***The International Exhibition of Sherlock Holmes***
**November 3, 2018 - May 27, 2019**

***The Lion Guard Exhibit***
**February 16 - September 8, 2019**

# THERE'S NO PLACE LIKE THE SURE HOUSE

Explore the SURE House on our front lawn! Designed by Stevens Institute of Technology students, the house won the prestigious Solar Decathlon, run by the U.S. Department of Energy.

The SURE team merged the efficient indoor-outdoor rooms and open floor plan of a traditional beach cottage with state-of-the-art building science, the latest renewable energy technologies, and fiber-composite materials repurposed from the boat-building industry. The result is a building armored against extreme weather that uses 90% less energy than its conventional cousins, powers itself through clean solar energy, and becomes a hub for emergency power to the neighborhood in the aftermath of a storm.

**Your group can explore the SURE House as part of a workshop on clean energy, electronics, or meteorology. Topics may include:**

- Exploring Renewable Energy
- Introduction to Electronics
- Energy Audits
- Insulation Lab
- Green Roof Construction
- Beach Erosion
- Tropical Storm Systems

# FREE PREVIEW DAYS

Parents and teachers are vital to our children's future and we applaud their dedication to making each school year enriching and memorable. Please join us for a free, enjoyable, and informative LSC preview event. Learn how our programs and robust hands-on experiences can focus and improve student learning and support teachers.

**Participants will enjoy:**

- Two professional development hours
- Breakfast and networking
- Exploring our labs
- Live demonstrations
- STEM program and workshop previews
- Free raffles
- A complimentary film
- A 20% discount at the gift shop
- Free exploration of the center for the rest of the day
- Discount for family members to visit the center during the event*

*Bring your family to explore the Science Center while you're at the event at a discounted rate of $11.75 per person. Accompany your guests to the Box Office for the discounted rate. Inform the Box Office attendant that you are with the preview event to ensure you receive the special rate. Adults only at the preview event, please! Thank you for your cooperation.

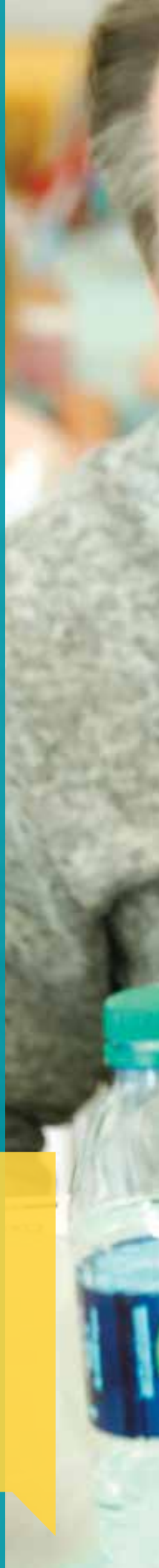
Parking is available in our convenient, on-site lot at $7 per car.

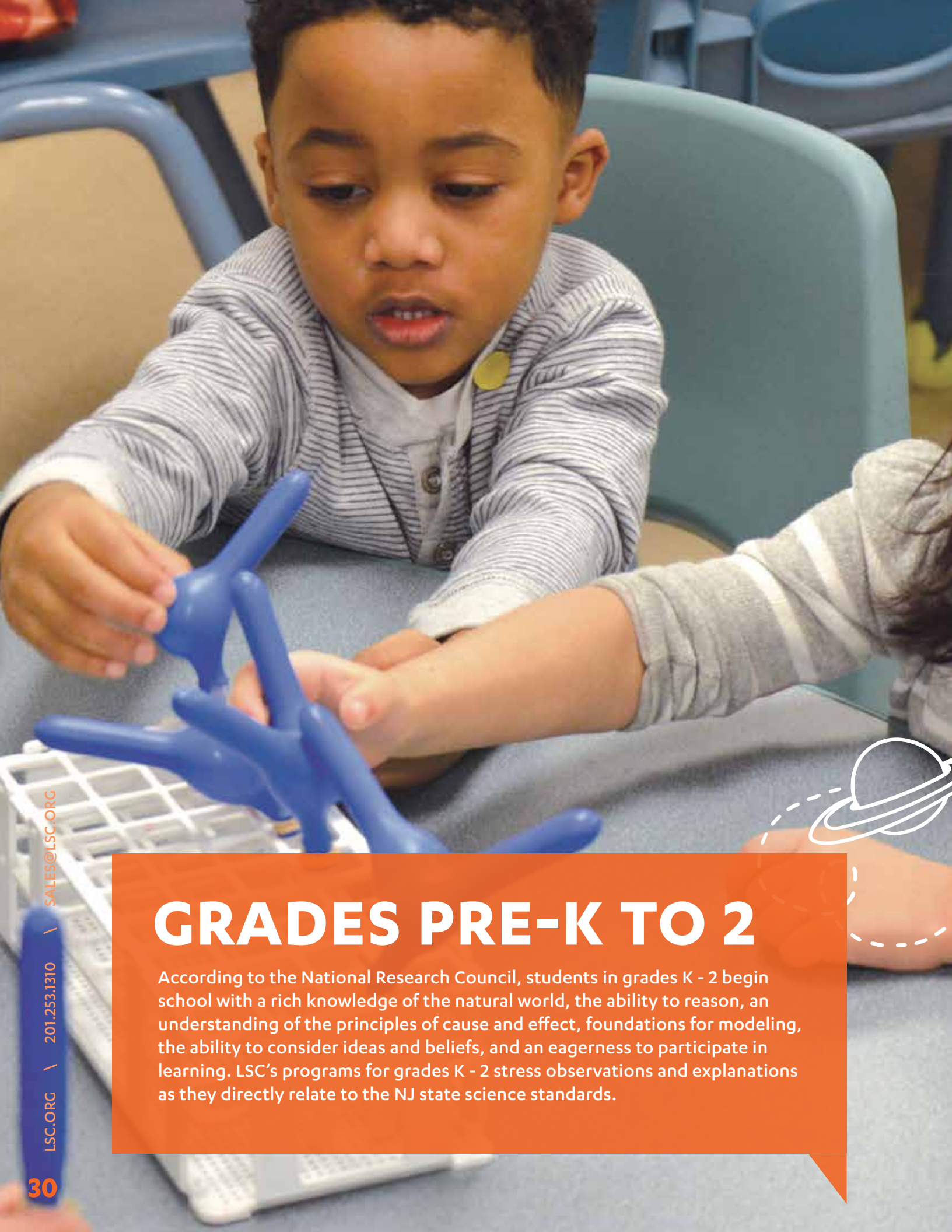
Liberty Science Center is a registered professional development provider with the NJ Department of Education; provider #1033.

The event is free, but space is limited.
Register at lsc.org/preview or email Lauren Rose at lrose@lsc.org.

**TEACHERS & PARENTS**
10:00 am - 1:00 pm
October 13, 2018
March 16, 2019
May 4, 2019

**TEACHERS**
10:00 am - 1:00 pm
January 26, 2019





# GRADES PRE-K TO 2

According to the National Research Council, students in grades K - 2 begin school with a rich knowledge of the natural world, the ability to reason, an understanding of the principles of cause and effect, foundations for modeling, the ability to consider ideas and beliefs, and an eagerness to participate in learning. LSC's programs for grades K - 2 stress observations and explanations as they directly relate to the NJ state science standards.



## JENNIFER CHALSTY PLANETARIUM

### NEW Wonders of the Night Sky (K - 12)

Using the unique immersive environment of the planetarium, students will explore earth and space science concepts using the current night sky above New Jersey. Topics covered are correlated with objects visible in the night sky on your visit date and will include: seasonal constellations and planets; exciting deep-sky objects in the current sky; and breaking astronomical news.

**NJSLS (Science): Topics discussed during the program will be correlated to the corresponding Earth and Space Systems Performance Expectations for the grade level of the students attending the program.**

### NEW Wonderful Sky (Grade 1)

Explore observations of the sun, moon, and stars to discover patterns that can be predicted. These patterns include sunrise and sunset locations, moon phases, and how constellation visibility varies with earth's position from season to season.

**NJSLS (Science): Space Systems: 1-ESS-1-1**

## NEW WESTON FAMILY LAB FOR EARTH AND SPACE EXPLORATION

### Rain, Rain, Go Away! (Grade K)

The suspended six-foot Earth globe will be used to explore causes for our weather, and to see how Earth's weather varies from place to place and changes with the seasons.

**NJSLS (Science): K-ESS2-1**

### Fast Change, Slow Change (Grade 2)

The *Science on a Sphere* will be used to explore how Earth has changed over time as continents shift, separate, and collide. We'll see what the planet looked like in the days of the dinosaurs. We'll also use the big globe to examine ways in which the forces of wind, water, and ice have changed our planet in ways slow and fast.

**NJSLS (Science): 2-ESS1-1**

## ASSEMBLY PROGRAMS

### NEW Fundamental Physics

At LSC

Alex would much rather play with toys than learn about boring physics. But soon Alex will learn that physics is all around: at home, the park, and even on a simple walk. The push-and-pull forces at work in favorite games will entertain and educate both Alex and your students, and help them understand that physics is *fun*!

**NJSLS (Science): Motion and Stability: Forces and Interactions K-PS2-1, K-PS2-2**

## 45-MINUTE WORKSHOPS

### NEW Waterbenders

At LSC

Stop water from changing the shape of land and protect a simulated town. Using a variety of materials, students will engineer a structure to prevent the effects of erosion in this engineering-meets-earth-science, hands-on workshop.

**NJSLS (Science): Earth's Systems 2-ESS2-1**

### NEW Nature's Helpers

At LSC | At your school

Discover how we depend on plants, insects, and other animals, and how they are essential to the environment we live in. This workshop includes live animal encounters and hands-on activities in topics such as pollination and soil ecology.

**NJSLS (Science): From Molecules to Organisms: Structures and Processes K-LS1-1, Ecosystems: Interactions, Energy and Dynamics 2-LS2-2**

### NEW Rocky Looks at Living Things

At LSC | At your school

Rocky the rock is wondering whether he is alive. Investigate what living things need, how they grow and change, and ways that they survive in their habitats. Life cycles, camouflage, living and nonliving specimens will all be observed in order to gather evidence for Rocky.

**NJSLS (Science): From Molecules to Organisms: Structures and Processes K-LS1-1, From Molecules to Organisms: Structures and Processes 1-LS1-2 Biological Evolution: Unity and Diversity 2-LS4-1**

### NEW Me...As a Tree

At LSC | At your school

Through music, movement, art, pictures, and writing, comparing and contrasting our bodies and our life history to those of trees.

**NJSLS (Science): From Molecules to Organisms: Structures and Processes K-LS1-1, Heredity: Inheritance and Variation of Trains 1-LS3-1**

### The Skeleton Inside You

At LSC | At your school

Why do we have bones? What are they made of? How is their structure related to their function? What happens when they break? Discover these answers and many more as we learn about bones in the story The Skeleton Inside You by Philip Balestrino. After reading our story, craft your own 'broken bone' and mend it with a cast.

**NJSLS (Science): Engineering Design K-2-ETS1-2**

### Ch-Ch-Ch-Changes

At LSC | At your school

Our planet is constantly being shaped by events that can happen very slowly over time, or quite suddenly. Using a model to represent land, students will simulate how earthquakes, volcanoes, and erosion can change the shape of the land around us.

**NJSLS (Science): Earth's Place in the Universe 2-ESS1-1**

### Shooting Hoops with Uncle Isaac

At LSC | At your school

Want to shoot baskets like a pro? Engineer a catapult designed to push and pull your way toward this goal. Then analyze, compare, and test a friend's design. There is always more than one possible solution to a problem!

**NJSLS (Science): Engineering Design K-2-ETS1-3**

### Flow Motion

At LSC | At your school

Learn the basics of the water cycle in this highly interactive program. Through active listening, investigation, and kinesthetic role-play, students will understand the main processes of the water cycle, from the sun warming Earth to the various forms water can take. Follow the leader as we become water droplets to model the water cycle and complete our journey.

**NJSLS (Science): Energy K-PS3-1**

### Light It Up!

At LSC | At your school

Plan and conduct investigations using flashlights and light boxes to focus on what it means for objects to be transparent, opaque, translucent, and reflective.

**NJSLS (Science): Waves and Their Applications in Technologies for Information Transfer 1-PS4-3**

### Ready, Set, Robotics!

At LSC | At your school

Aspiring computer scientists, get ready for a hands-on introduction to the world of robotics. Observe how a small set of pieces can be disassembled and made into a variety of new robots!

**NJSLS (Science): Matter and Its Interactions 2-PS1-3**

### What's the Matter?

At LSC | At your school

Explore the colorful world of chemistry with investigations that show how to classify materials by their observable properties and describe what happens when we cool matter using liquid nitrogen.

**NJSLS (Science): Matter and Its Interactions 2-PS1-1, 2-PS1-4**

## TECH & DESIGN STUDIO | 45-MINUTE WORKSHOPS

### NEW Morphi Modeling

At LSC

Dream it. Draw it. Evolve it. Get an introduction to 3D design thinking. This program is great for beginners and the tool is flexible enough for experienced S.T.E.A.M students. Please note: Students' projects will not be printed during the course of this program. We will focus instead on building their models.

**NJSLS (Science): Engineering Design K-2-ETS1-1; ISTE 6b**

## ELECTRONIC FIELD TRIPS | 45-MINUTE WORKSHOPS

### Pollinators: Honey Bees

Online Connection

Have you thanked a bee today? Pollinators provide an essential service to the ecosystem. At least a third of the world's agricultural crops depends upon pollination provided by insects and other animals. Honey bees produce and store honey, but they also help to make other favorite foods. Design a pollination device that works just as hard as a busy bee.

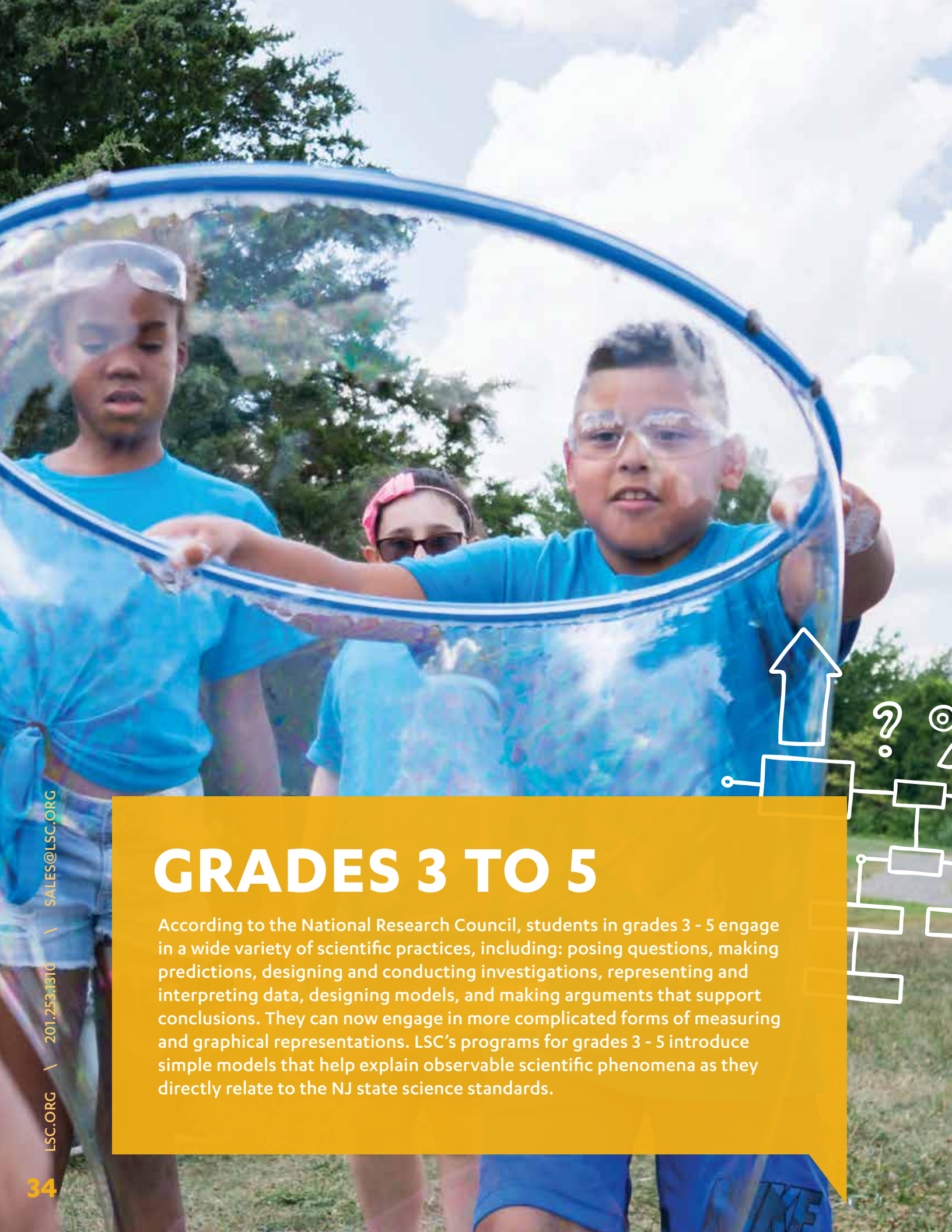
**NJSLS (Science): Ecosystems: Interactions, Energy, and Dynamics: 2-LS2-2**

### 3D Design

Online Connection

Learn the basics of 3D design. Prerequisites:
Each participant will need a computer
Participants must download open source software (TinkerCad)
A document with directions on how to download TinkerCad will be provided.

**NJSLS (Science): Engineering Design: K-2-ETS1-2**



# GRADES 3 TO 5

According to the National Research Council, students in grades 3 - 5 engage in a wide variety of scientific practices, including: posing questions, making predictions, designing and conducting investigations, representing and interpreting data, designing models, and making arguments that support conclusions. They can now engage in more complicated forms of measuring and graphical representations. LSC's programs for grades 3 - 5 introduce simple models that help explain observable scientific phenomena as they directly relate to the NJ state science standards.



## JENNIFER CHALSTY PLANETARIUM

### NEW Wonders of the Night Sky (K - 12)

Using the unique immersive environment of the planetarium, students will explore Earth and space science concepts using the current night sky above New Jersey. Topics covered are correlated with objects visible in the night sky on your visit date and will include: seasonal constellations and planets, exciting deep-sky objects in the current sky, and breaking astronomical news.

**NJSLS (Science): Topics discussed during the program will be correlated to the corresponding Earth and Space Systems Performance Expectations for the grade level of the students attending the program.**

### NEW Are We There Yet? (Grade 5)

Explore observations of the Sun, planets, and stars to discover that objects in the universe are located at large distances from Earth and exhibit predictable cyclic patterns. Large objects can appear very small when they are located far from Earth. Students will discover, as per 5-ESS1-1, that the "Sun is a star that appears larger and brighter than other stars because it is close."

**NJSLS (Science): Space Systems: 5-ESS1-1**

### NEW Cycles of the Seasons (Grade 5 and Middle School)

Observe the repeating pattern of the seasons. See how Earth's orbit around the Sun, and our planet's tilt, changes the length of day and night during the year. We'll also address the way in which Earth's motion around the Sun affects which stars are visible from season to season. These astronomical phenomena will be explored from both the surface of Earth and outer space as we virtually leave the planet to give students a unique perspective that is possible only in the immersive environment of the planetarium.

**NJSLS (Science): 5-ESS1-2; MS-ESS1-1**

## NEW WESTON FAMILY LAB

### Weather vs. Climate (Grade 3)

Earth data sets will be used on the *Science on a Sphere* to observe climate changes over time, and to explore how the short-term changes of weather are different from the long-time changes of climate.

**NJSLS (Science): 3-ESS2-1; 3-ESS2-2**

### Introduction to Spheres (Grade 5)

*Science on a Sphere* brings vividly to life the nature of Earth Systems Science, exploring the geosphere, hydrosphere, atmosphere, biosphere, and ways in which these spheres interact with each other.

**NJSLS (Science): 5-ESS2-1**

## LIVE FROM SURGERY

### Live From Cardiac Classroom

At LSC | Online

Students watch bypass or valve replacement surgery, performed at Morristown Medical Center. The program focuses on surgical procedures, risk factors for coronary artery disease, and careers in medicine.

### Meet the Surgeon: Pediatric Orthopedics

At LSC | Online

Appearing in person, Dr. Samara Friedman discusses pre-recorded surgeries which include the treatment of bone fractures, surgery of the knee, or pinning of the arm. During the session, Dr. Friedman will speak about her career path and other support careers in medicine.

### Meet the Surgeon: Neonatal

At LSC | Online

Appearing in person, Dr. Yi-horng Lee discusses pre-recorded surgeries on the Gastric Tube placement (G-Tube). During the session, Dr. Lee will speak about how surgery on a small infant and child differ from surgery on an adult, teach about caloric needs and the developing child, and how digestion and the digestive system work. Explore a career path in neonatology and pediatric medicine.

## ASSEMBLY PROGRAMS

### A Dose of Gross

At your school

Your body carries out many "gross" functions, like burping and sweating, but it does so for very important reasons. Take a journey through the human body to discover how your brain makes decisions, without your knowing it, to keep you healthy and strong by controlling the various organ systems of the body.

**NJSLS (Science): From Molecules to Organisms: Structure & Processes: 4-LS1-1**

### Science Circus

At your school

It's our most popular show! Explore the positives and negatives of static electricity, the subzero temperatures of liquid nitrogen, the states of matter, and the immense pressure of air. Includes more than a dozen thrilling experiments and, as always, we use lots of volunteers. It's a great way to showcase the concepts of energy and matter.

**NJSLS (Science): Matter and Its Interactions: 3-PS2-3, Matter and Its Interactions: 5-PS1-1**

### Flash! Bang!

At your school

Arcing electricity. Balls of fiery gas. Join us for an interactive look at the two most common forms of home energy. Students generate electricity, explore insulators and conductors, and participate in our very own game show, all while learning how to avoid the hazards inherent in using natural gas and electricity.

**NJSLS (Science): Energy: 4-PS3-2**

## 45-MINUTE WORKSHOPS

### NEW Energize

At LSC

through your teeth? Discover ways that energy can be used in our everyday life as you explore and experiment with different forms of energies.

**NJSLS (Science): Energy: 4-PS3-2**

### NEW It Ain't Easy Being Green

At LSC | At your school

Why is it so much hotter in a city than in the country in the summertime? Can we use plants to cool down? Learn about the urban heat island effect as you complete an engineering design challenge to create your very own model green roof!

**NJSLS (Science): Energy: 4-PS3-4**

### NEW Fight the Flood

At LSC | At your school

It's mother nature's world, we just live in it. Come learn how humans design and modify structures to resist extreme weather. Become a civil engineer and design a home that can withstand regular flooding.

**NJSLS (Science): Earth and Human Activity: 3-ESS3-1, 4-ESS3-2**

### Adaptation Exploration

At LSC | At your school

Could a polar bear survive in the middle of the Sahara Desert? Explore animal adaptations up close with live animal interactions. Reveal how they have developed unique survival solutions to adapt to their environment in order to find food, protect themselves, or find a mate.

**NJSLS (Science): Biological Evolution: Unity and Diversity 3-LS4-3, Heredity: Inheritance and Variation of Traits: 3-LS3-2**

### Owl Pellet Dissection

At LSC | At your school

Explore the diet of our favorite raptors by dissecting the undigested remains of their prey. Pairs team up to dissect their own owl pellet and identify what the owl consumed. This workshop is a great investigation of animal adaptations and an introduction to the food web.

**NJSLS (Science): Biological Evolution: Unity & Diversity: 3-LS4-3 From Molecules to Organisms: Structures & Processes: 4-LS1-1**

### A Look Inside

At LSC | At your school

How does the structure of the human body keep us moving? Find out the purpose of our skeleton and muscles, learn how our bones connect, and add muscles to a model skeleton to see how these systems work together.

**NJSLS (Science): From Molecules to Organisms: Structures and Processes 4-LS1-1**

## Electricity and Magnetism

At LSC | At your school

Starting with the phenomenon of an electromagnet, students conduct a series of hands-on experiments to come to an understanding of the relationship between the two forces of electricity and magnetism.

**NJSLS (Science): Motion & Stability: Forces & Interactions: 3-PS2-3 Matter and Its Interactions: 5-PS1-1**

## The States of Matter

At your school

Using super-cold liquid nitrogen and common household items, observe how things change from solid to liquid to gas. Construct explanations for the changes in this really cool exploration of matter.

**NJSLS (Science): Matter and Its Interactions: 5-PS1-1**

## Balls and Tracks

At LSC | At your school

What forces of science help ski jumpers become champions? Using marbles and ramps, this hands-on program introduces the fundamental principles of gravitational forces and projectile motion. Investigate the path that a launched projectile takes, discover the patterns of this motion, and use data to predict the distance of a final launch!

**NJSLS (Science): Motion & Stability: Forces & Interactions: 3-PS2-2**

## It's a Slimy Time

At LSC

Investigate chemical and physical changes by making your own slime and experimenting with others! Get messy and have fun exploring the properties of polymers to help you engineer and create your ultimate slime.

**NJSLS (Science): Matter and Its Interactions: 5-PS1-4 and Engineering Design 3-5-ETS1-1**

## The Power of Air

At LSC | At your school

Experience first-hand how surprisingly strong air can be! Conduct air pressure experiments in this interactive, station-based workshop. Discover the underlying principles of what makes wind, how suction cups work, and why airplanes fly!

**NJSLS (Science): Motion and Stability: Forces and Interactions 3-PS2-1**

## Filter the Future

At LSC

How does tap water become so clean and clear? Conduct a variety of tests to determine if a water sample is safe for human consumption. Then generate a solution to make the water sample as clean and clear as the water from your home faucets.

**NJSLS (Science): Earth and Human Activity: 4-ESS3-2**

## Bee-Bot Robot Challenge

At LSC

Bee-Bots are programmable robots that follow a few basic rules, called algorithms. Discover how algorithms can be used in conjunction with mathematics skills to develop a solution to a given problem.

**NJSLS (Science): Engineering Design: 3-5-ETS1-1**

## 90-MINUTE WORKSHOPS

### NEW All Shook Up

At LSC

Why are there volcanoes in the middle of the ocean? Why aren't there volcanoes in our own backyard? Discover how scientists are learning to accurately predict natural disasters by plotting and analyzing patterns found in seismic activity around the planet. Model the movement of Earth's plates and discover what's boiling beneath the surface of the planet.

**NJSLS (Science): Earth's Systems 4-ESS2-2**

### Diversity of Life

At LSC

Explore the energy pyramid and learn about the relationships among producers, consumers, and decomposers. Interact with live plants and animals to see how their external structures help them grow and survive, then explore the role fungi play in breaking down organisms and returning them to the soil.

**NJSLS (Science): From Molecules to Organisms: Structure and Processes: 4-LS1-1, Ecosystems: Interactions, Energy, and Dynamics: 5-LS2-1**

### Swinging into the Past

At LSC

*Jurassic* times call for *Jurassic* measures! Put your paleo party shoes on for a trek into the past with a variety of hands-on fossil activities, including making your own fossil. Compare live animals to their past relatives to determine environments from long ago.

**NJSLS (Science): Biological Evolution: Unity and Diversity: 3-LS4-1, 3-LS4-3**

### Ocular Observations

At LSC

Follow light on its journey through the eye. In this very hands-on workshop, perform cow eye dissections and gain a deeper understanding of how light gets from an object to the human eye, and explore how the shape of the lens bends light.

**NJSLS (Science): Waves and Their Applications in Technologies for Information Transfer 4-PS4-2**

### Matter Matters

At LSC

Explore the basis of chemical changes by engaging in hands-on experiments to identify unknown substances by their properties. Investigate such concepts as hardness, chemical change, solubility, and others.

**NJSLS (Science): Matter and Its Interactions: 5-PS1-3**

### Brainstorming around the World

At LSC

Using global data display units, embark on a meteorological journey around the world! Climatological data collection is a breeze for student meteorologists exploring the relationship between temperature, precipitation and climate. Students create graphical representations of their data to classify the climate zone of their region.

**NJSLS (Science): Earth's Systems: 3-ESS2-1, 3-ESS2-2**

### It's All Connected

At LSC

Explore how our one planet is actually composed of several major spheres; the biosphere, lithosphere, atmosphere, and hydrosphere! Learn how these spheres impact each other to shape our world.

**NJSLS (Science): Earth's System: 5-ESS2-1**

### Weathering Away

At LSC

We know that Earth is made of minerals and rocks, but there are many tinier particles. This workshop examines how these tiny particles, called sediments, form. Investigate how rocks and minerals break and move across Earth through chemical and physical changes.

**NJSLS (Science): Earth's System: 4-ESS2-1**

### Oh No, Oil Spill

At LSC

Identify how oil spills can adversely affect our environment and learn ways that human beings can build solutions to this problem.

**NJSLS (Science): Engineering Design: 3-5-ETS1-2 Earth and Human Activity: 5-ESS3-1**

## MAKERLAB WORKSHOPS | 45-MINUTE WORKSHOPS

### NEW Pepakura: Digital Origami

At LSC

Explore connections between the ancient Japanese art of paper folding and modern-day engineering design using Pepakura.

**NJSLS (Science): Engineering Design 3-5 ETS1-2**
**NJCCCS:Technology: 8.2.5.C.4**

## TECH & DESIGN STUDIO WORKSHOPS | 45-MINUTE WORKSHOPS

### NEW Simple Circuits

At LSC

Explore electrical current and learn about simple circuits. Use critical thinking skills and deductive reasoning to create your own electric circuits. Explore careers that draw on this knowledge on a daily basis.

**ISTE 5d**
**NJSLS (Science): Engineering Design: 3-5-ETS1-2**

## TECH & DESIGN STUDIO WORKSHOPS | 90-MINUTE WORKSHOPS

### NEW Intro to Game Design

At LSC

Design custom characters with animations and behaviors by completing a crash course in Stencyl. This intuitive toolset is limited only by your creativity. The Stencyl platform sets a foundation of computational thinking—an essential skill in today's tech-driven world.

### NEW Learning with Games

At LSC

Learn through play, play to learn. In this program, students will build and play games using the Bloxels platform to investigate concepts in chemistry, ecology, or physics.

**ISTE: 1d,4b,4c,6b,**
**NJSLS (Science): MS-ETS1-4,**
**NJCCCS:Technology: 8.2.8.E.1, 8.2.8.C.1, 8.2.8.C.2, 8.2.8.E.4**

### NEW Digital Art Studio

At LSC

This intuitive S.T.E.A.M. toolset demonstrates how technology and art intersect. Explore color theory, lighting, and animation to create digital art or animation.

**ISTE 1d, 2c, 4a, 4c, 4d, 6b**
**NJCCCS: 8.2.8.E.1, 8.2.12.D.3**
**NJSLS (Science): 3-5 ETS1-3; MS-ETS1-3**

## ELECTRONIC FIELD TRIPS | 45-MINUTE WORKSHOPS

### Animal Adaptations

Online

Animals from our collection illustrate that in a particular habitat, some organisms can survive well, some struggle to survive, and some cannot survive at all. Patterns of interactions among organisms can be predicted.

**NJSLS (Science): Interdependent Relationships in Ecosystems 3-LS4-3**

### Glowing Rocks

Online

Have you ever looked at rocks—really looked at them under different types of light sources? Take a look at rocks in a whole new way and make your own extraordinary rock.

**NJSLS (Science): Structure and Properties: 5-PS1-3**

### Ants: The Original Farmers

Online

Get excited when the ants come marching one by one. Leaf-cutter ants will astonish you with their expertise in farming to support the survival of the group and their proficiency in organizing matter in the environment.

**NJSLS (Science): Matter and Energy in Organisms and Ecosystems: 5-LS2-1**

### NEW Chemistry of Candy

Online

Learn the differences between chemical and physical changes, then separate materials based on their properties and learn about the roles of reactants and products.

**NJSLS (Science): Structure and Property of Matter: 5-PS1-4**

### Geometry in Nature

Online

Classify different kinds of materials by their observable properties. Show how an understanding of shapes helps us every day. Cut out a 2D shape and form it into a 3D shape you find you can't do without!

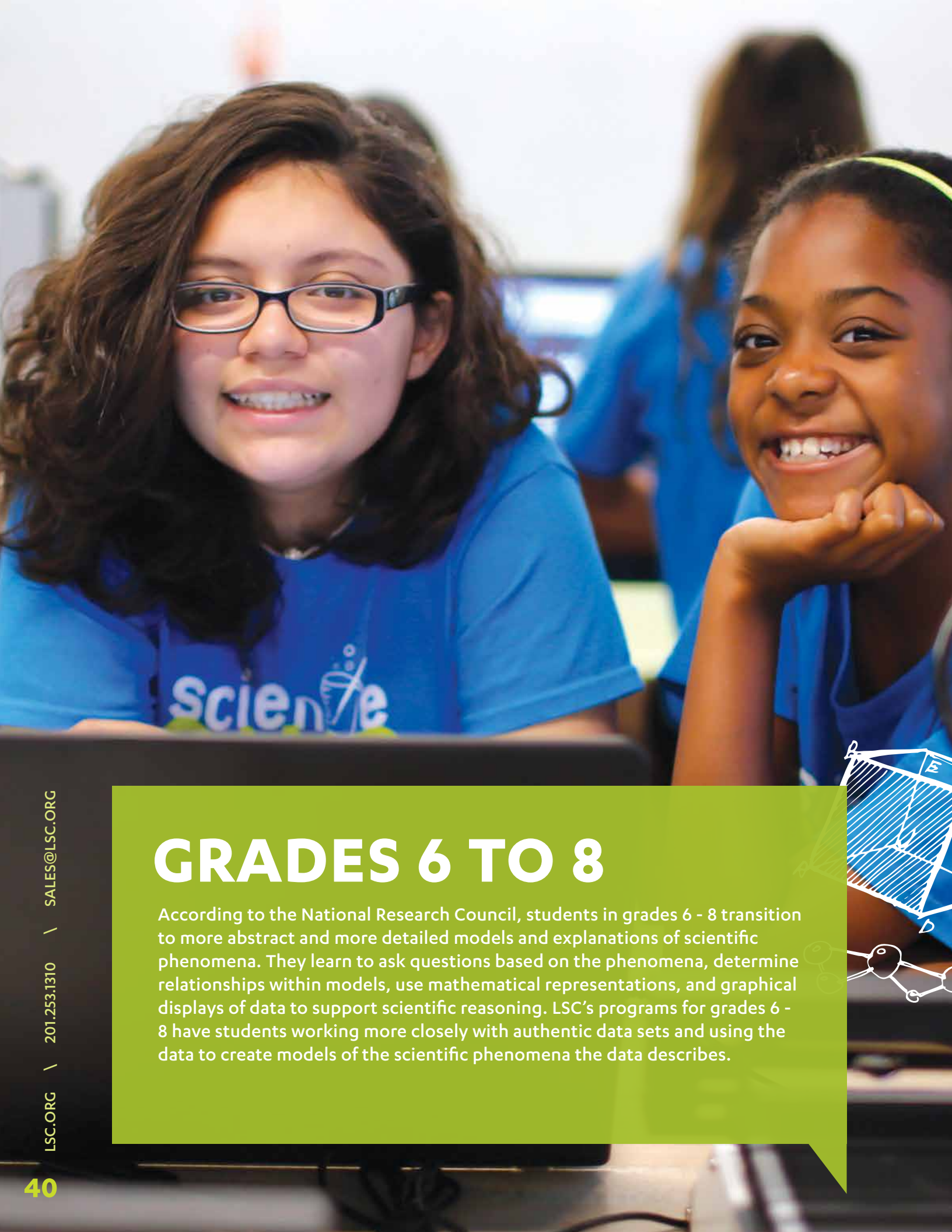
**NJSLS (Science): Structure and Properties of Matter: 5-PS1-3**

### The Power of Air!

Online

Is the glass half empty, or half full? Scientifically speaking, the glass is always full—of matter. A gas is one of the four fundamental states of matter. Explore the properties of gases.

**NJSLS (Science): Structure and Property of Matter: 5-PS1-1**



# GRADES 6 TO 8

According to the National Research Council, students in grades 6 - 8 transition to more abstract and more detailed models and explanations of scientific phenomena. They learn to ask questions based on the phenomena, determine relationships within models, use mathematical representations, and graphical displays of data to support scientific reasoning. LSC's programs for grades 6 - 8 have students working more closely with authentic data sets and using the data to create models of the scientific phenomena the data describes.


## JENNIFER CHALSTY PLANETARIUM

### NEW Wonders of the Night Sky (K - 12)

Using the unique immersive environment of the planetarium, students will explore Earth and space science concepts using the current night sky above New Jersey. Topics covered are correlated with objects visible in the night sky on your visit date and will include: seasonal constellations and planets; exciting deep-sky objects in the current sky; and breaking astronomical news.

**NJSLS (Science): Topics discussed during the program will be correlated to the corresponding Earth and Space Systems Performance Expectations for the grade level of the students attending the program.**

### NEW Cycles of the Seasons (Middle School)

Observe the repeating pattern of the seasons and see how Earth's orbit around the Sun, and our planet's tilt, change the length of day and night during the year. Learn why Earth's motion around the Sun affects which stars are visible from season to season. Explore these astronomical phenomena from both the surface of Earth and outer space as we virtually leave the planet to gain a unique perspective that is possible only in the immersive environment of the planetarium.

**NJSLS (Science): 5-ESS1-2; MS-ESS1-1**

### NEW Phases and Eclipses! (Middle School)

Track the changes in the Moon's phases as a month goes by and develop a conceptual model of the cyclic patterns of lunar phases and of eclipses of the Sun and Moon. We will make these observations from both the surface of Earth and outer space as we take advantage of the immersive environment of the planetarium.

**NJSLS (Science): Space Systems: MS-ESS1-1**

## NEW WESTON FAMILY LAB

### Changing Earth (Grades 6 - 8)

*Science on a Sphere* is ideal for vividly illustrating the large-scale forces that drive our planet, including the motion of the plates. Students will explore how Earth's appearance has changed over a long span resulting from plate motion, in a journey going back to the days of the dinosaurs.

**NJSLS (Science): MS-ESS1-4; MS-ESS2-3**

## LIVE FROM SURGERY

### Live From Cardiac Classroom | 2.5 hours

At LSC | Online

Students watch bypass or valve replacement surgery performed at Morristown Medical Center. The program focuses on the surgical procedure, risk factors for coronary artery disease, and careers in medicine.

### Meet the Surgeon: Pediatric Orthopedics | 2.5 hours

At LSC | Online

Appearing in person, Samara Friedman, MD, discusses pre-recorded surgeries which include the treatment of bone fractures, surgery of the knee, or pinning of the arm. During the session, Dr. Friedman will speak about her career path and other support careers in medicine.

### Meet the Surgeon: Neonatal | 2.5 hours

At LSC | Online

Appearing in person, Yi-horng Lee, MD, discusses pre-recorded surgeries on the Gastric Tube placement (G-Tube). During the session, Dr. Lee will speak about how surgery on a small infant and child differ from surgery on an adult, teach about caloric needs and the developing child, and how digestion and the digestive system work. Explore career paths in neonatology and pediatric medicine.

### Meet the Surgeon: Heart Transplant | 2.5 hours

At LSC | Online

Appearing in person, Margarita T. Camacho, MD, discusses pre-recorded heart transplant surgery. She discusses risk factors for heart disease, mechanical hearts and assistive devices, and new cardiac transplant technologies and procedures. Learn about the organ donation process and analyze data from past research on mechanical devices.

### Live From Kidney Transplant | 2.5 hours

At LSC | Online

Witness the gift of life shared between two people as a surgical team removes a donor kidney, prepares it for transplantation, takes it to an adjacent operating room, and transplants it into a recipient. When the donated kidney is attached to the patient's blood supply and becomes pink, many students experience a profound sense of wonder and elation.

### Neurosurgery | 3 hours

At LSC | Online

Watch delicate neurosurgery performed to extract tumors from the brain or pituitary glands, repair spinal column damage, implant brain pacemakers to provide deep electrical stimulation to a Parkinson's patient, or deflate dangerously ballooning aneurysms. Some operations even include removing the top of the skull, fully exposing the cranium.

### Robotic Surgery | 2.5 hours

At LSC | Online

This program focuses on the engineering and design of high-end medical equipment, like the Da Vinci Robotic Surgical System and its application in partially removing a tumor from a kidney or a related urological procedure. This program is transmitted from Hackensack Meridian. During the program you will see a live surgery and speak to the surgical team as they perform the procedure.

## ASSEMBLY PROGRAMS

### Science Sportacular

At your school

Sports all have one thing in common—science. We demonstrate Newton's Laws and cause and effect using sports equipment. Students learn how a pitcher makes a baseball curve and volunteers join in a momentum race. We even demonstrate concepts related to helmet safety by lying on a bed of sharp nails. No tricks or illusions here, just pure science.

**Motion and Stability: Forces & Interactions: MS-PS2-2**

### Science of Flight

At your school

Most of us have probably wondered how aircraft fly. While it might seem impossible or magical, it's really just science. Take a closer look at the four forces of flight and aviation in an educational and entertaining way!

**NJSLS (Science): Motion and Stability: Forces and Interactions MS-PS2-2**

### Science Circus

At your school

It's our most popular show! Explore the positives and negatives of static electricity, the subzero temperatures of liquid nitrogen, the states of matter, and the immense pressure of air. Includes more than a dozen thrilling experiments and, as always, we use lots of volunteers. It's a great way to showcase the concepts of energy and matter.

**NJSLS (Science): Matter and Its Interactions MS-PS1-4**

## 45-MINUTE WORKSHOPS

### BRAAINS! You and the Zombie

At LSC | At your school

Zombies are everywhere these days! Join the Zombie Response Team as research scientists to help explain how a mutated strain of the zombie virus is altering zombie behavior. By identifying and explaining differences in behavior and capabilities of zombies and humans, learn to form scientific explanations while gaining a better understanding of how the brain works.

**NJSLS (Science): From Molecules to Organisms: Structure and Processes MS-LS1-5**

## Cow Eye Dissection

At LSC | At your school

Follow light on its journey through the eye. Pairs of students will perform cow eye dissections and gain a deeper understanding of the structure and function of the human eye.

**NJSLS (Science): From Molecules to Organisms: Structures & Processes: MS-LS1-8**
**NJSLS (Science): Biological Evolution: Unity & Diversity: MS-LS4-2**

## Walking into the Present

At LSC | At your school

What did early humans look like? How closely are humans related to gorillas? How do we determine how old a fossil is? Discover the answers to these questions and more as students measure, compare, and organize hominid skulls into a family tree.

**NJSLS (Science): Biological Evolution: Unity and Diversity: MS-LS4-2**

## Living or NOT!

At LSC

Using state-of-the-art microscopes, discover the characteristics of living things, investigate different types of single-celled and multicellular organisms, and make arguments supported by evidence to determine whether something is living or nonliving.

**NJSLS (Science): From Molecules to Organisms: Structures and Processes: MS-LS1-1**

## Transform It!

At LSC | At your school

Energy comes in many forms, some are renewable and can power the future, others can not. Join us as we experiment with energy transformations and/or power generations.

**NJSLS (Science): Energy MS-PS-3-2, MS-PS-3-5; Engineering Design: MS-ETS1-2**

## It's All about Reactions

At LSC | At your school

Conduct an inquiry-based set of experiments using chemical reactions to analyze and interpret data on the properties of unknown substances.

**NJSLS (Science): Matter and Its Interactions: MS-PS1-2**

## Scaling the Solar System

At LSC | At your school

Create a model of our solar system to gain an understanding of its spatial scale. Work with fractions and ratios to generate an accurate physical model of the solar system.

**NJSLS (Science): Earth's Place in the Universe: MS-ESS1-3**

## Understanding Gravity

At LSC | At your school

Gravity is one of the fundamental forces in the universe and is strictly attractive in nature. Using an online simulation and station-based experiments, explore varying interactions and their gravitational effects on other celestial bodies.

**NJSLS (Science): Earth's Place in the Universe: MS-ESS1-2**

## 90-MINUTE WORKSHOPS

### NEW Rolling Down the River

At LSC

Create a model of a floodplain to investigate the relationship between precipitation, gravity, and river geometry. Students will leave with an understanding of how flooding occurs in different scenarios and why humans are limited in their options to adapt.

**NJSLS (Science): Earth's Systems MS-ESS2-4**

### NEW The Case of the Silver Monkey

At LSC

LSC has lost a valuable artifact and we need your help! Become forensic investigators as you examine fingerprints, study shoeprints, delve into blood typing, and put all your knowledge together to nab the thief and solve the case!

**NJSLS (Science): Engineering Design: MS-ETS1-1, MS-ETS1-3**

### Trouble on the Waterfront

At LSC

A small town just opened Kanye Western Automotive factory by an old water reservoir. Test a water sample to determine if the water is safe for use, and budget limited resources to decide which treatments must be purchased to purify the water.

**NJSLS (Science): Ecosystems: Interactions, Energy, and Dynamics: MS-LS2-5, Engineering Design MS-ETS1-2**

### The Right Stuff: Science of Materials

At LSC

Explore the exciting world of materials science by learning about the properties and structures of metals, ceramics, and polymers (plastics). See metal that "remembers" its shape and tin foil being made right before your eyes. Learn how the underlying structure of a material determines its function and suitability for a specific need.

**NJSLS (Science): Matter and Its Interactions; MS-PS1-1; MS-PS1-3**

### Under Pressure

At LSC

Atmospheric pressure governs almost all weather! Discover how different converging and diverging air masses bring along different forms of precipitation, temperatures, and more. Experiment with the physics of pressure and apply that understanding to investigations of weather phenomena to comprehend how weather is always about pressure!

**NJSLS (Science): Earth's Systems MS-ESS2-5**

### Project Skyscraper

At LSC

Begin with a mini engineering design challenge, handle surveying equipment, and try other activities to explore real world applications of mathematical concepts. Then put your skills to the test and work collaboratively to build a scale model of One World Trade Center. Math concepts incorporated into this program include measurement, proportions, and scaling.

**NJSLS (Science): Engineering Design MS-ETS1-3**

## MAKERLAB WORKSHOPS | 90-MINUTE WORKSHOPS

### Aviation: Flight Simulator and Drones

At LSC

This is drone training 101. Learn basic concepts of flight and apply this knowledge through hands-on experiences like using micro pocket drones and an actual flight simulator that lets you and your co-pilot fly the friendly skies.

**NJSLS (Science): Motion and Stability: HS-PS2-1, HS-PS2-2**

### NEW Solder 101

At LSC

Learn how electronics work first hand. Construct a simple circuit then solder together a personal kit that will be yours to keep!

**NJSLS (Science): HS-ETS1-4**

### NEW Mars Terraforming

At LSC

Can humans overcome Mars's harsh environment and live there one day? Design a habitat for life on Mars based on a topographic map which resembles a real Martian location, then 3D print a model of your Martian home.

**NJSLS (Science): HS-ESS3-2**
**NJCCCS: Technology: 8.2.8.D.2**
**ISTE 6b, c**

### NEW Intro to Tinkercad

At LSC

Engage in online digital creation of 3D models and learn how to create intricate pieces designed for 3D printing using Autodesk Tinkercad. Using our Monoprice Mini Select printers, print a personal design that's yours to keep.

**NJSLS (Science): HS-ETS1-2**
**ISTE 6b, c**
**NJCCCS: Technology: 8.2.12.D.3**

### NEW Intro to Blender

At LSC

Using a more advanced interface, learn how to 3D design down to the atomic level. Each student will 3D design and 3D print a personal project.

**NJSLS (Science): HS-ETS1-2**
**ISTE 6b, c**
**NJCCCS: Technology: 8.2.12.D.3**

### NEW Bridge Engineering: Engineering & Design Challenge

At LSC

Learn to work in collaborative groups to solve complex problems using 3D printers. Your group will be engaged in advanced 3D bridge design with Autodesk Tinkercad.

**NJSLS (Science): HS-ETS-4**
**NJCCCS: Technology 8.2.8.D.3**

### NEW Fish Evolution: Engineering & Design Challenge

At LSC

Learn to work in collaborative groups to solve complex problems using 3D printers. Your group will use Autodesk Tinkercad to design a fish, then race the fishes to see which is best engineered for speed.

**NJSLS (Science): HS-LS4-2**
**NJCCCS: Technology 8.2.8.D.3**

### NEW Derby Car Racing: Engineering & Design Challenge

At LSC

Learn to work in collaborative groups to solve complex problems using 3D printers. Your group will design a derby race car with Autodesk Tinkercad.

**NJSLS (Science): HS-PS2-3**
**NJCCCS: Technology 8.2.8.D.3**

## TECH & DESIGN STUDIO WORKSHOP | 45-MINUTE WORKSHOPS

### NEW Morphi Modeling

At LSC

Dream it. Draw it. Evolve it. Get an introduction to 3D design thinking. This program is great for beginners and the tool is flexible enough for experienced S.T.E.A.M students. Please note: Students' model projects will not be printed during the program.

**ISTE 6b**
**NJSLS (Science): K-2-ETS1-1**

### NEW Simple Circuits

At LSC

Explore electrical current and learn about simple circuits. Use critical thinking skills and deductive reasoning to create your own electric circuits. Explore careers that use this knowledge on a daily basis.

**ISTE 5d**
**NJSLS (Science): 3-5-ETS1-2**

### NEW Digital Art Studio

At LSC

Explore color theory, lighting, and animation to create digital art or animation. This intuitive S.T.E.A.M. toolset is limited only by your imagination.

**ISTE 1d, 2c, 4a, 4c,4d, 6b**
**NJCCCS: Technology: 8.2.8.E.1, 8.2.12.D.3**

## NEW Arduino Circuits

At LSC

Learn about circuitry and to code for arduino. This microcontroller is great for beginners but flexible enough to provide additional challenges for more knowledgeable students.

**ISTE 1c,1d, 4a,4b, 4c, 4d, 5d, 6b, 7c 7d**
**NJCCCS:Technology: 8.2.8.E.1, 8.2.8.E.2, 8.2.8.E.3,8.2.8.E.4, 8.2.12.E.3, 8.2.12.E.4,**
**NJSLS (Science): MS-ETS1-2, MS-ETS1-3, MS-ETS1-4**

## NEW Program, Aim, Fire

At LSC

Are you up to the challenge? Plan, test, and automate your high-lying ideas using a programmable catapult.

**NJSLS (Science): Engineering Design MS-PS2-1, MS-PS2-2, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, HS-ETS1-2**
**ISTE: 1.b**

# TECH & DESIGN STUDIO WORKSHOP | 90-MINUTE WORKSHOPS

## NEW Intro to Game Design

At LSC

Design custom characters with animations and behaviors by completing a crash course in Stencyl. This intuitive toolset is limited only by your creativity. This platform sets a foundation of computational thinking—an essential skill in today's tech-driven world.

**ISTE 1d, 4a, 4b, 4c, 6b**
**NJSLS (Science): MS-ETS1-1, MS-ETS1-2, MS-ETS3-1**
**NJCCCS: Technology: 8.2.8.E.1, 8.2.8.C.1, 8.2.8.C.2, 8.2.8.E.4, 8.2.12.E.3, 8.2.12.E.4**

## NEW Learning with Games

At LSC

Learn through play, play to learn. In this program students will build and play games using Bloxels to investigate concepts in chemistry, ecology, or physics.

**ISTE: 1d, 4b, 4c, 6b**
**NJSLS (Science): MS-ETS1-4,**
**NJCCCS: Technology -8.2.8.E.1, 8.2.8.C.1, 8.2.8.C.2, 8.2.8.E.4**

## NEW Digital Art Studio

At LSC

Explore color theory, lighting, and animation to create digital art or animation. This intuitive S.T.E.A.M. toolset is limited only by your imagination.

**ISTE 1d, 2c, 4a, 4c,4d, 6b**
**NJCCCS: Technology 8.2.12.D.3**

## NEW Intro to Arduino

At LSC

Learn about circuitry and how to code for Arduino. This microcontroller is great for beginners but flexible enough to provide additional challenges for more knowledgeable students.

**ISTE 1c, 1d, 4a, 4b, 4c, 4d, 5d, 6b, 7c, 7d**
**NJCCCS: Technology 8.2.8.E.1, 8.2.8.E.2, 8.2.8.E.3, 8.2.8.E.4, 8.2.12.E.3, 8.2.12.E.4**
**NJSLS (Science): MS-ETS1-2, MS-ETS1-3, MS-ETS1-4**

## NEW Program, Aim, Fire

At LSC

Are you up to the challenge? Plan, test and automate your high-flying ideas using programmable catapults. Identify possible solutions to operational constraints then, through the use of the engineering design process, improve the accuracy and distance.

**NJSLS (Science): Motion and Stability: Forces and Interactions: MS-PS2-1, MS-PS2-2**
**NJSLS (Science): Engineering Design: MS-ETS1-4 / HS-ETS1-2**
**ISTE:1.b**

## NEW Models and Statistics

At LSC

Introductory program that analyzes real-world formation of trails, pathways, and routes made by humans and animals through simulations and models.

**NJSLS (Science): MS-ESS3-3**
**NJCCCS: Technology: 8.2.12.C.7**
**ISTE 5a**

# ELECTRONIC FIELD TRIPS | 45-MINUTE WORKSHOP

## Forensic Science: Gotham Detective Kit (60 min.)

Online

This program includes a kit and a 45-to-60-minute videoconference.
Conduct an investigation and analyze evidence to build a case against one of the city's notorious criminal masterminds before it's too late.

**NJSLS (Science): Matter and Its Interactions: MS-PS1-3, Structure and Function: HS-LS1-3**

## Plants

Online

These amazing organisms do such much for the environment. But how? In this program, construct a model to support the argument that plants get the materials they need for growth chiefly from air and water. The role of photosynthesis is also explored.

**NJSLS (Science): MS-LS1-6, HS-LS1-5**

## NEW Power of Frankenstein

Online

Is it possible to use electricity to bring someone back from the dead? We will investigate the true events that inspired the legend of Frankenstein and explore how electricity and our biology are linked.

**NJSLS (Science): MS-LS1-8**

## NEW Pump It Up

Online

Get up and get active! Understand the value of nutrition and heart health. Navigate the circulatory system from the point of view of a red blood cell.

**NJSLS (Science): MS-LS1-2**

## Chemistry: Decomposition

Online

Substances react chemically in characteristic ways. In a chemical process, the atoms that make up the original substances are regrouped into different molecules, and these new substances have different properties from those of the reactants.

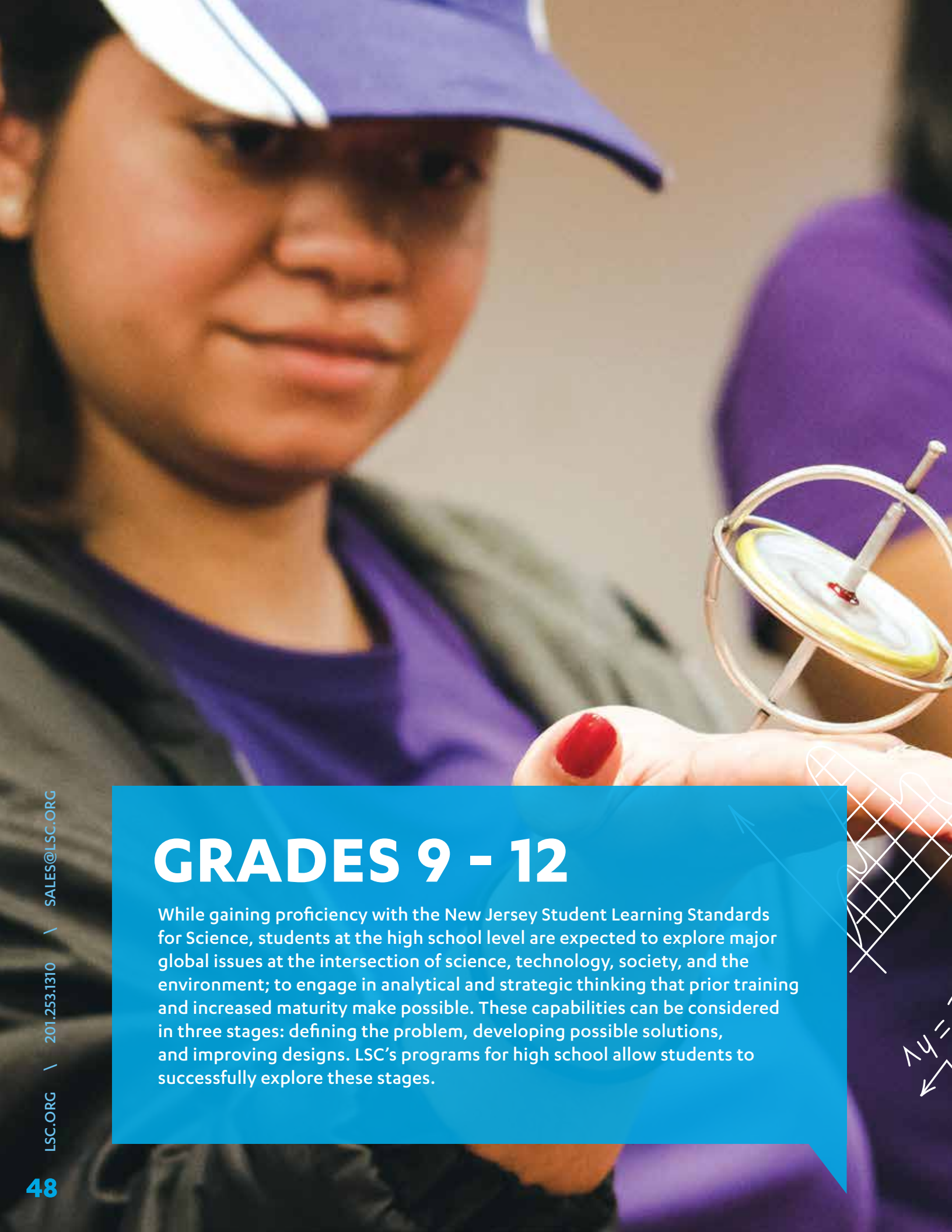
**NJSLS (Science): Chemical Reactions: MS-PS1-2**

## Renewable Energy

Online

While such nonrenewable energy sources as coal and oil dwindle, we need to look to other sources such as Sun, wind, and water. Explore our Energy Quest gallery and experiment with a variety of renewable energy sources.

**NJSLS (Science): Energy: MS-PS3-4**



# GRADES 9 - 12

While gaining proficiency with the New Jersey Student Learning Standards for Science, students at the high school level are expected to explore major global issues at the intersection of science, technology, society, and the environment; to engage in analytical and strategic thinking that prior training and increased maturity make possible. These capabilities can be considered in three stages: defining the problem, developing possible solutions, and improving designs. LSC's programs for high school allow students to successfully explore these stages.

## JENNIFER CHALSTY PLANETARIUM

### NEW Wonders of the Night Sky (K - 12)

Using the unique immersive environment of the planetarium, students will explore Earth and space science concepts using the current night sky above New Jersey. Topics covered are correlated with objects visible in the night sky on your visit date and will include: seasonal constellations and planets; exciting deep-sky objects in the current sky; and breaking astronomical news.

**NJSLS (Science): Topics discussed during the program will be correlated to the corresponding Earth and Space Systems Performance Expectations for the grade level of the students attending the program.**

### NEW Life Cycles of the Stars (High School)

Develop a conceptual model of the formation of the universe and the life cycle of a star. Construction of this model will use evidence from stellar light spectra, the motion of distant galaxies, the composition of matter in the universe, nuclear fusion, and the production of elements in stars. The immersive environment of the planetarium allows students to travel back in time to the formation of the universe to explore these space science phenomena.

**NJSLS (Science): Space Systems: HS-ESS1-1, HS-ESS1-2, HS-ESS1-3**

## NEW WESTON FAMILY LAB

### Violent Planet (Grades 9 - 12)

From our planet's currently active volcanoes and earthquakes to Earth's distant past, this program uses *Science on a Sphere* to explore the often-violent forces that have shaped our planet.

**NJSLS (Science): HS-ESS2-1**

## LIVE FROM SURGERY

### Live From Cardiac Classroom | 2.5 hours

At LSC | Online

Students watch bypass or valve replacement surgery performed at Morristown Medical Center. The program focuses on the surgical procedure, risk factors for coronary artery disease, and careers in medicine.

### Meet the Surgeon: Pediatric Orthopedics | 2.5 hours

At LSC | Online

Appearing in person, Samara Friedman, MD, discusses pre-recorded surgeries which include the treatment of bone fractures, surgery of the knee, or pinning of the arm. During the session, Dr. Friedman will speak about her career path and other support careers in medicine.

### Meet the Surgeon: Neonatal | 2.5 hours

At LSC | Online

Appearing in person, Yi-horng Lee, MD, discusses pre-recorded surgeries on the Gastric Tube placement (G-Tube). During the session, Dr. Lee will speak about how surgery on a small infant and child differ from surgery on an adult, teach about caloric needs and the developing child, and how digestion and the digestive system work. Explore career paths in neonatology and pediatric medicine.

### Meet the Surgeon: Heart Transplant | 2.5 hours

At LSC | Online

Appearing in person, Margarita T. Camacho, MD, discusses pre-recorded heart transplant surgery. She discusses risk factors for heart disease, mechanical hearts and assistive devices, and new cardiac transplant technologies and procedures. Learn about the organ donation process and analyze data from past research on mechanical devices.

### Live From Kidney Transplant | 2.5 hours

At LSC | Online

Witness the gift of life shared between two people as a surgical team removes a donor kidney, prepares it for transplantation, takes it to an adjacent operating room, and transplants it into a recipient. When the donated kidney is attached to the patient's blood supply and becomes pink, many students experience a profound sense of wonder and elation.

### Neurosurgery | 3 hours

At LSC | Online

Watch delicate neurosurgery performed to extract tumors from the brain or pituitary glands, repair spinal column damage, implant brain pacemakers to provide deep electrical stimulation to a Parkinson's patient, or deflate dangerously ballooning aneurysms. Some operations even include removing the top of the skull, fully exposing the cranium.

### Robotic Surgery | 2.5 hours

At LSC | Online

This program focuses on the engineering and design of high-end medical equipment, like the Da Vinci Robotic Surgical System and its application in partially removing a tumor from a kidney or a related urological procedure. This program is transmitted from Hackensack Meridian. During the program you will see a live surgery and speak to the surgical team as they perform the procedure.

## 90-MINUTE WORKSHOPS

### NEW The Physics of Car Crashes

At LSC

Students, using Vernier dynamics carts and tracks, will explore the physics of car crashes and keeping safe through the study of varying types of collisions (elastic and inelastic), force, and impact time. This exploration will lead students to engineer a device to survive in the impact of a 'crash.' LabQuest devices and force sensors will assist in data collections leading to design modification.

**NJSLS (Science): Motion and Stability: Forces and Interactions HS-PS2-3**

### NEW Our Water Systems: What's in Our Water?

At LSC

Where does the water we use come from, where does it go, what happens to it along the way? Students explore our water systems through a gallery format, becoming an "expert" on a contributing aspect such as eutrophication, combined sewage overflow, pH levels, and marine life in New York Harbor. Students then test local water from the Hudson River as well as our tap water, comparing the results to EPA guidelines.

**NJSLS (Science): Earth and Human Activity: HS-ESS3-1**

### NEW Animal Behavior

At LSC

What is a behavior? Can we influence it? Are humans animals with behaviors that can be manipulated? Observe our tamarins and your fellow humans as you learn how to decipher and record animal behaviors, and then discover how to influence behavior as you design an experimental habitat for a live Madagascar hissing cockroach!

**NJSLS (Science): Ecosystems: Interactions, Energy and Dynamics HS-LS2-8**

### Science of Sight

At LSC

How do we see? Understand how your eyes and brain interact to collect and interpret images as you dissect a cow eye, and learn what goes wrong along this pathway as you trick your brain with optical illusions.

**NJSLS (Science): From Molecules to Organisms: Structure and Processes: HS-LS1-2**

## Stabilizing the System

### At LSC

Learn about homeostasis and feedback mechanisms as you use Vernier sensors to observe and analyze your own heart rate, lung capacity, blood pressure, and more. Note: The results of these experiments can be taken back to school for analysis. Bring a USB drive for transport.

**NJSLS (Science): From Molecules to Organisms: Structure and Processes: HS-LS1-3**

## Forensics Anthropology

### At LSC

Tibia or not tibia, that is the question! Learn to observe and identify the bones and features that make us so unique. Tell the story of a human by reading the patterns in various skeletal features, and solve an archaeological crime by using clues dug up from the dirt to determine whether it is a funeral or a fraud.

**NJSLS (Science): Engineering Design HS-ETS1-2**

## Unlocking your DNA

### At LSC

Discover the world of genetics as you explore the human genome. Use hands-on lab techniques and lab equipment such as micro-pipettes, centrifuges, and gel electrophoresis chambers as you solve a genetic mystery. Note: The results of these experiments can be taken with the students on a USB.

**NJSLS (Science): Heredity: Inheritance and Variation of Traits: HS-LS3-1**
**NJSLS (Science): Biological Evolution: Unity and Diversity: HS-LS4-3**

## Chemical Investigations

### At LSC

Why is the periodic table that strange shape? Melt, dissolve, and electrify chemicals as you learn how to predict an element's properties by noting its place on the periodic table.

**NJSLS (Science): Matter and Its Interactions: HS-PS1-1**

## MAKERLAB WORKSHOPS | 90-MINUTE WORKSHOPS

### Aviation: Flight Simulator and Drones

At LSC

This is drone training 101. Learn basic concepts of flight and apply this knowledge through hands-on experiences like using micro pocket drones and an actual flight simulator that lets you and your co-pilot fly the friendly skies.

**NJSLS (Science): Motion and Stability: HS-PS2-1, HS-PS2-2**

### NEW Solder 101

At LSC

Learn how electronics work first hand. Construct a simple circuit then solder together a personal kit that will be yours to keep!

**NJSLS (Science): HS-ETS1-4**

### NEW Mars Terraforming

At LSC

Can humans overcome Mars's harsh environment and live there one day? Design a habitat for life on Mars based on a topographic map which resembles a real Martian location, then 3D print a model of your Martian home.

**NJSLS (Science): HS-ESS3-2**
**NJCCCS: Technology: 8.2.8.D.2**
**ISTE 6b, c**

### NEW Intro to Tinkercad

At LSC

Engage in online digital creation of 3D models and learn how to create intricate pieces designed for 3D printing using Autodesk Tinkercad. Using our Monoprice Mini Select printers, print a personal design that's yours to keep.

**NJSLS (Science): HS-ETS1-2**
**ISTE 6b, c**
**NJCCCS: Technology: 8.2.12.D.3**

### NEW Intro to Blender

At LSC

Using a more advanced interface, learn how to 3D design down to the atomic level. Each student will 3D design and 3D print a personal project.

**NJSLS (Science): HS-ETS1-2**
**ISTE 6b,c**
**NJCCCS: Technology: 8.2.12.D.3**

### NEW Bridge Engineering: Engineering & Design Challenge

At LSC

Learn to work in collaborative groups to solve complex problems using 3D printers. Your group will be engaged in advanced 3D bridge design with Autodesk Tinkercad.

**NJSLS (Science): HS-ETS-4**
**NJCCCS: Technology 8.2.8.D.3**

### NEW Fish Evolution: Engineering & Design Challenge

At LSC

Learn to work in collaborative groups to solve complex problems using 3D printers. Your group will use Autodesk Tinkercad to design a fish, then race the fishes to see which is best engineered for speed.

**NJSLS (Science): HS-LS4-2**
**NJCCCS: Technology 8.2.8.D.3**

### NEW Derby Car Racing: Engineering & Design Challenge

At LSC

Learn to work in collaborative groups to solve complex problems using 3D printers. Your group will design a derby race car with Autodesk Tinkercad.

**NJSLS (Science): HS-PS2-3**
**NJCCCS: Technology 8.2.8.D.3**

## TECH & DESIGN STUDIO WORKSHOPS

### NEW mBOT Masters

At LSC

Step into robotics and programming with mbot! Tackle select global and local challenges by creating and programming a robot to complete a series of challenges. Use critical thinking skills and deductive reasoning to create your own solutions.

**ISTE 1c,1d, 4a, 4c, 4d, 5d, 6b, 7c 7d**
**NJCCCS: Technology: 8.2.12.D.1, 8.2.12.E.3, 8.2.12.E.4**

### Intro to Game Design

At LSC

Design custom characters with animations and behaviors by completing a crash course in Stencyl. This intuitive toolset is limited only by your creativity. This platform sets a foundation of computational thinking—an essential skill in today's tech-driven world.

**ISTE 1d,4a,4b,4c,6b**
**NJSLS (Science): MS-ETS1-1, MS-ETS1-2, MS-ETS3-1**
**NJCCCS: Technology: 8.2.8.E.1, 8.2.8.C.1, 8.2.8.C.2, 8.2.8.E.4, 8.2.12.E.3, 8.2.12.E.4**

### NEW Robotics Lab

At LSC

Advanced robotics class for robo-warriors! This challenge-based course prepares students to compete against each other.

**ISTE 1c,1d, 4a, 4c, 4d, 5d, 6b, 7c 7d**
**NJCCCS: Technology - 8.2.12.D.1, 8.2.12.E.3, 8.2.12.E.4**

## Intro to Arduino

At LSC

Learn about circuitry and how to code for Arduino. This microcontroller is great for beginners but flexible enough to provide additional challenges for more knowledgeable students.

**ISTE 1c,1d, 4a,4b, 4c, 4d, 5d, 6b, 7c 7d**
**NJCCCS: Technology -8.2.12.E.3, 8.2.12.E.4**
**NJSLS (Science): HS-ETS1-3**

## NEW Models and Statistics

At LSC

Introductory program that analyzes real-world formation of trails, pathways, and routes made by humans and animals through simulations and models.

**ISTE 5a**
**NJSLS (Science): HS-ETS1-4**
**NJCCCS: Technology: 8.2.12.C.7**

## NEW Digital Art Studio

At LSC

Explore color theory, lighting, and animation to create digital art or animation. This intuitive S.T.E.A.M. toolset is limited only by your imagination.

**ISTE 1d, 2c, 4a, 4c,4d, 6b**
**NJCCCS: Technology 8.2.12.D.3**

## Program, Aim, Fire

At LSC

Are you up to the challenge? Plan, test, and automate your high-flying ideas using programmable catapults. Identify possible solutions to operational constraints then, through the use of the engineering design process, improve accuracy and distance.

**NJSLS (Science): HS-ETS1-2**
**ISTE:1.b**

# ELECTRONIC FIELD TRIPS

## Forensic Science: Gotham Detective Kit

Online

This program includes a kit and a 45-to-60-minute videoconference.
Conduct an investigation and analyze evidence to build a case against one of the city's notorious criminal masterminds before it's too late.

**NJSLS (Science): Structure and Function: HS-LS1-3**

# TEACHER PROFESSIONAL DEVELOPMENT WORKSHOPS

Teachers face new challenges as the NJSLS continue to be adopted and implemented. With an increased emphasis on evidence-based learning, exploration of science phenomena, and scientific discourse, educators need professional development experiences that reflect these new focal points of learning. Liberty Science Center can partner with your school or district to offer engaging and effective professional development programs tailored to implementing the NJSLS.

If you are certified or are applying for certification under the Future Ready Schools – New Jersey Initiative, our teacher professional development staff can help you with the Indicators of Future Readiness and help move your certification from bronze to silver.

You can even combine PD with student programs, including Electronic Field Trips and Extended Laboratory Workshops, to observe and learn from LSC educators in real time, with real students.

To learn more, contact Mary McDonald at mmcdonald@lsc.org or 201.253.1214.

Last year, 2,050 science teachers participated in LSC's Professional Development programs.

## LIBERTY SCIENCE CENTER NJSLS (SCIENCE) MASTER TEACHER INSTITUTE

**This professional development series offers comprehensive training in incorporating the NJSLS (Science) into the classroom. The content of each of these sessions can be customized for elementary, middle school, or high school teachers. The workshops may also be offered à la carte upon request.**

### NJSLS (Science) Overview: Teaching Science in Three Dimensions

This workshop introduces the NJSLS (Science), highlighting key shifts in content and practices that the new standards bring to classrooms. Become familiar with teaching through the three strands of NJSLS (Science): Disciplinary Core Ideas, Science and Engineering Practices, and Crosscutting Concepts. Review your current science lessons and make amendments to reflect NJSLS (Science) teaching and learning practices. Successive workshops will focus in depth on each Science Practice, Disciplinary Core Idea, and various Crosscutting Concepts.

### Asking Questions and Science Investigation Design/Implementation

**FOCUS:** The first and third Science Practices: Asking Questions and Planning and Carrying Out Investigations. Take part in NJSLS (Science)-based investigations that highlight the efficacy of these two Science Practices. Reflect on the science investigations in order to modify existing science lessons to be aligned to these Science Practices.

### Analyzing and Interpreting Data

**FOCUS:** The Science Practice of Analyzing and Interpreting Data as well as the Crosscutting Concept of Patterns. Conduct science investigations that highlight the importance of data in science teaching and learning. Reflect on these investigations to plan modifications of current science lessons for best NJSLS (Science) alignment.

### Developing and Using Models

**FOCUS:** The Science Practice of Developing and Using Models as well as the Crosscutting Concept of Systems and System Models. Deepen understanding of these aspects of NJSLS (Science) and participate in engaging science lessons. Upon reflection on the workshop sample investigations, modify existing science lessons in order to make them better aligned to NJSLS (Science).

### Evidence-Based Explanations and Argumentation

**FOCUS:** Two Science Practices—Constructing Explanations and Engaging in Argument from Evidence. Conduct investigations that require collecting data and other evidence that will form the foundation for constructing explanations and engaging in evidence-based science argumentation. Based on this learning, modify existing science lessons to be better aligned to NJSLS (Science).

### Teaching Science with Crosscutting Concepts

**FOCUS:** Crosscutting Concepts across the various Disciplinary Core Ideas. Take part in exemplary science investigations that highlight various aspects of these concepts, then modify existing science lessons to be better aligned to NJSLS (Science).

### Planning NJSLS (Science) Aligned Science Units and Lessons

**FOCUS:** Planning a unit of lessons that align to the three strands of the NJSLS (Science). Engage in science investigations that are part of the sample science unit. Then reflect on this learning and modify existing science lessons to be better aligned to NJSLS (Science).

### Integrating NJSLS (Science) with Common Core ELA and Math Standards

**FOCUS:** Learning synergies between NJSLS (Science) and Common Core ELA and Math Standards. Engage in exemplary investigations which illustrate Mathematics and Computational Thinking, Engaging in Argument from Evidence, and Obtaining Evaluation and Communicating Information. Gain mastery in modifying existing science lessons to emphasize connections between NJSLS (Science) and Common Core ELA and Math Standards.

### Problem-Based Learning through the NJSLS (Science) Engineering Practices

**FOCUS:** Integrating the NJSLS (Science) Engineering Practices in the science classroom. Participate in problem-based science investigations that use the NJSLS (Science) Engineering Practices. Reflect on this learning, then modify science units and curriculum to integrate NJSLS (Science) Engineering Practices.

# FULL-DAY PROFESSIONAL DEVELOPMENT 5-HOUR WORKSHOPS

## NEW Design Thinking in STEM

This workshop will unite science investigations, engineering, and coding as teachers explore how design thinking can develop students' creativity, communication, and problem solving skills. Engaging in hands-on and digital design, teachers will discuss how to leverage design thinking to support the NJSLS (Science) standards and 21st century skills.

**NJSLS (Science): Design Thinking can be applied to all science standards.**

## NEW Engineering is Elementary

This research-based elementary (K - 5) engineering curriculum has proven engaging and effective in involving students in STEM units that focus on the Engineering Practices. During this workshop, you will explore a sample curriculum unit and be exposed to many other topics that will engage both teachers and students in pursuing proficiency in the NJSLS-based Engineering Practices.

## NEW Inquiry-Based Learning in STEM and Humanities

Deepen your understanding of how inquiry-based learning looks in STEM and Humanities classrooms. Dive into sample hands-on inquiry lessons that connect across disciplines. This workshop is co-facilitated by a teacher with expertise in STEM inquiry alongside a colleague experienced in incorporating inquiry into the Humanities classroom.

## NEW Phenomena-Based Classrooms

This workshop will explore NJSLS phenomena, which are designed to motivate students to figure out why something happens. We will explore phenomena rooted in compelling real-world situations so that teachers can develop and implement phenomena more effectively in their classrooms.

**NJSLS (Science): Phenomena-Based Teaching can be applied to all science standards.**

## The Power of Mapping Data

Amaze your students with the power of mapping and manipulating data. Investigate online mapping technology Geographic Information Systems (GIS), which promotes visualization and manipulation of spatial data. Infinitely adaptable to exploring different science content areas, online GIS promotes digital literacy and critical thinking skills. With a focus on the Crosscutting Concept of Scale, Proportion, and Quantity and the Science Practices of Asking Questions and Analyzing and Interpreting Data, you will reflect on innovative ways to bring mapping and data analysis to your classroom.

**NJSLS (Science) Disciplinary Core Ideas such as LS4.D Biodiversity and Humans, ESS3.A Natural Resources, ESS3.B Natural Hazards, and ESS3.D Global Climate Change**

## Citizen Science in the Classroom

From BioBlitzes to backyard mapping to galaxy discovery, explore how your classroom can benefit from citizen science projects. With a focus on the Science Practices of Analyzing and Interpreting Data and Using Mathematics and Computational Thinking, reflect on how to develop a citizen science project that aligns with NJSLS (Science), promotes student collaboration, and engages students with solving real-world problems through scientific research.

**NJSLS (Science) Disciplinary Core Ideas such as LS2.A Interdependent Relationships in Ecosystems, LS2.C Ecosystem Dynamics, Functioning, and Resilience**

## Teach Science Using Multiple Intelligences

Discover how the eight intelligences can be focused for science instruction. Complete a multiple intelligence inventory and develop strategies to use in lesson design and implementation. Learn how to incorporate all facets of students' intelligence in science and engineering instruction.

**NJSLS (Science): Multiple intelligences can be applied to all science standards.**

## Integrating Science, Math, and Literacy: Activities for Pre-K to Grade 4

Connect mathematics, literacy, and science concepts. Using a wide variety of materials and objects, investigate topics in life, physical, Earth, and space sciences, as well as in early engineering and design practices.

**NJSLS (Science): PS1 Matter and Its Interactions, LS2 Ecosystems: Interactions, Energy, and Dynamics, ESS2 Earth's Systems**

## 3-HOUR TEACHER WORKSHOPS
## GRADE 7 - 12 TEACHERS

### Unpacking the NJSLS (Science) Planning 3-Dimensional STEM Lesson Elements

As you implement the new standards, LSC can partner with you to evaluate and adapt your curricular models, lesson design, and pedagogy to capitalize on your current strengths and incorporate NJSLS (Science) requirements. This course can be customized in content emphasis, grade-level bands (K - 4, 5 - 8, 9 - 12) and length (one day or multi-day) to complement your school district's needs and schedule.

### Math and Science Connection Workshop

Learn to collect, analyze, and interpret data. Explore patterns, proportion, and quantitative analysis. Work with early calculators, study the applications of probability, explore Platonic solids, and construct flexagons. Learn about Fibonacci numbers, graphing collected data, the golden mean, and more.

**NJSLS (Science): Interdependent Relationships in Ecosystems: HS-LS2-2**

### Intermediate Science Sampler

It's one of our most popular programs for middle school teachers. Use activities to initiate discussion and introduce areas of scientific inquiry, from topology and color vision to a simulation of the spread of communicable disease. Use observable data to draw conclusions and deepen understanding of scientific concepts.

**NJSLS (Science): Structure, Function and Information Processing: MS-LS1-8**

### Explorations in Ecology

Uncover the basics of ecology using math, simulations, and graphs to understand predator-prey relationships, population growth, photosynthesis, biome comparisons, and endangered species. This in-depth view of ecological principles is appropriate for grade 6 - 9 teachers.

**NJSLS (Science): Interdependent Relationships in Ecosystems: MS-LS2-2; Matter and Energy in Organisms and Ecosystems: MS-LS1-6**

### Hidden Worlds Revealed through the Microscope

Learn to use microscopes more effectively by examining pennies, feathers, fingerprints, and preserved and living organisms. Explore concepts of scale, structure, and the functions of tiny items and organisms. Plan and implement investigations that provide meaningful data about the intricacies of items visible only on a microscopic scale.

**NJSLS (Science): Structure, Function and Information Processing: MS-LS1-1**

## Exploring Matter: The Chemistry of the Universe

Collect, analyze, and interpret data on the physical and chemical properties of matter as well as changes produced by chemical combinations. Create a brochure about a favorite chemical, use enzymes to convert milk into cheese, make a pH indicator from cabbage leaves, investigate the incredible absorption power of disposable diapers, and extract DNA from wheat.

**NJSLS (Science): Structure and Properties of Matter: MS-PS1-4; Chemical Reactions: MS-PS1-2**

## Plants and Insects: Perfect Together

Explore insect senses and behaviors, then discover how plants reproduce, grow, make food, and in some cases even capture and consume insects. Analyze and interpret data related to plant and animal structures, their functions, and their interconnectedness.

**NJSLS (Science): Structure, Function and Information Processing: MS-LS1-1; Inheritance and Variance of Traits: HS-LS3-3**

## The Nervous System and Behavior

Examine the biological basis of behavior by studying the neuron, nerve impulse, and anatomical structure of vertebrate nervous systems, with an emphasis on the brain. Exciting activities cover visual perception, illusions, learning and memory experiments, reflexes, measuring the speed of a nerve impulse, and constructing a model human brain. Particular emphasis is placed on exploring concepts of biological cause and effect as well as the structure and function of the central nervous system.

**NJSLS (Science): Structure, Function and Information Processing: MS-LS1-8**

# 3-HOUR PROFESSIONAL DEVELOPMENT WORKSHOPS GRADE K - 8 TEACHERS

## It's All in the Question

Effective hands-on science instruction encourages students to make observations, manipulate data, construct explanations, and design solutions. Learn how to stimulate student thinking by helping them make predictions, plan and carry out investigations, and respond to open-ended questions.

**NJSLS (Science): PS1A: Structure and Properties of Matter; PS2B: Types of Interactions; PS3C: Relationship between Energy and Forces**

## Science Grabbers

Prepare a hands-on survival kit with activities for all science disciplines. Plan and conduct science investigations in various content areas and explore cause-and-effect relationships, energy transfer, and properties of matter.

**NJSLS (Science): PS1A: Structure and Properties of Matter; PS1B: Chemical Reactions; LS1C: Organization for Matter and Energy Flow in Organisms**

## Earth, Moon, and Stars

Explore interrelated concepts in Earth, space, and physical science with a focus on how forces such as gravity interact with planets, the Moon, stars, and people on Earth. Collect and analyze data on planetary cause and effect; develop, scale, and use models to understand relative sizes in the solar system; and compare patterns and cycles.

**NJSLS (Science): ESS1A: The Universe and Its Stars; ESS1B: Earth and the Solar System**

## Micro-Observations

Reveal ordinary things in an extraordinary way with our indestructible classroom microscopes. Learn how to plan and implement science investigations that use magnification as a springboard to gather and analyze meaningful data on the concepts of scale, structure, and function.

**NJSLS (Science): LSS1A: Structure and Function; ESS2A: Earth Materials and Systems**

## Matter, Matter, Everywhere

Spark critical thinking and good communication skills as you investigate the structures and properties of solids, liquids, and gases. Measure, combine, and classify changes and reactions in substances by touching, manipulating, and even tasting the results. Sweet!

**NJSLS (Science): PS1A: Structure and Properties of Matter; PS1B: Chemical Reactions**

## The L.A.W.S. of Weather

Discover how weather develops as land, atmosphere, water, and sunlight interact. Conduct easy experiments on the properties of air, create a model water cycle in a cup, and construct and test simple weather instruments. Use these instruments to gather and analyze meteorological data.

**NJSLS (Science): ESS2C: The Role of Water in Earth's Surface Processes; ESS2D: Weather and Climate**

## Eco-Awareness

Use hands-on activities to explore natural materials and resources. Examine the beneficial and harmful impacts humans can have on local and global ecosystems. Explore system models that illuminate the delicate balance found in ecosystems.

**NJSLS (Science): LS2A: Interdependent Relationships in Ecosystems; LS2B: Cycles of Matter and Energy Transfer in Ecosystems; ESS2A: Earth Materials and Systems**

## What's So Simple about Simple Machines?

Explore new ways to teach a simple machines unit with an emphasis on readily available materials. Define and explore problems that can be addressed by simple machines and design solutions based on the efficacy of particular machines that address a particular design challenge. Collect data to explain how simple machines work and use these concepts to think about how simple machines can be used to streamline everyday tasks.

**NJSLS (Science): PS2A: Forces and Motion; PS2B: Types of Interactions**

# GENERAL INFORMATION

## Contact our sales team

201.253.1310 or sales@LSC.org
Weekdays 9:00 am – 5:00 pm
Weekends 9:00 am – 2:00 pm

## Group Admission

Special rates are available for groups of 10 or more with advance reservations.

## Transportation and Directions

Easily accessible by bus, car, light rail, and ferry. See LSC.org/visit.

## Parking

Convenient, on-site parking is available. Cars are $7, buses $10.

## Health and Safety

We care about your safety and comfort.We have an allergy-aware dining room (reserve in advance), and offer free admission for school nurses. We have an experienced safety and security staff, a building-wide Code Adam protocol for lost children, and a basic first-aid room. LSC is ADA compliant, and located just one mile from a top-ranked hospital.

## Lunch Plans

To reserve brown-bag space or order box lunches, call 201.253.1310. You may also purchase lunches individually at Café Skylines. Just alert us when you reserve.

## Accessibility

Liberty Science Center is accessible to all guests. You may request wheelchairs at the Welcome Desk. Assistive listening devices for hearing-impaired guests are available for the theaters and several other public areas.

## Special Needs Days

**December 4, 2018 and April 9, 2019**

Each Special Needs Day includes live science presentations, activities, and theater shows. Pre-registration is required.

## Rare Disease Day

**February 2019**

Families and caregivers living with rare diseases are invited to spend the afternoon at LSC and enjoy unique hands-on activities.

**SIGN UP FOR OUR FREE EDUCATOR NEWSLETTER**

**Receive an e-newsletter of program updates, professional development news, and special event previews. Email sales@lsc.org to join.**

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