STEM INSTITUTE
Summer, 2017

The NYC Department of Education is committed to working with school leaders and teachers to build their capacity in, and develop a shared understanding of high quality STEM education. The STEM Institutes serve to provide professional learning opportunities to schools in their efforts to identify and develop a STEM focused approach to learning that supports student achievement. The NYCDOE is excited to offer the Summer STEM Institute, for teacher teams of 2 to 3 educators and to administrators.

During the three-day STEM Institute, which will take place from Tuesday, August 8th to Thursday, August 10th 2017, teacher teams will have an opportunity to:

- Develop a shared understanding of the important features of STEM and computer science education
- Develop an awareness of approaches to STEM and computer science education
- Build their leadership capacity to support STEM and computer science education within their school communities
- Begin to build partnerships with other schools with similar interests to support your STEM and computer science initiative

Offerings will include hands-on, interactive sessions in robotics, computer science, urban gardening, engineering, solar energy, design thinking and more. Teachers and eligible supervisors who attend the full Institute will receive 15 hours of per session. Teachers review Vacancy Circular #992. Supervisors review Vacancy Circular #991.

Please note: This is a paid professional development opportunity. We do not offer childcare, and children will not be allowed at the Institute.

Registration Closes: June 29th, 2017
Registration can be found here (click here).
http://bit.ly/2o3gCIL
Summer STEM INSTITUTE Offerings

STEM (ST) SESSIONS
All professional learning opportunities encompass three days of training at the Summer STEM Institute. By selecting one of these sessions you are committing to attending the full professional learning offering at the STEM Institute on August 8th through August 10th.

Instructions to register for an ST course:
- Before beginning your registration, review the catalog of programs available to decide which course you will register for.
- Select only a course that is appropriate to the grade level(s) that you teach. (e.g teachers of elementary students should not register for a course that is identified as a course for teachers of high school students)
- **ALL participants are expected to bring a laptop or tablet that they will use during the program.**
- Review the special requirements for the course you select. **Make sure that you will be able to fulfill the specific requirements of that course.** Please note that some programs, as identified within the catalog will take place at off-site locations, while other programs will require specific equipment, such as those that specifically identify the need for an iPad.
- Your registration is not finalized until your supervisor, principal or superintendent has approved your participation in the institute, as we will reach out to confirm their approval of your attendance. Verify the correct email address for the principal or supervisor you indicate as your approver before completing your registration.

**Registration Note:** Though you will initially receive a confirmation of your online registration, this confirmation does not constitute acceptance into the Institute. Final confirmation of acceptance in the Institute will only be sent once we have reviewed your registration details and have received your supervisor’s, principal’s or superintendent’s approval for you to participate in this program.
STEM (ST) SESSIONS –

ST01-Become an Expert: #DigCit, #DigLit, & #EdTech (Grades 6-12)
Presenters: NYCDOE, Digital Engagement and Learning

Learn how to teach students digital literacy, citizenship, and ed tech with Common Sense Education and EverFi’s innovative resources. Certified New York City tech teachers will share with you a full K-12 curriculum as well as a suite of interactive game-based learning experiences that can be used in your classrooms. Resources are research-based, flexible, and standards aligned. Explore the 5 essential edtech skills you need to effectively use technology with students using the SAMR model for edtech integration. This opportunity also prepares teachers with the tools and resources their school will need for Children’s Internet Protection Act (CIPA) compliance.

ST02-Building Possibilities: Design Thinking and Engineering (Grades 6-12)
Presenters: New York City Department of Design and Construction

Looking for innovative ways to bring engineering into your classroom? Do you want your students to understand why math matters? Why buildings stand up? How neighborhoods are built? Do you want them to be inspired to find the intersections between science, technology, engineering, architecture and math? And to see themselves as future engineers or urban planners? Come explore engineering and urban design with the NYC Department of Design and Construction. We will share curricula from our STEAM Summer Enrichment Program through a series of hands-on activities. Roll up your sleeves and come build with us!

ST03-Connecting the Polar Regions to Climate Change (Grades 9-12)
Presenters: Columbia University, Lamont Doherty Earth Observatory

The Lamont Doherty Earth Observatory (LDEO) program will introduce content, data and hands-on activities to support teachers who want to explore and teach climate change with a specific focus on the Poles and sea level rise. We will offer hands-on experiments grounded in scientific data (much of it collected by LDEO scientists), combined with short lectures and discussion, to provide teachers with the tools to construct a comprehensive picture of cryosphere and climate dynamics at the Poles, and how changes at the Poles connect to global climate and the climate here in New York.

SPECIAL REQUIREMENT: Participants will meet at the Lamont Doherty Earth Observatory for day 2 and day 3 of this workshop.

ST04 - Design Challenges from Our Classroom to Yours (Grade: 3 to 12)
Presenters: NYCDOE STEM Teachers

Explore several design challenges that can be modified for any grade level with a focus on topics such as circuits, biomimicry, buoyancy, and architecture. With the guidance and presentations of DOE middle school STEM teachers, participants will engage in several classroom strategies that can support collaboration and creativity in the classroom. Key components of STEM learning will be highlighted such as success through failure, testing to inform iterations and divergent solutions. Participants will walk away with classroom ready resources, and materials to immediately start implementing STEM in their own classrooms.

ST05 - Discover Coding in Our Everyday Lives with EV3 (Grades 6-12)
Presenters: LEGO Education

Join LEGO Education and discover how coding can be taught with a hands-on robotic component of true STEM learning in the classroom. This session will immerse you in problem-based learning to see how students can hone their communication, collaboration, and critical thinking skills through working with robotics while learning to code in two different languages. This session will expose educators to ways that the EV3 Coding Activities will connect students to real life scenarios. Educators will experience what it will be like for learners in the classroom.

ST06 - Dive into Design Thinking (Grade: K to 12)
Presenters: Cooper Hewitt, Smithsonian Design Museum

Cooper Hewitt, Smithsonian Design Museum will offer an interactive 3-day workshop for K-12 educators, introducing design thinking as a vehicle for creative problem-solving across disciplines. Educators will “play designer” and take on the tasks of brainstorming, prototyping and presenting solutions to open-ended curriculum challenges under time and material constraints. In
going through the design process, educators will not only come up with strategies that connect to project-based learning, STEM disciplines, 21st Century Skills, and Common Core Standards, but they will also be empowered to use design thinking as a tool for reflecting on and improving teaching practices.

**SPECIAL REQUIREMENT:** Participants will meet at Cooper Hewitt Smithsonian Design Museum for day 2 and day 3 of this workshop.

**ST07- Educators as Partners in Citizen Science (Grade: 6 to 8)**
**Presenter:** New York Botanical Garden

Engage in learning activities designed to introduce phenology, the study of how periodic life cycle events in plants and animals are affected by seasonal and climate change. This workshop introduces online citizen science projects that are actively collecting data on phenological events; Participants will consider how data collected by citizen scientists through the National Phenology Network can help students connect science and mathematical practices to preserving the health of local ecosystems. Participants will explore strategies used at the New York Botanical Garden in the Bronx and learn about the benefits and challenges of enlisting educators and students as citizen scientists.

**SPECIAL REQUIREMENT:** Participants will meet at the New York Botanical Garden for day 3 of this workshop.

**ST09-Engineering the Future 2.0- Design Process (Grade 9-12)**
**Presenters:** It's About Time

Join It's About Time in a teacher professional development course designed to introduce educators to the classroom world of technology and engineering. Participants will work together on hands-on activities as they make connections to real world problems and see how science, mathematics, and engineering are part of students' everyday world, and why it is important for every citizen to be technologically and scientifically literate. During this session, educators will experience cognitively challenging, relevant, and authentic learning experiences as they apply STEM concepts to real world situations. Activities in this session will be from the newly released Engineering the Future curriculum (2017).

**ST10- Engineering, PBL and STEAM In Practice (Grade: 3 to 8)**
**Presenters:** Mosa Mack

This session will focus on project-based learning and engineering in practice, from implementation to assessment through the lens of Mosa Mack. Demonstrations include a three-lesson progression moving from animated science mystery to hands-on labs, and culminating with an engineering challenge. Educators will explore concrete steps to take to move towards student-driven instruction, an understanding of meaningful engineering activities, and new tools to use in their classroom.

**ST11 - Invent-a-Wheel: Make a car that rolls down a ramp (Grade: Pre-K to 2)**
**Presenters:** City College, Engineering Department

Join staff from CCNY Engineering Department and explore concepts of gravity and friction by exploring ways to get an object to move, for example, by pushing, pulling or letting it slide down a ramp. How do the height and surface material affect whether an object will go down a ramp? How do rollers reduce friction? Participants will construct, test and compare their cars, make labeled drawings of them, and then create “How-to Books”.

**ST12 - Leveraging Student Growth with Game-Based Learning (Grade: 3 to 12)**
**Presenters:** BlackRocket Productions

Join Black Rocket staff and explore strategies to improve student engagement and achievement with game design. Learn how to motivate students and increase student achievement in Science, Language Arts, Math, or Social Studies through video game design and play. Participants explore game based approaches to learning and resources to utilize in the classroom. Learn latest trends and innovations in technology with examples of practical applications for a variety of subjects and content areas. All participants will end the workshop with a foundation in the theory and research behind game based learning and game concepts to use in their classroom.
ST13 - Making the Standards for Mathematical Practice Come Alive (Grade: K to 6)

Presenters: *Mind Research*

Leverage the neuroscience of learning through spatial temporal mathematics (*ST Math*), developed by *Mind Research*. Experience problem-solving lessons and instructional strategies that engage all students and provide access to rigorous, standards-based problems through interactive, digital content. Learn how to use visual problems to promote student perseverance and communication through classroom discussions and blended learning techniques.

ST14 - *Minecraft*: Education Edition Training for Teachers (Grade: 3 to 8)

Presenters: Microsoft

Join Microsoft staff and learn *Minecraft*. Learn the basic principles of game-based learning including pedagogy and design, as well as game play mechanics of *Minecraft*. Teachers will leave with an understanding of how to develop and implement game-based learning and *Minecraft* lessons into their classrooms.

**SPECIAL REQUIREMENTS:** Laptops must have Windows10, or Mac Operating System X(OSX) with 10.11 or greater. In addition, a wireless mouse is suggested and highly recommended.

ST15-Modeling Climate Change for Conservation & History (Grade 6-12)

Presenters: Wildlife Conservation Society

This course presented by the *Wildlife Conservation Society* will explore issues in climate change and its effects on wildlife conservation by looking at NYC ecology. Teachers will learn how to engage students in problem-based computer modeling projects that tie to NYS Content and Next Generation Science Standards. Teachers will also create a curriculum map that will allow them to connect this content to the classes that they teach.

ST16-NASA Beginning Engineering Science and Technology (Grades 3-8)

Presenters: NASA Education

Join NASA's *BEST* and focus on teaching the engineering design process, a series of steps that engineers use to solve problems. What makes these BEST activities different is that they provide no "recipe" and no drawings for building the items in each activity. The emphasis is on students' understanding that engineers must "imagine and plan" before they begin to build and experiment. Explore strategies that can be used in the classroom to help students formulate their ideas and draw up their plans before constructing their project. Activities will be shared that can be used during the school day or for after-school clubs.

ST17-New York City Water and Climate Change (Grade 6-12)

Presenters: New York City Environmental Protection Agency

Join members of the NYC Environmental Protection Agency to discuss climate as one of the Earth’s most fundamental elements, and how changes in climate reverberate through all systems. Teachers will gain a concrete understanding of New York City’s water systems, the science of climate change, and what is being done today to address climate impacts on our city. By the end of the program, teachers will have acquired the knowledge, resources, and practical application skills necessary to effectively engage their school communities for environmental conscientiousness and sustainability.

ST18-NYC Water System Field Course (Grades 3-12)

Presenters: *NYC H2O*

Teachers will be introduced to the NYC water system as a launch pad for teaching STEM concepts. Workshop participants will learn on site about the engineering and design features of Central Park Reservoir and High Bridge, and their importance to New York’s growth. Hands-on activities, applicable to the classroom, will be demonstrated to teach engineering concepts. Teachers will learn how to guide students in building a functioning aqueduct, assemble a 3-dimensional topographical map, and support students in map reading skills in a fun, engaging way.

**Special Requirements:** Day 2 will include a field trip to the Central Park Reservoir and Day 3 will include a field trip to High Bridge.

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ST19 - Producing Classroom Movies on the iPad (Grades K-12)
Presenter: Michael DiSpezio, Author and Global Educator

Learn how to use your iPad (using the iMovie app) to produce classroom videos. From desktop editing to chroma keying to participating in an actual field shoot, you'll experience all aspects of video production as your team creates its own short educational movie.

Special Requirements: All participants must bring an iPad each day to this course, and should have the following apps installed on it prior to the start of the institute: iMovie (http://www.wired.com/2011/03/how-to-install-imovie-on-your-ipad-1/) and Green Screen by Do Ink (https://itunes.apple.com/us/app/green-screen-by-do-ink/id730091131?mt=8).

ST20 - Project-based learning with the EV3 robots (Grade: K-8)
Presenter: LEGO First

Have you ever wondered how to build and program a robot? Do you have an innate Curiosity and Spirit? Or, were you just looking for an Opportunity? (Hint: All three are NASA Mars Exploration Rovers.) Educators attending this Level I workshop will build their confidence as they collaboratively learn the basics of building, programming and integrating sensors into a LEGO Mindstorms EV3 robot. Interdisciplinary curricular connections will be explored with an eye towards using robotics as part of the curriculum. Finally, participants will use their new skills to compete against each other in a friendly FIRST LEGO League challenge.

ST21 - Saving Humpty Dumpty: iSTEM & Engineering Design Tasks (Grade: 5-12)
Presenters: City College, School of Education

Join CCNY faculty in hands-on experiences and explore strategies for integrating STEM content via engineering design tasks in science classes. Teachers will be introduced to practices of engineering design thinking, participate in a design task, while learning the physics of what makes it work and do single-variable controlled experiments. Teachers will use simulations to discover the Law of Torque, recognize proportional tradeoffs in the mechanical advantage that simple machines provide, and optimize performance of motors and waterwheels. Hands-on activities will first focus on building qualitative understandings of cost-benefit ratios, and later show optimization can be quantified.

SPECIAL REQUIREMENT: Day 2 and Day 3 of this course will take place at City College

ST22 - Signs of the Seasons: An Introduction to Phenology (Grade: 3-8)
Presenters: Brooklyn Botanic Gardens

Join staff from Brooklyn Botanic Garden to explore investigations using phenology, the study of how life cycle events are affected by seasonal change. Focusing on woody plants, participants will learn about and practice the skills of field botanists: identifying plants from parts using dichotomous keys, recording observations, and accessing and contributing to phenological data records maintained by the National Phenology Network and Project Budburst. In exploring local plant collections we will build content and science practice knowledge while thinking about the ecological significance of the timing of life cycle events in plants native to our region. The design of long-term investigations that blend collection of original field data as well as secondary data will be included. This course provides a brief introduction to Citizen Science, and its value as an opportunity for NYC students to contribute to a significant global research initiative.

SPECIAL REQUIREMENT: Day 2 and Day 3 of this course will take place at Brooklyn Botanic Garden.

ST23 – Solar 1: Cool Activities for a Warming Planet (Grade: 6 to 12)
Presenters: Solar One Organization

How can we prepare our students to build a more sustainable future? Solar One, a local nonprofit sustainability education organization presents Green Design Lab (GDL). GDL promotes real-world learning and sustainability through 5 units- Energy, Water, Food, Materials and Air. During the training teachers will participate in hands-on STEM activities such as wind turbine design and battery building, develop customized lesson plans, and learn best practices for integrating sustainability and environmental science across disciplines.
ST24- Sound & Light Energy Transmission through Waves (Grade 6 to 8)  
Presenters: Lab-Aids

Although we live an EM waves-enabled lifestyle, most of us (middle school students included) have no idea how they actually work. Join LAB-AIDS as we explore properties of light by investigating colors of the visible spectrum as well as the energy levels of the different colors of white light through the use of phosphorescent material. Activities exemplify the practical application of the Standards and show how SEPUP embeds the research-based practices and real issues to deliver powerful content learning.

ST25-STEM In the Garden (Grades Pre K-12)  
Presenters: Grow To Learn

Interested in starting a school garden at your school, but aren’t sure how to begin? Looking for ways to make your garden a center for hands-on, inquiry-based learning? Join Grow to Learn staff for an exciting workshop focused on planning, building, and using a school garden. We'll cover all the gardening basics (mapping and planning, garden types and building, planting, maintenance, and harvesting) -- plus engaging STEM activities to use with students. This workshop is open to K-12 schools who either currently have or are planning a school garden. It is recommended that attendees come prepared with possible space(s) at their school for a garden and approximate dimensions of that garden space. Schools will leave this workshop registered with Grow to Learn (making them eligible to apply for Grow to Learn Mini-Grants and to receive free gardening materials), prepared to begin a school garden project, and armed with STEM activities to incorporate into classroom gardening.

Special Requirements: Day 2 of the Institute will take place on Governor's Island, at the Teaching Garden.

ST26-STEM Learning, Coding and Creativity in Elementary Grades (Grade K-5)  
Presenters: LEGO Education

Join LEGO Education and experience all that STEM has to offer in an elementary classroom through hands-on exploration of robotics and coding. This interactive session will allow participants to experience two coding languages, explore the WeDo 2.0 Software and use WeDo 2.0 robotics with Scratch. We will emphasize how project-based learning in these areas can give students real world experiences in the STEM fields and prepare them to be problem solvers and scientific thinkers through harnessing creativity, developing engineering habits of mind, and honing their skills in communication.

ST27-STEM QUEST: Game-Like Learning in STEM (Grade 3-12)  
Presenters: The Institute of Play

Learn how to use games and game design to support student-centered learning with the Institute of Play. This workshop series supports teachers in understanding game design and its relevance to STEM teaching and learning, along with taking the first steps empowering teachers to be creators of learning-oriented games for use in their own contexts. The goal of this program is to build capacity among teachers in understanding the value of game design and game-based learning, as well as the role of non-digital game-play and design to support student learning. Participants will create a “learning game” focused on a chosen STEM skill, practice, or crosscutting concept.

ST28- Teaching Engineering in the Elementary Classroom (Grade 3-5)  
Presenters: WNET, Channel 13

Join staff from Channel 13 and learn strategies to incorporate engineering design concepts in elementary school science lessons. Teachers will master the engineering design process and understand how it can be applied to their science teaching, identify engineering concepts that are already part of their lessons and highlight those concepts, and discover opportunities to tie in new engineering concepts while updating existing lessons and planning new ones. Teachers will explore PBS Learning Media, and will undertake an engineering design challenge and then plan a lesson using their new-found engineering expertise.
ST29-The Art and Science of Photography (grade 6-12)
Presenters: Magic Box

Join Magic Box and build your own digital camera from a Bigshot DIY camera kit, exploring the science and engineering—the gears, sensors and lenses that make up a functioning camera—and the mechanics of photography. Learn the basic concepts and vocabulary of photography during challenges that sharpen visual literacy, improve skills and stretch imaginations. Teachers will leave with ideas for integrating curriculum with exciting projects that build their students’ creativity and their communication, observation and critical thinking skills, and align with academic goals and standards in the sciences.

ST30- The Billion Oyster STEM Educator Workshop (Grade K-12)
Presenters: New York Harbor Foundation

The Billion Oyster STEM Educator Workshop will focus on restoration ecology and the New York Harbor. Content-intensive lessons and hands-on marine science problem solving activities will be presented, including Oyster Restoration Station monitoring and water quality analysis. An historical perspective of the oyster industry in New York Harbor will also be included. Teachers will receive classroom/field materials and standards aligned curriculum at the end of the session.

Special Requirements:
Day 2 and Day 3 will take place on Governor’s Island and will include a boat trip to view and monitor select oyster beds in the harbor.

ST31-Up your STEM Engagement with littleBits (Grade 3-5)
Presenters: Little Bits

Participants will begin by defining STEM/STEAM and understanding how authentic learning experiences can provide students with a 21st century skill set. Diving deeper into the ‘E’ in STEM, participants will explore the Engineering Design Process through a hands-on invention challenge. Next, problem-based learning will be used as a way to connect inventing to issues that matter to your students. Participants will learn how to adapt a current unit of study to a problem solving framework, encourage student reflection and conduct an inquiry investigation. LittleBits will be used as the hands-on tool throughout the workshop.

ST32-We are having molecules for dinner (Grade 9-12)
Presenters: Bill Yosses, Former White House Chef

Use cooking and culinary skills to explain science. Chemistry, Physics, Biology are all pertinent to cooking and they are dramatic and delicious experiments that illustrate complex scientific principles. Dive deeply into the subjects such as catalysts, emulsions, nitrogen fixation, properties of light, fermentation, and heat transfer that have all been used in cooking and in science since at least the 17th Century. We cook recipes that are visual, olfactory, and gustatory in a way that illustrates and highlights a science lesson.

ST33-Designing a STEM Coding Initiative with Swift Playgrounds(Grade 6-8)
Presenters: APPLE Education

Teachers, teacher leaders and administrators are invited to join members of the APPLE Education Staff and explore Swift Playgrounds, curriculum materials that make it easy to bring coding into your school. Learn how to create and deliver engaging STEM experiences aligned to the NYCDOE STEM Framework and learn how these experiences can personalize learning and help students of all learning styles grasp challenging coding concepts. Identify areas in which Swift Playgrounds aligns to standards and design a prototype to incorporate Swift Playgrounds into your school environment.

SPECIAL REQUIREMENT: All participants must bring an iPad each day to this course.

ST34- DIVE-in Engineering (Grade 3-8)
Presenters: Accelerate Learning:STEMScopes

Explore DIVE-in Engineering with STEMscopes and the New York Hall of Science and develop strategies to help students think like an engineer. Learn to guide students through engaging engineering curriculum built around flexible, hands-on lessons developed to transform your classroom into an authentic makerspace. Gift your students with practical, inquiry-based educational experiences that encourage exploration and inspire ingenuity while leveraging the DIVE method (Deconstruct, Imitate, Vary, Explore). Develop strategies to empower students to act like real engineers as they deconstruct and devise solutions to real-world problems.
This learner-driven workshop is designed for educators working with grades K-5. Participants will build knowledge of engineering and confidence in teaching it through a hands-on experience with *Engineering is Elementary© (EiE)* materials. EiE-trained DOE teachers will engage participants in discussions about effective strategies for teaching engineering at the elementary level. Participants will receive an EiE Teacher Guide of their choice and have access to a wealth of online educator resources to enhance STEM instruction.

**SPECIAL REQUIREMENT:** This session is open to educators who have not previously attended EiE training.