Department of Education
Carmen Fariña, Chancellor

STEM INSTITUTE

Mid-Winter February, 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 Mid- Winter STEM Institute, for teacher teams of 2 to 3 educators.

During the three-day STEM Institute, which will take place at Stuyvesant High School from Tuesday, February 21st to Thursday, February 23rd 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.

Eligible teachers and supervisors who attend the full Institute will receive 18 hours of per session. Teachers review Vacancy Circular #13. Supervisors review Vacancy Circular #12.

Please note: As this is a paid professional development opportunity and we do not offer childcare, we ask that you please do not bring children to the Institute.

Registration Closes: February 3, 2017
Registration can be found here (click here).

NOTE: You will initially receive confirmation of your online registration when it is complete. Confirmation of your acceptance in the program will occur after we have received your principal's approval of your attendance in this program.

STEM INSTITUTE TRACKS

STEM (ST) TRACK SESSIONS

The professional learning opportunities for with a course number beginning with ST encompass 3 days of training at the Mid-Winter 2017 STEM Institute. By selecting one of these sessions you are committing to attend the full professional learning offering at the Mid-Winter STEM Institute on February 21st through February 23rd 2017. Please note any special requirements when you register.

COMPUTER SCIENCE (CS) TRACK SESSIONS

The professional learning opportunities for Computer Science (CS) will encompass 3 days of training at the Mid-Winter 2017 STEM Institute. By selecting one of these sessions you are committing to attend the full professional learning offering at the Mid-Winter STEM Institute on February 21st through February 23rd 2017, as well as continuing follow-on support that will be provided during the remainder of the school year.

Instructions to register for CS and ST track:

- Review the breakout descriptions and decide which one your teacher team will attend. Teacher teams should attend the same session.
- A team consisting of a maximum of three teachers and an administrators can register individually for the Institute.
- Administrators who wish to ***only*** attend the plenary session on Tuesday, February 21 from 9am to 11am should email STEM@schools.nyc.gov indicating in the subject line: **Registration for MW 01.** In the body of the email list your name, position, school code, and district.
- Please make sure your principal approves your participation in the Institute as we will reach out to confirm the approval.
- **All participants are expected to bring a laptop or tablet that they will use during the program.**
- Please review the special requirements for the course you select. Make sure that you will be able to fulfill the specific requirements of that course.

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 Principal's approval for you to participate in this program.

STEM (ST) TRACK SESSIONS –

ST01 - Aviation and Aeronautics in Math and Science (Grades 6 to 12)

Learn to make an airplane fly as you explore the science and math of aviation with presenters who are DOE teachers. Teachers of math and physics exploring the benefits of STEM will identify and review instructional strategies that motivate students using computer-based flight simulators. Teachers will deepen their understanding of concepts such as motion, energy, forces, fluid dynamics, weather and climate, air density, navigation. Throughout the process math concepts from pre-algebra to linear and nonlinear equations will be used to explain the physics of flight. Physical concepts and associated math equations or techniques used to explain flight will be presented in the form of missions accomplished through the use of on-site flight simulators

Special Requirement: None.

ST02 - Design Challenges from Our Classroom to Yours (Grade: 3 to 12)

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.

Special Requirement: None.

ST03 - Developing Joy in Math with Problems and Puzzles (Grade: 6 to 12)

Mathematics is a beautiful subject, but it's easy to lose sight of its beauty while solving dozens of problems that all look the same. Worse, routine problems build basic skills but they don't prepare students for the more challenging problems they will encounter in STEM classes in high school and in college. No more! Bring forth the joy of mathematics through non-routine problems and puzzles that promote deep thinking. Explore problem solving that is fun while also prompting student reflection on math already learned, but in a new way. The ***Art of Problem Solving Organization (BEAM Center)*** will share problems and problem sources for use in the classroom.

Special Requirement: None.

ST04 - Dive into Design Thinking (Grade: K to 12)

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.

ST05 - Engineering the Future 2.0- Design Process (Grade: 9 to 12)

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).

Special Requirement: None.

ST06 - Engineering, PBL and STEAM In Practice (Grade: 3 to 8)

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.
Special Requirement: None.

ST07 - Green STEM: A Model for Real-World Learning (Grade: K to 12)

Green STEM blends traditional STEM education strategies with environment-based education and emphasizes project-based learning and real world problem-solving. Research and experience has shown that environment-based education improves students' motivation to learn and enhances academic achievement in all subjects. Join the ***National Wildlife Federation's NYC Eco-Schools*** for an exciting, hands-on program featuring educators who will demonstrate how to use ***Green STEM*** as a model for real-world learning – from cleaning up oil spills, designing schoolyard pollinator gardens, investigating the impact of human activities on water quality, and learning about plant biology and the vital role that plants play in our biosphere. Participants will leave with tools and ideas to help them explore project-based learning in and out of the classroom.
Special Requirement: None.

ST08 - Inquiring and Connecting: Effective STEM Teaching (Grade: 3 to 8)

Join experts from ***Liberty Science Center*** and explore hands-on, minds-on, interactive activities that engage and challenge students. Sessions are aligned with NY State Common Core and NY State Learning Standards for Math, Science, and Technology, NY CCLS, and NYC K-12 Scope and Sequence, as well as incorporating NGSS into instruction. The objective is to provide teachers with dynamic, robust STEM lesson plans that will allow teachers the opportunity to assimilate their new knowledge seamlessly into their own teaching using every-day, obtainable materials.
Special Requirement: None.

ST09 - Making Engineering Elementary- an Introduction to *Engineering is Elementary* (Grade: K to 5)

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.

ST10 - Making the Standards for Mathematical Practice Come Alive (Grade: K to 6)

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.
Special Requirement: None.

ST11 - MechAnimations: Make mechanisms that tell stories (Grade: K to 5)

MechAnimations are kinetic toys, which depict animals, people or scenes. Explore structures or mechanisms with ***CCNY Engineering faculty*** by making things from pegboard strips and boards. Both are examples of systems, which are represented by models. You will develop a visual language for modeling your devices, use them to create more complex designs, and learn to control the direction and speed of motion of a mechanism. Next you'll explore mechanisms made by others, such as flip toys, nail clippers, salad tongs, nutcrackers and pliers. You'll create your own flip toy, and then make a MechAnimation that tells a story.
Special Requirement: None.

ST12 - Modeling Climate Change for Conservation & History (Grade: 6 to 12)

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.

Special Requirement: None.

ST13 - Project-based learning with the EV3 robots (Grade: K to 8)

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.

Special Requirement: None.

ST14 - Saving Humpty Dumpty: iSTEM & Egg Drop Design Task (Grade: 9 to 12)

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. During this workshop, teachers will learn how to do science-informed brainstorming (Newton's Laws of motion, impulse-momentum) and use slow-motion videos to create voice-over enhanced troubleshooting portfolios that can help them (and students) iteratively improve and achieve optimal solutions to design challenges such as the classic "egg drop".

Special Requirement: None.

ST15 - Solar 1: Cool Activities for a Warming Planet (Grade: 6 to 12)

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.

Special Requirement: None.

ST16 - Sound & Light Energy Transmission through Waves (Grade: 6 to 8)

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.

Special Requirement: None.

ST17- STEM Learning, Coding and Creativity in Elementary Grades (Grade: K to 5)

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.

Special Requirement: None.

ST18 - STEM QUEST: Game-Like Learning in STEM (Grade: 3 to 12)

Learn how to use games + 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 gameplay and design to support student learning. Participants will create a "learning game" focused on a chosen STEM skill, practice, or crosscutting concept.

Special Requirement: None.

COMPUTER SCIENCE (CS) TRACK SESSIONS –

CS01 - Programming and Play: Creative Computing in K-5 (Grade: K to 5)

Join ***Hello Ruby*** in this hands-on workshop to learn how to teach computing in an unplugged way. Participants of this workshop will learn how to install curiosity and a creative attitude in their students without adding to their screen time. This workshop offers 20 lessons to bring creative computing to K5 education combining storytelling, crafting and coding. All participants will leave with an understanding of how to include computers, technology and coding to everyday learning situations or curriculum. Teachers will receive a storybook, teacher guide with lesson templates and Scratch exercises, workbooks for students and guidance for implementing the lessons.

Following the STEM Institute, participants will receive additional support sessions and lessons to cover new curriculum and three webinar Q&A opportunities.

Special Requirement: None.

CS02 - Choice Time and Enrichment With Robotics (Grade: 3 to 5)

Learn how to bring STEAM into your classroom by incorporating engineering and robotics into enrichment and choice time using Legos. This ***Sunset Spark*** workshop will help teachers learn how to successfully introduce concepts in mechanics, robotics, and coding into their general ed, ICT, and self-contained classrooms to instill confidence and excitement around engineering and robotics in both teachers and students.

Following the STEM Institute, each school site will receive two 90 minute coaching sessions to help tailor robotics to the specific culture and structure of the teacher's classroom or school. These sessions will help teachers plan out choice time activities, plan for weekly lunch clubs, and how to integrate it into upcoming units in their classroom. In addition, teachers will participate in one joint support full-day session to refresh on the material, share rollout/implementation models, and hold a robotics event among participants that can be brought back to schools through a club setting. Participants will also receive email and phone support.

Special Requirement: None.

CS03 - Creative Programming for Upper Elementary Using Scratch (Grade: 3 to 5)

During ***Ada and Leo's*** Creative Programming for Upper Elementary Using Scratch workshop, teachers will use the first four units of the ScratchEd Creative Computing Curriculum as a starting point to guide teachers through planning a 20-session introduction to programming for students in grades 3-5, with a focus on creative expression as a tool for engagement and access.

Following the STEM Institute, participants will receive an additional 15 hours of support with two five-hour weekend sessions in Manhattan, and two 2.5-hour after school sessions in the Bronx, Brooklyn, and/or Queens, depending on teacher preference. In addition, Ada and Leo will provide summary emails to participants, and a Google Group in which to post questions and share learnings, in which the workshop leaders will be active. Participants will also be invited to attend the New York Scratch Educators Meetup with the workshop leaders, to network with other educators and form relationships to support further development.

Special Requirement: None.

CS04 - Teaching Biorobotics in the Classroom (Grade: 3 to 8)

In this professional development opportunity, teachers will be introduced to the unique and scaffolded ***Iridescent*** biorobotics curriculum and learn how to implement it in the classroom. Through this curriculum teachers will help students learn observation skills, basic circuitry, how to use electrical engineering tools, and are introduced to programming and Arduinos to automate their own mechanical robots.

Following the STEM Institute, participants will receive one-on-one consultation services and support navigating the online platform that houses Iridescent's biorobotics and NGSS-aligned project-based curriculum. Teachers are also expected to participate in additional Webinars hosted by Iridescent throughout the year.
Special Requirement: Windows 7 or greater or Mac OSX or greater.

CS05 - Using Coding and Game Design to Create a STEM Learning Environment (Grade: 5 to 8)

In this session, ***Globaloria*** will walk teachers through the process of creating a learning game using coding and game design. Through a project-based approach to blended learning, ***Globaloria*** provides opportunities for students to think analytically, do online research, read, write and work collaboratively while solving complex problems using computational tools. All courses can be seamlessly integrated into core STEM subject areas or used as a stand-alone curriculum.

Following the STEM Institute, participants will be required to attend additional ongoing virtual training and be assigned to a ***Globaloria*** classroom support specialist who will provide approximately 15 hours of in-person and virtual support. Participants and their students will have access to the ***Globaloria*** Help Center where they can work virtually with experienced ***Globaloria*** Coding Coaches who can provide them support debugging and enhancing their games. Additionally educators will have access to online virtual resources (e.g. video tutorials, lesson plans etc.).
Special Requirement: None.

CS06 - Creative Coding in any Curriculum (Grade: 6 to 8)

Bring coding into the classroom through a medium that maximizes engagement for students. Participants will build basic and intermediate JavaScript skills through collaboration on creative projects incorporating variables, loops, conditionals and functions, while developing understanding and communication of fundamental programming concepts. Educators will take away methods and resources for integrating computer programming into their subject area.

Following the STEM Institute, participants will receive additional training through two face-to-face workshops and online sessions with ***Vidcode*** curriculum specialists through the 2016-17 school year. These follow-on sessions will equip participants with new lessons and project prompts to scaffold upon what was collected during the STEM institute. Face-to-face sessions and webinars will also enable participants to share classroom learnings (what is and is not working) with each other. The follow-on support will increase participant capacity with respect to computer programming and its role in curriculum as participants continue to learn to code and code to learn.
Special Requirement: None.

CS07- Bootstrap 1: Computer Programming with Algebra (Grade: 6 to 12)

Bootstrap is a curricular module that teaches students to program their own video games using algebraic concepts. Each lesson is aligned to National and NY standards for mathematics, allowing teachers to use existing classroom time to integrate ***Bootstrap***. In this workshop, we explore the research and pedagogy behind the curriculum, investigate the cognitive challenges of algebra, and practice the entire curriculum together from start to finish.

Following the STEM Institute, ***Bootstrap*** staff will follow-up with teachers in the form of email support, along with two in-person follow-up workshops during the school year. These follow-up sessions offer the opportunity to ask further questions, see new activities, work with other, local teachers implementing the material, and get assistance integrating the material into the classroom. Throughout the year participants will also have access to ***Bootstrap's*** online discussion group, as well as phone and email support from ***Bootstrap*** staff.
Special Requirement: Recommended for Algebra 1 teachers.

CS08 - Creative Web Development and Programming (Grade: 6 to 12)

Creative Web Development and Programming (CWDP) introduces students to web development using a robust curriculum that includes elements of design, entrepreneurship, and critical thinking skill development. Students, through a series of projects and lessons, learn how to build web site projects using HTML and CSS and core programming concepts with Scratch and JavaScript. Students complete entrepreneurship activities, designing their own technology solutions to real-world problems. During the workshop, participants will be provided with a full curriculum to be able to teach a semester or year-long course with CWDP.

Following the STEM Institute, participants will be able to access ***Code Interactive's*** (C/I) online community of support to connect teachers with C/I facilitators, Program Managers and one another for discussions regarding classroom instruction and problem solving.
Special Requirement: None.

CS09 - The Tech Skills Accelerator for Teachers (Grade: 9 to 12)

The Tech Skills Accelerator for Teachers is an immersive workshop series where participants will go through the accelerated process of learning to teach students how to develop a mobile augmented reality application and a website minimally viable product (MVP), which they can present professionally.

Following the STEM Institute, teachers will have access to ***Silicon Harlem's*** online community through google docs. Teachers will also be expected to participate in six two-hour shared collaboration virtual workshops that will focus on: AR and creative content development, subject matter AR, fostering team collaboration, gameifying the design process, practicing pitching and moonshot problem-solving strategies.
Special Requirement: None.

CS10 - Using Data, Security and Algorithms in a Connected Classroom (Grade: 9 to 12)

The program Using Data, Security and Algorithms in a Connected Classroom aims to equip educators with the language, skills and critical concepts needed to teach students how to maintain digital security, critique algorithmic bias, evaluate interpretations and applications of data, and harness information to improve communities.

Following the STEM Institute, participants will be required to attend virtual workshops, offered bi-weekly by the ***LAMP***, as well as one in-person weekend workshop. In addition, individual 30-minute phone call support sessions will be arranged with each participant.
Special Requirement: Microsoft Windows 7 or greater with Internet Explorer 8 or newer OR Mac OS 10.10 or newer, Google sheets or Microsoft Excel, Tableau Public free data visualization software.