Technology & Engineering Professional Learning Opportunities

Department of STEM

Office of Curriculum, Instruction, and Professional Learning
Division of Teaching and Learning

Listing by Grade – Registration Links available by clicking on event/session topic

PL sessions for Elementary teachers

PL sessions for Middle School teachers

PL sessions for High School teachers

Elementary Teachers

City Technology Fantastic Elastics Wind-Ups & Pop-Ups		
Event	**Dates**	**Time**
Description The Elementary City Technology Fantastic Elastic Wind-Ups & Pop-Ups are designed for elementary (2-5) teachers, including science cluster teachers. The Institute will consist of a series of four sessions, and it is expected that teachers will attend the entire series. The descriptions of the sessions are below:		
Description The City Technology Project will be based on two existing units developed by City Technology, Fantastic Elastic (Wind-ups) (grade 2-3) and Pop-ups (grade 4-5). Both units have been the subjects of DoE STEM Institutes in Spring and Summer 2015, and both were reviewed very favorably by the participants. Wind-ups and Pop-ups have been selected because they develop algebraic concepts at developmentally appropriate levels in the elementary grades. Extensive research strongly supports the development of algebraic reasoning in the elementary grades through identifying variables, pattern finding, mathematical modeling and drawing inferences from these models. Both Wind-ups and Pop-ups promote this type of learning in the context of engineering design. Each cohort will consist of a series of four sessions, two hands-on sessions of professional learning to prepare for implementation, followed by two half-days during the period of implementation and two days observing and interacting with best practice teachers and their classrooms in a NYCDOE school. At the end of the second PL session, the project will provide complete sets of classroom materials for each unit, based on 25 students per classroom	**Wind-Ups:** 11/8 11/15 Dec/Jan* Feb/March* **Pop-Ups:** Tuesday 11/8 (Chancellor's Conference Day) - CCNY Tuesday 11/22 - CCNY Dec/Jan* Feb/March* *Teacher scheduled visits to best practice sites	**9:00 am to 3:00 pm**

Register for Wind-Ups **Register for Pop-Ups**

MINECRAFT CHALLENGE FOR STEAM TEACHERS		
Event	**Dates**	**Time**
Description "The Minecraft Challenge for STEAM Teachers" is designed for Grade 2 – 12 STEAM teachers who are interested in incorporating internet based game design into their classrooms. The Institute will consist of a series of four sessions, and it is expected that teachers will attend the entire series. The descriptions of the sessions are below:		
Minecraft Challenge for STEAM teachers ** Prerequisite for attending and implementation – NYCDOE teachers who have access to MACBooks with the latest OS X EL Capitan or Microsoft Surfaces for a class of students.* This 2 day hands-on workshop will support educators in using Minecraft (Microsoft's new classroom version) into the STEAM classroom, and it will allow them to develop the skills and confidence needed to facilitate courses with their students. During the PD educators will also get to explore the IOP produced curriculum toolkit. Participants will move through a design process from a student's point of view to create exemplar projects based on the student curriculum. The design process they use will also teach them a pedagogical framework for use in their classrooms with students. The curriculum is designed for art teachers, and is heavily project based. It includes activities and projects that integrate creative uses of Minecraft such as world building, pixel art, sculpture, architecture & the design of spaces. Mark Grundel came to NYCDOE STEM via an introduction by Microsoft. Mark is a 5th grade teacher of 11 years, working in South Central New Jersey. He has been using Minecraft in his classroom for the last year and runs the #MinecraftEDU Twitter chat for educators on this Hashtag on Tuesday Nights at 8pm. He is a huge believer in gamified curriculum and is a regular education sponsored presenter on Minecraft at education conferences.	11/9 12/13	**9:00 am to 3:00 pm**

PBL – Helping Students and Educators – "See the Relevance"

Event	Dates	Time
Description The **PBL – Helping Students and Educators – "See the Relevance Institute"** is designed for teachers of any subject, grade 3-8. The workshop will consist of three sessions, and it is expected that teachers will attend the entire series. Project Based Learning is a teaching pedagogy that helps students understand the relevance of what they are learning in the completion of a project that requires their use of 21st century skills. What is also significant is that educators understand the relevance of what they are teaching and how this method engages their students. Intended Audience: 3rd – 8th grade (any subject). The descriptions of the sessions are below:		
Major Goals of Presentation: To give educators the tools they need to try a PBL lesson right away To help educators understand how to assess students during a PBL lesson To assist educators in how to change their teaching methodology To have teachers leave with a "ready to go" lesson To give teachers follow-up assistance if needed • Definition and identification about student success: how do you know when a student is learning? • Overcoming impediments to student learning • Strategies to develop 21st century learners • Inquiry based learning & project based learning • Challenges, successes, and examples of PBL • Creating a PBL lesson/unit • Beginning your PBL lesson-planning • Assessment & PBL • Next steps – coaching through process and implementation This workshop is presented using PBL so the educators get to see the strategy as it is used in the presentation of their workshop. Lots of participation and lots of fun accompany this presentation! What is key is that educators leave here ready to try a lesson. Teachers leave with the lesson that they developed and some summary sheets to aid them as they prepare to teach and a lifeline to Dr. Ray Ann Havasy for follow up. **Dr. Ray Ann Havasy** is an extraordinary local woman whose life revolves around dinosaurs. Dr. Ray Ann Havasy, a scientist and educator, specializes in paleontology and zoology. She has dedicated her life to educating youth about the wonders of science and how to apply scientific knowledge. Ray Ann is the co-founder and president of the Center for Science Teaching and Learning (CSTL), based at Rockville Centre's Tanglewood Preserve.	**CTSL (Center for Science Teaching & Learning)** 11/16 12/7 1/11	**9:00 am to 3:00 pm**

Exploring STEM through the Hudson River with Columbia's Lamont Doherty Earth Observatory

Event	Dates	Time
Description **Exploring STEM through the Hudson River with Columbia's Lamont Doherty Earth Observatory Institute** is targeted toward grade 4-12 teachers. The Institute will consist of a series of three sessions, and it is expected that teachers will attend the entire series. Part of this Institute will take place at (LDEO) Lamont-Doherty Earth Observatory in Nyack, NY. Teachers can drive or take the Columbia Univ (TC)/ Lamont Shuttle Bus Schedule round trip coach service from outside the entrance to the Columbia University Teachers College Campus. Some of the sessions will take place at the Columbia University Teachers College lab where Margie Turrin does her research. The descriptions of the sessions are below:		
Exploring STEM through the Hudson River, your tool to teaching system science and models – led by Margie Turrin, Education Coordinator at Columbia University's Lamont-Doherty Earth Observatory. Collecting place-based environmental measurements is a powerful way to explore system science and science models. This series of workshops will focus locally, providing teachers with training, tools and resources to engage their students in collecting measurements in our dynamic estuary. Teachers will engage in field measurements and then compare these to real-time data collected through instrumentation in order to examine temporal and spatial differences in the Hudson River estuary. We will then move from the Hudson to comparing this system to other estuaries to see if our Hudson system and estuary model matches to others. Supply kits will be provided so teachers will be fully prepared to carry this instruction back to their schools. We will host one class in the field at Piermont Pier in Rockland County and the other two workshops will be held at the Columbia campus in NYC. **Margie Turrin**, is Education Coordinator at Columbia University's Lamont-Doherty Earth Observatory where she develops and runs science education projects for groups from informal community education, to K12 and undergraduate students. Her projects and publications range from engaging students and the public in the polar regions, understanding our Earth and environment, human interactions and impacts on their environment, Hudson River education, biodiversity, mapping and spatial skills assessments.	**(LDEO) Lamont Doherty Earth Observatory & Columbia University Teacher's College** 10/25 2/7 4/3	**9:00 am to 3:00 pm**

"Wheel of Invention" CLUBINVENTION		
Event	**Dates**	**Time**
Description The "Wheel of Invention" CLUBINVENTION Institute is designed for elementary through middle school teachers - grades 1-8. The Institute will consist of a series of two sessions, and it is expected that teachers will attend the entire series. The descriptions of the sessions are below:		
The National Inventors Hall of Fame (NIHF) programs utilize creative teaching practices to foster innovation by bringing creativity-based programming to help educators give children the opportunity to apply classroom learning through a practical, hands-on approach. The goal of this professional learning experience is to provide hands-on, innovative and creative STEM experiences that will: • Develop educators' 21st century knowledge and skills in creativity, creative problem solving, innovation, teaming, collaboration and the entrepreneurial mindset. • Reinforce educationally sound, evidence-based instructional methods that provide immersive, hands-on experiences and promote open, safe environments that encourage risk taking and searching for solutions. • Incorporate creative problem solving elements and include effective strategies for developing creative challenges for students. • Encourage the mainstream transfer of inquiry-based science experiences into educators' classrooms. • Enhance educators' STEM knowledge and skills through engagement in scientific inquiry and the engineering design process. Teachers will experience facilitating and learning an inquiry based environment: • Natural Playground: A focus on STEM and creativity • CrickoBot: Illustrates how STEM & creativity combine with an academic concept • Epic Zip Line: Illustrates the power of collaboration and the academic concept of power and propulsion • Wax Sticks: Individual activity that reinforces one of NIHF Inductees, Chuck Hull • Heliball: Illustrates the power of inspiration from the Wright brothers' video. Provides opportunities for participates to take a risk & to experience the power of play • Snap Circuits: Illustrates the connectivity of the group as well as how as teachers we must strive to facilitate and inspire students to make connections between their own experience and the world around them. All modules align with NGSS and Common Core education standards and are designed to meet the needs of varying age groups through primary and intermediate hands-on activities disguised as fun.	11/14 12/9	**9:00 am to 3:00 pm**

Hands-on STEM Teacher Training for Project Based Learning using Rube Goldberg Machines

Event	Dates by	Time
Description The **Rube Goldberg Machine Building for Teachers Institute** is open to all grade levels, though the engineering principles components is designed for grades 6 – 12. **The Institute will consist of a series of two sessions,** and it is expected that teachers will attend both sessions. Teachers will receive all of the necessary kit based materials, curriculum, teachers guide needed to implement the program back at their school		
Program Title: **Rube Goldberg Machine Building for Teachers** This program is intended to follow the engineering and design thinking, project-based learning, art and integrated learning experiences in math and science strands and is intended to be a Level I program. **Total enrollment**: 25-30 teachers. Teachers are expected to attend both sessions in the series. **Time/scheduling**: two 6hr sessions, one in the fall and one in the spring, including breaks for meals. **Program Abstract:** The purpose of this session is to introduce educators to the world of Rube Goldberg Machines and to support their use of transdisciplinary art/science lessons in their schools. Participants will gain a new perspective about the connections between art and science, and see how engineering principles can be taught in any classroom as a creative process exercise. Teachers will deepen their understanding of the historical content about Rube's contribution to design and learn to utilize drawing cartoons as a planning tool. Ongoing support for implementation will include an introduction to free online resources and lesson plans and crowdsourcing new curriculum connections. **Workshop Alignment:** The objective of the "Rube Goldberg Machine Building for Teachers" professional learning sessions is to provide a project-based learning frame work to understanding simple machines, energy transfers and engineering principles. It is purposefully adaptable to almost any grade level, ability or background. The Learning Outcomes this curriculum will provide are: understand the basic simple machines; evaluate the mechanical advantage of simple machines; design simple and compound machines; understand the properties of energy transfers; know the principles of engineering and design. The resources supporting this session will be the Rube Goldberg Speed Building Kit, lesson plan activities and the large archive of Rube's cartoons and writings. The program aligns with the national Next Generation Science Standards in general, as do all of the Rube lessons. Specifically, the program aligns with the Science Scope and Sequence in the following places: Grade 2, Unit 2 Forces and Motion Grade 3, Unit 2 Energy and Unit 3 Simple Machines Grade 6, Unit 1 Energy and Simple Machines Grade 8, Unit 2 Forces and Motion Grades 9-12PH, Unit 6 Modern Physics In general, for most grade levels, the Cross Cutting Concepts that this program addresses are Cause/Effect, Engineering Design, Energy/ Matter and Structure/Function. Rube Goldberg Machines fit into the *STEM Framework* in Domain II 2.2 STEM-centric Curriculum, 2.4 Staff Capacity, Domain III 3.1 STEM Partnerships, and Domain IV 4.1 STEM Pathway Preparation for Elementary School and 4.2 Access to STEM College and Career Opportunities. The goals for this program include motivation for teachers to cover simple machines and energy transfers in new ways, integration of art and science concepts in all classrooms and inspiration for students to connect to STEM concepts in new, creative ways. We expect that teachers will integrate their new knowledge into their teaching practice through a transdisciplinary project-based approach using the Rube Goldberg Machine Lessons to teach collaboration, problem-solving and communication through art and science concepts.	Tuesday, 11/22 April Day #2 TBD	**9:00 am to 3:00 pm**

EVERFI INTERACTIVE ONLINE STEM RESOURCES		
Event	**Dates by Location**	**Time**
Description The Everfi Professional Learning opportunity is designed for teachers of Grades 5-8. The Institute will consist of one face-to-face professional learning session and ongoing technical support.		
Looking for interactive, engaging online STEM resources? EverFi has three web-based courses that 5th – 8th grade teachers can leverage to create a blended learning environment where students gain STEM knowledge and skills, connect STEM concepts to the real world, and learn about STEM careers. This session will introduce teachers to the suite of Everfi's interactive online STEM resources which is always available to teachers free of charge. Attendees will explore how these programs align with the NYC DOE STEM Framework and the Science Scope and Sequence, and will have the opportunity to test out the resources firsthand. Each attendee will leave the session with his/her own online EverFi account, an implementation plan, curriculum materials, and ongoing implementation support of an EverFi Schools Manager. Each Everfi course is composed of 25-minute online modules that use animation, interactive games, and real world simulations to teach, assess, and certify students in specific STEM topics. EverFi's courses are free of charge to schools, thanks to partners like the National Hockey League, NHL Players Association, New York Rangers, the American Society of Mechanical Engineers, and the Entertainment Software Association. Participating teachers will gain access to EverFi's courses, unlimited student licenses, curriculum materials, and ongoing technical support. All attendees are invited to the Everfi End of Year Celebration for the Everfi Teacher Community to celebrate best practices, connect with others interested in STEM practices and share STEM practices.	**To register, use the links on the Institute # you want to attend:** Institute #1: 12/6: Institute #2: 1/24: Institute #3: Late April after Recess One Day PD offered multiple times throughout the year.	**9:00 am to 3:00 pm**

Middle School Teachers

Eco-STEM: Digital Tools for Environmental Monitoring (BOP)		
Event	**Dates**	**Time**
Description The Eco-STEM: Digital Tools for Environmental Monitoring (BOP) Institute is designed for **middle to high school** teachers, including science teachers. The Institute will consist of a series of four sessions, and it is expected that teachers will attend the entire series. The descriptions of the sessions are below:		
Eco-STEM: Digital Tools for Environmental Monitoring Have you ever wanted to learn basic computer coding, electrical engineering, and hands-on environmental stewardship all in one project? These are the goals of this four-day hands-on intensive PD with the Billion Oyster Project, BioBase & Pace University. Teachers will create their own experimental oyster tank for the classroom, build a water quality sensor kit from scratch, learn to calibrate, collect data in the field and transfer all of these skills directly to students. We will work with Arduino microprocessors, Atlas Scientific probes and much more. In the first session we focus on basic estuarine ecology; water quality monitoring, species ID, microscopy, and practice tank set-up in the lab. At our second session, teachers gain basic Arduino programming theory and code, design their own low-cost water quality kit, practice calibration, and begin collecting data. In our third session, teachers recalibrate, test, trouble shoot and deploy their sensors. In the fourth session, participants will head out to the field to deploy their sensors "in-situ" at BOP restoration stations located on the East River shoreline at the LES Ecology Center. We will conclude with an orientation to the BOP's online Curriculum Portal, Citizen Science dashboard, and next steps for becoming a BOP School.	**Cohort #1:** **Pace University** Mon 10/24 Mon 11/7 Mon 11/21 Mon 12/5 **Cohort #2:** Spring Dates TBD	**9:00 am to 3:00 pm**

MINECRAFT CHALLENGE FOR STEAM TEACHERS		
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Hands-on STEM Teacher Training for Project Based Learning using Rube Goldberg Machines

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Description The **Rube Goldberg Machine Building for Teachers Institute** is open to all grade levels, though the engineering principles components is designed for grades 6 – 12. **The Institute will consist of a series of two sessions,** and it is expected that teachers will attend both sessions. Teachers will receive all of the necessary kit based materials, curriculum, teachers guide needed to implement the program back at their school		
Program Title: **Rube Goldberg Machine Building for Teachers** This program is intended to follow the engineering and design thinking, project-based learning, art and integrated learning experiences in math and science strands and is intended to be a Level I program. **Total enrollment**: 25-30 teachers. Teachers are expected to attend both sessions in the series. **Time/scheduling**: two 6hr sessions, one in the fall and one in the spring, including breaks for meals. **Program Abstract:** The purpose of this session is to introduce educators to the world of Rube Goldberg Machines and to support their use of transdisciplinary art/science lessons in their schools. Participants will gain a new perspective about the connections between art and science, and see how engineering principles can be taught in any classroom as a creative process exercise. Teachers will deepen their understanding of the historical content about Rube's contribution to design and learn to utilize drawing cartoons as a planning tool. Ongoing support for implementation will include an introduction to free online resources and lesson plans and crowdsourcing new curriculum connections. **Workshop Alignment:** The objective of the "Rube Goldberg Machine Building for Teachers" professional learning sessions is to provide a project-based learning frame work to understanding simple machines, energy transfers and engineering principles. It is purposefully adaptable to almost any grade level, ability or background. The Learning Outcomes this curriculum will provide are: understand the basic simple machines; evaluate the mechanical advantage of simple machines; design simple and compound machines; understand the properties of energy transfers; know the principles of engineering and design. The resources supporting this session will be the Rube Goldberg Speed Building Kit, lesson plan activities and the large archive of Rube's cartoons and writings. The program aligns with the national Next Generation Science Standards in general, as do all of the Rube lessons. Specifically, the program aligns with the Science Scope and Sequence in the following places: Grade 2, Unit 2 Forces and Motion Grade 3, Unit 2 Energy and Unit 3 Simple Machines Grade 6, Unit 1 Energy and Simple Machines Grade 8, Unit 2 Forces and Motion Grades 9-12PH, Unit 6 Modern Physics In general, for most grade levels, the Cross Cutting Concepts that this program addresses are Cause/Effect, Engineering Design, Energy/ Matter and Structure/Function. Rube Goldberg Machines fit into the *STEM Framework* in Domain II 2.2 STEM-centric Curriculum, 2.4 Staff Capacity, Domain III 3.1 STEM Partnerships, and Domain IV 4.1 STEM Pathway Preparation for Elementary School and 4.2 Access to STEM College and Career Opportunities. The goals for this program include motivation for teachers to cover simple machines and energy transfers in new ways, integration of art and science concepts in all classrooms and inspiration for students to connect to STEM concepts in new, creative ways. We expect that teachers will integrate their new knowledge into their teaching practice through a transdisciplinary project-based approach using the Rube Goldberg Machine Lessons to teach collaboration, problem-solving and communication through art and science concepts.	Tuesday, 11/22 April Day #2 TBD	**9:00 am to 3:00 pm**

High School Teachers

Eco-STEM: Digital Tools for Environmental Monitoring (BOP)		
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Exploring STEM through the Hudson River with Columbia's Lamont Doherty Earth Observatory

Event	Dates	Time
Description **Exploring STEM through the Hudson River with Columbia's Lamont Doherty Earth Observatory Institute** is targeted toward grade 4-12 teachers. The Institute will consist of a series of three sessions, and it is expected that teachers will attend the entire series. Part of this Institute will take place at (LDEO) Lamont-Doherty Earth Observatory in Nyack, NY. Teachers can drive or take the Columbia Univ (TC)/ Lamont Shuttle Bus Schedule round trip coach service from outside the entrance to the Columbia University Teachers College Campus. Some of the sessions will take place at the Columbia University Teachers College lab where Margie Turrin does her research. The descriptions of the sessions are below:		
Exploring STEM through the Hudson River, your tool to teaching system science and models – led by Margie Turrin, Education Coordinator at Columbia University's Lamont-Doherty Earth Observatory. Collecting place-based environmental measurements is a powerful way to explore system science and science models. This series of workshops will focus locally, providing teachers with training, tools and resources to engage their students in collecting measurements in our dynamic estuary. Teachers will engage in field measurements and then compare these to real-time data collected through instrumentation in order to examine temporal and spatial differences in the Hudson River estuary. We will then move from the Hudson to comparing this system to other estuaries to see if our Hudson system and estuary model matches to others. Supply kits will be provided so teachers will be fully prepared to carry this instruction back to their schools. We will host one class in the field at Piermont Pier in Rockland County and the other two workshops will be held at the Columbia campus in NYC. **Margie Turrin**, is Education Coordinator at Columbia University's Lamont-Doherty Earth Observatory where she develops and runs science education projects for groups from informal community education, to K12 and undergraduate students. Her projects and publications range from engaging students and the public in the polar regions, understanding our Earth and environment, human interactions and impacts on their environment, Hudson River education, biodiversity, mapping and spatial skills assessments.	**(LDEO) Lamont Doherty Earth Observatory & Columbia University Teacher's College** 10/25 2/7 4/3	**9:00 am to 3:00 pm**

Hands-on STEM Teacher Training for Project Based Learning using Rube Goldberg Machines

Event	Dates by	Time
Description The **Rube Goldberg Machine Building for Teachers Institute** is open to all grade levels, though the engineering principles components is designed for grades 6 – 12. **The Institute will consist of a series of two sessions,** and it is expected that teachers will attend both sessions. Teachers will receive all of the necessary kit based materials, curriculum, teachers guide needed to implement the program back at their school		
Program Title: **Rube Goldberg Machine Building for Teachers** This program is intended to follow the engineering and design thinking, project-based learning, art and integrated learning experiences in math and science strands and is intended to be a Level I program. **Total enrollment**: 25-30 teachers. Teachers are expected to attend both sessions in the series. **Time/scheduling**: two 6hr sessions, one in the fall and one in the spring, including breaks for meals. **Program Abstract:** The purpose of this session is to introduce educators to the world of Rube Goldberg Machines and to support their use of transdisciplinary art/science lessons in their schools. Participants will gain a new perspective about the connections between art and science, and see how engineering principles can be taught in any classroom as a creative process exercise. Teachers will deepen their understanding of the historical content about Rube's contribution to design and learn to utilize drawing cartoons as a planning tool. Ongoing support for implementation will include an introduction to free online resources and lesson plans and crowdsourcing new curriculum connections. **Workshop Alignment:** The objective of the "Rube Goldberg Machine Building for Teachers" professional learning sessions is to provide a project-based learning frame work to understanding simple machines, energy transfers and engineering principles. It is purposefully adaptable to almost any grade level, ability or background. The Learning Outcomes this curriculum will provide are: understand the basic simple machines; evaluate the mechanical advantage of simple machines; design simple and compound machines; understand the properties of energy transfers; know the principles of engineering and design. The resources supporting this session will be the Rube Goldberg Speed Building Kit, lesson plan activities and the large archive of Rube's cartoons and writings. The program aligns with the national Next Generation Science Standards in general, as do all of the Rube lessons. Specifically, the program aligns with the Science Scope and Sequence in the following places: Grade 2, Unit 2 Forces and Motion Grade 3, Unit 2 Energy and Unit 3 Simple Machines Grade 6, Unit 1 Energy and Simple Machines Grade 8, Unit 2 Forces and Motion Grades 9-12PH, Unit 6 Modern Physics In general, for most grade levels, the Cross Cutting Concepts that this program addresses are Cause/Effect, Engineering Design, Energy/ Matter and Structure/Function. Rube Goldberg Machines fit into the *STEM Framework* in Domain II 2.2 STEM-centric Curriculum, 2.4 Staff Capacity, Domain III 3.1 STEM Partnerships, and Domain IV 4.1 STEM Pathway Preparation for Elementary School and 4.2 Access to STEM College and Career Opportunities. The goals for this program include motivation for teachers to cover simple machines and energy transfers in new ways, integration of art and science concepts in all classrooms and inspiration for students to connect to STEM concepts in new, creative ways. We expect that teachers will integrate their new knowledge into their teaching practice through a transdisciplinary project-based approach using the Rube Goldberg Machine Lessons to teach collaboration, problem-solving and communication through art and science concepts.	Tuesday, 11/22 April Day #2 TBD	**9:00 am to 3:00 pm**