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MfA Professional Development Structure

MfA offers a variety of different types of professional development throughout the year.

Professional Learning Teams (PLTs) meet for four sessions over the course of the semester. PLTs are small teams of teachers who meet together monthly to deeply explore problems of practice. Participating in a PLT is a deliberate process that requires attention, focus, and a willingness to move beyond sharing lessons and ideas to critically examining practice, research, and implementation.

Mini-courses are three connected sessions where experts from outside academic institutions and from the MfA Teacher community engage MfA teachers at the cutting edge of their content area and/or pedagogical practice.

Extended length courses are a series of six to eight connected sessions that meet throughout a semester or school year. Experts from outside academic institutions engage MfA teachers at the cutting edge of their content area and/or pedagogical practice.

Single session workshops are one-time workshops where experts from the MfA Teacher community as well as outside academic institutions engage MfA teachers at the cutting edge of their content area and/or pedagogical practice.

Cohort meetings are regular workshops designed to provide opportunities for teachers and school leaders to lead, collaborate, learn, share, and reflect with their peers. Some cohort meetings are places for groups of teachers within the MfA community to have a voice of their own, while other meetings are specifically designed and required for certain cohorts; please refer to page 5 for attendance requirements by cohort.

Interest Groups are designed for small groups of teachers to meet informally around a common interest. They provide opportunities to make connections and begin conversations with colleagues. The conversations may lead to a new course or PLT at MfA or bridge to opportunities outside of MfA. Please note that while attending an "Interest Group" session does not count as credit towards minimum attendance requirements it does provide an additional opportunity to engage with the MfA community and additional Interest Groups can be started throughout the semester.

Engagement Opportunities include program information sessions, special events, and Chancellor’s Day workshops. Special events include film screenings, panels, and talks by experts from outside academic institutions as well as from the MfA Master Teacher community. Please note that while attending an "Engagement Opportunity" session does not count as credit towards minimum attendance requirements it does provide an additional opportunity to engage with the MfA community.
**GENERAL INFORMATION**

All MfA workshops run from 5:30–7:30 p.m. (unless otherwise noted).

Most MfA professional development opportunities take place at the MfA offices, 915 Broadway or The Simons Foundation, 160 Fifth Ave. Some events are held at other locations throughout the city. Please check course listings for details. The MfA offices house a lounge/library for all MfA community members as well as classrooms and conference rooms for workshops.

All MfA teachers are expected to be on time for workshops. The MfA lounge is available for teachers to work after school starting at 4 p.m. Pizza arrives by 5 p.m. and you should plan to arrive at your workshop location with enough time to be settled in the classrooms and ready to begin at 5:30 p.m.

Note: If your workshop is scheduled at our nearby classrooms in the Simons Foundation building at 160 Broadway, pizza will be available there beginning at 5 p.m. Please come to the MfA offices should you want to have a quiet space to work before 5 p.m.

In the event of NYC DOE public school closings, all MfA events will be cancelled that day.

**REGISTRATION**

Advanced registration is required for all MfA professional development and must be done through the Small-World Network. As you look over the catalog, keep in mind that although there is no limit to the number of workshops you can attend, we ask that you be conscientious of the limited number of seats available and do not register in excess. For more information on our attendance and lateness policies, please refer to your reference guide.

Register at: mfa.force.com/smallworldnetwork
Professional Development Attendance Requirements by Cohort

MfA offers four different fellowships to teachers and school leaders at various stages in their careers. The MfA Fellowship, MfA Early Career Teacher Fellowship, MfA Master Teacher Fellowship, and MfA School Leader Fellowship each afford distinct professional development opportunities and responsibilities. Below you will find the minimum attendance requirement by cohort.

**MfA FELLOWS**

**2014 MfA Fellows**
- Participate in a minimum of 10 MfA professional development opportunities over the course of the school year
- Participate in MfA Mentoring Program

**2012/2013 MfA Fellows**
- Participate in a minimum of 10 MfA professional development opportunities over the course of the school year

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**EARLY CAREER TEACHERS**

**2016 MfA Early Career Teachers**
- Participate in the Early Career Teacher Orientation
- Participate in the 10 MfA 2016 Early Career Teacher cohort meetings
- Teachers in their second year of teaching participate in MfA Mentoring Program

**2013/2014/2015 MfA Early Career Teachers**
- Participate in a minimum of 10 MfA professional development opportunities over the course of the school year

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**MASTER TEACHERS**

**2016 MfA Master Teachers**
- Participate in a Master Teacher Orientation.
- Participate in a minimum of 7 MfA professional development opportunities over the course of the school year

**2013/2014/2015 MfA Master Teachers**
- Participate in a minimum of 7 MfA professional development opportunities over the course of the school year

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**SCHOOL LEADER FELLOWS**

**MfA School Leader Fellows**
- Participate in the three mandatory School Leader Fellow Cohort meetings.
- Participate in a minimum of 4 additional MfA professional development opportunities.

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**Note:** Minimum attendance requirements are just that, and most MfA teachers attend more workshops over the course of the year. A strong record of attendance and overall program engagement is expected and, is considered when reviewing future fellowship application.

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**Note:** Interest Groups, Engagement Opportunities and MfA Social Events (Fall Function, softball games, etc.) do not count toward the MfA attendance requirement.
Summary of Workshops

**MATH CONTENT**

Algebraic and Transcendental Numbers (MINI)
Constructing Catenary Arches (SSW)
Geometric Surprises (MINI)
How Would Euclid Solve It? (SSW)
Infinite Series: Within and Outside the Bounds of AP Calculus (MINI)
Introduction to Game Theory: Prisoner’s Dilemma of Catan (SSW)
Introduction to Group Theory (MINI)
Math through Puzzles and Play: An Exploration of Mathema (SSW)
Mathematical Insights into Electing America’s President (MINI)
Nature’s Geometry (SSW)
Newton Sums (SSW)
Screening of The Man Who Knew Infinity (EO)
What Every Math Teacher Should Know about Cubic Equations (MINI)

Teaching Introductory Mechanics with Astrophysics (SSW)
Understanding the Machinery of Life: An Introduction to Structural Biology (MINI)
Why Should I Care about Marine Microbes? (SSW)

**COMPUTER SCIENCE AND TECHNOLOGY**

Algebraic Programming with Bootstrap (MINI)
Arduinos (PLT)
Computer Science AP Principles (PLT)
Exploring and Applying the Practices of Computer Science (MINI)
Google Classroom 101 (SSW)
Group Problem Analysis via the Engineering Design Process (MINI)
How to Create Videos for Flipping a Class (SSW)
Introduction to Computational Thinking, Tools, and Applications (MINI)
Introduction to Wood-Working with the ShopBot Desktop (SSW)
Mathematics and Scratch (SSW)
Personalizing Instruction: Blended Learning Technologies for the STEM Classroom (MINI)
Supporting Students through Blended Learning (SSW)

**SCIENCE CONTENT**

Chemistry in Art: Combing Contextual Knowledge and Guided Inquiry Learning (MINI)
DIY Biology at Genspace: How to Cheeply and Easily Incorporate DNA Science into the Classroom (MINI)
Doctors, DNA, and Darwin: How Evolution is Changing Modern Medicine (MINI)
Nuclear Weapons: Science, Policy, and Human Dimension (MINI)
Spectroscopy for the High School Chemistry, Biology or Physics (or more) Class (MINI)

Building Numeracy in Grades 9-12 (MINI)
Calculs (PLT)
Classroom Video Analysis: Deciphering Student Thinking in the Mathematics Classroom (PLT)
Connecting Algebra and Geometry through Paper Folding (MINI)
Creating, Implementing, and Analyzing Common Core Algebra Tasks (PLT)
Designing Algebra Around Big Ideas (PLT)
Digging Deeper into Fraction Concepts and Processes (SSW)
Do it with Confidence: Statistics and Common Core Algebra II (SSW)
Doing and Implementing Rich Math Tasks in Algebra (PLT)
Engaging in Math Through Storytelling (PLT)
Everyone’s a “Math Person”: How to Cultivate Students’ Positive Mathematics Identities (MINI)
Exploring Early Algebraic Reasoning (SSW)
Formative Assessment through Math Interviews (SSW)
Geometry Through Art and Visualization (PLT)
“Important Stuff, Neat Stuff, and Tough Stuff”: Developing Problem Sets that Honor Student Discovery (SSW)
Instructional Activities: Looking for and Making Use of Structure (MINI)
Introduction to Paper-Folding in the Math Classroom (SSW)
Joining the Global Teacher’s Lounge (SSW)
Let’s Give Them Something to Talk About: Orchestrating Cognitively Demanding Tasks in K-8 Classrooms (MINI)
Making the Common Core Accessible to English Language Learners (MINI)
Math and Equity Book Clubs (PLT)
Math PBATs (IG)
MfA Chancellor’s Day Workshop: A Pathway to Conic Sections Through Geometer’s Sketchpad (EO)
MfA Chancellor’s Day Workshop: Practicing Four Ambitious Teaching Practices (EO)
Modeling in Algebra I (PLT)
Pre-Calculus Interest Group (IG)
Project-Based Learning: Developing Algebra Projects in a Middle School Classroom (PLT)
Questions about Questions in Math Classrooms (PLT)
Social Justice Project-Based Learning in the Math Classroom (PLT)
Teaching Students how to Frame and Solve Diagram-Based Non-Routine Mathematics Problems: A Lesson Study Seminar (ELC)
Understanding the Geometry Regents (IG)

**MATH TEACHING AND LEARNING**

AP Statistics (PLT)
Beyond the “Great Task” — Using Design Thinking for Curriculum (ELC)

**KEY**

Professional Learning Teams (PLT)
Mini–Courses (MINI)
Extended Length Courses (ELC)
Single Session Workshops (SSW)
Cohort Meetings (CM)
Interest Groups (IG)
Engagement Opportunities (EO)
Summary of Workshops, ctd.

**SCIENCE TEACHING AND LEARNING**

The 5E Instructional Model: What it is and What it’s Not (SSW)
AP Biology: Developing Science Practices through Lab Investigations and Daily Classroom Instruction (PLT)
AP Chemistry (PLT)
BrainWaves: Bringing Neuroscience into the Classroom (MINI)
Chemistry Demo Derby (SSW)
Controversial Chemistry: Creating Relevance Using Media Resources (PLT)
Creating a “Killer” Unit - Infusing Forensic Science into Chemistry and Physics Classes (SSW)
Creating Next Generation Science Classrooms from Next Generation Science Standards (ELC)
De la Cocina al Laboratorio: Avances Científicos en los Campos de Nutrición Molecular y Dietética (MINI)
Designing Investigations in AP Environmental Science (PLT)
Earth Science (PLT)
Experimental Design in the K-12 Science Classroom (PLT)
Going Nuclear: Demystifying Nuclear Chemistry in the Classroom (MINI)
How to Develop PBATs as a Tool for Three-Dimensional Learning in the Science Classroom (MINI)
How Weatherwise are You and Your Students? (MINI)
An Introduction to Appalachian Mountain Club’s Mountain Classroom Program (SSW)
Introduction to the Science Olympiad (SSW)

**INQUIRY AND PRACTICE**

All Learners Learning Everyday: The ALL-ED Framework for Differentiation (ELC)
Basecamp Information Session (IG)
“But it’s Not on the Regents!” Racially Responsive STEM Activities Classrooms (SSW)
Coming from Self-Awareness: Social and Emotional Learning in Action (MINI)
A Continuing Conversation: Race, Equity, and STEM Education (SSW)
Connecting Calculus and Physics (PLT)
Engage Students with Engineering in Your Math and Science Content (MINI)
Games in the STEM Classroom (PLT)
A Historical Look at School Discipline in New York City (SSW)
Improve Your Teaching: Reflection Through Inquiry (PLT)
Living the Lives WE Want: Developing Tools for Empowered and Joyful Living for Teachers and Students (PLT)
Master Teachers on Teaching MT² (EO)
Mfa 2016 Early Career Cohort Meeting (CM)
Mfa 2016 Mentoring Cohort Meeting (CM)
Mfa 2016 Renewal Master Teacher Meeting (CM)
Mfa Elementary School Teacher Community Night (CM)
Mfa Elementary School Teacher Monthly Cohort Meeting (CM)
Practical Student-Empowered Assessment to Fuel Learning (SSW)
Racially Relevant Pedagogy (PLT)
The Ramapo Building Blocks for Promoting Positive Behavior (MINI)
Supporting Productive Struggle in STEM Classrooms (PLT)

**TEACHER LEADERSHIP**

College Access (SSW)
College Readiness and Advisory (SSW)
Fund for Teachers (SSW)
Information Sessions for Renewing Master Teachers (EO)
Mfa 2016 Early Career Cohort Facilitator Meeting (CM)
Mfa School Leader Fellows Cohort Meeting (CM)
PLT for Facilitation (PLT)
PLT Facilitator Preparation Workshop (SSW)
Preparing for MT² (MINI)
Project Dragonfly (SSW)

**KEY**

Professional Learning Teams (PLT)
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Professional Learning Teams (PLTs)

Professional Learning Teams (PLTs) meet for four sessions over the course of the semester. PLTs are small teams of teachers who meet together monthly to deeply explore problems of practice. Participating in a PLT is a deliberate process that requires attention, focus, and a willingness to move beyond sharing lessons and ideas to critically examining practice, research, and implementation.
Professional Learning Teams (PLTs)

AP Biology: Developing Science Practices through Lab Investigations and Daily Classroom Instruction
Facilitators: MƒA Master Teachers Marisa Wagner, Ph.D., and Shilini Budhram
 MONDAYS, SEP 26, NOV 7, DEC 5, JAN 9
 5:30-7:30 PM
 MƒA OFFICE, 915 BROADWAY, 17TH FLOOR

This PLT shares best practices to bring the rigor of a college level biology course to AP Biology high school students. We will focus on how we can help our students to develop proficiency in the seven Science Practices defined by the College Board in the AP Biology curriculum. We will explore labs from the AP Biology Lab Manual, as well as useful variations and viable alternative labs to help us to meet diverse time and lab resource constraints. We will share strategies for how to incorporate student use of the Science Practices including experimental design, data presentation, analysis and interpretation, and model building and interpretation, into our lessons on a regular basis. We will work together to create a shared bank of resources such as classic and recent primary source data with accompanying critical thinking questions, dedicated to building our students’ science skills through daily classroom practice.

AP Chemistry
Facilitators: MƒA Master Teachers Paul Thompson and Stephen O’Malley, Ph.D.
 MONDAYS, OCT 17, NOV 21, DEC 19, JAN 30
 5:30-7:30 PM
 MƒA OFFICE, 915 BROADWAY, 17TH FLOOR

Whether you’re teaching AP chemistry for the first time, or have been doing so for years, this PLT will give teachers a forum to bring questions, concerns, and examples of their best practices. Each month participants will bring one artifact – such as a demonstration, lab activity, or assessment – that they use in the classroom which somehow focuses on the AP’s new Scientific Practices. We will collaborate on how to use these artifacts to teach the Five Big Ideas, expand them into guided-inquiry labs, and use them to prepare students for the AP chemistry exam.

AP Statistics
Facilitators: MƒA Master Teachers Amy Hogan and Stephen Mazza
 THURSDAYS, SEP 29, OCT 27, DEC 1, JAN 5
 5:30-7:30 PM
 MƒA OFFICE, 915 BROADWAY, 17TH FLOOR

This is an opportunity for AP Statistics teachers to share ideas and learn best practices from each other. Participants will continue to discuss project and lesson ideas on randomness and probability, sampling distribution, inference, hypothesis testing, and much more. This PLT is a place to support one another with ideas and innovations for making statistics come alive for students. Bring your dice, cards, spinners, hypotheses, sampling strategies, datasets, ideas, lessons, and projects to share. Additionally, we will look at student work as a springboard for discussing student understandings and misunderstandings of various topics. Non-AP statistics teachers are welcome, though the focus will be on the AP curriculum.

Arduinos
Facilitators: MƒA Master Teachers Mike Zitolo and Joel Bianchi
 TUESDAYS, SEP 27, OCT 18, NOV 15, DEC 13
 5:30-7:30 PM
 MƒA OFFICE, 915 BROADWAY, 17TH FLOOR
 COMPUTER SCIENCE AND TECHNOLOGY

Explore new capabilities for Arduino with advanced sensors and shields (including wireless communication, camera image processing, and data-logging) with a group of teachers looking to improve our STEM pedagogy. Teachers from any discipline are invited to see how we can make our classrooms and projects ‘smarter.’ This PLT will be project-based and is open to any MƒA teacher who has a basic understanding of how to use an Arduino. Basic skills should include an understanding of how to control actuators, collect measurements from simple sensors, and engage in Serial communication. Participants are required to bring their own laptop, Arduino, breadboard, wires, and electrical components for projects (such as resistors, LEDs, potentiometers, etc.).

Calculus
Facilitators: MƒA Masters Teachers Ryan Sajac, Lori Bodner, Ryan Bittman, and Andrew Wille
 WEDNESDAYS, SEP 21, NOV 2, DEC 7, JAN 11
 5:30-7:30 PM
 MƒA OFFICE, 915 BROADWAY, 17TH FLOOR
 MATH TEACHING AND LEARNING

This PLT is designed for both experienced and inexperienced calculus teachers (AB and BC as well as non-AP). Since our work together relies on collecting
artifacts from our classrooms, teachers must currently be teaching calculus in order to participate in the PLT. We will take a critical look at student work, data, and other evidence of students’ thinking from classrooms. Participants will also have opportunities to share lessons, assignments, and resources as well as discuss ways to teach the big ideas of the curriculum. Much of this work will be done in small groups in order to better reflect the needs and interests of the participants. There will occasionally be workshops and breakouts where we will explore a topic, technology, or learning tool in more depth. Additionally, all participants will have access to a wealth of resources from current and past PLT sessions.

**Classroom Video Analysis: Deciphering Student Thinking in the Mathematics Classroom**

**Facilitators:** MfA Master Teachers Kristen Smith and Jemal Graham

![Image](image1.jpg)

**THURSDAY, SEP 29, OCT 27, DEC 1, JAN 5**

**5:30-7:30 PM**

**MfA OFFICE, 915 BROADWAY, 17TH FLOOR**

**MATH TEACHING AND LEARNING**

Good teaching is often like detective work; what students say is often only a clue as to what they know. Using video can help “slow down” the classroom and offer teachers the opportunity to pin-point what students do and do not understand. Math teachers in this PLT will participate in an innovative model for video-based PD created by a team of educational researchers. This model focuses on using clips of student discussion about mathematics in our classrooms in order to analyze their thinking. Video will be collected with the support of MfA staff. The group will follow a carefully designed protocol that focuses on discussion on what students are saying rather than teacher best practices. The group will make connections and discover strategies for pushing students’ mathematical thinking to the next level. This PLT is open to all teachers of mathematics, K-12.

**Computer Science AP Principles**

**Facilitators:** MfA Master Teachers George Ludovici and Margaret Tanzosh

![Image](image2.jpg)

**THURSDAY, OCT 20, NOV 10, DEC 15, JAN 26**

**5:30-7:30 PM**

**MfA OFFICE, 915 BROADWAY, 17TH FLOOR**

**COMPUTER SCIENCE AND TECHNOLOGY**

In this PLT, we will focus on both gaining a better understanding of the new Computer Science AP Principles exam being introduced in May of 2017. Additionally, we will think collectively about how to teach computer science in a way that allows students to be creative problem solvers. We will examine the curriculum, discuss our approaches to teaching it, and analyze student work to gain a better understanding of our students’ thinking.

**Controversial Chemistry: Creating Relevance Using Media Resources**

**Facilitators:** MfA Master Teachers Jessica Weedon and Jude Julien

![Image](image3.jpg)

**MONDAYS, SEP 26, NOV 7, DEC 5, JAN 9**

**5:30-7:30 PM**

**MfA OFFICE, 915 BROADWAY, 17TH FLOOR**

**SCIENCE TEACHING AND LEARNING**

One of the most difficult tasks faced by chemistry teachers is connecting the curriculum to the lives of our students. Encouraging students to develop informed opinions regarding what may be considered controversial issues can be an invaluable way to create relevance and foster the deep debates and discussions we desire for our students. With so much access to media, we thought it would be a good idea for chemistry teachers to collect and curate a series of resources that we can design lessons around to spark conversations with our students that matter, both in terms of chemistry and the decisions that are made that affect their own quality of life. Resources may include a video from YouTube, a clip from a story in the news, an article from a local newspaper, or anything that may capture the curiosity of our students with ties to Newton described motion and gravity, and in doing so, developed calculus independently from Leibniz to synthesize his observations into a system. However, when we teach calculus and physics, it’s most often in separate classes where the deep connections between the subjects are not always evident. In this PLT, calculus and physics teachers will learn from one another so that best practices are shared, conceptual connections are reinforced, and students’ learning of the two subjects is truly complementary. Participants will bring in artifacts from their classrooms and use them to begin conversations about the connections between calculus and physics.
Professional Learning Teams (PLTs)

Professional Development course catalog: fall 2016

the curriculum. Participants will bring these resources to PLT meetings to view and discuss them, and to incorporate them into lessons to bring more relevance and constructive discourse to our classrooms.

Creating, Implementing, and Analyzing Common Core Algebra II Tasks
Facilitators: MfA Early Career Teachers Paige Healy, and Samantha Mazzeo and MfA Master Teacher Shari Eng

MfA Office, 915 Broadway, 17th Floor

Designing Investigations in AP Environmental Science
Facilitators: MfA Master Teachers Julie Mankiewicz, Ph.D., and Peter Mullroy

MfA Office, 915 Broadway, 17th Floor

In this PLT, participants will collaborate to design engaging seminar style tasks and group work tasks that target one big idea in Algebra. Over the course of the semester, participants will incorporate this work within their own classrooms and come together to reflect on the implementation of the task. In addition, we hope to organize inter-visitor opportunities or video recordings of classrooms that can be utilized by the group throughout the reflection process.

In this PLT, Algebra II teachers will work together to create Common Core aligned tasks for their classrooms. Participants will discuss common misconceptions and posit probing questions to push students further. They will then use these tasks in their classrooms and come together to share artifacts from the lessons and discuss how the tasks went. A main focus will be creating and aligning tasks directly to the standards, ensuring we are meeting the needs of all students while continuing the transition to the Common Core Curriculum. The tasks created will serve as effective resources that engage all learners in the big ideas in Common Core Algebra II.

Designing Algebra Instruction Around Big Ideas
Facilitators: MfA Master Teachers Brian McCormack and Sheana Powell

MfA Office, 915 Broadway, 17th Floor

In this PLT, participants will focus on creating Algebra tasks that target the big ideas of Algebra. During each session, participants will collaborate to design engaging seminar style tasks and group work tasks that target one big idea in Algebra. Over the course of the semester, participants will incorporate this work within their own classrooms and come together to reflect on the implementation of the task. In addition, we hope to organize inter-visitor opportunities or video recordings of classrooms that can be utilized by the group throughout the reflection process.

Designing Investigations in AP Environmental Science
Facilitators: MfA Master Teachers Julie Mankiewicz, Ph.D., and Peter Mullroy

MfA Office, 915 Broadway, 17th Floor

In this PLT, participants will work together to share, refine, and develop labs and student investigations of environmental data. From glacial retreat, to fishery collapse, marine algal blooms, or demographic transition, we will examine existing global data, analyze it, and use the NGSS condensed practices as a guide to produce meaningful student investigations of environmental issues for any unit of the AP Environmental Science curriculum.

Earth Science
Facilitators: MfA Master Teachers Pamela Meyer and Nicole Holmes

MfA Office, 915 Broadway, 17th Floor

Doing and Implementing Rich Math Tasks in Algebra
Facilitators: MfA Master Teacher Bushra Makiya and MfA Program Officer Liz Clark-Garvey

MfA Office, 915 Broadway, 17th Floor

In this PLT, participants will delve deeply into the work of supporting students’ mathematical reasoning. Using a research-based model called the Problem Solving Cycle, participants will explore a rich math task, design a lesson using the task for their students, implement the lesson in their classrooms and reflect on both the student thinking and instructional practices that took place during the lesson. As a way to slow down and analyze moments from each lesson, short videos will be collected with the support of MfA staff. Due to the nature of the collaboration, it will be important that all participants are prepared to teach the particular lesson they designed during the PLT. In this first iteration of the Problem Solving Cycle, we will select a task that could be adapted for use in classrooms in an 8th grade class or a 9th grade algebra class.

Engaging in Mathematics Through Storytelling
Facilitators: MfA Master Teachers Jeffrey Lowenhaupt and Michelle Sims

MfA Office, 915 Broadway, 17th Floor

Doesn’t everyone enjoy a good story? Students of all ages remember concepts and facts better and longer when they are presented in the form of an interesting story. In this PLT, participants will learn how storytelling can foster mathematical curiosity in students while providing entertainment and context to the various content and practice standards they are
learning. PLT members will work in content teams to develop engaging, educational, and relevant stories on the topics their students struggle with to motivate and create a sense of connectedness and meaning to the work they are doing. Participants will additionally have the opportunity to reflect on the successes and challenges of using these stories in the classroom and discuss ways to improve with other team members. All stories collected and created over the course of these sessions will be available to participants in an online forum.

**Games in the STEM Classroom**
*Facilitators: MfA Master Teachers James Cleveland and Bridget Mahoney*

**Mondays, Sep 26, Nov 7, Dec 5, Jan 9**
5:30-7:30 PM
MfA Office, 915 Broadway, 17th Floor

**Inquiry and Practice**

Often when we read about cool math and science games, our first reaction might be something like “But how can I really use this in class? I have curriculum to teach!” But games can be used not just to review and reinforce ideas: they can teach or introduce curricular content as well. This PLT will serve to introduce existing games for math and science class and discuss guiding principles of good (classroom) game design as well as how to bring those games into your classroom in a meaningful way. In addition, the PLT will collaborate to create new games, and bring those ideas into fruition with community feedback, play testing, refinement based on the results of those tests, and then releasing the finalized products into the wild.

**Geometry through Art and Visualization**
*Facilitators: MfA Master Teachers Carol Kinney and Gregory Hinckson*

**Thursdays, Oct 20, Nov 10, Dec 15, Jan 26**
5:30-7:30 PM
MfA Office, 915 Broadway, 17th Floor

**Math Teaching and Learning**

How do you create art and use your geometric knowledge? Have you looked at a work of art and seen the shapes you teach and principles and theorems your students struggle to master underlying the work? In this PLT, participants will explore geometry through the lens of art. From the graphing of beautiful polygonal pictures inspired by Sol Lewitt to the dilations and changes in shapes in two-dimensional landscapes through the principles of perspective drawings to how compasses make sense when seen as a way to create mosaic patterns, we will push each other to view these works of art as opportunities to expand student thinking about geometric concepts. Come prepared to share, create, and take away ideas for connecting each angle of geometry to art and possibly inspire more of your students to love all the theorems, formulas, and the aesthetics of pure geometry!

**How to Develop PBATs as a Tool for Three-Dimensional Learning in the Science Classroom**
*Facilitators: MfA Master Teachers Kara MacDevitt, Vielca Anglin, and Marina Webb*

**Mondays, Oct 17, Nov 21, Dec 19, Jan 30**
5:30-7:30 PM
MfA Office, 915 Broadway, 17th Floor

**Science Teaching and Learning**

Science teachers in this PLT will explore how NGSS three-dimensional learning supports Project Based Assessment Tasks (PBATs) as a tool for learning and assessment in the science classroom. Scaffolds will be shared that help order and guide inquiry and scientific investigation and meet students at their varied levels. Additionally, there will be a focus on language and content integration for ELLs through authentic assessment tools. Participants will learn how to embed content through a project lens to provide a memorable learning experience that reaches beyond the classroom and/or exam. You will leave each session with materials for a project you can use right away and get tools and strategies for designing projects that will fit into any unit and offer interdisciplinary opportunities.

**Improve Your Teaching: Reflection through Inquiry**
*Facilitators: MfA Master Teacher Rehanna Ebrahim-Givans and MfA Early Career Teacher Deb Barnum*

**Tuesdays, Oct 25, Nov 22, Dec 20, Jan 24**
5:30-7:30 PM
MfA Office, 915 Broadway, 17th Floor

**Inquiry and Practice**

In this PLT, MfA teachers across all experience and content levels will complete a reflective inquiry cycle in order to improve teaching practices. Teachers will use a...
series of protocols in order to develop a focus question, collect artifacts such as student work or anecdotes, and gather feedback from the community in order to explore their inquiry question. Throughout the process, participants will also conduct and use current research on best practices regarding their problem question.

**Literacy in the Living Environment**
**Facilitators:** MfA Master Teachers Ellie Williamson and Michelle Daly

**WEDNESDAYS, SEP 21, NOV 2, DEC 7, JAN 11**
5:30-7:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR

In this PLT, we will identify which literacy strategies breed success, and work collaboratively to design lessons/activities with science literacy at the forefront. It is the goal of the PLT to come up with a toolkit of strategies that will help our students to become scientifically literate so that they can critically evaluate scientific text. This is an opportunity for Living Environment teachers to discuss and implement current literacy strategies that will allow for equal access to students of varying levels while still preparing for the Living Environment Regents Examination. We will also share and develop curriculum planning templates that will help us to differentiate lessons and tasks, incorporate student choice, and develop questions to push our students’ thinking through the lens of science literacy.

**Math and Equity Book Club**
**Facilitators:** MfA Master Teachers Brian Palacios, Mat Sullivan, and Alex Sczesnak

**THURSDAYS, OCT 6, NOV 3, DEC 8, JAN 12**
5:30-7:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR

Are you interested in finding new, exciting ways to make math accessible for all students? Do you want to explore low-floor/high-ceiling tasks, or learn how to make group work more effective? Then join us for Math and Equity Book Club! We’ll be reading Jo Boaler’s Mathematical Mindsets, putting her ideas into practice in our classrooms, and creating a safe space to reflect on the process. All participants will share responsibility for reading the book, co-facilitating sessions, and sharing artifacts from classroom practice (free copies of the book will be distributed).

**Living the Lives WE Want: Developing Tools for Empowered and Joyful Living for Teachers and Students**
**Facilitators:** MfA Fellow Kate Maschmeyer and MfA Master Teacher Arah Lewis

**WEDNESDAYS, OCT 19, Nov 16, DEC 21, JAN 25**
5:30-7:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR
INQUIRY AND PRACTICE

The purpose of this PLT is to develop and share tools for meditation and restoration that teachers can implement for themselves and their students. Building on MfA courses facilitated by Jesse Johnson, we will support each other in exploring and developing our individual meditation and mindfulness practices AND we will share resources and techniques for implementing these practices in the classroom. Our first session will focus on restoration for ourselves, but all further sessions will balance both restoration for ourselves and bringing this work to our students. All experience levels with meditation are welcome, we only ask that you engage in meditation and share what you have tried in the classroom over the course of the PLT.

**Modeling in Algebra I**
**Facilitators:** MfA Master Teachers Doug Shuman and Kristen Bies

**TUESDAYS, OCT 11, NOV 8, DEC 6, JAN 10**
5:30-7:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR

The purpose of this PLT is to develop and share tools for meditation and restoration that teachers can implement for themselves and their students. Building on MfA courses facilitated by Jesse Johnson, we will support each other in exploring and developing our individual meditation and mindfulness practices AND we will share resources and techniques for implementing these practices in the classroom. Our first session will focus on restoration for ourselves, but all further sessions will balance both restoration for ourselves and bringing this work to our students. All experience levels with meditation are welcome, we only ask that you engage in meditation and share what you have tried in the classroom over the course of the PLT.

**Physics and Computational Thinking**
**Facilitators:** MfA Master Teachers Abigail Sewall and Jack Chen

**MONDAYS, OCT 17, NOV 21, DEC 19, JAN 30**
5:30-7:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR

This PLT will be a workshop to support participants as we develop project-based lessons that focus on students’ ability to use computational thinking within a context. Participants should be interested in spending sessions learning about what it means for students to be able to use mathematical computation within a context, planning lessons and critiquing student work that: 1) utilizes inquiry-based practices, 2) builds student capacity to use computational thinking within a context.
PLT for Facilitation
Facilitators: MfA Program Officers Liz Clark-Garvey and John Russell

Professional Learning Teams - at their best - recognize, appreciate, and support the dynamic nature and complexity of teaching. In MfA PLTs, a small group of teachers explore the challenges of developing a classroom environment where all students thrive. There will be a PLT for math facilitators and one for science facilitators, and we will work together to surface and solve problems of practice specific to professional learning teams. Participation is limited to invited math and science PLT facilitators.

Project-Based Learning: Developing Algebra Projects in a Middle School Classroom
Facilitators: MfA Master Teachers Asia Franks and Reggie Scott

What does Project-Based Learning actually look like? How do you plan for it? How do you go about implementing it in your classroom? In this PLT, participants will explore how to develop meaningful and engaging algebra projects for middle school classrooms that are based on Common Core standards. Participants will analyze projects they’ve used and discuss and strengthen the aspects that align with the goals of project-based learning which include enabling students to make connections between big mathematical ideas while deepening their conceptual understanding. Additionally, we will discuss the teacher’s role of being a facilitator of student learning while implementing projects. Over the course of the semester, participants will work together to create a bank of resources that can be used in algebra classes from 6th to 9th grade.

Questions about Questions in Math Classrooms
Facilitators: MfA Master Teachers Eric Scott and Rita Loomba

Questioning plays a huge role in the math classroom. Teachers ask them. Students ask them. But what makes a good question? This PLT will be a forum for teachers to discuss how to ask meaningful questions to students and how to get students to ask meaningful questions about mathematics. This PLT is geared toward high school math teachers as we will be focusing on specific content in small groups.

Racially Relevant Pedagogy
Facilitators: MfA Master Teachers Wendy Menard and José Vilson

Regardless of the school in which we teach, race plays an important, and often unexamined, role in the classroom. Whether or not we ‘look like’ our students and our colleagues, race impacts communication and thus learning in our classrooms and school communities. In this PLT, we will create a safe space in which we can openly discuss the manifestations of racism and power in all levels of our school communities - in our classrooms, in the lives of our students, and within ourselves. We will also explore the effects of racism and power on our teaching of mathematics and science.

Scientific Primary Research as Classroom Teaching Tools
Facilitators: MfA Master Teachers Edward Wren and Derek Dubossi

The goal of this PLT is to collectively discover meaningful ways to bring primary research into classrooms. Primary research is an excellent way to keep content current and enriched. Additionally, we will look at the data sets included in research which can be used to develop graphing and interpretation skills, introduce statistical significance, shape meaningful conclusions and design follow-up experiments. Participants will come away from each session with lessons appropriate for their own classroom needs as well as new ideas for lessons to further expand those initial lessons.

Social Justice Project-Based Learning in the Math Classroom
Facilitators: MfA Master Teachers Mohammed Aminyar and Sage Forbes-Gray

This PLT will offer a space for 6-12th grade math teachers to explore project-based learning both in and outside of a high-stakes testing context as a means of social justice. We will share some of our own projects and look at topical academic texts. Also, we will discuss how social justice themes can be woven into Common Core curriculum through intentional project design and relevant content. Participants will have the opportunity to workshop project ideas, carry out a project and share student outcomes in small groups. Together we will build a toolkit of social justice projects to share amongst ourselves and with our colleagues.
Professional Learning Teams (PLTs)

Supporting Productive Struggle in STEM Classrooms
Facilitators: MfA Master Teachers Brooke Nixon-Friedheim and Robert Andruskiewicz
📅 THURSDAYS, OCT 6, NOV 10, DEC 8, JAN 12
🕒 5:30-7:30 PM
📍 MfA OFFICE, 915 BROADWAY, 17TH FLOOR
⇒ INQUIRY AND PRACTICE

We become teachers because we love to help kids learn. However, much of kids’ best learning happens when we step back and let them grapple with a problem and reach an understanding through mistakes, redirection, and self-guided revision. This PLT will explore how we, as teachers, provide an environment conducive to this form of learning. How do we help students engage—and stay engaged—in problems that they don’t think they can solve at first glance? How do we help students offer each other constructive feedback and engage in student-centered dialogue? How do we provide scaffolds that allow students to reflect on their own thinking process, rather than give them answers? How do we stand back, stay quiet, and let students work?

Taking the Fear Out of Investigations in Middle School Science
Facilitators: MfA Master Teachers Ben Lewin and Liz Whelan
📅 WEDNESDAYS, OCT 5, NOV 9, DEC 14, JAN 18
🕒 5:30-7:30 PM
📍 MfA OFFICE, 915 BROADWAY, 17TH FLOOR
⇒ SCIENCE TEACHING AND LEARNING

Guiding students through successful investigations can be intimidating. In this PLT, teachers will focus on developing and sharing methods to help students become proficient in the various components of scientific research. The sessions will focus on developing testable questions, articulating background knowledge, designing the experiment, collecting and analyzing data, summarizing the results, and writing conclusions. Participants are asked to bring a laptop in order to share, modify, and create resources for their classes.
Mini-Courses

Mini-courses are three connected sessions where experts from outside academic institutions and from the MfA Master Teacher community engage MfA teachers at the cutting edge of their content area and/or pedagogical practice.
Mini-Courses

Algebraic and Transcendental Numbers
Facilitator: Mahmoud Zeinalian, Ph.D.
Mondays, Nov 7, Nov 14, Nov 21
5:30-7:30 PM
Simons Foundation, 160 Fifth Ave, 9th Floor
Math Content

We divide the real numbers into two groups: algebraic and transcendental. The algebraic numbers are by definition the solutions of polynomial equations with integer coefficients. These numbers are self-sufficient in the sense that their sums, differences, products and quotients are among themselves. The rest of the numbers, which we lump into a big set, are very mysterious and are known as the transcendental numbers. Familiar numbers like “e” and pi are in this set. It is often very difficult to determine whether a given number is algebraic or transcendental. In 1873, Hermite showed “e” was transcendental, and in 1882 Lindemann showed the same for pi. These proofs are somewhat involved but we will discuss a simplified version of the argument which proves something weaker i.e. the irrationality of pi while exhibiting the general flavor of the more advanced transcendence arguments. All numbers, algebraic or transcendental, can be approximated with rational numbers. Surprisingly, transcendental numbers can be approximated much faster than the algebraic numbers. We will discuss what we mean by a faster rate and try to give a basic understanding of some properties of numbers.

Mahmoud Zeinalian is an Algebraic Topologist at Long Island University, where he teaches and does research. He is a Ph.D. advisor to doctoral students at the Graduate Center of the City University of New York and recipient of National Science Foundation research grants.

Algebraic Programming with Bootstrap
Facilitators: MfA Early Career Teacher Eric Allatta and Emmanuel Schanzer, Ed.D.
Thursdays, Sep 22, Sep 29, Oct 13
5:30-7:30 PM
MfA Office, 915 Broadway, 17th Floor
Computer Science and Technology

This mini-course will introduce teachers to the Racket programming language and the Bootstrap pedagogy. Bootstrap is a collection of computer science curricula designed to help math and science teachers bring computational thinking into their courses. Bootstrap maps skills and concepts between math and computer science by utilizing Racket, a programming language that behaves mathematically. Racket’s unique syntax allows students to build a bridge between arithmetic and algebra and encourages a pedagogy of design. In the first session, we will learn to evaluate Racket expressions through two innovative approaches we call “Circles of Evaluation” and “Contracts and Purpose Statements.” In the second session, we learn the “Design Recipe,” a step-by-step problem solving process that connects expressions and functions. Finally, we’ll dive into practicing our function design skills by decoding word problems using the design recipe. A range of next-steps for teachers who wish to continue their computer science learning and to incorporate computing into their classrooms will be offered.

Eric Allatta is an MfA Early Career Teacher and mathematics teacher at Academy for Software Engineering in Manhattan.

Emmanuel Schanzer is a former teacher and software developer. He is the founder and co-director of Bootstrap, which he first designed as a curriculum for his own students in Boston. He holds degrees in computer science and curriculum development as well as a Doctorate of Education from Harvard University, where his research focused on using programming to teach algebra.

BrainWaves: Bringing Neuroscience into the Classroom
Facilitator: Ido Davidesco, Ph.D.
Thursdays, Dec 1, Dec 8, Dec 15
5:30-7:30 PM
MfA Office, 915 Broadway, 17th Floor
Science Teaching and Learning

Neuroscience is one of the most rapidly growing STEM fields, with increasing presence in public media and potentially important implications to everyday life. Yet, the presence of neuroscience in K-12 education is limited, and students are often unaware of the field’s foundations and dramatic advances. This mini-course will introduce teachers to innovative methods of teaching neuroscience in the classroom. Teachers will be trained in using portable electroencephalogram (EEG) technology to record and analyze their own brainwaves. Discussions will focus on how this technology can be used to construct neuroscience research experiences in the classroom.

Ido Davidesco is a postdoctoral researcher at NYU Department of Psychology and the Center for Neural Science. His work focuses on integrating neuroscience and education through neuroscientific research in classrooms and through development of neuroscience programs for students and educators. He holds a Ph.D. in computational neuroscience from the Hebrew University of Jerusalem, Israel.

Building Numeracy in Grades 9-12
Facilitator: Kara Imm
Tuesdays/Thursdays, Sep 27, Oct 13, Oct 25
5:30-7:30 PM
MfA Office, 915 Broadway, 17th Floor
Math Teaching and Learning

High school coursework assumes that students have already automatized a set of mathematical facts and come to understand and trust various big ideas and relationships about number. But the reality, as any high school teacher knows, is that many students have limited foundational number sense. The tension for teachers is real - how to forge ahead with rigorous new content, while being responsive to the needs of students who have not yet mastered the
Mini-Courses

prerequisites? In this three-session course we will: wrestle productively with this dilemma, learn and try out alternative approaches that help students build number sense within and beyond the existing course of study, and highlight the work of several New York City teachers who are dedicated to addressing this challenge.

Kara Imm is a K-12 math educator currently serving as the Co-Director of Math in the City (City College, NY), where she provides professional development and school-based coaching to K-12 public schools throughout New York City and beyond. Kara earned a M.S. Ed in Early Adolescence from Bank Street College and a B.A. in American Studies from Stanford University. She is currently completing a Ph.D. in Urban Education from the Graduate Center of the City University of New York. Kara is the author of several publications for and with teachers as well as a co-founder of the numeracy blog www.numberstrings.com.

Chemistry in Art: Combining Contextual Knowledge and Guided Inquiry Learning
Facilitator: Cindie Kehlet, Ph.D.
Tuesdays, Nov 1, Nov 8, Nov 15
5:30-7:30 PM
Pratt Institute, Activities Resources Center RM D-02, Brooklyn Campus, Willoughby Avenue
Science Content
This mini-course is a guided inquiry into the use of chemistry for investigating works of art. In this course we focus on art and design materials to show how theory, activities, and labs can be integrated in a cohesive way to guide inquiry and motivate students towards rigorous chemistry discoveries. Teachers will be led through several laboratory investigations with the idea that the labs may be implementable in their own classrooms. In the first lab, basic inorganic chemistry concepts will be introduced through the making of pigments; and in the second lab, organic dyes will be used to introduce concepts of organic chemistry. In the final lab, we will use binders, along with the pigments we created in the first lab, to make paint!

Coming from Self-Awareness: Social and Emotional Learning in Action
Facilitator: Marieke van Woerkom, Ph.D.
Fridays, Sep 30, Oct 14, Oct 28
5:30-7:30 PM
MA Office, 915 Broadway, 17th Floor
Inquiry and Practice
In this interactive mini-course, we’ll take a look at ourselves in the classroom: how we are, as well as what we do. We will explore how mindful awareness combined with social and emotional learning (S.E.L.) can help to create the kind of safe and supportive classroom environment needed for teaching and learning. We’ll look at teenage brain development, how students learn best, why people behave the way they do, and how to address the underlying reasons for students “acting out.” Teachers will walk away with concrete tools that will help them retain their calm, work with students to do the same, prevent escalation in the classroom, and create a healthy learning environment where everyone can feel included.

Connecting Algebra and Geometry through Paper Folding
Facilitator: Sunita Vatuk, Ph.D.
Wednesdays, Nov 2, Nov 16, Dec 14
5:30-7:30 PM
MA Office, 915 Broadway, 17th Floor
Math Teaching and Learning
Bringing the “real world” into the math classroom is a goal that many teachers share; but if the goal is student engagement and deeper conceptual understanding, “real” doesn’t have to mean utilitarian – it can mean anything that students can touch, make, or imagine. Using paper-folding to explore mathematics has many advantages – it is cheap, it doesn’t require long set-up or clean-up time, and paper is all around us. The skills that students develop while learning to fold animals, boxes, or geometric figures can also be used to explore and explain a wide variety of mathematical ideas, foster conversations about deep mathematical concepts, and provide motivation for developing common mathematical language. In this mini-course, we will explore some of the myriad connections between algebraic thinking and geometric thinking and open our eyes to the amazing variety of mathematical activities one can do and questions one can pose once students have paper in their hands. Please note that it is recommended that those without prior folding experience sign up for the single-session introductory workshop to prepare for this mini-course.

De la Cocina al Laboratorio; Avances Científicos en los Campos de Nutrición Molecular y Dietética
Facilitator: Jaume Amengual, Ph.D.
Mondays, Oct 24, Nov 14, Nov 28
5:30-7:30 PM
MA Office, 915 Broadway, 17th Floor
Science Teaching and Learning
“We que tu medicina sea tu alimento y el alimento tu medicina”. Hipocrates.

Todos sabemos lo importante que es comer bien para estar sano. Pero, ¿sabemos realmente como la comida y sus nutrientes afectan a nuestro organismo? A pesar de que la nutrición es una parte elemental
en nuestra vida diaria, muy poca gente tiene un conocimiento riguroso sobre esta ciencia. Debido a nuestro creciente interés sobre estas materias, cada vez podemos encontrar más información sobre alimentación y nutrición en nuestro entorno, aunque por desgracia, esta información no siempre es rigurosa. En este curso aprenderemos como determinados nutrientes afectan a nuestro organismo, así como ciertas patologías directamente relacionadas con la alimentación. Estudiaremos además los efectos que determinados nutrientes tienen a nivel molecular y celular afectando, por ejemplo, la transcripción de genes. Por último trataremos los novedosos campos de la nutrición personalizada y la nutrigenómica.

This mini-course will be a Spanish immersion experience. Content will be introduced primarily in Spanish (with allowances for questions and vocabulary in Spanish and English). As such, it is designed for teachers who want opportunities to learn and practice scientific vocabulary for their Spanish-speaking communities. Jaume’s research interests are across many fields in biology tied together by nutrition and this course is designed as a way to show how it can be a common thread for many common themes in biology.

Jaume Amengual es Profesor Asistente Investigador en el Departamento de Medicina en NYU-Langone Medical Center. Su trabajo se centra en el estudio de enfermedades cardiacas, más concretamente en el estudio de los efectos de la vitamina A sobre los niveles de colesterol sanguíneo. Realizó su licenciatura en biología y en bioquímica en la Universidad de los Islas Baleares (España), donde también obtuvo su doctorado en Nutrición y Metabolismo (2005-09). Se formó como investigador postdoctoral en Case Western Reserve University (Ohio) (2009-13) y en NYU (2013-15), donde recientemente ha conseguido una plaza de Profesor.

**DIY Biology at Genspace: How to Cheaply and Easily Incorporate DNA Science into the Classroom**

**Facilitators:** Ellen Jorgensen, Ph.D., and MfA Master Teacher Megan Wallner

**WEDNESDAYS, OCT 5, OCT 19, OCT 26**

**5:30-7:30 PM**

**GENSPACE, 33 FLATBUSH, BROOKLYN NY 11217**

**SCIENCE CONTENT**

Since 2009, Genspace has been making modern bioscience more accessible to the general public, both to increase science literacy through participation in research and to support meaningful dialogue around the social, moral, and ethical questions raised by modern technological advances in DNA science.

In this mini-course, we will explore ways to bring modern DNA science lab techniques into the everyday classroom without having to rely on pre-made kits and expensive equipment. Participants will learn simple hacks for lab equipment that will allow their students to experience hands-on genetic engineering and genomic analysis, by constructing equipment that they will be able to take back to their classrooms and students. Upon completion of this mini-course, teachers will walk away with an understanding of how to implement labs around polymerase chain reactions (amplification of DNA), bacterial transformation, and gel electrophoresis as used in the fields of genetic engineering and genomic analysis.

Ellen Jorgensen is co-founder and Executive Director of Genspace. In 2011 she initiated Genspace’s award-winning curriculum of informal science education for adults in biotechnology and synthetic biology. Ellen has spearheaded many of Genspace’s outreach programs such as the Urban Barcode Project, a collaboration between Cold Spring Harbor Laboratory and Genspace where high school students pursue projects using DNA barcoding.

Megan Wallner is an MfA Master Teacher and science teacher at Sunset Park High School in Brooklyn.

**Doctors, DNA, and Darwin: How Evolution is Changing Modern Medicine**

**Facilitator:** Eugene Plavskin, Ph.D.

**TUESDAYS, NOV 29, DEC 20, JAN 3**

**5:30-7:30 PM**

**MfA OFFICE, 915 BROADWAY, 17TH FLOOR**

**SCIENCE CONTENT**

In 1973, the great geneticist Theodosius Dobzhansky wrote that “nothing in biology makes sense except in the light of evolution.” However, in the decades since, biology has undergone a molecular revolution with the spotlight increasingly on the tiny molecules that make each of us tick. Does evolution still have a place in the age of personalized medicine and genomics?

In this course, we will explore the pervasive role of evolutionary thinking in modern molecular biology and medicine. During the first session, we will discuss how ideas and scientific approaches from evolutionary biology have been applied to DNA sequences and have quickly made their way into the burgeoning field of molecular medicine. During the second session, we will analyze evolutionary relationships between actual DNA sequences taken from important recent studies to explore how evolutionary biology can lead to insights into cancer biology, disease outbreaks, forensics, and conservation biology. These activities will be done using publicly available software designed specifically for use in the classroom. Finally, during the third session, we will share the results of our small studies, and discuss how an understanding of evolutionary biology is becoming increasingly essential as biological questions creep ever more into our everyday lives. Participants are asked to bring a laptop.

Eugene Plavskin is currently a biology researcher at the Center for Genomics and Systems Biology at NYU, where he has worked since earning his Ph.D. in Biology from the Watson School of Biological Sciences at Cold Spring Harbor Laboratory. His research focuses on how evolution shapes the genetic networks that regulate all aspects of an organism’s life, and how these networks in turn constrain further evolution. Outside of the lab, he is also very interested in finding ways to bring some of the exciting recent advances at the interface of molecular genetics and evolution into the K-12 classroom.
Mini-Courses

Engage Students with Engineering in Your Math and Science Content
Facilitator: Katey Shirey

Thursdays, Oct 6, Oct 27, Nov 10, Dec 8
5:30-7:30 PM
MFA Office, 915 Broadway, 17th Floor
Inquiry and Practice

Engineering design is a powerful way to enliven your math or science content and to equip your students to solve problems in their own lives. In this mini-course you will learn about the engineering design cycle by experiencing content-enriched engineering design challenges, then dive deeply into practical ways to bring engineering in your content area. You are encouraged to share this work with a colleague or partner that you can plan with to start using engineering design in your classes. This mini-course will morph into a professional learning team (PLT) in the Spring for sustained support and collaboration. Please note that this is a four session mini-course.

Katey Shirey strives to bring creativity to math and science instruction through engineering design integration. She taught high school physics for five years and is currently completing her Ph.D. in engineering and science education at the University of Maryland. As a Senior Fellow in the Knowles Science Teaching Foundation, she has worked with teachers in long-term engineering integration professional learning contexts for three years.

Everyone’s a “Math Person:” How to Cultivate Students’ Positive Mathematics Identities
Facilitator: Erica N. Walker, Ph.D.

Wednesdays, Nov 2, Nov 16, Nov 30
5:30-7:30 PM
Simons Foundation, 160 Fifth Ave, 9th Floor
Math Teaching and Learning

In this mini-course, we will explore the relationships between the constructs of mathematics identity and socialization and outcomes related to students’ performance, participation, and persistence in mathematics. In any teaching-learning transaction, students’ and teachers’ beliefs, perceptions, roles, and behaviors critically influence whether students see themselves as “math people.” But students and teachers are also strongly – and too often, negatively – affected by the larger popular social discourse about mathematics and mathematicians. Together, we will explore ways to mitigate damaging popular discourse and its impact on school mathematics practices. We will also identify and craft mathematical talk and teaching practices — both within and beyond classrooms — that support the development of students’ strong and positive math identities.

Erica N. Walker is Professor of Mathematics Education at Teachers College, Columbia University. Her research focuses on the social and cultural factors that facilitate mathematics engagement, learning, and performance, especially for under-served students. Dr. Walker is the author of Building Mathematics Learning Communities: Improving Outcomes in Urban High Schools (Teachers College Press, 2012) and Beyond Banneker: Black Mathematicians and the Paths to Excellence (SUNY Press, 2014).

Exploring and Applying the Practices of Computer Science
Facilitator: Leigh Ann DeLysy, Ph.D.

Tuesdays, Nov 1, Nov 8, Nov 22
5:30-7:30 PM
MFA Office, 915 Broadway, 17th Floor
Computer Science and Technology

The K12CS.org computer science framework, the collaborative effort of more than 100 advisors within the computer science education community, helps define what concepts and practices are important and appropriate for K-12 students. For example, the framework invites educators to help their students become informed citizens who can critically engage in discourse about computer science. In this workshop we will explore this and other practices specified in the framework, building an understanding of the powerful ideas behind each concept, and identifying both CS-specific and interdisciplinary approaches to using them in the classroom.

Leigh Ann DeLysy, Ph.D., is a former high school mathematics and computer science teacher, and now works with CSNYC to provide professional development to teachers and conduct research around CS education initiatives in NYC. Leigh Ann is a lead writer on the framework.

Geometric Surprises
Facilitator: Gil Kessler

Mondays, Nov 28, Dec 5, Dec 19
5:30-7:30 PM
Simons Foundation, 160 Fifth Ave, 9th Floor
Math Content

This mini-course is for teachers wanting to refresh their stock of interesting problems related to geometry or wishing to be surprised themselves. We will consider Pick’s and Morley’s Theorems, use Ptolemy’s Theorem to develop some Trigonometry formulas, prove the Butterfly Theorem, and get a tiny taste of solid geometry. We’ll also do clever constructions with obstructions, and constructions with compass or straightedge alone.

Gil Kessler taught math for 30 years. The last half of his career was as an Assistant Principal in Brooklyn. He was one of the two primary authors of the ARML and NYSML competitions from 1983 to 1994 (NYSML until 1992), and is a co-author of several published books.

Going Nuclear: Demystifying Nuclear Chemistry in the Classroom
Facilitator: Disan Davis, Ph.D., and Jeanne Garbarino, Ph.D.

Mondays, Nov 7, Nov 14, Dec 5
5:30-7:30 PM
Rockefeller University, 1230 York, New York, NY 10065
Science Teaching and Learning

Radiation... radioactivity... nuclear... decay... these words often have a negative connotation for our students, as portrayed through the mainstream media. However, nuclear chemistry is a powerful and often beneficial branch of chemistry. As hands-on activities and demonstrations can be challenging and the negative stereotypes hard to overcome, nuclear chemistry continues to be under-appreciated in the classroom. This professional development opportunity aims to demystify nuclear chemistry as taught at the high school level. Each teacher will have the...
Mini-Courses

opportunity to build (and take back to their schools with them) a functioning Geiger counter for detecting typical radiation exposure from the environment around us. This course will be aligned with the New York State Regents Chemistry curriculum and the Next Generation Science Standards (NGSS). While the course will primarily address chemistry standards, biology teachers are also welcome to attend. There is much to be gained by increasing interaction between chemistry and biology teachers in nuclear chemistry.

Disan Davis studied chemistry at Carleton College and then earned her Ph.D. in chemical biology from Rockefeller University for her study of the structure and function of potassium channels. Disan has continued to collaborate with Rockefeller University’s Science Outreach Program including creating neuroscience educational materials for high school students and running teacher professional development sessions that draw on her experiences in the lab and the classroom.

Jeanne Garbarino earned her Ph.D. in metabolic biology from Columbia University, followed by a postdoc at the Rockefeller University, where she now serves as Director of Science Outreach. Jeanne also works as a science communicator, and has contributed to multiple blogs and national media outlets. She also serves as Director of Media Ventures for Neurodome — a planetarium-style film that explores the brain.

Group Problem Analysis via the Engineering Design Process
Facilitator: Norm Sutaria

This mini-course provides a hands-on approach to the engineering design process. Students will work in teams to solve a problem, using tools and techniques from the field of engineering design. The course will cover topics such as brainstorming, prototyping, and testing, and will culminate in a final project that students will present to the class.

How Weatherwise are You and Your Students?
Facilitator: Michael Passow, Ed.D.

As Director of Programs for NYC FIRST, Norm Sutaria helps to oversee four K-12 robotics competitions that, along with dedicated mentors and teacher/coaches, reaches 4,000 students citywide. Norm also coached a FIRST LEGO League team and taught middle school computer applications, including programming with Scratch, in New Jersey before becoming an instructional designer at Long Island University’s Brooklyn Campus. He holds a Master of Arts in Teaching from Montclair State University and a bachelor’s degree from Syracuse University.

Infinite Series: Within and Outside the Bounds of AP Calculus
Facilitator: MfA Master Teacher Tom Blozy, Ph.D.

Along with integration and differentiation, infinite series are a fundamental limit process. Infinite series provide a lens to examine functions such as rational, trigonometric, exponential, and logarithmic by expressing the functions as polynomials. In addition, infinite series as a mathematically rich topic can be used to derive a number of amazing results. This topic is a main component of the AP-BC Calculus curriculum, which the mini-course will address, but not be limited to. The beauty of infinite series will be revealed by taking a problem-based approach.

Introduction to Computational Thinking, Tools, and Applications
Facilitator: Margaret (Midge) Cozzens, Ph.D.

Computational thinking is a high level thought process that considers the world in computational terms. It begins with learning to see opportunities to compute something, and it develops to include such considerations as computational efficiency, selecting appropriate ways to represent data, and making approximations. Computational thinking is not programming. It relates to mathematical thinking in
its use of abstraction, decomposition, measurement, and modeling; but is more directly cognizant of the need to compute and the potential benefits of doing so. In this mini-course, we will explore how to formulate problems in a way that enables us to use a computer and other tools to help solve them, logically organize and analyze data, and represent data through abstractions such as models and simulations. We will also identify, analyze, and implement possible solutions, then generalize and transfer the problem solving process employed to a wide variety of other problems.

Margaret (Midge) Cozzens is a Research Professor at Rutgers University in the Discrete Mathematics and Theoretical Computer Science Center. Previously she was President and CEO of Colorado Institute of Technology and Provost at the University of Colorado at Denver.

**Introduction to Group Theory**

Facilitator: Ben Blum-Smith

- **MONDAYS, OCT 24, NOV 14, NOV 28**
- **5:30-7:30 PM**
- **MFA OFFICE, 915 BROADWAY, 17TH FLOOR**
- **MATH CONTENT**

The theory of groups has been one of the organizing principles of mathematics since the late 19th century, yet outside of the world of mathematicians it is barely known. This mini-course is a motivated introduction to the idea behind this theory, which brings themes from algebra, geometry, and number theory together under one roof. The main goal of the course is to understand the definition of a group, why it is an elegant and useful definition, and the diversity of the mathematical phenomena it describes. We will develop numerous concrete examples involving symmetry, transformations, permutations, formal systems, and of course numbers. We will also concentrate on the connections between the definition of a group and the basic equation-solving we teach in pre-algebra and algebra. Although this material is “advanced” in the sense that it is unfamiliar to most adults, even in math-heavy fields like science and finance, it requires no mathematical prerequisites. In fact, with minor modifications, all activities in the course can be used with your middle or high school students.

Ben Blum-Smith has spent the last fifteen years teaching and studying the teaching of mathematics. He graduated from Yale University and obtained a Masters in Teaching Mathematics from Tufts University before teaching for six years in the public schools of Boston, Cambridge, and New York City. Subsequently he worked as a math coach and faculty member of Bard’s MAT program. He is currently pursuing a Ph.D. in mathematics at NYU.

**Instructional Activities: Looking for and Making Use of Structure**

**Facilitators: MFA Master Teachers Constance Bowen and Jasper DeAntonio**

- **THURSDAYS, SEP 29, OCT 13, OCT 27**
- **5:30-7:30 PM**
- **SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR**
- **MATH TEACHING AND LEARNING**

The focus of the course will be on supporting teachers in understanding and enacting Contemplate then Calculate, which is an Instructional Activity developed by Amy Lucenta and Grace Kelemanik at the Boston Teacher Residency. This activity supports students in developing the habits of mind described by the Common Core Standards of Mathematical Practice (SMP), with a focus on the seventh practice, Look for and make use of structure. By looking at the structure of mathematics in various forms, students access content in a way that pushes their mathematical thinking and discussion skills. In this course, teachers will have time to learn about the activity, apply it to their own content, enact it with colleagues and students, and reflect on the outcomes. The activity represents highly effective formative assessment practices according to the Danielson Framework for Teaching.

Constance Bowen is an MFA Master Teacher and mathematics teacher at Young Women’s Leadership School of Brooklyn in Brooklyn.

Jasper DeAntonio is an MFA Master Teacher and a mathematics teacher at East Bronx Academy for the Future in the Bronx.

**Let’s Give Them Something To Talk About:**

**Orchestrating Cognitively Demanding Tasks In K-8 Classrooms**

**Facilitator: Lynne Godfrey**

- **THURSDAYS, OCT 6, OCT 20, NOV 10**
- **5:30-7:30 PM**
- **MFA OFFICE, 915 BROADWAY, 17TH FLOOR**
- **SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR**
- **MATH TEACHING AND LEARNING**

In the traditional math classroom, an “I do, You do, We do” pattern persists, where the teacher demonstrates, students practice, and the whole class reviews right answers, allowing misconceptions and errors to stay undercover. In this type of classroom, the teacher is doing the heavy lifting and students are passive recipients at worst and rebellious consumers at best. In this mini-course, we will explore three instructional activities that will allow teachers to support students in initiating strategies for solving problems, making sense of their own and each other’s ideas, and revising their thinking. Teachers will have opportunities to employ instructional practices where errors and misconceptions are opportunities to deepen understanding and students’ ideas and misunderstandings drive and maintain the cognitive demand throughout the lesson. Teachers will also have opportunities to plan, rehearse, and facilitate these activities in their classrooms between sessions. In sessions two and three, selected participants will bring short video clips or classroom transcripts for reflection and feedback in small groups.

Lynne Godfrey is the Director of Instruction, Curriculum and Adult Development for Mathematics at the Dudley Street Neighborhood Charter School. Lynne facilitates professional learning, coaches classroom teachers and residents, and co-teaches the Elementary Mathematics Content Methods Class for Boston Teacher Residency. Ms. Godfrey’s classroom at the King Open School in Cambridge is where Bob Moses began his pioneering work that became the Algebra Project.
Mathematical Insights into Electing America’s President
Facilitator: Joseph Malkevitch, Ph.D.
🕒 WEDNESDAYS, SEP 21, OCT 5, OCT 26
🕒 5:30-7:30 PM
📍 SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR
⇒ MATH CONTENT

In essence, to get elected President an individual must:
  a. Get nominated by a party.
  b. Win enough of the popular vote in enough states to win in the Electoral College.

Winning the popular vote, as Albert Gore did in 2000, does not guarantee one will be elected President! Mathematical modeling can be applied to the process of conducting an election or, more generally, voting situations. The pieces involved in the model are voters, candidates (choices), ballots, and a procedure for deciding a winner using the ballots. In the background are the fairness principles involved in democratic elections in the United States (and other countries) which might be invoked to support what is currently done and what might be done to make democracy work more optimally in the future. Using the forthcoming November 2016 election and subsequent meeting of the Electoral College to select a President as a backdrop, mathematical ideas involved in elections and legislative fairness will be examined. Numerous suggestions as to where the ideas covered can be treated in support of the current K-12 mathematics curriculum will be offered.

Joseph Malkevitch was born and raised in Brooklyn and attended public schools including Queens College (CUNY). He is now retired after 40 years of teaching mathematics at York College (CUNY) and CUNY’s Graduate Center but continues to teach part time in Mathematics Education at Teachers College at Columbia University. He is co-author of the mathematics for liberal arts student book, “For All Practical Purposes.”

Nuclear Weapons: Science, Policy, and Human Dimension
Facilitator: Ivana Nikolic Hughes, Ph.D.
🕒 THURSDAYS, DEC 15, JAN 5, JAN 19
🕒 5:30-7:30 PM
📍 MFA OFFICE, 915 BROADWAY, 17TH FLOOR
⇒ SCIENCE CONTENT

Ivana Nikolic Hughes is a Senior Lecturer in the Discipline of Chemistry at Columbia University. She is the Director of Frontiers of Science where she works with faculty members each semester to prepare and deliver a curriculum to all first year students at Columbia University. Ivana is also the Associate Director of the K=1 Project at the Center for Nuclear Studies at Columbia University. Ivana holds a B.S in Chemical Engineering from Caltech, and a Ph.D. from Stanford University.

Personalizing Instruction: Blended Learning Technologies for the STEM Classroom
Facilitators: Britt Neuhaus and MFA Master Teachers Daniel Babauta and Aaron Kaswell
🕒 TUESDAYS, NOV 8, NOV 22, DEC 6
🕒 5:30-7:30 PM
📍 SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR
⇒ COMPUTER SCIENCE AND TECHNOLOGY

We want our students to be empowered, self-directed, and take ownership over their learning. We want them to be able to self-regulate, set meaningful goals, and ask for help. We want them to engage in work that targets their individual learning challenges and builds strong relationships via one-to-one and small group interactions. These core goals can be achieved through blended learning. Technology is just a tool that helps get you and your students there. This mini-course will seek to model the principles of personalized blended STEM instruction by facilitating a self-directed exploration into tools, resources, and models. There will be no “front of the room” for this mini-course and soon there may be none in your classroom either!

Britt Neuhaus is the Innovative Schools program officer at the Overdeck Family Foundation, where she is lucky to learn about and support school innovation nationally. Prior to this role, she worked at the NYC DOE’s
Mini-Courses

Office of Innovation, supporting schools with blended learning and leading the Blended Learning Institute, an educator training program. Brit’s career started as a teacher in NYC.

Daniel Babauta is an MƒA Master Teacher and mathematics teacher at Sunset Park High School in Brooklyn.

Aaron Kaswell is an MƒA Master Teacher and mathematics teacher at M.S. 88 Peter Rouget Middle School in Brooklyn.

Preparing for MT²
Facilitator: MƒA Master Teacher Michael Paoli

FRIDAYS, OCT 14, OCT 21, OCT 28
5:30-7:30 PM
MƒA OFFICE, 915 BROADWAY, 17TH FLOOR

TEACHER LEADERSHIP

This three session work period, facilitated by Michael Paoli and MƒA staff, will use protocols to develop, practice, hone (and practice again) selected participants who are presenting at MT2. This course is invite only for those whose proposals to speak are accepted. Please see our MT2 description for more information on our theme this year!

Michael Paoli is an MƒA Master Teacher and mathematics teacher at Ella Baker School in Manhattan.

The Ramapo Building Blocks for Promoting Positive Behavior
Facilitator: Rachel Lissy, Ph.D.

TUESDAYS, NOV 29, DEC 13, DEC 20
5:30-7:30 PM
SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR

INQUIRY AND PRACTICE

In this foundational workshop, participants will be introduced to the Ramapo Building Blocks for Creating Environments that Support Success. Participants will learn to view youth behaviors that adults find challenging through the lens of unmet needs and lagging skills. Using hands-on experiential activities, reflection questions, case studies, and role plays; participants will develop and practice techniques for meeting needs and teaching skills. Participants will leave with an organized “Toolbox” of strategies and a common language for preventing, understanding, and responding to challenging behaviors through role modeling, building relationships, clarifying expectations, establishing structures and routines, adapting for individual needs, and responding, reflecting, and repairing.

Rachel Lissy is the Senior Program Officer for Ramapo for Children. She has a doctorate in Social and Cultural Studies in Education from the University of California at Berkeley, a master’s in Policy, Organization and Leadership Studies from Stanford University School of Education and a B.A. in English from Brown University.

Spectroscopy for the High School Chemistry, Biology or Physics (or more) Class
Facilitators: MƒA Master Teachers Matt Craddock, Ph.D., and Mary Schiff

THURSDAYS, JAN 5, JAN 19, FEB 2
5:30-7:30 PM
MƒA OFFICE, 915 BROADWAY, 17TH FLOOR

SCIENCE CONTENT

This mini-course is designed primarily for Chemistry, Biology, Physics, or even Forensics teachers who are curious about incorporating spectroscopy into their Advanced/AP course for the first time or for those teachers who already do so, but would like to expand how they use it in their course and generally collaborate with other teachers on this fascinating and important topic. Spectroscopy utilizes the interaction of matter with electromagnetic radiation to elucidate electronic structure, molecular structure and concentration information from pure substances, solutions and other mixtures (solid, liquids and gases). This mini-course will have 3 main components.(1) THEORY - We will offer a basic overview and theory of spectroscopy and the major types of spectroscopy used in science. (2) EQUIPMENT - We’ll provide a comprehensive list of instruments/spectrometers and related computer applications commonly used at the high school level today. (3) PRACTICAL - We’ll review lab experiments and courses specifically designed to teach students spectroscopy. Some will be paper-based labs and some will be hands-on labs. Participants will be encouraged to share their ideas and experiences with equipment and labs they currently do or are interested in doing in their classes.

Matt Craddock is an MƒA Master Teacher and science teacher at Millennium High School in Manhattan.

Mary Schiff is an MƒA Master Teacher and science teacher at Brooklyn Technical High School in Brooklyn.

Facilitator: Steve Stanne

THURSDAYS, OCT 13, OCT 27, NOV 3
5:30-7:30 PM
SWINDLER COVE, 3703 HARLEM RIVER DRIVE, NEW YORK, NY 10034

SCIENCE TEACHING AND LEARNING

Remote sensors in New York Harbor and the Hudson River check the estuary’s vital signs every few minutes and make the information freely available on the internet. These data can engage classes with place-based environmental science, exploring tides, temperature, salinity, dissolved oxygen, and weather conditions on our city’s waterways. Students can learn to read the stories presented in these graphs; such as water levels that rise and fall with the tides or respond to storms, winds, or oxygen levels that increase as sunlight energizes photosynthesis. These sensor networks offer near real-time immediacy in viewing the impacts of dramatic events like nor’easters, as well as historical data to analyze past events. Coupled to field experiences, remote-sensor data can put student-collected results in a larger system context. This course will begin with a trip to the Harlem River for hands-on field data collection, and then move indoors to explore the estuary in the virtual realm.

Steve Stanne has taught about the Hudson for over 35 years, starting as an educator onboard the sloop Clearwater and currently as the education coordinator for the NYS Department of Environmental Conservation’s Hudson River Estuary Program, in partnership with the NYS Water Resources Institute at Cornell University. Steve is the lead

**Understanding the Machinery of Life: An Introduction to Structural Biology**

*Facilitators: MfA President John Ewing, Ph.D., and NYSBC*

📅 **WEDNESDAYS, OCT 26, NOV 2, NOV 9**

⏰ **5:30-7:30 PM**

📍 **MFA Office, 915 Broadway, 17th Floor/New York Structural Biology Center, 89 Convent, New York, NY 10027**

 adolescente CONTENT

The New York Structural Biology Center (NYSBC) is a not-for-profit consortium that provides advanced resources in structural biology to the scientific community. In this mini-course offered by NYSBC, participants will be introduced to some of the mathematical concepts and experimental methods used by structural biologists to understand “molecular machines,” the biological complexes that carry out multiple functions within our cells. An understanding of the structure, function, and dynamics of these machines is essential to our understanding of the fundamentals of life as well as to the causes and treatment of disease. In the first session, there will be an introduction to some of the mathematical concepts and methods commonly used by structural biologists, which will be presented by researchers at the Simons Foundation as well as by MfA President John Ewing. The next two sessions will take place at the New York Structural Biology Center and will include an introduction to structural biology, NMR and X-ray crystallography, and cryo-electron microscopy.

John Ewing is the President of MfA. Before joining MfA, he served as Executive Director of the American Mathematical Society for nearly 14 years. He previously was a professor of mathematics at Indiana University, where he also served as Chair of the department for two terms.

The New York Structural Biology Center, NYSBC, is an organization of nine eminent academic research institutions. Founded in 1999, NYSBC is a not-for-profit consortium that provides advanced resources in structural biology to its members and outside users.

**What Every Math Teacher Should Know about Cubic Equations**

*Facilitator: MfA Master Teacher Kent Freeman*

📅 **WEDNESDAYS, DEC 7, DEC 14, DEC 21**

⏰ **5:30-7:30 PM**

📍 **Simons Foundation, 160 Fifth Ave, 9th Floor**

 adolescente CONTENT

Often high school courses cover solving certain types of cubic polynomial equations by using “grouping” and other factoring tricks, but what happens when these methods fail? If there exists a “cubic formula” to solve these equations analogous to the quadratic formula, why isn’t it taught at the high-school level? Can it be? This mini-course addresses these questions by giving an overview of the theory of cubic polynomials, including a review of the complex variable techniques needed for a full understanding. Topics covered will include Cardano’s Method, Viète’s Formula, and visualizing complex roots on the graph of a real polynomial.

Kent Freeman is an MfA Master Teacher and mathematics teacher at Bard High School Early College Queens in Queens.

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"Mini-Courses"

25
Extended Length Courses

Extended length courses are a series of six to eight connected sessions that meet throughout a semester or school year. Experts from outside academic institutions engage MfA teachers at the cutting edge of their content area and/or pedagogical practice.
All Learners Learning Everyday: The ALL-ED Framework for Differentiation

**Facilitator:** Rhonda Bondie, Ph.D.

**SECTION 1: WEDNESDAYS, OCT 19, NOV 2, NOV 30, DEC 7, DEC 21**

**SECTION 2: THURSDAYS, OCT 20, NOV 10, DEC 1, DEC 8, DEC 22**

5:30-7:30 PM

**MFA OFFICE, 915 BROADWAY, 17TH FLOOR**

**INQUIRY AND PRACTICE**

Teachers know that students come to classes with divergent experiences, understandings, interests, strengths and needs. However, finding sustainable ways to respond to student diversity on a daily basis is among teachers’ greatest challenges. In this year long course, teachers will learn how to differentiate instruction both in planning and in practice addressing problems such as variations in student need for review, missing basic skills, confusion, absence, early finishers, and literacy levels.

Four sessions will focus on developing differentiated instructional materials and four sessions will introduce “on your feet” decision making to ensure engagement, adjust rigor, and promote persistence using group learning and self-regulation routines. Taken together, the All Learners Learning Every Day (ALL-ED) framework brings together practical, sustainable, research-based routines enabling teachers to effectively tailor instruction to meet the learning needs of all students.

Rhonda Bondie is an assistant professor of special education at Fordham University. She enjoyed being a classroom teacher and administrator in public schools for over twenty years. Rhonda has served on the faculty of Project Zero from many years developing an expertise in Teaching for Understanding, Making Thinking Visible, and Multiple Intelligences.

Creating Next Generation Science Classrooms from Next Generation Science Standards

**Facilitator:** Dora Kastel and MFA Program Officer John Russell

**TUESDAYS, SEP 27, OCT 25, NOV 22, DEC 20, JAN 24, FEB 28, MAR 21, MAY 23**

5:30-7:30 PM

**MFA OFFICE, 915 BROADWAY, 17TH FLOOR**

**SCIENCE TEACHING AND LEARNING**

In this year-long course, teachers will learn a process for translating the Next Generation Science Standards into instruction and classroom assessment. Meeting once a month, participants will work in groups to deconstruct a standards page relevant to their teaching practice, and reconstruct it into a unit “blueprint.” They will engage in

Beyond the “Great Task” — Using Design Thinking for Curriculum

**Facilitator:** Kara Imm

**THURSDAYS, OCT 6, NOV 3, DEC 15, JAN 26, MAR 2, MAR 30, APR 20, MAY 25**

5:30-7:30 PM

**MFA OFFICE, 915 BROADWAY, 17TH FLOOR**

**MATH TEACHING AND LEARNING**

Despite our continual search, teachers know well that no single “best” curriculum exists. Never quite satisfied with published materials, many of us find ourselves in a nearly-constant state of online search, revision, re-writing, and re-organization. In this yearlong course an alternative will be provided — we will first “zoom out” to study the history and philosophy of curriculum design, define what constitutes curriculum, and examine some competing ideas about the relationship between teachers and content. Then we will develop a framework to select, modify, enhance, and design memorable learning experiences for students. We will consider how design thinking, as an approach, can help us to wade through the troves of “great task,” providing students with a coherent, sequence of experiences. Lastly we will study how written and enacted curriculum can be so different — using small group video protocols, participants will have the chance to get feedback on the effectiveness of their own implementation.

Kara Imm is a K-12 math educator, currently serving as the Co-Director of Math in the City (City College, NY). In this capacity she provides professional development and school-based coaching to K-12 public schools throughout New York City and beyond. Kara earned a M.S. Ed in Early Adolescence from Bank Street College and a B.A. in American Studies from Stanford University. She is currently completing a Ph.D. in Urban Education from the Graduate Center, The City University of New York. Kara is the author of several publications for and with teachers, as well as a co-founder of the numeracy blog www.numberstrings.com.
a process to unpack the performance expectations and create meaningful evidence of learning specifications for a task aligned with instruction. The course will also include analysis of classroom scenarios with a connection to research on best practices related to how people learn. Participants will come away with a deeper understanding of the three dimensions of the NGSS, a vision for how this translates to classroom practice, and tools to develop standards-aligned learning sequences in which students are doing the sense-making about phenomena. No previous experience with the NGSS is required. This course is for middle and high school science teachers interested in preparing for the adoption of the new NYS draft standards.

Dora Kastel currently designs and facilitates professional learning experiences for science teachers at the American Museum of Natural History, working with national leaders of science education such as WestEd and BSCS to bring teachers to the cutting edge of their pedagogy. Prior to that, she taught middle school math and science for 6 years in East Harlem. The focus of her work has principally been around helping science teachers align CCSS as well as NGSS with inquiry-based mindsets among NYC teachers. In addition, she is currently a doctoral student at Teachers College at Columbia University.

John Russell is a Program Officer at MfA, as well as a former MfA Master Teacher.

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**Teaching Students how to Frame and Solve Diagram-Based Non-Routine Mathematics Problems: A Lesson Study Seminar**

**Facilitator:** Betina Zolkower, Ph.D.

- **TUESDAYS/WEDNESDAYS, OCT 19, OCT 25, NOV 2, NOV 30, DEC 7, DEC 21**
- **5:30-7:30 PM**
- **MfA OFFICE, 915 BROADWAY, 17TH FLOOR/ SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR**

**MATh TEACHING AND LEARNING**

In this course, participants will engage in a ‘Lesson Study’ seminar. We will begin by framing and solving open-ended, non-routine problems (NRPs) introduced through a diagram or set of diagrams, and suitable for exploring and connecting central ideas in algebra, geometry, and number theory. Participants will then develop detailed plans for lessons around the problems we explored (or similar ones) including thinking about good questions to ask students throughout the lesson. During the course, participants will then try out their lessons and capture what happened during the lesson through audio/video clips, whiteboard/Smartboard captures, chart paper, and/or student work samples. We will then analyze and discuss the collected artifacts with a focus on both, the teacher’s use of questions to guide whole-class interaction and the effect of those questions in strengthening students’ ability to make and exchange mathematical meanings in speech, writing, and diagrams. Due to the problems we will explore, this course is recommended for 6th through 10th grade math teachers.

Betina Zolkower is an Associate Professor of Mathematics Education in the Secondary Education Department at Brooklyn College.
Single Session Workshops

Single session workshops are one-time workshops where experts from the MfA Master Teacher community as well as outside academic institutions engage MfA teachers at the cutting edge of their content area and/or pedagogical practice.
The 5E Instructional Model: What it is and What it’s Not
Facilitator: MfA Master Teacher Anna Annina
 Moodle, JAN 18
5:30-7:30 PM
MfA Office, 915 Broadway, 17th Floor
SCIENCE TEACHING AND LEARNING
The goal of this workshop is to deepen participants’ understanding of how the Biological Sciences Curriculum Study’s 5E instructional model can be used and integrated in their science classroom. Participants will also have an opportunity to discover what engage, explore, explain, elaborate, and evaluate can look like through the facilitator’s own experiences in her chemistry classroom. The 5E model is the only one endorsed currently by the National Science Teacher’s Association, yet it still seems new to many science teachers. This workshop will explore and describe the 5E model of instruction in science. We will discuss what it is and is not. Time will also be provided for participants to collaborate and explore how they can apply this model in a science unit.
Anna Annina is an MfA Master Teacher and science teacher at Williamsburg Preparatory School in Brooklyn.

“But it’s Not on the Regents!” Racially Responsive Activities in STEM Classrooms
Facilitator: MfA Master Teacher Melanie Pflaum and TBD
 Moodle, JAN 11
5:30-7:30 PM
Simons Foundation, 160 Fifth Ave, 9th Floor
INQUIRY AND PRACTICE
The best elementary school teacher I know said that the secret to her success was that students want to be “seen.” In teaching, when issues of race come up, many students become markedly more engaged and feel more noticed in a way that is positive instead of threatening. However, there are many barriers to bringing up issues of race in a math or science classroom. It’s uncomfortable. It’s not in the curriculum. It could lead to increased tension. There aren’t any “activities” that apply. This workshop looks to address these barriers, focusing specifically on the last of these reasons. We will collectively brainstorm and plan out some ways to bring up this essential discussion in our classes.
Melanie Pflaum is an MfA Master Teacher and mathematics teacher at Fiorello H. LaGuardia High School of Music & Art and Performing Arts in Manhattan.

Chemistry Demo Derby
Facilitators: MfA Master Teachers Tom Sangiorgi and Shaniece Mosley
 Moodle, SEP 26
5:30-7:30 PM
East Side Community School, 420 East 12 Street
SCIENCE TEACHING AND LEARNING
From using liquid nitrogen to demonstrate Charles’ Law to life-sized collision theory exercises, chemical demonstrations are a visual way to grab a student’s attention and motivate them to understand concepts, key ideas, and real-world applications. During this Demo Derby each participant will be asked to perform one or two chemical demonstrations (about four minutes total time) suitable for a high school classroom. A complete write-up including topic, chemicals and equipment used, procedure, follow up questions, and cleanup will need to be submitted to the facilitator in advance. Details of each demo will be distributed. The goal of this workshop is for each participant to walk away with a variety of motivating activities they can use in the chemistry classroom.
Tom Sangiorgi is an MfA Master Teacher and science teacher at Townsend Harris High School in Queens.
Shaniece Mosley is an MfA Master Teacher and science teacher at Midwood High School in Brooklyn.

College Access
Facilitator: Allison Palmer
 Moodle, OCT 7
5:30-7:30 PM
MfA Office, 915 Broadway, 17th Floor
TEACHER LEADERSHIP
Applying to college is a complicated process for our students to navigate and teachers can be great resources to supporting students in this process. In this interactive college access workshop, you will be provided with an overview of the college admissions process and with the necessary tools to support students through the process. Topics of discussion include the college admissions timeline, writing effective recommendations, assisting with personal statements, and preparing students for the ACT and SAT.
Allison Palmer, M.S., Senior Director of the College Access Center (CAC), joined New Settlement as the founding director of the College Access Center in July 2001. She holds an M.S. in social administration from Columbia University’s School of Social Work and a B.A. in history from Wesleyan University.

College Readiness and Advisory
Facilitator: Allison Palmer
 Moodle, OCT 11
5:30-7:30 PM
MfA Office, 915 Broadway, 17th Floor
TEACHER LEADERSHIP
How can you most effectively use advisory time with your students to support them throughout the complex college admissions process? This interactive workshop is designed to support you in doing just that. Participants will leave with an understanding of the skills, knowledge, and preparation that a student needs to complete the college application process and successfully matriculate into college. In addition, we will share activities, tools, and resources that teachers can use to support students as they navigate this complicated process.
Allison Palmer, M.S., Senior Director of the College Access Center (CAC), joined New Settlement as the founding director of the College Access Center in July 2001. She holds an M.S. in social administration from Columbia University’s School of Social Work and a B.A. in history from Wesleyan University.
Constructing Catenary Arches
Facilitators: George Hart, Ph.D., and Elisabeth Heathfield
📆 WEDNESDAY, NOV 30
⏰ 5:30-7:30 PM
📍 MJF OFFICE, 915 BROADWAY, 17TH FLOOR
≡ MATH CONTENT

The catenary curve is interesting because there are many examples of it in the world around us. The best way to visualize a catenary curve is to imagine the shape of a hanging chain. Catenaries are used in engineering and architecture, for example in the shape of hanging bridges, or when inverted, in the shape of some arches. In this workshop, participants will first build paper modules that assemble into an elegant catenary arch 18 inches tall. This construction is a fun dexterity challenge that can be adapted to different skill levels. Then we will work as a group to build a five-foot tall version of the arch using cardboard. This activity provides a group exercise in collaborative construction and mathematical thinking. Along the way, we will explore the underlying math and science concepts that explain the shape of the catenary and why it shows up in so many contexts. For a preview of the material, see http://MakingMathVisible.com. All materials will be provided.

George Hart is a mathematician and sculptor, whose work has been exhibited around the world. He holds a B.S. in Mathematics and a Ph.D. in Electrical Engineering and Computer Science, both from MIT. Hart’s research explores innovative ways to use computer technology in the design and fabrication of artwork. He is a research professor in the computer science department at Stony Brook University, a co-founder of the Museum of Mathematics, and is the author of the book Zome Geometry. Learn more at http://georgehart.com.

Elisabeth Heathfield is a certified teacher and artist. For the 2015/2016 academic year, she is a visiting scholar at Stony Brook University, where she is conducting research into early math education. She is interested in exploring the connections between math and art and how hands-on construction activities can change children’s mindsets about mathematics. Elisabeth has a B.A. in Visual Art from OCAD University, a B.Ed. from Lakehead University, and an M.A. from Norwich University of Art.

A Continuing Conversation: Race, Equity and STEM Education
Facilitators: MfA Master Teachers Wendy Menard and José Vilson
📆 TUESDAY, NOV 29
⏰ 5:30-7:30 PM
📍 MJF OFFICE, 915 BROADWAY, 17TH FLOOR
≡ INQUIRY AND PRACTICE

How do we, as teachers of diverse groups of students, address issues of race and equity in our schools, and more specifically, in our classrooms? How do we, as Math for America teachers, ensure that themes of racial justice are interwoven into our professional development? In this workshop, we will use an Open Space framework to explore these urgent questions and others generated by the group. Our collaborative focus and discussion will also help us create actionable information and ideas which we can implement and incorporate in our professional practices.

Wendy Menard is an MfA Master Teacher and math teacher at Midwood High School in Brooklyn.
José Vilson is an MfA Master Teacher and math teacher at JHS 052 Inwood Junior High School in Manhattan.

Creating a “Killer” Unit - Infusing Forensic Science into Chemistry and Physics Classes
Facilitators: MfA Master Teachers Kay Sirianni and Joshua Paverud
📆 WEDNESDAY, NOV 16
⏰ 5:30-7:30 PM
📍 BROOKLYN TECH, 29 FORT GREENE, BROOKLYN, NY, 11217
≡ SCIENCE TEACHING AND LEARNING

Do you want to add a little “mystery” to your chemistry or physics classroom? Creating a mystery scenario motivates students to understand chemistry and physics principles and to apply them in interesting, hands-on ways. In this interactive single session workshop you investigate your own crime scenes, which provide a demo derby of several forensic science techniques. You then discuss the chemistry and physics concepts underlying each technique and strategize with other teachers about how to blend them into your chemistry or physics curricula. This single session course is also a good place to start if you would like to develop a forensic science course in your school or network with other forensic science teachers to improve your practice. Please note: this workshop will be take place at Brooklyn Tech High School.

Kay Sirianni is an MfA Master Teacher and science teacher at Brooklyn Technical High School in Brooklyn.
Joshua Paverud is an MfA Master Teacher and science teacher at Lyons Community School in Brooklyn.

Digging Deeper into Fraction Concepts and Processes
Facilitator: MfA Master Teacher Celia Cruz
📆 MONDAY, SEP 19
⏰ 5:30-7:30 PM
📍 MJF OFFICE, 915 BROADWAY, 17TH FLOOR
≡ MATH TEACHING AND LEARNING

Fractions are among the most challenging concepts for students to understand and likewise one of the most difficult topics for teachers to teach. This workshop is intended for teachers looking for ways to make the teaching of fraction concepts meaningful, so that the focus is not on the algorithmic nature of fraction operations but on constructively discovering formulas and rules that make sense. In this workshop, participants will explore various meanings of fraction and model these meanings using multiple representations.

Celia Cruz is an MfA Master Teacher and mathematics teacher at Discovery High School in the Bronx.

Do it with Confidence: Statistics and Common Core Algebra II
Facilitator: MfA Master Teacher David Prince
📆 TUESDAY, JAN 10
⏰ 5:30-7:30 PM
📍 SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR
≡ MATH TEACHING AND LEARNING

The statistics module introduced in Common Core Algebra II is drastically different than what was previously taught in Algebra II/Trig. Students are asked...
to not only analyze samples of data, but use that data to draw inferences about a larger population - procedures previously taught in AP Statistics. This workshop will focus on exploring the statistics and probability content new to the Algebra II curriculum; confidence intervals, simulations, conditional probability, and more will be discussed. Please bring a TI-84 calculator with you and any Regents questions you may want to discuss!

David Prince is an MƒA Master Teacher and mathematics teacher at Long Beach High School.

**Exploring Early Algebraic Reasoning**

**Facilitator:** Daniel Scher, Ph.D.

**THURSDAY, DEC 1**

**5:30-7:30 PM**

**MƒA OFFICE, 915 BROADWAY, 17TH FLOOR**

**MATH TEACHING AND LEARNING**

What does it look like to engage young learners in algebraic thinking prior to a formal algebra course? This workshop is based on the premise that algebraic habits of mind are entirely natural for elementary and middle-school children when approached through logic and common sense reasoning. We will explore puzzle-like interactive models where young learners solve simultaneous equations without applying formal rules. We will also view videotaped interviews of students engaging in these puzzles and discuss how their acts of abstraction and their pattern finding skills serve as important precursors to the more formal approaches they will encounter in algebra class.

Daniel Scher has authored activities for The Geometer’s Sketchpad across grades K–12 and was the principal investigator for the NSF-funded Dynamic Number project at KCP Technologies.

**Formative Assessment through Math Interviews**

**Facilitators:** Herbert Ginsburg, Ph.D. and Bona Lee

**MONDAY OCT. 24**

**5:30-7:30 PM**

**SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR**

**MATH TEACHING AND LEARNING**

The goal of formative assessment is help teachers to investigate and understand their students’ learning in order to improve their own teaching. This workshop is recommended for elementary and middle school educators who are interested in learning about the clinical interview method, a type of formative assessment that can be used to deepen their understanding of children’s learning and thinking. The clinical interview can be used to probe the strategies children use to arrive at their answers, right or wrong, and to identify student conceptions and misconceptions of mathematics. Teachers will explore how the clinical interview can be used in their classrooms by participating in various activities, including the analysis of videos illustrating the do’s and don’ts of interviewing and the implications of interview results for teaching.

Herbert P. Ginsburg, Ph.D., is the Jacob H. Schiff Professor of Psychology and Education at Teachers College at Columbia University. With colleagues, he is currently creating a model course that draws heavily on video based clinical interviews to help undergraduate and graduate students to gain insight into children’s mathematical thinking and how it can serve as the foundation for early mathematics education.

Bona Lee is a Ph.D. student in the Cognitive Studies in Education program at Teachers College. Her areas of interest are math anxiety in early childhood teachers and creating professional development for pre/in service teachers.

**Google Classroom 101**

**Facilitator:** MƒA Master Teacher Leovie Diaz

**THURSDAY, DEC 1**

**5:30-7:30 PM**

**SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR**

**COMPUTER SCIENCE AND TECHNOLOGY**

Do you want to go paperless in your classroom? In this workshop, we will explore the basics of the Google Classroom such as using docs, forms, drive, and slides. Together, we will consider how to use Google Classroom to promote student collaboration and differentiation, provide immediate and actionable feedback, organize files, create electronic portfolios of classroom materials, and much more. Prior to the workshop, participants should make sure that their home school has a domain or Google for Education account.

Leovie Diaz is an MƒA Master Teacher and science teacher at New Utrecht High School in Brooklyn.

**Fund for Teachers**

**Facilitator:** MƒA Program Officer John Russell

**WEDNESDAY, DEC 14**

**5:30-7:30 PM**

**MƒA OFFICE, 915 BROADWAY, 17TH FLOOR**

**TEACHER LEADERSHIP**

Math for America has partnered with Fund for Teachers, so that any MƒA teacher with 3+ years of teaching experience (by June 2017) is eligible to apply for a 2017 Fund for Teachers summer enrichment fellowship. Whether it’s Singapore Math in Singapore, tessellated tiles in Tirana, Mayan math in Mexico, Pythagoras in Samos, or a workshop in Wales - whatever your ideal professional growth summer expedition may be - through MƒA’s partnership with FFT, you have the opportunity to design it and get it funded (up to $5000 for individuals and $10,000 for teams). MƒA is hosting a workshop to support you in the application process. You will learn more about the fellowship opportunity, generate ideas for individual and group proposals, and learn best practices for completing the fellowship application.

John Russell is an MƒA Program Officer and former science teacher.
Single Session Workshops

**A Historical Look at School Discipline in New York City**
**Facilitator:** Rachel Lissy, Ph.D.
**MONDAY, DEC 12**
**5:30-7:30 PM**
**MFA OFFICE, 915 BROADWAY, 17TH FLOOR**

*Inquiry and Practice*

For as long as there have been schools, there have been students that adults deem “disruptive,” “disorderly,” and “unruly.” In this single session workshop, participants will explore themes and challenges related to classroom discipline from a historical perspective. Using the story of the formation and expansion of the use of suspensions in New York City schools, participants will examine the ideas, policies, and practices informing contemporary disciplinary policies that exclude, segregate, and criminalize students – particularly students of color. Throughout the workshop participants will consider the complicated and often contradictory roles teachers are asked to play in creating classroom order. They will draw upon these themes and challenges to better understand their own thinking and practices related to classroom management, disruptive students, and discipline policy.

Rachel Lissy is the Senior Program Officer for Ramapo for Children. She has a doctorate in Social and Cultural Studies in Education from the University of California at Berkeley, a master’s in Policy, Organization and Leadership Studies from Stanford University School of Education and a B.A. in English from Brown University.

**How Would Euclid Solve It?**
**Facilitators:** MfA Master Teachers Elena Rodriguez and Zlatica Horcinova
**THURSDAY, JAN 19**
**5:30-7:30 PM**
**SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR**

*Math Content*

If the following problem intrigues you: “Construct a triangle where you are given one angle, the altitude drawn from the vertex of the given angle, and the perimeter of the triangle,” – join us in this workshop. Using only pencils, rulers, and compasses, we will focus on using not-so-traditional Euclidean constructions to solve some interesting problems and also create some intriguing art. This workshop is designed for math teachers who have a little experience with hands-on geometric constructions and would like to improve their craft. Problems used during this workshop could be used to enrich any geometry course.

Elena Rodriguez is an MfA Master Teacher and mathematics teacher at Academy for Scholarship and Entrepreneurship: A College Board School in the Bronx.

Zlatica Horcinova is an MfA Master Teacher and mathematics teacher at Bronx Compass High School in the Bronx.

**An Introduction to Appalachian Mountain Club’s Mountain Classroom Program**
**Facilitator:** Andrea Muller and MfA Master Teacher Marissa Maggio
**WEDNESDAY, NOV 9**
**5:30-7:30 PM**
**MFA OFFICE, 915 BROADWAY, 17TH FLOOR**

*Science Teaching and Learning*

Are you interested in taking your students on an overnight camping trip but are daunted by the cost? Or do you have a lack of outdoor education training? Have you been looking for something to do in the summer?
Maybe you’re looking for something that allows you to work outside... alongside environmental professionals and urban teens to protect an ecosystem? If so, then come and learn about three different environmental programs: The Appalachian Mountain Club’s (AMC) Mountain Classroom Program, which brings trained facilitators out into the woods with you to run educational programs catered to your curriculum. The AMC Youth Opportunities Program (YOP) offers training and services that support youth workers to take the youth they work with on outdoor adventure trips. Finally, The Nature Conservancies summer LEAF program is always looking for enthusiastic new mentors for their one month paid internships.

Andrea Muller serves as Youth Education Director of the Appalachian Mountain Club, with over 20 years of experience in the environmental education field. Andy now directs the AMC’s A Mountain Classroom and its affiliated place-based education initiatives. Andy holds an undergraduate degree in economics and sociology from Mount Holyoke College, South Hadley, MA and a master’s degree in educational leadership from Plymouth State University, NH.

Marissa Maggio is an MfA Master Teacher and science teacher at Stuyvesant High School in Brooklyn.

**Introduction to Game Theory: Prisoner’s Dilemma of Catan**

**Facilitator:** MfA Emeritus Teacher Kent Hanson

**Wednesday, Nov 1**
5:30-7:30 PM
SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR

How do we optimize our decision making in the face of imperfect information? How do our strategies change when we need to make our decision first, or last, or simultaneously? How do we accurately evaluate different options with probabilistic outcomes? This single session workshop will allow participants to gain an entry to game theory through classical examples such as the Prisoner’s Dilemma and simple application in modern board games. Participants do not need any previous experience with game theory.

Kent Hanson is an MfA Emeritus Teacher and mathematics teacher at KIPP NYC College Prep High School in Manhattan.

**Introduction to Paper-Folding in the Math Classroom**

**Facilitator:** Sunita Vatuk, Ph.D.

**Wednesday, Sep 21**
5:30-7:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR

In this workshop, we will begin to explore mathematics through folding paper in many different ways. We will focus on learning to fold a few classic models and use that as an opportunity to go over basic folding techniques, discuss important vocabulary, provide tips for taking paper-folding into your classrooms, and give a preview to the amazing variety of mathematical questions one can pose once students have paper in their hands. While this workshop is geared towards those who are new to paper folding, more experienced folders are always welcome. Additionally, if you would like to explore paper-folding more in depth, please consider registering for the Connecting Algebra and Geometry through Paper Folding mini-course.

Sunita Vatuk, Ph.D., is a mathematician and Assistant Professor of Secondary Math Education at The City College of New York. She has worked extensively with math teachers in NYC and India. As a former Teaching Artist in the NYC schools, she uses paper-folding, textiles, art, and other hands-on activities in her own classes and workshops.

**Introduction to the Science Olympiad**

**Facilitator:** Alice Kasten and MfA Master Teacher Tom Sangiorgi

**Wednesday, Nov 16**
5:30-7:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR

Science Olympiad is the largest all around science competition in NYC and offers competitions for both middle and high school students. With 25 events including Anatomy & Physiology, Disease Detective, Rocks & Minerals, Chem Lab, Forensics, Optics, Experimental Design, Helicopters, and Towers, Science Olympiad is a perfect opportunity to provide enrichment opportunities for your students. This workshop will explain how the competitions are organized, the rules for this year’s events, and how to start and train a team. Examples of how to incorporate Science Olympiad activities into classroom curricula will also be discussed.

Alice Kasten taught middle school science as well as regents earth science and regents bio in a NYC Middle School for 34 years. One of the original NYS earth science mentors, she has conducted hundreds of hours of professional development workshops. As the NYC Coordinator for the Middle Level Olympiad for over 20 years, she helps to bring hands-on science to students in middle schools city-wide. She has received an Exemplary Service award from the New York State Science Olympiad.

Tom Sangiorgi is an MfA Master Teacher and science teacher at Townsend Harris High School in Queens.
Single Session Workshops

Introduction to Wood-Working with the ShopBot Desktop
Facilitators: MfA Master Teachers Jack Chen and Joel Bianchi
📅 THURSDAY, NOV 10
🕒 5:30-7:30 PM
📍 FREDERICK DOUGLASS ACADEMY, 2581 ADAM CLAYTON POWELL JR, NEW YORK, NY 10039
╞ COMPUTER SCIENCE AND TECHNOLOGY

The ShopBot Desktop Computer Numerical Control (CNC) machine is a flexible computer-controlled cutting machine that allows students to engrave, cut, and shape materials from wood, plastic, aluminum and other materials. This workshop will introduce you to the fundamentals of CNC fabrication using a ShopBot Desktop router, and will guide you through the design, setup, and cutting process. We will also discuss how you can incorporate this machine into your lesson planning.

Jack Chen is an MfA Master Teacher and science teacher at Sewanhaka High School.
Joel Bianchi is an MfA Master Teacher and science teacher at Frederick Douglass Academy in Manhattan.

Joining the Global Teacher’s Lounge
Facilitators: MfA Fellows Matt Baker and Sahar Khatri
📅 TUESDAY, SEP 20
🕒 5:30-7:30 PM
📍 MfA OFFICE, 915 BROADWAY, 17TH FLOOR
╞ MATH TEACHING AND LEARNING

We all know about the great resources available through MfA PDs, but what if it’s a Sunday night and you need an amazing, teacher-tested activity for the week? The Math Twitter Blogosphere (or MTBoS) expands your Professional Learning Network across the world. This workshop will help teachers to get connected to the amazing online community of math teachers by spending some time reviewing the multitude of resources available online from other experienced teachers. Numerous MfA teachers active in the #MTBoS will be present. No previous experience with social networking required!

Matt Baker is an MfA Fellow and mathematics teacher at The Brooklyn Latin School in Brooklyn.
Sahar Khatri is an MfA Fellow and mathematics teacher at The Highbridge Green School in the Bronx.

Math through Puzzles and Play: An Exploration of Mathema
Facilitator: MfA Master Teacher Gary Rubinstein
📅 TUESDAY, JAN 3
🕒 5:30-7:30 PM
📍 MfA OFFICE, 915 BROADWAY, 17TH FLOOR
╞ MATH CONTENT

The interactive e-book, Mathema, is a hands-on way to explore different branches of math through puzzles and play. This book was introduced last year by Hugo Parlier, one of the authors. This workshop invites master teachers to explore the book together in a study group. The only prerequisite is to download Mathema and spend time before class doing the assigned ‘reading’ (or ‘playing,’ more accurately). This amazing resource gets to the heart of mathematics and the nature of conjecture and proof; and this workshop will be a great opportunity to experience math in this unique way!

Gary Rubinstein is an MfA Master Teacher and mathematics teacher at Stuyvesant High School in Manhattan.

Mathematics and Scratch
Facilitator: MfA Master Teacher Patrick Honner
📅 MONDAY, JAN 23
🕒 5:30-7:30 PM
📍 MfA OFFICE, 915 BROADWAY, 17TH FLOOR
╞ COMPUTER SCIENCE AND TECHNOLOGY

Explore mathematical ideas in Scratch – the free, web-based, block-based programming environment from MIT Media Labs! We’ll look at simple - but rich - examples of mathematical computing across the curriculum and learn how to build simulations that are suitable for advanced mathematical modeling projects. Participants will leave with ideas that are implementable in both mathematics and coding classes or as enrichment projects. No knowledge of Scratch is required, though basic programming experience will be helpful. Participants should bring a laptop.

Patrick Honner is an MfA Master Teacher and mathematics teacher at Brooklyn Technical High School in Brooklyn.

Nature’s Geometry
Facilitators: MfA Master Teacher Steve Deihl and MfA Early Career Teacher Mara Markinson
📅 WEDNESDAY, NOV 9
🕒 5:30-7:30 PM
📍 SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR
╞ MATH CONTENT

In this single session, participants will explore the connections between art, geometry, and nature. In particular, we will focus on iterations and the Mandelbrot Set and look at how fractals relate to coastlines and mountain ranges. Additionally, we will use an iterative process to generate and graph complex numbers. Join us to learn about the Hausdorff Dimension, the Koch Snowflake, and the Vicsek Fractal, and leave with a fractal that you will create during the session! Please bring your own TI-84 calculator to the session, if you have one.

Mara Markinson is an MfA Early Career Teacher and mathematics teacher at East-West School of International Studies in Queens.
Steve Deihl is an MfA Master Teacher and mathematics teacher at East-West School of International Studies in Queens.

Newton Sums
Facilitator: David Hankin
📅 TUESDAY, NOV 15
🕒 5:30-7:30 PM
📍 SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR
╞ MATH CONTENT

Given a polynomial, Newton Sums offers a clever way to find the sums of the roots raised to a power. In this single session, we will start with an algebra problem
that we can solve in less than a minute and we explore various solutions and discuss their advantages. Then we investigate related problems obtained by slight variations of the original. Before long, participants are involved in questions of increasing difficulty and interest. The class culminates with the discovery and implementation of a powerful algebraic concept that enables us to solve what might otherwise appear to be intimidating algebra problems.

David Hankin is a long time Math Educator and math contest devotee and author. Included among his extensive set of professional accomplishments are many years of teaching and supervising high school math in the NYC public school system, Staff Developer for the Brooklyn High Schools, Mathematics Department Chair at Hunter College High School, Chair of the AIME Committee, Teacher at New York Math Circle, consultant at The Dalton School, and problem author for the New York City Interscholastic Math League Junior Division.

PLT Facilitator Preparation Workshop
Facilitators: MƒA Program Officers Liz Clark-Garvey and John Russell

- FRIDAY AUG 26 AND WEDNESDAY SEP 14
- 10:00AM-12:00PM AND 5:30-7:30 PM
- MƒA OFFICE, 915 BROADWAY, 17TH FLOOR
- TEACHER LEADERSHIP

These workshops are open to anyone facilitating a PLT in the fall. However, attendance at one of these workshops is required for anyone who will be facilitating a PLT for the first time. Participants in these workshops will explore theories of Professional Learning Teams, discuss ways to foster an environment open for honest reflection and a vision for a team of peers working together towards common goals. In addition, participants will get a chance to introduce themselves and work with other facilitators on common problems that come up during PLT meetings.

Practical Student-Empowered Assessment to Fuel Learning
Facilitator: Rhonda Bondie, Ph.D.

- MONDAY, DEC 12
- 5:30-7:30 PM
- MƒA OFFICE, 915 BROADWAY, 17TH FLOOR
- INQUIRY AND PRACTICE

Join us as we explore how student-empowered assessments further learning and provide teachers with information needed to differentiate instruction. Find out how to use your current curriculum materials as assessments and try out practical assessment tools that ensure students’ differing abilities, strengths, and needs are made visible in the classroom. Learn why this approach to learning fosters student autonomy and motivation. Be prepared to roll up your sleeves as we discuss, reflect upon, and craft ways to empower learners through ongoing assessments. (This workshop aligns with Danielson 3D Using Assessment in Instruction).

Rhonda Bondie is an assistant professor of special education at Fordham University. She enjoyed being a classroom teacher and administrator in public schools for over twenty years. Rhonda has served on the faculty of Project Zero from many years developing an expertise in Teaching for Understanding, Making Thinking Visible, and Multiple Intelligences.

Project Dragonfly
Facilitators: MƒA Master Teachers Megan Wallner, Daniel Babauta, and Katie McCarthy

- WEDNESDAY, JAN 4
- 5:30-7:30 PM
- MƒA OFFICE, 915 BROADWAY, 17TH FLOOR
- TEACHER LEADERSHIP

Project Dragonfly, at Miami University, promotes inquiry-driven reform, reaching millions of people worldwide through learning media, exhibits, and education programs. One of the programs, Earth Expeditions, provides participants extraordinary graduate-credit courses in Africa, Asia, Australia, and the Americas while advancing global understanding, community-based education, and environmental stewardship. All courses share a focus on the process of inquiry, including observation, uncovering evidence, and interpreting findings. This session will be led by teachers who have participated in India, Belize, and Australia trips and will include helpful information about applying and preparing for the experience.

Megan Wallner, Daniel Babauta, and Katie McCarthy are MƒA Master Teachers and science teachers at Sunset Park High School in Brooklyn.

Strategies for Powerful Research in Middle School Science
Facilitators: MƒA Master Teachers Jaclyn Maricle and Kara Thompson

- THURSDAY, FEB 2
- 5:30-7:30 PM
- MƒA OFFICE, 915 BROADWAY, 17TH FLOOR
- SCIENCE TEACHING AND LEARNING

The new vocabulary, technical language, and unfamiliar styles of science texts can frustrate even our strongest readers and impede rich research into a topic. We want to give our students the reading and research skills to help them overcome these obstacles as they encounter increasingly difficult material in middle school science and beyond. In this session, we’ll explore how to move beyond school genres and textbooks to facilitate students’ work with authentic science texts. We’ll discuss strategies you can use immediately to help students of all reading levels build foundational understanding, create research plans, develop big ideas, and develop useful notes in service of authentic research-based projects. We’ll also discuss ways to build agency and independence, and strategies to share timely, actionable feedback to students as they move through their research plans.

Jaclyn Maricle and Kara Thompson are MƒA Master Teachers and science teachers at I.S. 289 Hudson River Middle School in Manhattan.
Supporting Students through Blended Learning

**Facilitators:** MfA Master Teacher Cesar Ebonia  
**TUESDAY, JAN 24**  
5:30-7:30 PM  
SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR  
⇒ COMPUTER SCIENCE AND TECHNOLOGY

Are you looking for ways to support struggling and long-term absentees? In this workshop you will learn how to use “Blended Learning” as a way to support these students. Blended learning combines classroom learning with online learning where students can control the time, pace, and place of their learning. Many talented teachers, both new and experienced, are finding themselves increasingly empowered by — and excited to use — technology. Let’s get empowered!

_Cesar Ebonia is an MfA Master Teacher and mathematics teacher at Voyages Prep - South Queens in Queens._

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Teaching Introductory Mechanics with Astrophysics

**Facilitator:** Eric Raymer, Ph.D.  
**WEDNESDAY, OCT 19**  
5:30-7:30 PM  
MFA OFFICE, 915 BROADWAY, 17TH FLOOR  
⇒ SCIENCE TEACHING AND LEARNING

What is dark matter and how do we know it exists? What happens if you fall into a black hole? Why are dozens of neutron stars in our galaxy emitting unusually rapid bursts of X-rays? Mechanics problems are often populated with billiard balls, boxes, and ramps, but the same laws that govern these macroscopic objects also apply on astronomical scales. Applying classical mechanics to problems in astrophysics provides a unique opportunity to engage students with topics that often appear in news headlines and popular science programs. In this single-session we will explore topics in astrophysics that can enrich and extend the traditional classical mechanics curriculum. Participants will learn the science behind several topics in astrophysics such as black holes, neutron stars, dark matter, and gravitational accretion. They will also be encouraged to explore how these topics can be connected to those traditionally taught in introductory physics such as energy, gravitation, and circular motion.

_Eric Raymer earned his Ph.D. from North Carolina State University, where he used supercomputer simulations of accretion to investigate interacting binary stars. He is currently a post-doctoral fellow with the physics department at Columbia University as part of the interdisciplinary Frontiers of Science fellowship._

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**Trout in the Classroom**

**Facilitator:** MfA Master Teacher Jaclyn Hoahing  
**THURSDAY, JAN 26**  
5:30-7:30 PM  
SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR  
⇒ SCIENCE TEACHING AND LEARNING

Looking for a way to engage students in authentic research that fosters an appreciation of water resources? Want to have a class pet that connects to your curriculum and isn’t a hassle in the summer? If you answered “yes,” then Trout in the Classroom is for you! This environmental education program includes raising trout from eggs to fry, monitoring tank water quality, and releasing trout in a state approved stream. During this workshop, participants will get an overview of the program, explore resources available to them, learn ideas for how to incorporate the program into classes, and try some of the activities students may engage in. Come find out all you can do with this exciting program and how you can make it happen in your classroom.

_Jaclyn Hoahing is an MfA Master Teacher and science teacher at Bronx Aerospace High School in the Bronx._

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Why Should I Care about Marine Microbes?

**Facilitator:** Monica Rouco, Ph.D.  
**TUESDAY, NOV 1**  
5:30-7:30 PM  
MFA OFFICE, 915 BROADWAY, 17TH FLOOR  
⇒ SCIENCE CONTENT

How diverse and abundant are marine microbes? Why are they considered a keystone in the maintenance of the habitability of our planet? What is their fate, and that of our planet, in an unprecedented changing environment? During this workshop, participants will learn about cutting edge research in microbial oceanography in the context of climate change and the direction this field of research is taking. Additionally, participants will engage in several hands-on activities that they can later incorporate into their classrooms for the discussion of climate change issues and its consequences.

_Monica Rouco is a postdoctoral scientist at Lamont Doherty Earth Observatory, Columbia University and a lecturer as part of the Columbia University science core course, Frontiers of Science. Besides teaching and research, she also works intensely to increase science literacy among the public, K-12 students, and teachers, as a way to promote social equality through science._

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Do your students have difficulty digesting long processes and multi-step problems? Students use technology and social media constantly. Why not hone in on using what students know and use daily into our classrooms? By having student groups create and share their own content in a constructive and meaningful way, we can utilize their social media presence and use it for positive educational impact. We will discuss how to create class and group connections, generate GIFs and other image or word formats, share and review student work, as well as exchange ideas efficiently with colleagues.

_Mimi Prabhu is an MfA Master Teacher and science teacher at Stuyvesant High School in Manhattan._

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Using the Power of Social Media to Enhance your Classroom Connections

**Facilitator:** MfA Master Teacher Mimi Prabhu  
**WEDNESDAY, DEC 7**  
5:30-7:30 PM  
MFA OFFICE, 915 BROADWAY, 17TH FLOOR  
⇒ SCIENCE TEACHING AND LEARNING

**Monica Rouco is a postdoctoral scientist at Lamont Doherty Earth Observatory, Columbia University and a lecturer as part of the Columbia University science core course, Frontiers of Science. Besides teaching and research, she also works intensely to increase science literacy among the public, K-12 students, and teachers, as a way to promote social equality through science.**
Cohort Meetings

Cohort meetings are regular workshops designed to provide opportunities for teachers and school leaders to lead, collaborate, learn, share, and reflect with their peers. Some cohort meetings are places for groups of teachers within the MfA community to have a voice of their own, while other meetings are specifically designed and required for certain cohorts; please refer to page 5 for attendance requirements by cohort.
In order to provide a meaningful and sustained partnership between Early Career Teachers and Master Teacher Cohort Facilitators, this group of teacher-leaders will come together monthly to collaboratively plan and debrief their work as co-facilitators of the Early Career Cohort Meeting. Participants will hone leadership skills such as coaching, facilitation, and professional development design. This course is limited to Master Teacher Cohort Facilitators who will be working with Early Career Teachers in their Cohort Meetings.

**MfA 2016 Early Career Cohort Meetings**

**Facilitator:** MfA Program Officer Leah Hirsch  
**Dates:** TUESDAY, SEP 20, NOV 1, NOV 29, JAN 13  
**Time:** 5:30-7:30 PM  
**Location:** MfA OFFICE, 915 BROADWAY, 17TH FLOOR  

**TEACHER LEADERSHIP**

Our one-to-one mentoring program will focus on pairing second year teachers with a Master Teacher mentor who teaches similar content. We ask Early Career Teachers and their mentors to come together at the beginning of the year to meet their partner, discuss the expectations of this partnership, and to explore the possibilities of this new MfA program. This course is limited to Master Teacher Mentors and MfA teachers in their second year of teaching.

**MfA 2016 Mentoring Cohort Meeting**

**Facilitator:** MfA Program Officer Leah Hirsch  
**Date:** TUESDAY, SEP 27  
**Time:** 5:30-7:30 PM  
**Location:** SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR  

**INQUIRY AND PRACTICE**

This is a mandatory meeting for any MfA 2016 Renewal Master Teacher. In this meeting, participants will have the opportunity to discuss their leadership projects for the upcoming school year as well as get an overview of the program.

**MfA 2016 Renewal Master Teacher Meeting**

**Facilitators:** MfA Professional Development Team  
**Date:** MONDAY, SEP 19  
**Time:** 5:30-7:30 PM  
**Location:** MfA OFFICE, 915 BROADWAY, 17TH FLOOR  

**INQUIRY AND PRACTICE**

In this initial Elementary Master Teacher cohort meeting, all Elementary Master Teachers are encouraged to attend and participate in community building and networking, as well as planning for ongoing professional development that is designed and facilitated by Elementary Master Teachers. Teachers will have an opportunity to meet other Elementary Math and Science Master Teachers, and work collaboratively to brainstorm topics for further professional development.

**MfA Elementary School Teacher Community Night**

**Facilitators:** MfA Master Teachers Genna Johnson, Kady Safer, and Bernadette Napoleon  
**Date:** THURSDAY, SEP 29  
**Time:** 5:30-7:30 PM  
**Location:** MfA OFFICE, 915 BROADWAY, 17TH FLOOR  

**INQUIRY AND PRACTICE**
Cohort Meetings

MfA Elementary School Teacher Monthly Cohort Meetings

Facilitators: MfA Master Teachers Marisa Bolson and Alexis Guerques

THURSDAYS, OCT 13, NOV 17, DEC 22, JAN 19
5:30-7:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR

In monthly cohort meetings, Elementary Master Teachers will explore issues of content and pedagogy. Facilitators will rotate each session and focus on different areas of interest such as routines, articles, models, best practices, curriculum, and any other relevant topics that come up. Each cohort meeting will begin with elementary math and science teachers gathering together for a short period. Then participants will choose between two separate sessions, one led by a master science teacher and the other led by a master math teacher.

MfA School Leader Fellows Cohort Meetings

Facilitators: Tim Kaltenecker and Alan Cheng

WEDNESDAYS, OCT 5, NOV 9, MAY 10
5:30-7:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR

During cohort meetings this year, MfA School Leader Fellows, as leaders of mathematics and science education, will explore ways to leverage leadership for instructional improvement. We will evaluate the needs in our schools, and through texts, discussions, and experiences in MfA courses, we will develop systems and strategies for improving instruction and student learning.
Interest Groups

Interest Groups are designed for small groups of teachers to meet informally around a common interest. They provide opportunities to make connections and begin conversations with colleagues. The conversations may lead to a new course or PLT at MfA or bridge to opportunities outside of MfA. Please note that while attending an “Interest Group” session doesn’t count as credit towards minimum attendance requirements it does provide an additional opportunity to engage with the MfA community.
Interest Groups

Basecamp Information Session
Facilitators: MfA Master Teachers Aaron Kaswell and Lynn Shon, and MfA Early Career Teacher Andrew Zimmerman
📅 TUESDAY, OCT 25
⏰ 5:30-7:30 PM
📍 MfA OFFICE, 915 BROADWAY, 17TH FLOOR
⇨ INQUIRY AND PRACTICE

Basecamp is a blended learning model developed by Summit Public Schools and implemented for the first time in New York City last year at Middle School 88 by MfA Master Teachers Lynn Shon, Aaron Kaswell, and Early Career Teacher Andrew Zimmermann. The Basecamp model blends integrated (STEAM) project-based work with a personalized learning platform that allows students to learn at their own pace. Using this model, the MS 88 teachers developed eight integrated STEAM/design projects around the theme of Spaceship Earth, which had students tackling the challenge of how humans consume and distribute our planet’s limited resources. If you would like to learn more about the solutions they developed and the personalized learning platform that helps differentiate this content for all kinds of learners, please attend this interest group!

Math PBATs
Facilitators: MfA Master Teachers Bruce Karhoff and Carol Kinney
📅 TUESDAY, NOV 15
⏰ 5:30-7:30 PM
📍 MfA OFFICE, 915 BROADWAY, 17TH FLOOR
⇨ MATH TEACHING AND LEARNING

The Math PBAT Interest Group is looking for teachers at Consortium schools who wish to collaborate on the development, revision, or implementation of Math PBAT projects. Some of the topics we may choose to discuss include: developing projects that are authentic, challenging and relevant for our students; designing scaffolds and modifications to support and push our diverse learners; assessing student work; and the alignment of learning objectives and assessment. As many of the Consortium schools are small schools, we wish to create a community of teachers within MfA who support each other, and provide a forum to receive and offer feedback to one another.

NGSS and New York State
Facilitators: MfA Program Officer John Russell and TBD
📅 THURSDAY, DEC 8
⏰ 5:30-7:30 PM
📍 MfA OFFICE, 915 BROADWAY, 17TH FLOOR
⇨ SCIENCE TEACHING AND LEARNING

The new vision for science learning and teaching established in the Framework for K-12 Science Education and the Next Generation Science Standards requires dramatic shifts in the way that typical science classrooms operate, with a focus on central core ideas, scientific practices that stress not only inquiry and experimental design, but also other practices such as argumentation and making sense of models, and a greater coherence between science classes through crosscutting concepts. New York State has been working on new state standards that closely match NGSS’s structure that may be approved as soon as this Fall. This interest group asks how teachers can be an integral part of the sense-making process, and what our community wants in order to build NGSS classrooms.

Understanding the Geometry Regents
Facilitator: MfA Master Teachers James Milana and JC Whittaker
📅 MONDAY, NOV 14
⏰ 5:30-7:30 PM
📍 MfA OFFICE, 915 BROADWAY, 17TH FLOOR
⇨ MATH TEACHING AND LEARNING

This interest group will meet to discuss the NYS geometry standards and the types of questions that apply to them. We will review past exams, predict topics for future exams, and create our own questions. We can also focus on student engagement strategies and how best to apply them on a daily basis.

Pre-Calculus Interest Group
Facilitators: MfA Early Career Teacher Katie Francis and MfA Master Teacher Lauren Salerno
📅 THURSDAY, OCT 27
⏰ 5:30-7:30 PM
📍 MfA OFFICE, 915 BROADWAY, 17TH FLOOR
⇨ MATH TEACHING AND LEARNING

This meeting is designed to help form a focus for a future pre-calculus PLT while also creating a pre-calculus community. Points of discussion could be: new topics that are in the Common Core Curriculum, the pacing of these topics, creating Common Core tasks, preparing students for calculus, and resource sharing.
Engagement Opportunities

Engagement Opportunities include program information sessions, special events, and Chancellor’s Day workshops. Special events include film screenings, panels, and talks by experts from outside academic institutions as well as from the MfA Master Teacher community. Please note that while attending an “Engagement Opportunity” session does not count as credit towards minimum attendance requirements it does provide an additional opportunity to engage with the MfA community.
Information Sessions for Renewing Master Teachers
Facilitators: MfA Executive Director Megan Roberts and MfA Deputy Executive Director Courtney Allison

TUESDAY, SEP 20, THURSDAY SEP 22, MONDAY, SEP 26, FRIDAY OCT 21
5:30-6:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR

TEACHER LEADERSHIP

This meeting is open to Master Teachers whose fellowships are ending this year (mostly 2013 MTs). In this session we will discuss the admissions process for renewing your Master Teacher Fellowship. This meeting will not count for PD credit, but it will be valuable to anyone interested in applying. Please note that these information sessions will be from 5:30 to 6:30 p.m.

Master Teachers on Teaching: MT²
Facilitators: MfA Master Teacher Michael Paoli

TUESDAY, NOV 8
5:30-8 PM
SIMONS FOUNDATION, 160 FIFTH AVE, 2ND FLOOR

INQUIRY AND PRACTICE

Join us for the 4th annual Master Teachers on Teaching (MT²) event. Similar to a TEDx, MT² features original, thought provoking presentations by Master Teachers. This year Michael Paoli, a TEDx speaker himself, Master Teacher, and Fund for Teachers fellow, will be hosting the event.

Michael Paoli is an MfA Master Teacher and mathematics teacher at Ella Baker School in Manhattan.

MfA Chancellor’s Day Workshop: A Pathway to Conic Sections Through Geometer’s Sketchpad
Facilitators: Daniel Scher, Ph.D.

MONDAY, JANUARY 30
9 AM- 3:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR
MATH TEACHING AND LEARNING

This day long workshop offers an introduction to The Geometer’s Sketchpad software with a twist: we’ll begin by focusing on geometric constructions and the ways that Sketchpad supports students’ development of geometric reasoning. From there, we’ll apply our newfound construction skills to the creation of conic sections, drawing devices from the work of the 17th-century Dutch mathematician Frans van Schooten. We’ll build interactive models of van Schooten’s devices and explore the connections these devices invite between geometry, trigonometry, and proof. To conclude, we’ll pursue a geometric approach to an optimization problem that makes clever use of our conic section constructions.

Daniel Scher has authored activities for The Geometer’s Sketchpad across grades K–12 and was the principal investigator for the NSF-funded Dynamic Number project at KCP Technologies.

MfA Chancellor’s Day Workshop: Practicing Four Ambitious Teaching Practices
Facilitator: Max Ray-Riek

TUESDAY, NOV 8
9 AM - 3:30 PM
MfA OFFICE, 915 BROADWAY, 17TH FLOOR
MATH TEACHING AND LEARNING

NCTM’s Principles to Actions reminds us that ambitious math teaching involves:

- Using and Connecting Mathematical Representations
- Facilitating Meaningful Mathematical Discourse
- Posing Purposeful Questions
- Eliciting and Using Evidence of Student Thinking

Each of these practices requires flexibly responding to student thinking, and so can only be planned for up to a point. Becoming proficient in each of these practices tends to involve lots of in-the-moment trial and error with live students. Looking at student work with colleagues gives us the opportunity to flex these muscles in a less demanding setting, with more opportunities for getting feedback and revising our lessons. In this workshop we’ll look at a class set of student work on an algebraic reasoning task, practice connecting representations and interpreting student thinking, and brainstorm purposeful questions and useful teacher moves. Then we’ll work together to develop routines for looking at student work with colleagues for a variety of purposes.

Max Ray-Riek is a Project Manager at the Math Forum at NCTM, and the author of the book Powerful Problem Solving. Max is a former secondary mathematics teacher who has presented at regional and national conferences on fostering problem solving and communication and valuing student thinking.

Screening of The Man Who Knew Infinity with Remarks by Ken Ono
Facilitator: Ken Ono, Ph.D.

THURSDAY, JAN 12
5:30-8:00PM
SIMONS FOUNDATION, 160 FIFTH AVE, 2ND FLOOR
MATH CONTENT

The Man Who Knew Infinity beautifully documents the life and work of mathematician Srinivasa Ramanujan. Ramanujan was an Indian mathematician in the late 19th and early 20th century who made many contributions...
to mathematical analysis, number theory, infinite series, and continued fractions. First studying mathematics in isolation, he was recognized by other mathematicians in India and eventually by mathematicians throughout Europe. Studying at Cambridge University under G.H. Hardy, Ramanujan became a world renowned mathematician. Join us for a screening of the film with remarks from distinguished mathematician Ken Ono, who was the mathematics consultant for the film.

Ken Ono is the Asa Griggs Candler Professor of Mathematics at Emory University. He is considered to be an expert in the theory of integer partitions and modular forms. He received his Ph.D. from UCLA and has received many awards for his research in number theory, including a Guggenheim Fellowship, a Packard Fellowship and a Sloan Fellowship. He was awarded a Presidential Early Career Award for Science and Engineering (PECASE) by Bill Clinton in 2000 and he was named the National Science Foundation’s Distinguished Teaching Scholar in 2005. He serves as Editor-in-Chief for several journals and is an editor of The Ramanujan Journal. Visit his web page at http://www.mathcs.emory.edu/~ono/
Course Addendum

The following courses were added to the course catalog after the initial release.
**Genes in Space and on Earth, Too!**

**Facilitator:** Sebastian Kraves, Ph.D. and Ezequiel (Zeke) Alvarez-Saavedra, Ph.D.

**Course Addendum**

`MFA OFFICE, 915 BROADWAY, 17TH FLOOR`  `SCIENCE CONTENT`

For decades the tools of modern biology and DNA analysis have remained inaccessible to classrooms. The miniPCR team develops technology and experiences to close this gap. In this workshop, we will discuss how you can increase engagement in your classroom by enabling discovery at the cutting edge of DNA science. MfA, miniPCR, and Boeing have partnered to create Genes in Space (genesinspace.org), a contest where teachers and students can design authentic DNA analysis experiments for space. We will discuss ideas for integrating the physical and biological sciences through Genes in Space. We will also learn to use PCR and DNA gel electrophoresis on Earth, illustrating with examples how these techniques can enhance learning in a variety of contexts: human genetics, agriculture, environmental science, forensics, and animal health.

Sebastian Kraves, Ph.D. is a molecular neurobiologist trained at Harvard. Previously, he worked with The Boston Consulting Group (BCG), where he helped make biomedical technology accessible to low-resource settings. Sebastian has published widely cited work on neural circuits and the genetic regulation of behavior.

Ezequiel (Zeke) Alvarez-Saavedra, Ph.D. is a geneticist trained at MIT and Stanford. He has conducted biomedical research alongside two Nobel Laureates and is an inventor of gene detection technologies. His work has been cited thousands of times and profiled in The New York Times, National Public Radio, and the BBC.

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**How to Bake Pi: Making Abstract Mathematics Palatable**

**Facilitator:** Eugenia Cheng, Ph.D.

`THURSDAY, OCT 6`  `MFA OFFICE, 915 BROADWAY, 17TH FLOOR`  `SCIENCE TEACHING & LEARNING`

Mathematics can be tasty! It’s a way of thinking, and not just about numbers. Through unexpectedly connected examples from music, juggling, and baking; in this workshop we will explore how math can be made fun and intriguing for all with hands-on activities, examples that everyone can relate to, and funny stories. In addition, surprisingly high-level mathematics, including some advanced abstract algebra usually only seen by math majors and graduate students, will be presented. There will be a distinct emphasis on edible examples.

*Dr Eugenia Cheng is a pure mathematician and concert pianist. She is a Scientist-In-Residence at the School of the Art Institute of Chicago and won tenure in Pure Mathematics at the University of Sheffield, UK. She is now an Honorary Fellow at the University of Sheffield and an Honorary Visiting Fellow at City University in London. She taught at universities in Cambridge, Chicago and Nice and holds a PhD in pure mathematics from the University of Cambridge.*

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**MFA Chancellor’s Day Workshop: Let’s Make Butter: Using Food to Teach the Physics, Chemistry and Biology of Colloids**

**Facilitator:** Sarah Weisberg, Ph.D.

`TUESDAY, NOV 8`  `MFA OFFICE, 915 BROADWAY, 17TH FLOOR`  `SCIENCE TEACHING & LEARNING`

Colloids are fascinating materials. These mixtures look homogenous to our eyes, but on a microscopic level they have two discrete components, which can sometimes exist in different phases of matter. Much materials science research is around the underlying micro- and nano-scale interactions that create the unique macroscopic behavior of various colloids, and we think that colloids can fascinate your students too - especially through food.

Join us as professors from NYU’s Materials Research Science and Engineering Center (http://mrsec.as.nyu.edu/) lead us through hands-on activities to explore the physics, chemistry and biology of kitchen staples. Milk, for example, is a biologically engineered emulsified colloid, whose stability can be overcome through simple mechanical force. We will discuss this in principle and demonstrate it in practice - in the end, we will have handmade butter!

Then, you will climb aboard the BioBus (http://biobus.org), a state-of-the-art mobile microscope laboratory to have the chance to examine colloids up close, visualizing and what implications they have for working with students. Come prepared to share, listen, relax, and enjoy. The classes are made to be deeply nourishing for participants of all experience levels and is designed to be tailored to your specific interests and needs.

Jesse Johnson is a life coach, mediator, kirtaniya, and yogi. Jesse values her meditation practice as the pivotal tool in her sustained enthusiasm and resilience as a teacher. In addition to her meditation workshops at MfA, which have been ongoing for the last 5 years, she has also taught meditation to adults and adolescents at Virayoga, Abhaya Yoga, City Life Wellness, YogaLocal, New Design High School, and Essex Street Academy. You can read more and sign up for her newsletter on her website at www.relentlessjoy.com.

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**Living The Lives We Want: Techniques For Staying Healthy And Happy As We Teach**

**Facilitator:** Jesse Johnson

`WEDNESDAY, SEP 14`  `MFA OFFICE, 915 BROADWAY, 17TH FLOOR`  `INQUIRY AND PRACTICE`

Please join us for a relaxing, rejuvenating, and instructive meditation workshop designed specifically for teachers. Through guided meditation and group reflection, you will learn tools for building sustainability in your work and cultivating balance in your full lives. You will learn to quickly restore yourselves at home or at work with breathing exercises, meditations, and physical stretches. Each meditation will be easy, accessible, and enjoyable. As a group, we will reflect on our experiences in meditation, how these practices impact our teaching,
the microscopic particles swimming in their surrounding medium. You will come away from the day with practical examples of how to use food to introduce complex concepts in materials science to students of any age.

Sarah Weisberg is currently Chief Scientist on the BioBus and at the BioBase. Sarah completed her Master’s of Science degree at the Weizmann Institute of Science in Israel, where she was trained as an independent research scientist. Prior to moving to Israel, Sarah graduated Magna Cum Laude, Phi Beta Kappa from Harvard College with a degree in Biology and Linguistics.

Screening of Most Likely to Succeed
Facilitator: MfA PD Team.

❖ THURSDAY, FEB 2
❖ 5:00-8:00 PM
❖ MfA OFFICE, 915 BROADWAY, 17TH FLOOR
❖ INQUIRY & PRACTICE

The feature-length documentary Most Likely to Succeed examines the history of education in the United States, revealing the growing shortcomings of conventional education methods in today’s innovative world. The film explores compelling new approaches that aim to transform learning as we know it. After seeing this film, the way you think about “school” will never be the same. Over a century ago, American education underwent a dramatic transformation as the iconic one-room schoolhouse evolved into an effective system that produced an unmatched workforce tailored for the 20th Century. As the world economy shifts and traditional white-collar jobs begin to disappear, that same system remains intact, producing potentially chronic levels of unemployment among graduates in the 21st Century. The film follows students into the classrooms of High Tech High, an innovative new school in San Diego. There, over the course of a school year, two groups of ninth graders take on ambitious, project-based challenges that promote critical skills rather than rote memorization. Most Likely to Succeed points to a transformation in learning that may hold the key to success for millions of our youth – and our nation – as we grapple with the ramifications of rapid advances in technology, automation and growing levels of income inequality.

Stargazing at the Center Stage: Education & Public Outreach
Facilitator: Peter Tagatac, Joe Delfausse, MfA Master Teachers David Deutsch and Olivia Ramirez
❖ TUESDAYS, JAN 3, JAN 17, JAN 31
❖ 5:30-7:30 PM
❖ SIMONS FOUNDATION, 160 FIFTH AVE, 9TH FLOOR
❖ SCIENCE TEACHING AND LEARNING

Amateur astronomers are no strangers to education. Most astronomy clubs have public outreach events designed to meet with the general public, tickle their curiosity, inspire young minds, and raise awareness of the natural world by which they’re surrounded. Often, public astronomy outreach is the stage for an informal educational experience. Presented in conjunction with the Amateur Astronomers Association of New York (one of the oldest astronomy clubs in the nation) staff from the AAA and MfA Master Teachers will share tips and techniques from their Education & Public Outreach playbook coupled with hands-on training to operate a telescope with the greatest effect. In this mini-course, we will teach basic observing skills, an understanding of what is in the sky, what types of celestial objects to look for, and how to use different types of telescopes for the greatest effect. We’ll also discuss how to plan and conduct a public outreach event. Each session will consist of a 30-45 minute presentation, followed by a one-hour hands-on telescope and stargazing workshop on the roof of the building. Realize the joy, wonder, and excitement that culminates from setting up a telescope for all to use.

Peter Tagatac is an avid amateur astronomer and member of AAA’s Board of Directors. Sidewalk astronomy has been an integral part of his observing program, serving as an opportunity to be an informal educator to the public. He has logged thousands of hours of astronomical observing with conventional amateur observing equipment, mostly under the urban sky from the public sidewalk.

Joe Delfausse is the AAA Financial Secretary and is responsible for the club membership. He bought his first telescope in August of 1994 and has been a dedicated sidewalk astronomer ever since. He estimates that 40,000 people have looked through his telescopes over the last 22 years.

David Deutsch is an MfA Master Teacher and science teacher at Manhattan Center for Science and Mathematics.

Olivia Ramirez is an MfA Master Teacher and science teacher at Marble Hill High School for International Studies.

Teaching Health Education
Facilitator: MfA Master Teachers Brittany Beck and Liz Whelan
❖ WEDNESDAY, NOV 30
❖ 5:30-7:30 PM
❖ MfA OFFICE, 915 BROADWAY, 17TH FLOOR
❖ SCIENCE TEACHING AND LEARNING

In this Interest Group, we hope to bring together teachers of all grade levels who lead a Health class or teach Health-related content. In particular, we would love to discuss useful resources and assessments, to brainstorm relevant field trips and hands-on activities, and to share strategies for having potentially tough discussions with students and among students.