

## Example Professional Development Offerings

The Department of Science/Mathematics Education can offer a wide variety of workshops and professional development opportunities for teachers. Our faculty includes Ph.D.s in science and mathematics disciplines, award winning instructors, and talented educators with practical public school classroom and leadership experience. Our strengths are complementary to those of Region Service Centers, drawing from the deep STEM content knowledge and resources as well as innovative teacher preparation that universities can provide.

The following is a menu of existing and customizable workshops that can be offered through the department. Most existing workshops have been previously offered at teacher conferences and through grant programs.

### Customized Science and Mathematics Workshops – One Hour to Multi-Day

#### *Multiple Faculty Members*

The faculty of the Department of Science/Mathematics Education have run numerous professional development programs including through the Texas Regional Collaboratives and WeTeach\_CS that have been tailored to a wide variety of TEKS and grade levels. Let us **work with you** to customize professional development that meets **your** needs and time requirements.

#### *Leverage **Our** Teachers*

Many of our graduates and teachers from our grant programs would make excellent presenters for their peers. Most of these individuals have experience presenting here at UT Dallas and/or at STEM teacher conferences. We are happy to work with these and other teachers in your districts or make recommendations to you and assist in leveraging the incredible talent of your own local teacher-leaders.

---

### Multi-Day Workshops

Various faculty members have led multi-day workshops and summer institutes for local teachers, some created in house such as computational thinking, project-based learning, stars and planets, zebrafish and model organisms, and a wide-variety of science and mathematics topics.

Thanks to training and experience with the Texas Regional Collaboratives, the department and some of our former-teacher participants also can offer workshops based on nationally recognized professional development programs such as those of WestEd's *Making Sense of Science* series including: *Force and Motion*, *Energy*, *Genes and Traits*, *Matter*, *Planet Earth*, *Organisms*, and *Water*.

WestEd's literacy in science pieces can be done as a separate multi-day workshop. We are interested in developing potential complementary pieces in mathematics literacy.

---



## **Full Day Workshops**

### **Intro to TI-Nspire**

*Amin Lalani, Master Teacher*

Participants will learn how the TI-Nspire can be used in a Math Classroom to help students conceptualize abstract concepts. (*middle school math*)

---

### **All About Atoms**

*Dr. Stephanie Taylor, Senior Lecturer*

From counting protons, neutrons and electrons to periodic trends, there is a lot of interesting pieces to the periodic table. Take a day to dive deep into atoms! (*high school science, middle school science*)

---

### **Learning Through Projects!**

*Dr. Kate York, Master Teacher and Katie Donaldson, UTeach Dallas Associate Director*

Projects can be an amazing way for students to engage more deeply with STEM content. Often, though, these occur after the content has been taught. This professional development focuses on using projects to actually facilitate content instruction and learning through mini project-based lessons. This professional development provides attendees with the all the tips and tricks needed to successfully design small-scale PBL lessons. Additionally, attendees get to experience and take away two mini-PBL STEM lessons! This workshop is designed to align to multiple elementary and secondary math and science TEKS, making it a versatile addition to anyone's instructional tool box! (*K-12 science and math*)

---

### **Cooperative Learning with SEL**

*Pam Kirkland, Master Teacher and Emily Hennessy, Senior Lecturer/Graduate Advisor*

Using Cooperative Learning Strategies, educators address the social-emotional learning of all students, and give additional support to At Risk, ELL, SPED, GT students. Per research, students working in a cooperative learning environment have demonstrated improved learning, increased motivation and improved performance compared to students who work in "groups". Students will support one another in connecting concepts in a variety of ways, utilizing reading, writing, listening, and speaking skills. The activities also assist in developing 21st Century Skills including: critical thinking, communication, collaboration, and creativity. Students will work cooperatively using questioning strategies to solve problems, test decisions based on outcomes, and developing a growth mindset for learning. (*K-12 science and math*)

---

### **Making Sense of Science: Systems (WestEd)**

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas and Dr. Stephanie Taylor, Senior Lecturer*

*This full-day WestEd training encourages teachers to explore both the engineering design process and process of science through the lens of inquiry and iterative design.*

---

**If there was a problem... Facilitating Rich Mathematical Discourse while Problem Solving (All Day Session)**

*Dr. Julie Sutton, Sr Lecturer, UT Dallas*

Problem based learning in mathematics allows students to experience academic struggle; teachers and facilitators must strive to balance fruitful struggle with the overwhelming feelings of being stuck. This all-day session focuses on keeping the discourse meaningful, while acknowledging (and learning to embrace) the importance of productive struggle within your mathematics classroom. Participants will work on problems that will challenge them, and through this struggle, teachers will experience the importance of providing a safe atmosphere in which students are successful. Discussions during the session may focus on enriching tasks, preparing for student questions, facilitating group work, and how to manage feelings of overwhelming struggle. *(5-12 math)*

### Three-hour Workshops

#### **Going Global in STEM**

*Dr. Kate York, Master Teacher and Katie Donaldson, UTeach Dallas Associate Director*

In the global society in which we now live, it is important that students are not only globally “aware,” but are also globally connected. STEM classrooms provide ideal settings for allowing students to learn content in the context of international collaboration and discourse. In doing so, students strengthen content acquisition while developing critical 21st century skills. In this interactive professional development, participants discuss the benefits and challenges of engaging teachers and students in global collaboration experiences in order to facilitate both STEM content acquisition and critical 21st century skills. Attendees will gain “how to’s” for the novice, aligning experiences to standards/learning outcomes for both K-12 and teacher preparation programs, resources for finding and establishing global partners in STEM areas, ways to incorporate technology for design and collaboration, tips for establishing safe partner communication, and suggestions for establishing stakeholder support. Attendees will also get to participate in a mini “global” experience! (*K-12 science and math*)

---

#### **Strategies to Encourage Classroom Conversation for ELLs**

*Pam Kirkland, Master Teacher*

In this workshop, participants will learn how to:

1. Increase student interaction between peers and encourage content-area conversation
  2. Encourage ELL students in language acquisition skills ( BICS and CALP)
  3. Develop Inquiry Skills
  4. Enhance Understanding of Science Concepts/TEKS
  5. Develop 21st Century Skills by using technology and collaboration skills
  6. Address the social-emotional needs of students (*K-12 science and math*)
- 

#### **Lunar Phases and Eclipses: Observe, Explore, Develop Expertise**

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas*

Discuss the importance of lunar observations, build a scale model integrating math and science, model phases eclipses, and play with building expert knowledge of the phase cycle with Dr. Urquhart’s own creation – the free and reproducible Lunar Phase Wheel. Leave with deeper Earth-Moon-Sun system knowledge and free classroom-ready resources!

---

#### **Seasons**

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas*

Most students, upper elementary through college, will say that seasons are caused by the tilt of the Earth? But what does that really mean? While seemingly simple to an expert, understanding the true causes of the seasons is a challenge for children and adult learners alike. In this three-hour workshop pulled from a graduate astronomy class designed for teachers in the UT Dallas Master of Arts in Teaching program, participants will both explore the real reasons for the seasons and how to guide students in challenging their own naïve conceptions to building understanding using a variety of approaches including data, a GEMS guide, video resources, interactives, and models.

---

## **Building Understanding of Scale in the Solar System (Can be Abbreviated to One Hour)**

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas*

Why does scale matter? Models and their limitations are an important part of describing and understanding the natural world. The activities presented have been extensively field-tested and are either original or adaptations of classic astronomy education activities. The simple scale models participants will use in this session also integrate science and mathematics skills, and can be adapted for many levels.

---

## **Exploring Newton's Laws**

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas*

Repeating definition is easy. Yet, Physics Education Research tells us that understanding Newton's Laws of Motion is challenging for adults as well as for middle and high school students. What do these laws really mean, and why are they so challenging to understand? This workshop will include simple and practical activities that can be done with students of all ages

---

## **How to Spot an Enriched Mathematical Task**

*Dr. Julie Sutton, Sr Lecturer, UT Dallas*

What does an enriched mathematical task look like? Why are such tasks important in mathematics classrooms? Does engagement mean the same as enrichment? This workshop focuses on ways to enrich standard mathematical activity. In the end, we will explore writing tasks that will help students be more successful on any district or state assessment. Using the Mathematical Task Enrichment Guide (Álvarez, 1998), participants practice modifying tasks to add enriching elements. Feedback on such efforts is paramount to success; this session explores ways to practice the writing-feedback-edit loop. *(5-12 math)*

### **One-hour workshops**

## **To Engage Your Students, Bring TI-Nspire Programming Into Your Classroom**

*Amin Lalani, Master Teacher*

Participants will learn how to create short programs on the TI-Nspire. We will start with "hello world" activity and quickly move to creating the following programs: determine if an integer is even or odd using modular arithmetic, using a loop to create two lists with one list containing all even numbers and the other containing all odd numbers, and creating a program to find the hypotenuse of a right triangle. *(middle school math, high school math)*

---

### Using TI-Nspire to find relationship between dimensions of famous paintings

*Amin Lalani, Master Teacher*

Participants will use TI-Nspire to determine if famous artists, such as da Vinci, Rubens, Van Gogh, Picasso, and many others, had a preference when it came to the dimension of their paintings. (*middle school math, high school math*)

---

### Use the TI-Nspire to explore Infinity within Finite and how Fractals can be studied using functions

*Amin Lalani, Master Teacher*

First, participants will get a chance to construct the first three iterations of Sierpinski's triangle. After constructing the Sierpinski's triangle, a tns file will be used to explore and model the behavior within the Sierpinski's triangle. Using the interactive tns file, individuals will capture data that will allow them to use functions to model the relationship between the number of new triangles within each iteration. Finally, participants will explore the relationship between total number of equilateral triangles that are constructed up to a given iteration

---

### Taste and Smell the Science

*Dr. Stephanie Taylor, Senior Lecturer*

Too often we must focus on all the safety rules of what we cannot do in science. Take the time to explore the fun of tasting and smelling a variety of science concepts. Taste a periodic trend and explore a twist on "like dissolves like" among others! (*K-12 science*)

---

### Nuclear Power in the World

*Dr. Stephanie Taylor, Senior Lecturer*

Let's shoot nuclear waste into the sun! Was Fukushima a nuclear or chemical explosion? How does nuclear power work? Can we mine the moon to further fusion research? How does radiation kill cancer cells? Explore resources and activities to answer these questions and more! Attendees will engage in discussions, explore resources and discover many of these answers for themselves. Virtual resources will be shared via Dropbox links, and displayed. 1) Attendees will be able to explain how nuclear fission and fusion give energy. 2) Attendees will be able to name and describe three applications of nuclear materials. 3) Attendees will be able to describe the pros and cons of nuclear power. (*K-12 science*)

---

## Counting Chemists

*Dr. Stephanie Taylor, Senior Lecturer*

In chemistry, we use the mole for counting atoms. Yet this strange number is often a struggle for students. We will explore a way to make the concept of the mole more palatable, as well as ways to work with the exponent mathematics. (*high school science, high school math*)

---

## From Cabbages to Pocket Mice: The Power of Selection

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas with Dr. Stephanie Taylor, Senior Lecturer, and/or Dr. Vinita Hajeri, Senior Lecturer*

In this discussion-rich, TEKS-focused workshop, see how powerful small genetic changes can be! From diverse food plants that are all members of a single species to natural selection in the wild, explore the power of artificial and natural selection. Grocery store produce and free online resources are all you need!

---

## The Search for Habitable Worlds, Near and Far! Exploring Exoplanets in the Classroom

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas*

How does our own solar system compare to the thousands of planetary systems around other stars? What makes a habitable world? Explore our solar system and the alien worlds within it and far beyond, using NASA resources, classroom-friendly spectroscopy, and scale models created by space scientist/educator Dr. Mary Urquhart. Learn why Earth is so special and why strange “eyeball Earths” maybe the most common “Earth-like” planets of all.

---

## Interactive Visualization of the Invisible

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas and Dr. Stephanie Taylor, Senior Lecturer*

What is pressure? What really causes convection? How do particles of matter move? Answer these questions and more! Explore buildable kinesthetic models created by faculty at UT Dallas involving simple and inexpensive materials like ping pong balls and marshmallows. We'll also share plenty of teaching ideas and free technology-based interactive simulations we use in our professional development programs for science teachers of all levels and in our own university classrooms!

---

## Worlds of Weather and Rock

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas*

Fantastic discoveries are being made by NASA's planetary exploration program, but what do they have to do with the TEKS teachers have to teach? What can recent discoveries in our solar system, such as streambeds on Mars, a convecting frozen sea of nitrogen ice on Pluto, and methane rain and lakes on

Titan, tell us about weather, rock, and erosion on our own planet Earth? What can Earth tell us about worlds so different from our own? Explore three surprisingly familiar yet alien worlds. Discuss how physics and chemistry relate to the composition and movements of weather and rock on our world and on alien worlds farther from our star, the Sun. Links, the presentation, and abundant classroom resources will be provided!

---

### **The Sun, Earth, Moon System: Observations, Models, and More!**

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas*

Why is understanding the 'why' of lunar phases challenging for students of all ages? Why is doing authentic observations of the moon important? How are day and night related to the phases of the moon? How can you find the moon in the daytime sky? Come explore lunar phases and more with space scientist/educator Dr. Mary Urquhart. You'll also receive free TEKS-relevant classroom-ready resources, including the Lunar Phase Wheel developed by Dr. Urquhart at UT Dallas!

---

### **Building Understanding of Scale in the Solar System**

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas*

Why does scale matter? Models and their limitations are an important part of describing and understanding the natural world. The activities presented have been extensively field-tested and are either original or adaptations of classic astronomy education activities. The simple scale models participants will use in this session also integrate science and mathematics skills, and can be adapted for many levels.

---

### **Seasons – An Introduction to Misconceptions and Strategies**

*Dr. Mary Urquhart, Associate Professor, Dept. Head, Director of UTeach Dallas*

Most students, upper elementary through college, will say that seasons are caused by the tilt of the Earth? But what does that really mean? While seemingly simple to an expert, understanding the true causes of the seasons is a challenge for children and adult learners alike. In shorter version of a workshop pulled from a graduate astronomy class designed for teachers in the UT Dallas Master of Arts in Teaching program, participants will explore common barriers to understanding this topic. Planetary scientist and science educator Dr. Mary Urquhart will guide participants in how they can help build student understanding by challenging common sense (and common) incorrect ideas about the seasons with evidence and models.

---

### **Make a Big Splash in Your Science Classroom with Zebrafish**

*Dr. Vinita Hajeri, Senior Lecturer*

Come explore through fun, hands-on activities, how you can use the zebrafish (*Danio rerio*), a freshwater fish at the forefront of scientific research, to make a big splash in your science classroom. These hardy fish commonly found in pet stores can be easily maintained in a classroom and serve as robust instructional tools to drive cutting-edge, real-world investigations. Discover the value of zebrafish to bring alive complex topics including cell structure and processes; growth, development, and reproduction of organisms; and multiple topics in ecology and aquatic science. Explore how you can use the popular





Glowfish to excite your learners about biotechnology, heredity, and genetics. Classroom-ready resources including vendor information for these organisms, care and feeding requirements, links to free teaching resources and alignments to TEKS across grade levels will be provided.



### Meet Some of Our Presenters:

#### **Katie Donaldson**

Katie Donaldson is the Associate Director and a Master Teacher for the UTeach Dallas program at the University of Texas at Dallas. She spent 16 years in Garland ISD as a science teacher, instructional coach, and science facilitator before joining UTeach Dallas in 2010. She has been teaching and/or providing field supervision for the UTeach project-based instruction course since 2011 and has written CScope Curriculum for Texas Region X Service Center and project-based units for middle school and high school science.

#### **Dr. Vinita Hajeri**

Vinita Hajeri is a Senior Lecturer with a Ph.D. in Molecular Biology from the University of North Texas and an M.S. and B.S. in Botany from the University of Mumbai. Her work focuses on the genetics of model organisms, including zebrafish, and their use in the K–12 classroom. She teaches courses in applied genetics and ecology for the Master of Arts in Teaching program. And co-teaches Research Methods for the UTeach Dallas program for which she also teaches an undergraduate course in applied genetics.

#### **Emily Hennessy**

Emily Hennessy is a former elementary science teacher and curriculum writer. She is in her tenth year at the University of Texas at Dallas as a senior lecturer and is currently the graduate advisor for the Master of the Arts in Teaching Science and Math Education. She teaches Elementary Science Methods and UTeach Step One courses for undergraduates in both UTeach and the Teacher Development Center. In addition, she teaches the Teaching and Learning of Science and Math course for the graduate MAT program.

#### **Pam Kirkland**

Pam Kirkland is a Master Teacher and the Induction Coordinator for the UTeach Dallas program. Her role as Master Teacher includes teaching Step 1, Step 2, and Classroom Interactions to preservice science and math teachers. Induction Coordinator has included providing Professional Development and support to UTeach Dallas graduates who are currently teaching secondary science or math. Her educational work experience has included teaching science in Title 1 middle schools in both Richardson and Garland ISD, Science Curriculum Writer, Instructional Specialist, New Teacher Science Trainer, Administrative Intern and Science Department Chair. Pam holds a M.Ed. with an Administrator certification and ESL supplemental.

#### **Amin Lalani**

Amin Lalani is a clinical professor at the University of Texas at Dallas. He is a Math Master Teacher within the UTeach program and teaches STEP 1, STEP 2 and Functions & Modeling. STEP 1 and STEP 2 are the introductory 1hr courses to recruit STEM majors to pursue teaching. Amin is passionate about integrating Computer Science into Math Curriculum.



### **Dr. Julie Sutton**

Two years teaching high school mathematics led Julie Sutton to UT-Arlington to earn a PhD in mathematics. As the Graduate Research Assistant on the Arlington Undergraduate Research-Based Achievement for STEM (AURAS) grant (NSF), Julie wrote curriculum for a unique pre-calculus and calculus experience at UT-Arlington. Through this she fell in love with Mathematics Education and wrote her dissertation on the use of technology in the undergraduate calculus classroom. Julie teaches freshmen mathematics classes as well as graduate courses for the Masters of Arts in Teaching program at the University of Texas at Dallas.

### **Dr. Stephanie Taylor**

A Ph.D in biochemistry and Postdoctoral Fellowship in chemical education led Stephanie Taylor, an award-winning lecturer, to teach university freshmen chemistry, as well as graduate courses for the Masters of Arts in Teaching program at the University of Texas at Dallas. After six years of teaching and four years of leading a middle school chemistry summer camp, Stephanie continues to look for ways to spark creativity and interest in the sciences.

### ***Dr. Mary Urquhart***

Mary Urquhart is an award-winning Associate Professor and Head of the Department of Science and Mathematics Education in the School of Natural Sciences and Mathematics of the University of Texas of Dallas, and an Affiliate Associate Professor of Physics. She holds degrees in Physics and Geophysics from New Mexico Tech and an M.S. and Ph.D. in Astrophysical, Planetary, and Atmospheric Sciences from the University of Colorado at Boulder. Her postdoctoral work was conducted at NASA's Jet Propulsion Laboratory and the NASA Ames Center for Mars Exploration. She was Education and Public Outreach Co-Lead for the UT Dallas built NASA CINDI mission and has worked on numerous NASA and educational projects. Mary is the Director of UTeach Dallas secondary STEM teacher preparation program, and the physics and Earth/space science content specialist for the Master of Arts in Teaching program in Science Education. She has active projects with the National Science Foundation, and has served as Project Director for several programs for in-service teachers at UT Dallas including through the Texas Regional Collaboratives for Excellence in Science and Mathematics Teaching, WeTeach\_CS, TEA, and the THECB.

### ***Dr. Kate York***

Kate York is in her fifth year as a Master Teacher for the UTeach Dallas program. She joined the program in 2014 after serving 12 years in Texas public schools. Her previous experience includes 7 years in the high school science classroom with both Moody and Wylie ISDs and 4 years as a high school science instructional specialist, followed by 2 years as a high school assistant principal, in McKinney ISD. Kate earned her Master's degree in Educational Leadership and Policy Studies K-16 from The University of Texas at Arlington and her Ph.D. in Curriculum and Instruction in Science Education from Texas Tech University. Kate has led school district instructional transformation using PBL pedagogy and continues to present on the benefits of PBL at the state and national levels.