

# INSIDE MATH & SCIENCE TEACHING

## STEM OR STEAM OR STEMM OR ...?

The acronym STEM has come into common usage in the last decade or so, but the connections across the fields of science, technology, engineering, and mathematics have been utilized for much, much longer. Since the acronym can be used in a few ways and can be adapted to a particular context, it can be helpful to consider its various meanings.

Initially, STEM as an acronym was used to refer to a number of related fields for the purposes of education or economic development projects. Eventually, the acronym was picked up by legislative, industry, and other groups and applied to their particular contexts. STEM became a term for real-world, inquiry based activities or a focus for workforce development. It has been merged with other ideas, such as:

- with Art to create STEAM
- with Agriculture to create STEAM
- with Reading and Art to create STREAM
- with Computer Science to create STEM-C
- with Medicine to create STEMM

Although each of these acronyms carry meaning in particular contexts, they all share a basic foundation of the content and practices associated with the component areas of science, technology, engineering, and mathematics.

So what does it mean for schools to use the acronym STEM? There are actually several different programs that incorporate the  
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### Teaching Tip:

#### Origami for the Classroom

Believe it or not, the ancient paper folding art of origami can support student learning in the classroom. Origami can support students in developing their ability to visualize or to manipulate visualizations, supporting their abilities in the mathematics and science classrooms as well as in engineering and design. Some of the benefits include:

- providing additional ways for students to describe objects, their orientation, and their manipulation
- introducing additional modalities of learning that include new terminology and tools for identifying
- discussing proportions through relative sizes or creating scaled representations
- troubleshooting and adjusting course
- exploring the strength of shapes and their occurrence in nature
- connecting to the arts and to a different cultural context

edutopia.com - 5 Reasons Why Origami Improves Students' Skills



image from canva.com, a publishing platform

## 2019 NSTA STEM Forum

Want to learn more at STEM teaching and partnerships? Consider attending the 2019 NSTA STEM Forum in San Francisco! The TEAMS program has travel funds to support your attendance. More information can be found at <https://tinyurl.com/y5vsorn7>. You can attend presentations, a workshop on 3D assessment, and more. Interested? Email Tracie Salinas to begin the travel planning process.

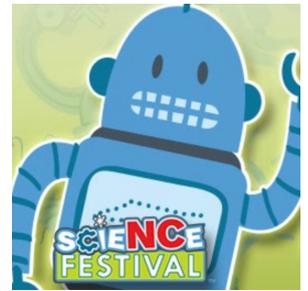


San Francisco  
July 24–26, 2019

## April is NC Science Festival Month

In April, all of North Carolina gets excited about STEM - it's Science Festival month!

The Morehead Planetarium and Science Center introduced the festival idea in 2010 with an initial combination of events and participants. In 2012, they moved the festival to April and began growing the numbers of activities and partners.



Within a couple of years, the NC Science Festival had a spokesbot, Kelvin, and grew to occupy the entire month of April. In western NC, there are a number of events that you can tap into, including the STEAM Expo on the Appalachian campus on April 30 from 9-2. For more information, visit [www.ncsciencefestival.org](http://www.ncsciencefestival.org).

## Course and Professional Development Options for Noyce Scholars

If you are a current student, you may want to talk with your advisor about one of the interesting courses available to you. These courses can expand your teaching practices, increase your ability to work with diverse learners, and enrich the teaching methods you are developing in your program. Following are a few that might be of interest:

**jSPE 3531: Disability, Social Justice, and Inclusion in School and Community:** Offered fall 2019, SPE 3531 will examine educational services in the US with a critical lens. Topics will include how to productively view student disabilities, how to develop a repertoire of advocacy skills, and how to teach self-determination skills to all students. Contact Dr. Susan Pogoloff ([pogoloffsm@](mailto:pogoloffsm@)) for more information.

**CI 5340: Culturally Sustaining Pedagogies for Emergent Bilingual Learners:** This course, part of a new graduate certificate in working with bilingual learners, provides a rich investigation of the funds of knowledge of migrant, refugee, and emergent bilingual learners and then provides culturally sustaining pedagogies as a guiding framework for creating effective classrooms for them. This course does include a field experience in which participants collaborate with community/school members to create curriculum projects.

**MELT Program:** MELT (Mathematics Education Leadership Training) program is a professional development program in the Department of Mathematical Sciences. Each summer, a variety of week-long workshops are offered, many of which can also be taken for graduate credit. Visit [melt.appstate.edu](http://melt.appstate.edu) for more information on courses offered in summer 2019. Contact program director Mike Bossé ([bossemj@](mailto:bossemj@)) for more information. MELT courses may be taken for continuing education credits by those who have already completed their licensure program as well. Funding may be available to support the MELT program workshop participation for current Noyce teachers.



DON'T FORGET TO

*Get Connected!*



Appstate\_TEAMS  
@TMcSalinas

STEM Leadership  
Community  
(a facebook group)



NC SCIENCE TEACHERS ASSOCIATION

NC COUNCIL OF TEACHERS OF  
MATHEMATICS

The TEAMS Noyce Scholarship  
program at Appalachian State  
University is funded by the  
National Science Foundation  
(DUE 1540830)

## Don't Forget!

Maintaining our funding status depends heavily on our ability to provide accurate data to our funding agency, and our data become part of reports provided to the US Congress that demonstrate the effectiveness and impact of programs like the Noyce Scholarship Program. That means we need your help!

Remember, **each year** we need information on your **current status**, including a copy of your teaching contract when you are employed. If you **change your mailing address, phone number, or email address**, please update us as soon as possible.

**Survey data is a vital component of our reporting.** When you receive surveys or other requests for information, please respond as quickly as possible. Your timely responses help us ensure that other students receive their scholarship funds on schedule.

Failing to comply with data provision may result in your having to payback your scholarship funds, so let's avoid that!

## STEM or STEAM or STEMM or ...?

concept of STEM, including the recognition of some schools as STEM Schools based on certain characteristics in their curriculum and instruction and a variety of P-12 and economic partnership programs based on STEM.

Bringing STEM into your classroom can be accomplished by co-teaching with other STEM faculty, by including more integrated, multi-disciplinary activities in your teaching, or by incorporating STEM practices in your everyday classroom activities.

What are STEM practices? These include the kinds of thinking that occur at the intersection of the STEM disciplines or within them, thinking that might include troubleshooting, communicating, iterating, hypothesizing, justifying, generalizing, and more. When students engage in these kinds of thinking, they are engaging their STEM thinking no matter the context - or additional letters in the acronym! Some great ways to bring in more STEM into your classroom are to look for Problem-Based Learning activities or to bring both current science topics AND "settled science" into the classroom. Look at [stemteachingtools.org](http://stemteachingtools.org) and the STEM Resources area of [www.nea.org](http://www.nea.org) for more ideas. And if you try something exciting in your classroom, let us know!

## did you know?

The NC Environmental Education organization shares a variety of grants that are available for teachers, including some for travel dollars, classroom resources, and technology.

See the link below for more information, and don't forget that there is a grant writing resource available to you at this link: <https://tinyurl.com/y4nz8buj>

For a listing of grants from NCEE, see <https://tinyurl.com/y5kbmpty>

N.C. ENVIRONMENTAL EDUCATION



## A MESSAGE FROM THE DIRECTOR

April is always so much fun in the mountains! The flowers have begun to bloom; some of the trees have begun to show their leaves - and the STEAM Expo arrives on campus! This year's STEAM Expo is scheduled for April 30, and more than 2,000 middle and high school students from across the area will visit the campus. Students will engage in hands on activities in the convocation center and may also visit departments for demonstrations. Perhaps the most exciting part of an event like the Expo is that you never know at what moment one of the students will discover something that will become their life long passion. When a student who has never been to the campus, for example, sees a scientist who looks like him or her or when a student who is concerned about a relative with a health issue sees the research that may lead to its cure, lives can be changed. The question is how to maintain that level of engagement, that level of interest in the STEM fields on a day to day basis in the classroom, not just on a field trip. How do we let students see engaging mathematics and science and more in our lessons so that they see those fields as fundamentally interesting and relevant and not that the fun stuff is somehow "extra"?

*Don't ask kids what they want to be when they grow up. Ask them what problems they want to solve and what they need to learn to be able to do that.*  
-- Jaime Casap

Connecting the classroom to students' every day lives is one way to capitalize on their interests, and posing problems that are complex and that lend themselves to multi-disciplinary or cross-disciplinary approaches can be as well. Rich problems that matter are good motivators for students. They also support the development of creativity and communication and reflect the complexity of the real world. In fact, thinking about problems can be an impactful way for students to begin to recognize what problems interest them enough to spend their lives tackling. Climate change? Clean water availability? Recycling? Disease spread? All of these are wicked problems that will require creativity, innovation, and inter-disciplinary approaches. How will you pose problems that don't just teach content but that prompt students to think about their passions and future impact?

*Tracie McLemore Salinas*

