

5TH ANNUAL

STEM

SCIENCE

TECHNOLOGY

ENGINEERING

MATHEMATICS

— **Forum & Expo** —

HOSTED BY NSTA

Denver, CO

July 27–29, 2016

#STEMforum

NSTA National
Science
Teachers
Association



Inspiring Generation STEM

We share your commitment to the success of your students. After all, the next generation of Texas Instruments engineers and technicians are in today's math and science classrooms. So we deliver the interactive technology,

engaging activities and world-class professional development that teachers need to help their students succeed — now, in post-secondary STEM programs tomorrow and as the inventors and innovators of the future.

There's a scientIst in every student. Learn more at education.ti.com/stem.



5th Annual STEM Forum & Expo, *hosted by NSTA* Denver, Colorado • July 27–29, 2016

Wednesday Kickoff: First-Timers Session and Student Panel Discussion followed by Evening Exhibit Preview and Welcome Reception, as well as STEM Leaders' Panel

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National Science Teachers Association

1840 Wilson Blvd.
Arlington, VA 22201-3000
703-243-7100
E-mail: conferences@nsta.org
www.nsta.org

NSTA Affiliates

Association for Multicultural Science Education (AMSE)
Association for Science Teacher Education (ASTE)
Association of Science-Technology Centers (ASTC)
Council for Elementary Science International (CESI)
Council of State Science Supervisors (CSSS)
National Association for Research in Science Teaching (NARST)
National Middle Level Science Teachers Association (NMLSTA)
National Science Education Leadership Association (NSELA)
Society for College Science Teachers (SCST)

The 5th Annual STEM Forum & Expo, hosted by NSTA

NSTA and the STEM Forum Steering Committee are extremely grateful to the following companies and organizations for their generous support and contributions to the 5th Annual STEM Forum & Expo, *hosted by NSTA*.

Sponsors

FIRST® (For Inspiration and Recognition of Science and Technology)

GOOGLE, Making & Science

Pitsco Education

TeacherGeek



Contributors

Denver Museum of Nature & Science

Denver Zoological Foundation



Program Partners

American Association of Chemistry Teachers (AACT)

American Association of Physics Teachers (AAPT)

American Society for Engineering Education (ASEE)

International Technology and Engineering Educators Association (ITEEA)

National Association of Biology Teachers (NABT)

National Council of Teachers of Mathematics (NCTM)



Welcome to the 5th Annual STEM Forum & Expo, hosted by NSTA



Jennifer C. Williams



Mary Gromko

Welcome to the Mile High City—Denver, Colorado, the Queen City of the Plains. This summer, NSTA is proud to host the 5th Annual STEM Forum & Expo. Because STEM permeates every aspect of our daily lives and work, the teaching of science, technology, engineering, and mathematics must be a priority in today's classrooms. We are excited to bring you this highly specialized professional development event that enables us, as educators, to help our students stay globally competitive in terms of innovation, while demonstrating real-life applications to concepts we are teaching.

NSTA, the Steering Committee, and all our partners have worked diligently to bring you an excellent program that includes a dynamic keynote speaker, sessions, and invited panels providing you with strategies to stimulate your students' interests in STEM, begin or enhance STEM initiatives in your school or district, as well as offer models and more strategies to enhance the skills and knowledge of current and future STEM leaders at prekindergarten through university levels. We also hope to provide opportunities to network with colleagues around the world through face-to-face and digital interactions, as well as through social events.

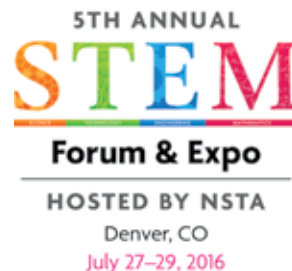
We are extremely excited to introduce a few new features to this year's STEM Forum & Expo. These include:

- Elementary STEM Showcase: A flea market-style sharing featuring 20+ STEM leaders in preK–6 education
- STEM Leaders' Panel
- More Than What's Made: Stories of Making Possibilities Panel (Organized by MakerEd)
- Design Thinking and Experiential Learning Panel

We encourage you to invigorate your classrooms and schools by using the tools, knowledge, and resources shared by our presenters and exhibitors. Thank you for attending and we hope that you will have an exciting and rewarding time exploring the STEM experiences at the 5th Annual STEM Forum & Expo, hosted by NSTA.

Jennifer C. Williams, 2016 STEM Forum Steering Committee Chairperson

Mary Gromko, 2016–2017 NSTA President



2016 STEM Forum Steering Committee

Chairperson

Jennifer C. Williams

Department Chair, Lower School
Science
Isidore Newman School
New Orleans, LA

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Spanish Dual Language
Kindergarten Teacher
Sherwood Forest Elementary
School
Bellevue, WA

Upper Elementary Strand Leader

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STEM Manager
Shelby County Schools
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STEM Teacher
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Louisiana State University
Baton Rouge, LA

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Retired Principal
Lansdowne Middle School
Baltimore, MD

Honorary Steering Committee Member

Tera Jones

STEM Coordinator/
Recruitment Specialist
Denver Public Schools
Denver, CO

NSTA Conferences and STEM Forum & Expo Go Green!

The National Science Teachers Association is committed to meeting today's environmental challenges by adopting eco-friendly practices both in our own day-to-day operations and at our 5th Annual STEM Forum & Expo, conferences, workshops, and other events. In addition, we strongly encourage our contracted conference facilities to follow green practices as well. Here are some of the ways NSTA's conference department has worked to minimize our impact on the environment:

Online Forum Information and Personal Scheduler

Most of your STEM Forum & Expo arrangements can now be accomplished online (www.nsta.org/stemforum). Register and make your housing reservations on the web. Program details are available to you on our website using the Session Browser/Personal Scheduler. Scheduling information on our website is up to date and more complete than that available through a printed piece.

Final Forum Programs by E-Mail

Forum registrants are now given the option of receiving an electronic version (PDF) of the final program by e-mail approximately one week prior to the forum, further reducing printing and shipping requirements. Also, attendees are encouraged to use the NSTA Conference app, which provides all the tools necessary for a successful STEM Forum experience.

Recycled Paper and Sustainable Print Services

Forum programs are printed on recycled paper whenever possible. In addition, Walsworth Inc., the printer for our conference materials, is in strict compliance with all environmental laws and exceeds these standards in many areas. Wherever possible, Walsworth works to reduce and recycle waste, use reduced- or low-VOC chemicals, increase the recycled content of raw materials, and use soy- or vegetable-based inks. Walsworth has also obtained certifications with the Sustainable Forest Initiative (SFI) and the Forest Stewardship Council® (FSC) to ensure paper products are being harvested from environmentally responsible sources.

Eco-Friendly Exhibition Practices

Our forum partner, Hargrove, Inc., offers many green product options and services in the production of our forum and conference exhibitions, including 100% recyclable carpet and padding, recycled exhibit structures, a "reclaimer" that recycles 92% of all solvents the company uses in production of graphics, use of LP natural gas in 75–90% of show-site vehicles, and many biodegradable and recycled products such as trash bags and wastebaskets. Their green efforts are extended operationally with reductions in electricity, heating fuel, and water usage, as well as a move to 100% recyclable and biodegradable products.

Colorado Convention Center's Green Efforts

In October 2015, the Colorado Convention Center (CCC) received the CDPHE Environmental Gold Leader Recognition. The Colorado Environmental Leadership Program (ELP) is a voluntary program, within the Colorado Department of Public Health and Environment (CDPHE), designed to recognize and reward organizations and businesses that demonstrate superior environmental/sustainability performance and, as a result, consistently operate at a level that goes beyond compliance with environmental regulations and are working toward the goal of sustainability. The following are some of their innovative eco-friendly practices:

- Reduced emissions of CO₂ by 4,117,826 lbs. with its rooftop Solar Array that generates approximately 350,000 kwh per year.
- Has single-stream recycling throughout the facility and a back-of-house compost collection program to help minimize the amount of materials hauled to landfills. In 2015, 373.2 tons of materials were recycled via single-stream recycling.
- In a continued partnership with RAFT Colorado (Resource Area for Teachers), the CCC donates leftover conference materials to the organization. In 2015, the CCC donated a total of 4,500 lbs. to RAFT.
- More than 90% of the housecleaning materials are either certified by Green Seal or the equivalent.
- Has sponsorship of two Denver Bike Share Stations located on the property.

"Go Green" at the 5th Annual STEM Forum & Expo!

- Recycle your forum programs in the clearly marked recycle bins located throughout the Convention Center.
- Recycle or reuse your plastic badge holders—you can either turn them in at the NSTA Registration Counter or use them at future conferences.
- If you prefer to bring handouts to your session, use double-sided printing and/or recycled paper.
- Walk or use public transportation when possible at the conference.
- Bring your own refillable water bottle to the forum. Water refill stations are located at every water fountain.
- In advance of the forum, presenters are encouraged to post their presentations and handouts online on the Session Browser/Personal Scheduler.
- Evaluate sessions attended online.



Courtesy of Scott Dressler-Martin / VISIT DENVER

the day. Purchase your train ticket at the ticket vending machines or at the RTD Customer Care counter, both located in the middle of Denver Airport Station. Airport fare is \$9 one way. For details, visit www.rtd-denver.com/a-line.shtml.

Denver STEM Forum & Expo attendees may also use SuperShuttle, which operates daily from 4:30 AM until 12 Midnight, serving all downtown and Denver Tech Center hotels to/from the airport. Travel time is 45–60 minutes, depending on hotel location and number of stops. Shuttles will stop at the Convention Center with advance reservation (two-hour minimum notice). To book a shuttle, visit www.supershuttle.com/locations/DenverDEN.

Getting Around Town

Public bus service is scheduled and provided within the local metro area by the Regional Transportation District (RTD). One highlight is RTD's FREE 16th Street MallRide. This is your ride to great restaurants, shops, tourist attractions, and businesses up and down 16th Street Mall. The FREE 16th Street MallRide runs seven days a week and stops on every block between Civic Center and Union Station. Service begins at 5:00 AM on weekdays, 5:30 AM on Saturdays, and 6:30 AM on Sundays/holidays and ends every night at 1:06 AM. For more information, visit bit.ly/1X8R3n3.

Parking

The Convention Center has a 1,000-space covered parking garage, including three reserved parking stalls for hybrid and electric vehicles for up to eight hours of free parking. For directions to the Convention Center as well as parking rates and maps, visit bit.ly/133TUEV.

Discounted Rental Cars

The toll-free number to contact an NSTA-designated car rental company is:

Enterprise 800-593-0505 16AH230

* go to www.enterprise.com and use "16AH230" in the "Optional: Coupon, Customer, or Corporate Number" box. Click on "search" and enter PIN "NST."

Meeting Location and Times

STEM Forum & Expo hotels are the Hyatt Regency Denver at Colorado Convention Center (*headquarters*), Hilton Garden Inn Denver Downtown, Sheraton Denver Downtown, and Hyatt Place/Hyatt House. STEM Forum registration, the exhibits, the NSTA Science Store, and sessions will be located at the Colorado Convention Center. The STEM Forum & Expo will begin on Wednesday, July 27, with a First-Timers Session from 2:00 to 2:45 PM, followed by an Opening Session (Student Panel), an Evening Exhibit Preview and Welcome Reception, and a STEM Leaders' Panel. The Thursday keynote address will be given by Derek Muller, science communicator, filmmaker, and television presenter, 4:30–5:30 PM.

The STEM Forum & Expo will end on Friday with a Closing Session from strand leaders, 4:30–5:30 PM.

Registration

Registration is required for participation in all forum activities and the exhibits. The lapel badge mailed to you with your confirmation, or issued to you at registration on-site, is your "ticket of admission" to the Exhibit Hall and all non-ticketed forum activities.

NSTA Registration and the NSTA Science Store are both located in Exhibit Hall A of the Convention Center. NSTA Registration will be open the following hours:

Wed., July 27	1:00–7:00 PM
Thu., July 28	7:00 AM–5:30 PM
Fri., July 29	7:00 AM–5:30 PM

The NSTA Science Store will be open the following hours:

Wed., July 27	1:00–7:00 PM
Thu., July 28	7:30 AM–5:30 PM
Fri., July 29	7:30 AM–5:30 PM

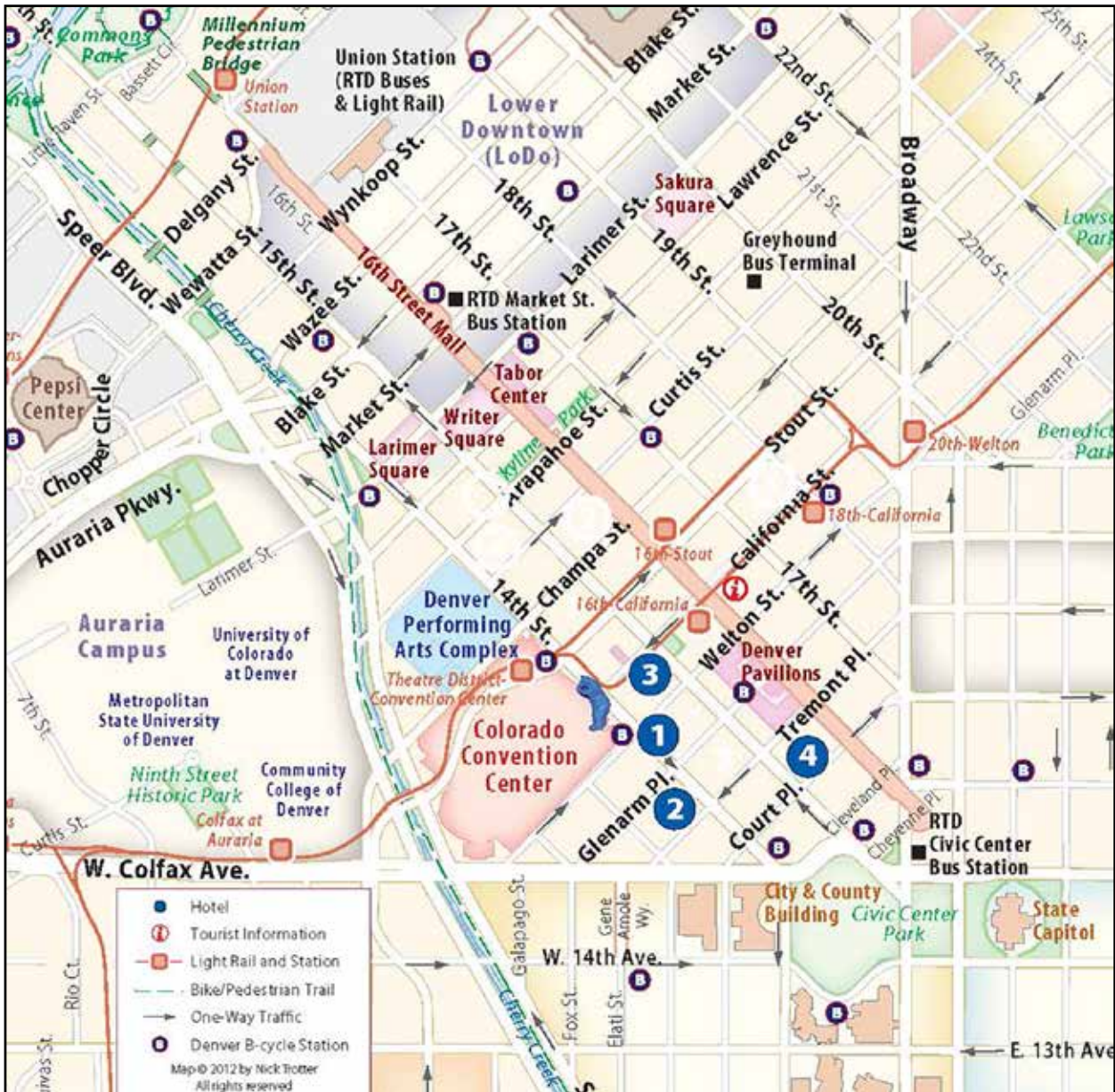
If you misplace your badge or tickets, present your personal ID at the Badge Reprint Counter in the Registration Area and you will be issued replacements. Only one replacement badge will be issued.

Ground Transportation to/from Airport

Denver International Airport (DEN), the fifth busiest airport in the U.S., is a major airline hub. Taxi fare from the airport to the Central Business District in the area of the Convention Center runs around \$65–\$70.

The new light rail from Denver International Airport goes directly to Downtown Denver (Union Station). Trains leave every 15 minutes during most parts of

Registration, Travel, and Hotels



1. Hilton Garden Inn Denver Downtown
1400 Welton St.

2. Hyatt Place/Hyatt House
440 14th St.

3. Hyatt Regency Denver at Colorado Conv. Center (Headquarters Hotel)
650 15th St.

4. Sheraton Denver Downtown Hotel
1550 Court Place

Housing Questions or Concerns?

If you have any questions or concerns about your housing, please contact Ashley Garrett, Orchid Event Solutions, toll-free at 877-352-6710 or on-site at the Housing Booth located in Hall A, during registration hours.



Don't forget to visit the NSTA Science Store for a selection of titles as well as hundreds of teaching resources for STEM educators.

NSTA Exhibits

The NSTA Exhibit Hall is a must-see! NSTA brings you the leading STEM education companies and organizations to showcase products, services, curricula, and much more. You'll discover something new and exciting in the world of STEM education.

The lapel badge mailed to you with your confirmation, or issued to you at registration on-site, is your "ticket of admission" to the Exhibit Hall and all forum activities. A map display of the Exhibit Hall will be on-site and accessible via our Conference app. A complete list of exhibitors and contact information starts on page 88.

Exhibit Hall Hours. Located in Hall A of the Convention Center, exhibits will be open for viewing during the following hours:

Evening Exhibit Preview and Welcome Reception
Wed., July 27 4:30–6:30 PM

Exhibits

Thu., July 28 9:15 AM–3:00 PM

Fri., July 29 9:15 AM–3:00 PM

Lead Retrieval. NSTA exhibitors use lead retrieval, a paperless tracking system to allow them to receive fast, accurate information about forum attendees who have visited their booths. With the lead retrieval system, an exhibitor scans

your badge as you visit the booth. This allows exhibitors to send information to you while the STEM Forum & Expo is still fresh in your mind.

Exhibitor Workshops. Exhibitor-sponsored workshops for STEM teachers are offered throughout the forum. These workshops give you an opportunity to use a variety of commercial instructional materials. Attendance is on a first-come, first served basis. See page 101 for a complete listing of exhibitor workshops.

Presenters and Presiders Check-In

If you are presenting or presiding at a session, please check in and pick up your ribbon at the Presenters/Presiders booth in the Registration Area after you have registered for the forum and received your name badge.

Wi-Fi at the Convention Center

Free wireless internet is available in the street-level public spaces and meeting rooms. The name of the network is "Complimentary WIFI."

NSTA Science Store

You are invited to browse the NSTA Science Store, where you're sure to find hundreds of the very best teaching resources for STEM educators. NSTA Press® books uniquely blend accurate scientific con-

tent with sound teaching strategies, and they appeal to STEM educators of all grade bands and disciplines. Examine some of our latest books—including *More Everyday Engineering*; *Bringing STEM to the Elementary Classroom*; *Uncovering Student Ideas in Earth and Environmental Science*; *Science Learning in the Early Years*; *Once Upon an Earth Science Book*; *Creative Writing in Science*; *The Feedback Loop*; *Be a Winner!*; and *Problem-Based Learning in the Life Science Classroom, K–12*. Our best-selling *Argument-Driven Inquiry* series now has a book for middle school, *Argument-Driven Inquiry in Life Science*, as well as student lab manuals to go along with all of the books in the series. You can also check out our growing line of children's books from NSTA Kids, including recent award-winner *Next Time You See a Spiderweb*.

In addition, we carry dozens of wonderful NSTA Gear items—such as T-shirts, mugs, and pencils—as reminders of your forum experience or as gifts for your family, colleagues, and students. Show your love of science and pride in teaching with items from our "I Love Science" product lines.

The NSTA Science Store is located in Exhibit Hall A of the Convention Center. All members receive discounts of 20% on NSTA Press and Gear items and 10% on books from other publishers. Perhaps best of all—enjoy free shipping when you order online during your visit to the on-site store.

Graduate Credit Opportunity

STEM Forum & Expo attendees can earn one graduate-level credit in professional development through Framingham State University. For details on the assignment requirements, visit www.framingham.edu/nsta. Questions? E-mail Paula Hogard at phogard@framingham.edu or call 508-626-4034.

Note: Grading will be pass/fail.

VISIT DENVER Colorado Convention Center Tourist Information Center

Located inside the 14th and California Street entrance of the Convention Center, the staff here is available to assist with city questions and dining reservations—they know all the best restaurants in the city! Stop by for brochures, maps, and general visitor information. Hours will be July 28 and 29 from 9:30 AM to 6:30 PM.

NSTA Conference App



Navigate the STEM Forum & Expo from the palm of your hand! The NSTA Conference app provides all the tools necessary for a successful STEM Forum & Expo experience. Features include the ability to view session and workshop listings by time and presenter; maps of the Convention Center and Exhibit Hall; social media plugins; and a note-taking tool. Scan QR code above or visit www.nsta.org/conference_app to download the app. *Note:* Make sure to create a CrowdCompass account when logging in to be able to export any notes taken with the app.

Audiovisual Needs

NSTA will fulfill AV needs originally requested on the program proposals as long as the request is within the limits of equipment that NSTA provides (an LCD projector and screen). For any last-minute AV needs, presenters must arrange and pay for their own equipment. Image Audiovisuals, Inc., the designated AV company on-site, will be located in Hall A (exhibitor service area) of the Convention Center.

Business Services

Located on Concourse A of the Convention Center, the UPS Business Center offers a variety of services, including photocopying, scanning, faxing, use of computer work stations, office supplies, and same-day shipping. During the week of the forum, hours will be

Monday–Friday	8:00 AM–5:00 PM
Saturday	9:00 AM–3:00 PM

For more information, please call 720-904-2300 or e-mail store6611@theupsstore.com.

First Aid/Emergency Services

First Aid is located in Lobby E, across from Room 507, in the Convention Center (a First Aid sign is displayed outside the door). Attendees in need of first aid may simply walk into the room, or call 303-228-8030. Located throughout the Convention Center, beige phones can be used to reach Security by dialing extension 200 who will dispatch assistance.

Lost and Found

All lost-and-found items will be turned in at the NSTA Exhibitor Registration counter at the Convention Center.

Interested in Joining NSTA?

The NSTA Membership Booth (#424) is located in the Exhibit Hall of the Convention Center. Stop by to learn more about the benefits of becoming an NSTA member, including all the best professional development and resources a STEM educator needs. If you received a six-month free membership coupon at registration, please redeem it here.

Online Session Evaluations and Tracking Professional Development

All attendees can evaluate sessions online while simultaneously tracking their professional development certification (based on clock hours).

Help NSTA's **GREEN** efforts by completing session evaluations online July 27–August 11, 2016, while the session is fresh in your mind!

To evaluate a session, attendees should follow these steps:

- Visit the STEM Forum session browser and search for part of the session title or presenter's name using the **Find Keyword** search option. *Note:* Our session evaluation system is designed to work from a computer and while it may work on smartphones/tablets, it is not really designed for them.
- Once you find the session you wish to evaluate, simply click the **Evaluate Session** button.
- Enter badge number (if you don't remember your badge number, click "help me find my badge number").
- When finished evaluating the session, click the **Submit Evaluation** button.
- Repeat this process for each session attended.

Concurrent session presenters may also complete evaluations for their own sessions in order to track professional development credit.

A Professional Development Documentation Form is included following page 16 to help attendees keep track of sessions/events attended that are NOT available for online session evaluation. This form can also be used to take notes on sessions attended that are available for online session evaluation.

Beginning August 23, 2016, an attendee can view his or her transcript at the NSTA Learning Center (learningcenter.nsta.org) by clicking on "My PD Record and Certificates." Attendees can also document credit for activities that are not being evaluated (e.g., Exhibit Hall visits). Each attendee is responsible for tracking his or her own attendance at such events. The transcript can be printed here and presented to an administrator who requires documentation of participation in the forum. All information in these transcripts will be maintained (and can be accessed) indefinitely as part of an attendee's individual profile.



—Photo of Larimer Square courtesy of Stan Obert / VISIT DENVER

The following venues have extended special offers for STEM Forum & Expo attendees.

Denver Museum of Nature & Science

www.dmns.org



Present your NSTA STEM Forum & Expo badge and receive free general admission from July 27 to 29. Please note that this special offer does not include additional exhibit or attraction fees. Explore one of the world's great museums, right in the heart of Denver! Huge dinosaurs transport you back in time, interactive space exhibits make your mind wonder, and personalized health science fun puts your body to the test. Plus our Phipps IMAX 3D Theater and Gates Planetarium are not to be missed. Visit www.dmns.org to learn more.

Denver Zoo

www.denverzoo.org

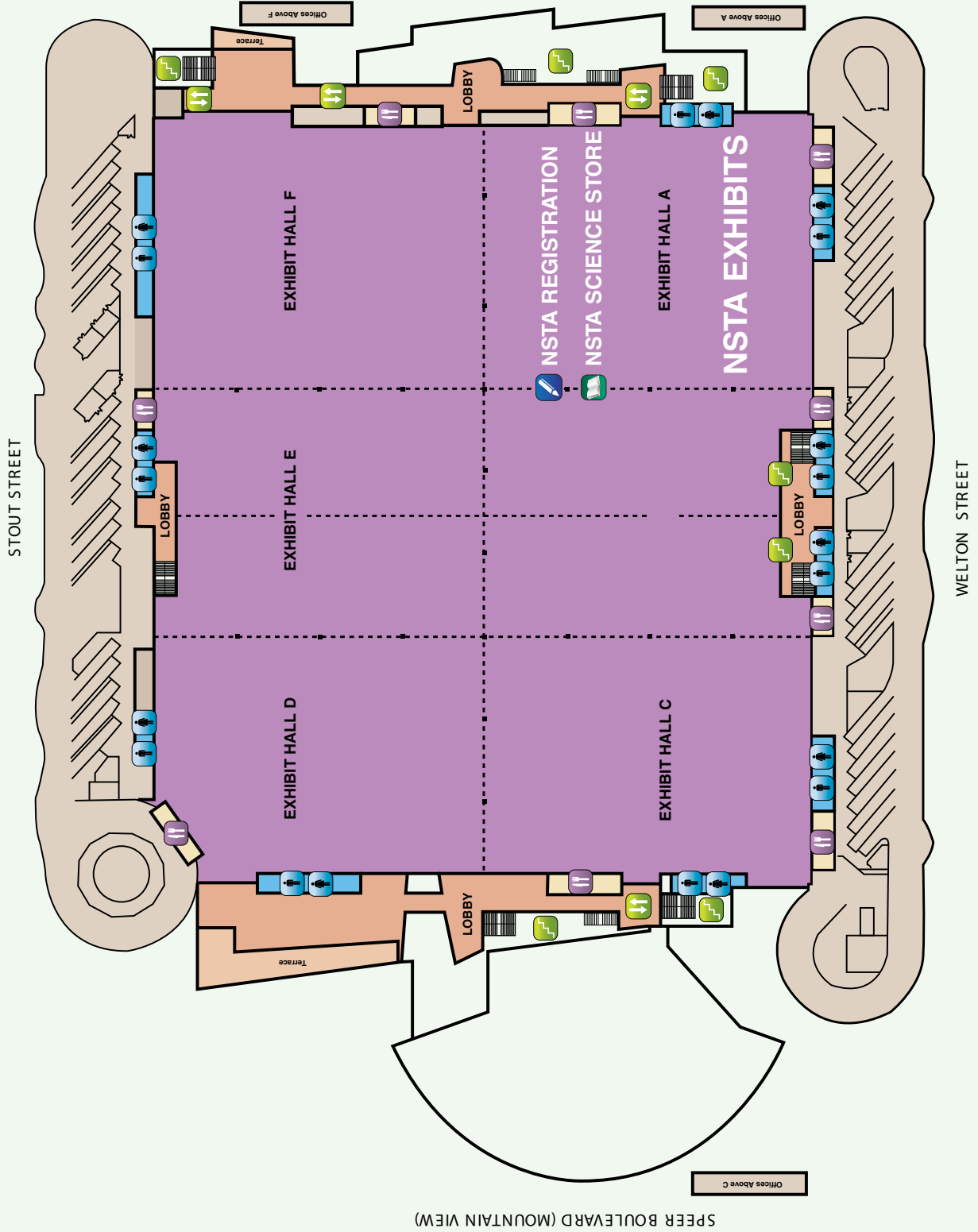
Come visit Denver Zoo and see 4,000 different animals, representing more than 600 species. From Wednesday, July 27, to Friday, July 29, you can receive free general admission when you present your NSTA STEM Forum & Expo badge at the ticket counter. Please note that this special offer does not include additional exhibit or attraction fees. The zoo serves more than 1,000 schools through facilitated on-site and off-campus informal education programs. Denver Zoo is a vibrant, living venue where education comes alive! Visit www.denverzoo.org for details.



Colorado Convention Center

Exhibit Level

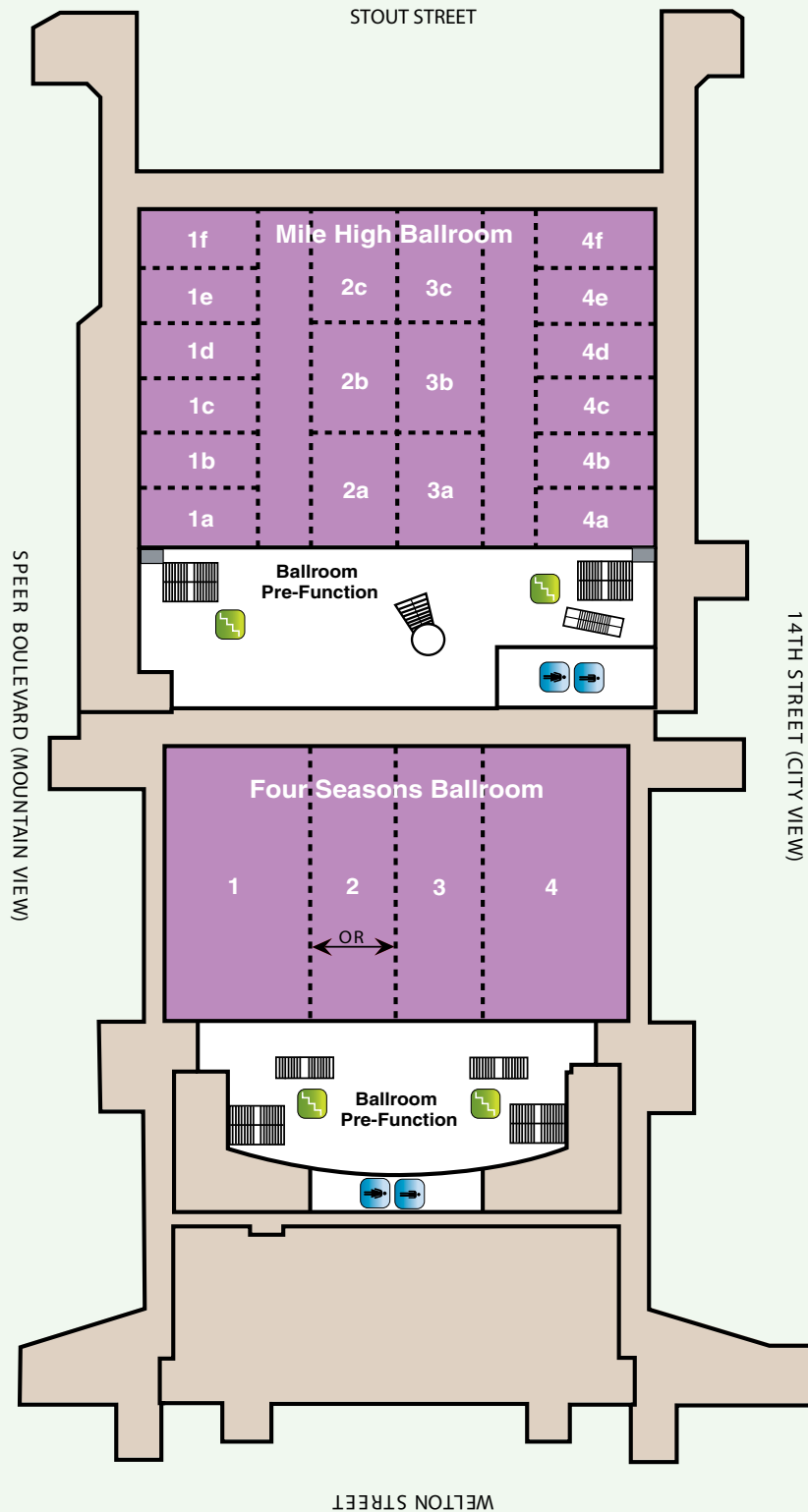
14TH STREET (CITY VIEW)



SPEER BOULEVARD (MOUNTAIN VIEW)

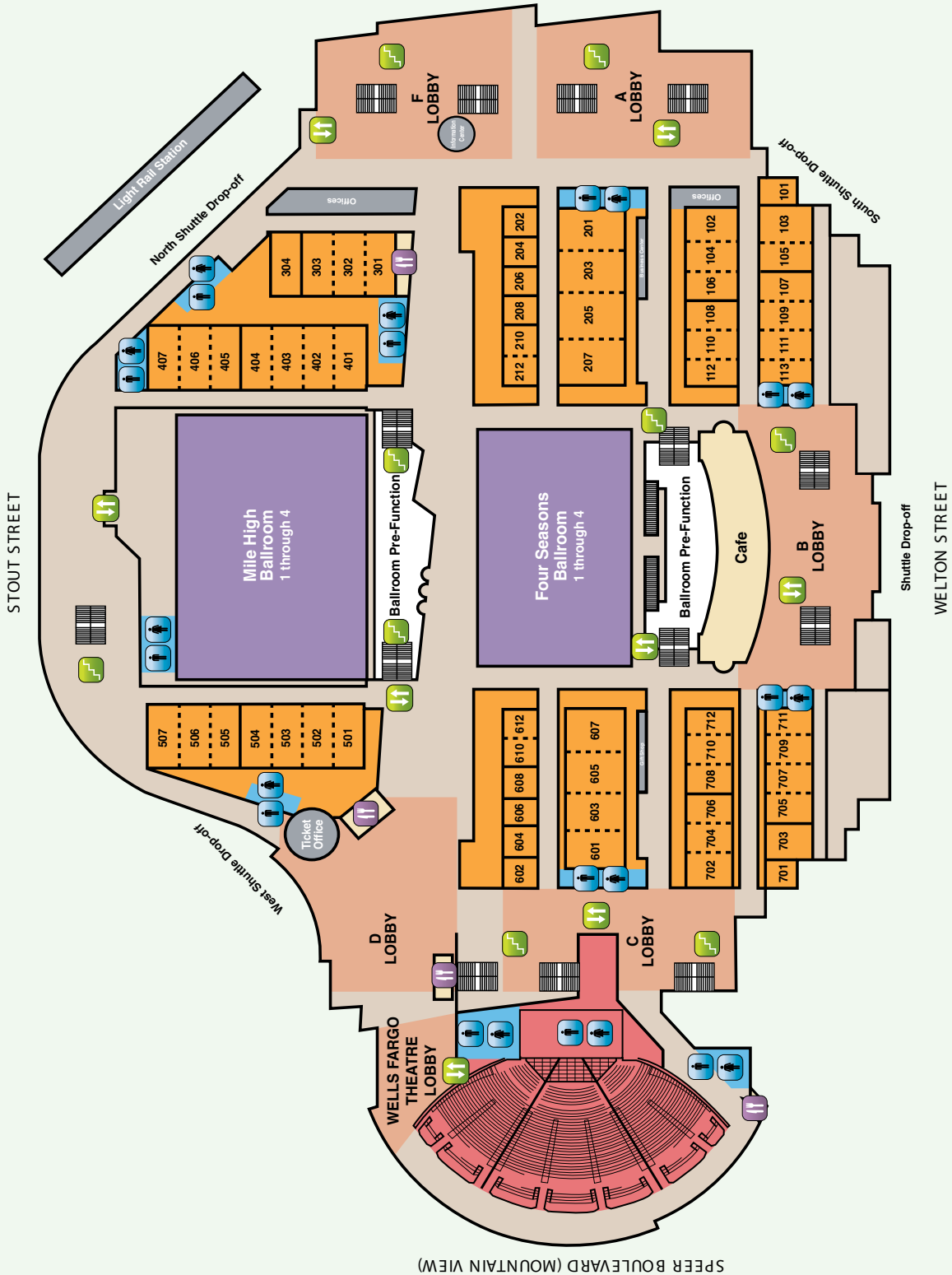
Colorado Convention Center

Ballroom Level



Colorado Convention Center

Meeting Room Level



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Travel Light with
FREE Shipping
for Online Orders!



Offering the latest resources for
STEM teachers, including new
releases and best sellers!

- Fun NSTA-branded gear—unique hats, shirts, mugs, collectible pins, and more
- Everyone enjoys member pricing: **20%** off all NSTA Press® titles

Check in often for special giveaways, contests, and more throughout the Forum!

Visit www.nsta.org/store to make a purchase today, or call 800-277-5300.

STORE HOURS

Wednesday	1:00 PM–7:00 PM
Thursday	7:30 AM–5:30 PM
Friday	7:30 AM–5:30 PM

NSTA National
Science
Teachers
Association

Executive Office

David Evans, Executive Director
Michelle Butler, Executive Administrator and Manager
Shawn Crowder, Administrative Coordinator

BOARD RELATIONS

Michelle Butler, Executive Administrator and Manager

CHAPTER RELATIONS AND MEMBERSHIP

Teshia Birts, Senior Director of Membership Development and Chapter Relations
Shawn Crowder, Administrative Coordinator

DEVELOPMENT OFFICE

Vacant, Assistant Executive Director, Development
Azi Ambrishami, Development Coordinator

NEXT GENERATION SCIENCE STANDARDS (NGSS@NSTA)

Ted Willard, Program Director
Jennifer Horak, Project Director

NOMINATIONS AND TEACHER AWARDS PROGRAMS

Amanda Upton, Manager

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Tim Weber, Assistant Executive Director, Web and News
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Shantee Young, Accounts Receivable Specialist

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Diane Cash, Senior Manager, A/P and Internal Compliance
Jodie Rozzell, Director of Grants and Contracts
Gaby Bathiche, Accountant
La'Keisha Hines, Accounting Associate

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Nelly Guacheta, Senior Manager, Service Central
Sharlene Steward, Customer Service Representative, Data Entry/Pub Sales
Kiara Pate, Customer Service Representative
Cindy Thomas, Fulfillment Coordinator/Claims Correspondent

LaToya Parks, Coordinator, CSR/Data Entry, Publication Sales
Kristen Reiss, Customer Service Representative, Publication Sales

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Rodney Palmer, Building Engineer
Donovan Parker, Assistant Manager, Mailing Services
Joe Harpe, Mailing Services Assistant

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Janine Smith, HR Benefits Manager and Generalist

INFORMATION TECHNOLOGY

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Ryan Foley, Assistant Executive Director, Systems Development
Mike Sullivan, Director, IT
Edwin Pearce, Manager, IT Support
Edward Hausknecht, Web and Database Developer
Martin Lopong, Manager, Web Development

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Kimberly Hotz, Senior Manager, Exhibitor Operations
Jeffrey LeGrand-Douglass, Account Manager
Becky Shoemaker, Advertising Production Manager
Danielle McNeill, Project Manager, NSTA Mailing List

Products Division

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Rick Bounds, Assistant Executive Director, Strategic Initiatives
Emily Brady, Executive Administrator and Manager, NSTA Recommends

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Joseph Butera, Senior Graphic Designer
Hima Bichali, Graphic Designer

E-PRODUCTS

Leisa Clark, Director/Producer
Kara Pantalena, Course Developer
Eleanore Dixon-Roche, e-Learning Multimedia Specialist

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Kate Lu, Associate Editor
Luke Towler, Editorial Assistant

Science & Children

Linda Froschauer, Field Editor
Valynda Mayes, Managing Editor

Science Scope

Inez Fugate Liftig, Field Editor
Ken Roberts, Assistant Executive Director, Journals

The Science Teacher

Stephen C. Metz, Field Editor
Scott Stuckey, Managing Editor

Journal of College Science Teaching

Ann Cutler, Field Editor
Caroline Barnes, Managing Editor

NEW PRODUCTS

Tyson Brown, Director

NSTA PRESS

Claire Reinburg, Assistant Executive Director
Wendy Rubin, Managing Editor, Books (NSTA Press)
Vacant, Associate Editor
Donna Yudkin, Book Acquisitions Coordinator
Rachal Ledbetter, Associate Editor

NSTA Reports

Lynn Petrinjak, Editor
Debra Shapiro, Associate Editor

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NSTA Mission Statement

The mission of NSTA is to promote excellence and innovation in science teaching and learning for all.

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All cities are subject to change pending final negotiation.

National Conferences on Science Education

Los Angeles, California
March 30–April 2, 2017

Atlanta, Georgia
March 15–18, 2018

St. Louis, Missouri
April 11–14, 2019

Boston, Massachusetts
March 26–29, 2020

Chicago, Illinois
April 8–11, 2021

6th Annual STEM Forum & Expo, hosted by NSTA

Gaylord Palm Resort/Kissimmee, Orlando, Florida
July 12–14, 2017

Area Conferences on Science Education

2016 Area Conferences

Minneapolis, Minnesota—October 27–29

Portland, Oregon—November 10–12

Columbus, Ohio—December 1–3

2017 Area Conferences

Baltimore, Maryland—October 5–7

Milwaukee, Wisconsin—November 9–11

New Orleans, Louisiana—November 30–December 2



Keynote Address

Thursday, July 28, 4:30–5:30 PM



Derek Muller
Science Communicator,
Filmmaker, Television
Presenter, and Creator
of YouTube Channel
Veritasium

This Will Revolutionize Education

Over the past century, the world has changed dramatically and at a pace that is only accelerating. Smart Boards, smartphones, and smart devices are now poised to disrupt life in the home, at work, and many predict at school. But a number of historical precedents suggest the changes in education will be less dramatic than expected. Understanding why sheds light on the nature of education and on the role of teachers.

(See page 56 for details.)

Wednesday, July 27

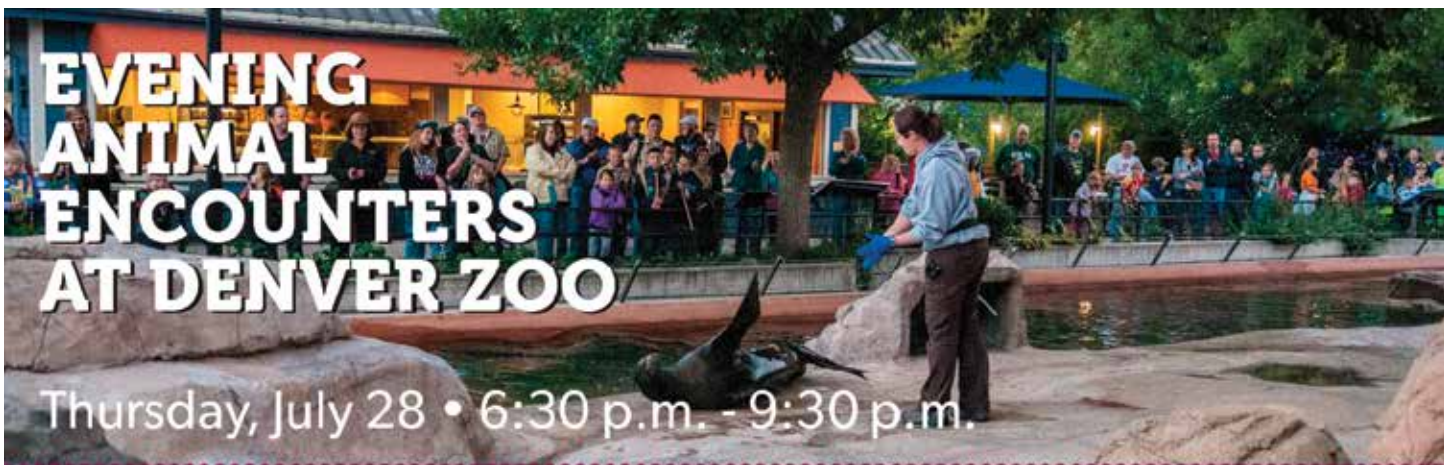
2:00–2:45 PM	First-Timers Orientation	23
3:00–4:15 PM	Opening Session: Student Panel Discussion	24
4:30–6:30 PM	Evening Exhibit Preview and Welcome Reception	24
6:45–8:00 PM	STEM Leaders’ Panel	25

Thursday, July 28

8:00–9:00 AM	Educators’ Invited Panels	27
9:15 AM–3:00 PM	Exhibits	28
9:30–10:30 AM	Administrators’ Invited Panel	28
10:30 AM–12 Noon	Elementary STEM Showcase!	35
4:30–5:30 PM	Keynote Address: Derek Muller	56
6:30–9:30 PM	Evening Animal Encounters at the Denver Zoo (Ticket: T-1).	56

Friday, July 29

8:00–9:00 AM	Educators’ Invited Panels	59
9:15 AM–3:00 PM	Exhibits	59
9:30–10:30 AM	Educators’ Invited Panel	60
4:30–5:30 PM	Closing Session	87



EVENING ANIMAL ENCOUNTERS AT DENVER ZOO

Thursday, July 28 • 6:30 p.m. - 9:30 p.m.

Join your NSTA friends and colleagues for an adventurous evening after hours at Denver Zoo, where education comes alive! Experience majestic elephants in Toyota Elephant Passage and explore the wonders of aquatic life, including marine mammals, in Northern Shores. The evening will be filled with up close animal encounters and shows with some of Denver Zoo’s wild inhabitants. Enjoy dinner or snacks at Northern Shores and Kamala café. Don’t forget to pick up a souvenir at the gift shop to remember your visit.

Ticket cost includes roundtrip shuttle transportation**, admission for a private evening event, and associated activities. Cash bar and restaurants open for purchases. (Note: NOT included in ticket cost.)

**There will be continuous shuttles running between the Colorado Convention Center and Denver Zoo. The first shuttle departs from the Convention Center at 6:00 p.m.; the last shuttle leaves the Zoo at 9:45 p.m., promptly.

Tickets required: T-1: \$18/per person
Capacity is limited; tickets may not be for sale during the forum.



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– **Sharon Ruggieri**,
past conference
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An index of all strand sessions starts on page 104.

Lower Elementary/Early Childhood

LE Students in the lower elementary grades are beginning to understand the world around them and the role they play in it. They are curious and want to make sense of their surroundings. By providing students with inquiry-based experiences in Science, Technology, Engineering, and Mathematics, we can unlock each student's natural curiosity and help them understand the world in an engaging way. The foundational skills learned and mastered through the integration of STEM during the early years, if done right, will help these students be critical thinkers and makers that can innovate the future they will be a part of. Sessions in this strand will emphasize open-ended and active exploration, play, and investigation of the real world through the lens of NGSS.

Upper Elementary

UE How do we respond to research that indicates that by the time our students reach the fourth grade, a third of them will lose interest in science? How do we ensure that our students develop a solid foundation in the STEM areas so that they are prepared to both work and live in the 21st century? To reverse this trend and ignite their interest in future STEM careers, elementary students need quality learning activities and experiences that spark curiosity, promote confidence, align to the rigor of current standards, and develop competence in STEM subjects. The sessions in this strand showcase programs and instructional strategies that support STEM and have been successfully integrated into the elementary core curriculum.

Middle Level

M Equipping students with the opportunities to explore STEM fields of study that support the NRC *Framework* and the *Next Generation Science Standards* is a top priority at the middle school level. A successful middle school STEM program allows students to create, innovate, communicate, and collaborate on projects that are driven by their own interests. The sessions in this strand showcase learning environments where Science, Technology, Engineering, and Mathematics interconnect to serve as a vehicle for discovery, innovation, and independent problem solving while also meeting rigorous content standards.

High School

HS As we move forward in the 21st century and begin preparing high school students to enter the workforce and college, STEM careers should be optimal goals for all students. Traditionally, high school content would be taught in isolation of other areas of study. Now, Science, Technology, Engineering, and Mathematics must be effectively integrated and delivered in impactful and meaningful ways. Using an integrated approach that includes real-world connections and hands-on experiences will establish a solid STEM education for students in grades 9–12. The sessions in this strand will highlight strategies and curriculum design both for formal and informal learning environments that best facilitate effective STEM integration and STEM Career Awareness.

Partnerships

Pa As the Nation recognizes the importance of STEM education to our economic future, we are beginning to see collaborations in STEM education between preK–middle schools, high schools, higher education, and business and cultural communities, with varying degrees of success and impact. The sessions in this strand highlight select initiatives that have demonstrated an impact and have been successfully implemented.

Administrators

A U.S. schools are working to ensure that all American students receive the skills and knowledge required for success in the 21st-century workforce. The STEM fields are collectively considered the core technological underpinnings of an advanced society, and the strength of the STEM workforce is viewed as an indicator of a nation's ability to sustain itself. Maintaining a citizenry that is well versed in the STEM fields is a key segment of the U.S. public education agenda.

Successful STEM programs at the primary and secondary levels align the interrelated nature of science and mathematics education with an emphasis on technology and engineering through hands-on and real-life applications for elementary, middle school, and high school students. The new standards in mathematics and ELA and, specifically, the Standards for Mathematical Practice and the *Next Generation Science Standards* help to connect all areas of STEM. The integration of STEM content to answer complex questions, to investigate global issues, and to develop solutions for challenges and real-world problems requires the use of practices such as making sense of problems and persevering in solving them; reasoning abstractly and quantitatively; constructing viable arguments and critiquing the work of others; modeling with mathematics; using appropriate tools strategically; attending to precision; looking for and making use of structure; and looking for and expressing regularity in repeated reasoning. The sessions in this strand are intended to highlight exemplary efforts that are being made by schools to create a STEM culture.

Opening Session: Student Panel Discussion

The Power of STEM Education

Wednesday, July 27, 3:00–4:15 PM

Mile High Ballroom 2 A/B and 3 A/B, Convention Center

Because STEM opportunities are important to the future of our students and workforce, it is critical that we ground our conversations in students' perspectives. A diverse panel of Colorado students will describe why STEM is a critical component of their futures, how it has affected their school experiences, and the most effective ways they have engaged with STEM. They will also discuss their aspirations and interests related to STEM opportunities and careers, and the impact that STEM educational experiences have on their aspirations.

Introductions and Moderator:

Tera Jones, STEM Coordinator/Recruitment Specialist, Denver (Colo.) Public Schools

Student Panelists:

- Patricia Todd, Fairview High School, Boulder, Colo.
- Gabriela Dulanto, Colorado State University, Fort Collins
- Moses Ramirez-Tapia, Indian Peaks Elementary School, Longmont, Colo.
- Mary Katherine Howard, STEM School and Academy, Highlands Ranch, Colo.

STEM Leaders' Panel

Wednesday, July 27, 6:45–8:00 PM

Mile High Ballroom 2 A/B and 3 A/B
Convention Center

Leaders from participating STEM organizations will talk about issues related to STEM education, including definitions, certifications, and recommendations for the newly elected U.S. President.

Moderator: David Evans, NSTA Executive Director

Panelists:

- Carolyn Hayes, NSTA Retiring President, Greenwood, Ind.

Program Partner Representatives:

- *American Association of Chemistry Teachers (AACT)*
Sally Mitchell, AACT Past President, and Einstein Fellow, U.S. Dept. of Energy, Washington, D.C.
- *American Association of Physics Teachers (AAPT)*
Steven Iona, 2014 AAPT President, and Lecturer, University of Denver, Colo.
- *American Society for Engineering Education (ASEE)*
Elizabeth Parry, Chair of ASEE's Committee on P–12 Education, and North Carolina State University, Raleigh
- *International Technology and Engineering Educators Association (ITEEA)*
John Wells, Associate Professor of Education, Virginia Tech, Blacksburg
- *National Association of Biology Teachers (NABT)*
Bob Melton, NABT President, and Assessment Coordinator/STEM Facilitator, Putnam City Schools, Oklahoma City, Okla.
- *National Council of Teachers of Mathematics (NCTM)*
Cathy Martin, K–12 Mathematics Director, Denver (Colo.) Public Schools





Photo courtesy of Jennifer C. Williams

Photo of 2015 STEM Forum & Expo

Closing Session

Wrap Up/Strand Leaders' Reports

Friday, July 29, 4:30–5:30 PM

Mile High Ballroom 4 A–D, Convention Center

The closing session (page 87) will provide an opportunity to hear highlights from the Forum experience. Jennifer Williams, chairperson of the STEM Steering Committee, will lead strand leaders through brief reports and summaries. This is an opportunity to hear some of the highlights you may have missed.

Steering Committee:

- **Jennifer Williams**, Steering Committee Chairperson, and Department Chair, Lower School Science, Isidore Newman School, New Orleans, La.
- **Mariano Lizano Alpizar**, *Lower Elementary/Early Childhood Strand Leader* and Spanish Dual-Language Kindergarten Teacher, Sherwood Forest Elementary School, Bellevue, Wash.
- **Dedric McGhee**, *Upper Elementary Strand Leader*, and STEM Manager (Science, Mathematics, Health, Physical Education, Lifetime Wellness), Shelby County Schools, Memphis, Tenn.
- **Kenneth William**, *Middle Level Strand Leader*, and STEM Teacher, Oxon Hill Middle School, Fort Washington, Md.
- **Garrett Mason**, *High School Strand Leader*, and Director of Innovation and Design, St. Martin's Episcopal School, Metairie, La.
- **Brenda Nixon**, *Partnerships Strand Leader*, and Co-Director, Gordon A. Cain Center for Scientific, Technological, Engineering, and Mathematical Literacy, Louisiana State University, Baton Rouge
- **Susan Evans**, *Administrators Strand Leader*, and Retired Principal, Cockeysville, Md.
- **Tera Jones**, Honorary Steering Committee Member, and STEM Coordinator/Recruitment Specialist, Denver (Colo.) Public Schools

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2:00–2:45 PM Presentation

First-Timers Orientation

(General) Mile High Ballroom 1 A–C, Conv. Center

NSTA Board and Council

Come learn about the STEM Forum program and networking opportunities for registrants who are first-time attendees. Join us for tips on navigating the forum and learn how to make the most of the amazing opportunities available over the next few days.

Strands

The STEM Form & Expo Steering Committee has planned the forum around six strands, enabling you to focus on a specific area of interest or need. Strand events are identified by icons throughout the daily program. For strand descriptions, see page 19. On page 104, you will find the sessions grouped according to their strand.

LE	Lower Elementary/ Early Childhood	HS	High School
UE	Upper Elementary	Pa	Partnerships
M	Middle Level	A	Administrators

The ideas and opinions expressed in the forum sessions, and in any handout materials provided, are those of the presenter. They are not those of the National Science Teachers Association nor can any endorsement by NSTA be claimed.



FIRST TIMER?

NEED SOME HELP NAVIGATING YOUR FIRST STEM FORUM & EXPO?
JOIN US AND WE'LL SHOW YOU THE ROPES.

- **First-Timers Orientation**
Wednesday, July 27, 2:00–2:45 PM

**Mile High Ballroom 1 A–C,
Colorado Convention Center**



3:00–4:15 PM Opening Session

Student Panel Discussion: The Power of STEM Education

(General) Mile High Blrm. 2 A/B and 3 A/B, Conv. Center

Introductions and Moderator: **Tera Jones**, STEM Coordinator/Recruitment Specialist, Denver (Colo.) Public Schools

Student Panelists:

Patricia Todd, Fairview High School, Boulder, Colo.

Gabriela Dulanto, Colorado State University, Fort Collins

Moses Ramierez-Tapia, Indian Peaks Elementary School, Longmont, Colo.

Mary Katherine Howard, STEM School and Academy, Highlands Ranch, Colo.

Introduction: Mary Gromko, NSTA President, Colorado Springs, Colo.

Platform Guests: Tera Jones; Patricia Todd; Gabriela Dulanto; Moses Ramierez-Tapia; Mary Katherine Howard

Long-term economic prosperity in the United States is going to be based on innovation and entrepreneurship. According to the Brookings Institute, more than 20% of U.S. jobs in 2011 required specialized knowledge in STEM fields, and STEM jobs pay, on average, nearly double the wage of non-STEM jobs. STEM education is critical to prepare students for success in college, career, and life in a 21st-century economy.

Because STEM opportunities are important to the future of our students and workforce, it is critical that we ground our conversations in students' perspectives. How and why is STEM an important component to students' school experience and their future aspirations? How can educators, in and out of traditional schools, ensure they are engaging all students in STEM experiences effectively?

A diverse panel of Colorado students, representing many different ages and a variety of school models, will discuss these questions and more to help educators understand the power of STEM educational experiences.

4:30–6:30 PM Evening Exhibit Preview and Welcome Reception

Exhibit Hall A, Conv. Center

Please join us for this exclusive sneak preview of the Exhibit Hall and reception. Be among the first to take in the sights and sounds of the Expo as you enjoy complimentary refreshments throughout the exhibit hall. Exhibitors will have hands-on activities, free resources, giveaways, best practices, and more—all tailored specifically to teachers' needs. Brand-new and soon-to-be-released STEM resources will be featured by industry leaders. Don't forget to come back for our regular exhibit hours on Thursday and Friday.

Support for the Welcome Reception is generously provided by Google, Making & Science.

For a complete list of exhibitors, see page 88.



Mark Your Calendars for Next Year's STEM Forum & Expo

We're excited to announce the following site/dates for the 6th Annual STEM Forum & Expo, *hosted by NSTA*:

**Gaylord Palms Resort/Kissimmee
Orlando, Florida, July 12–14, 2017**

More details to come at
www.nsta.org/conferences

6:45–8:00 PM Invited Panel

STEM Leaders' Panel

(General) Mile High Blrm. 2 A/B and 3 A/B, Conv. Center

Moderator: **David Evans** (devans@nsta.org), NSTA Executive Director, Arlington, Va.

Panelists:

Carolyn Hayes (caahayes@comcast.net), NSTA Retiring President, Greenwood, Ind.

Sally Mitchell (sbmitchell2@gmail.com), AACT Past President, and Einstein Fellow, U.S. Dept. of Energy, Washington, D.C.

Steven Iona (steve.iona@earthlink.net), 2014 AAPT President, and Lecturer, University of Denver, Colo.

Bob Melton (bmelton@putnamcityschools.org), NABT President, and Assessment Coordinator/STEM Facilitator, Putnam City Schools, Oklahoma City, Okla.

Cathy Martin (cathy_martin@dpsk12.org), K–12 Mathematics Director, Denver (Colo.) Public Schools

Elizabeth Parry (eaparry@ncsu.edu), Chair of ASEE's Committee on P–12 Education, and North Carolina State University, Raleigh

John Wells (jgwells@vt.edu), Associate Professor of Education, Virginia Tech, Blacksburg

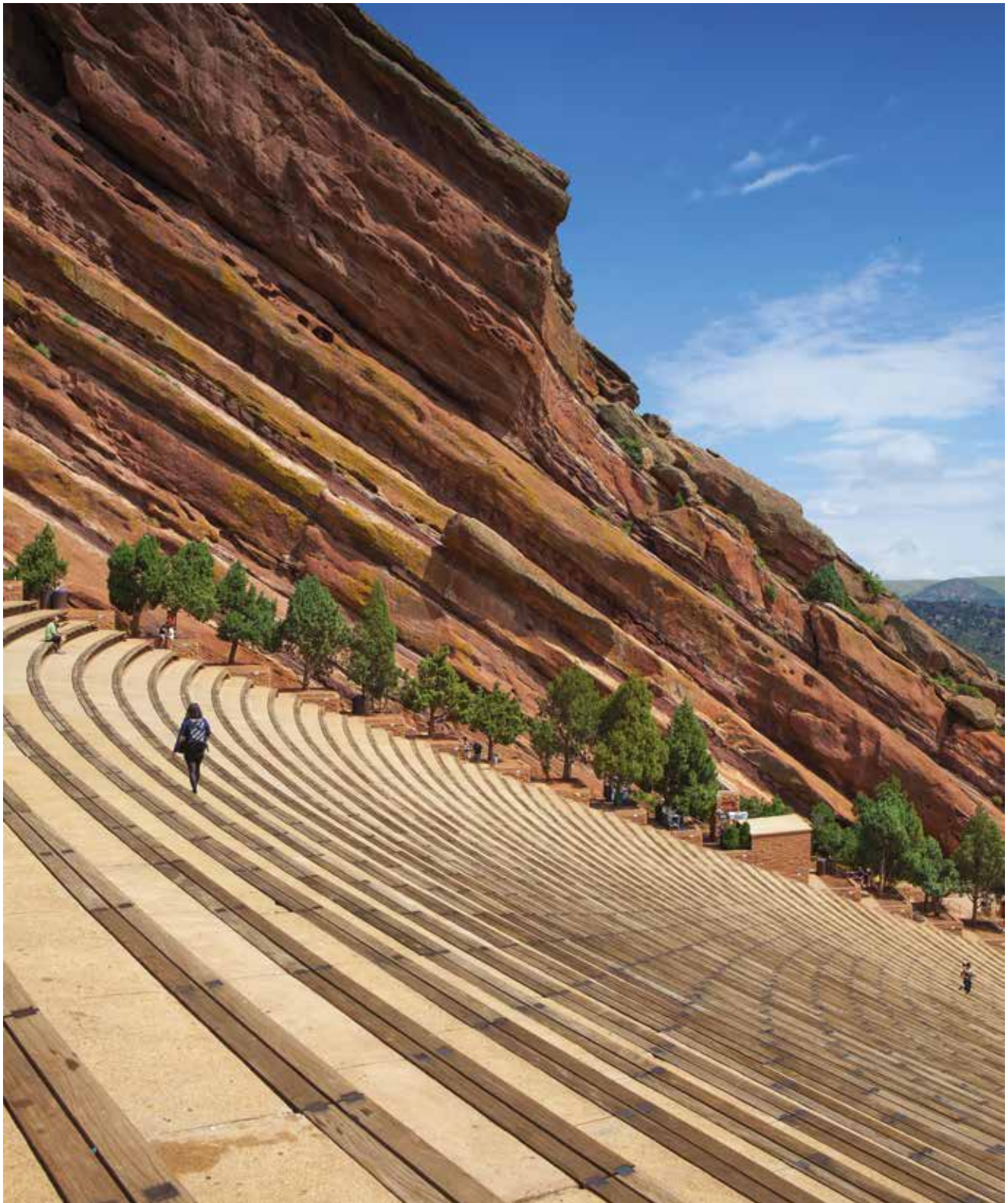
Leaders from participating STEM organizations will talk about issues related to STEM education, including definitions, certifications, and recommendations for the newly elected U.S. President.

Panelists are members of our program partners:

- American Association of Chemistry Teachers (AACT)
- American Association of Physics Teachers (AAPT)
- American Society for Engineering Education (ASEE)
- International Technology and Engineering Educators Association (ITEEA)
- National Association of Biology Teachers (NABT)
- National Council of Teachers of Mathematics (NCTM)



—Photo courtesy of Jacob Slaton



Originally called the “Garden of the Angels,” the site for the current Red Rocks Amphitheatre was likely used by the Ute tribe in earlier times. Only 10 miles west of Denver, the amphitheatre is owned by the city of Denver.

8:00–9:00 AM Invited Panels

More Than What's Made: Stories of Making Possibilities (Organized by Maker Ed)

(General) Mile High Blrm. 2 A/B and 3 A/B, Conv. Center

Moderator: **Steve Davee** (steve@makered.org), Chief Maker Educator, Maker Education Initiative, Emeryville, Calif.

Panelists:

Meghan Reilly Michaud (meghan@visualidentitystudio.com), RISD Museum Board, Past RISD Trustee/Alumni President, and Art Teacher, Andover, Mass.

Robert Munsey (rmunsey@k12albemarle.org), Science/Engineering Teacher, Sutherland Middle School, Charlottesville, Va.

Janella Watson (jwatson@nysci.org), Director of Early Childhood Education, New York Hall of Science, Corona

Maker education is represented by a wide diversity of approaches nurturing curiosity, agency, empathy, and a love of learning. What are some of the processes and forms of making that empower exploration, discovery, and construction of knowledge? How might making connect STEM with student interests and all areas of learning? In this panel, we'll hear powerful stories from teachers integrating making in early childhood through college settings. Together, with your questions and continued discussions, we'll build on the vast possibilities of making in education, for every child.

Pa Forming Partnerships

(General) Mile High Ballroom 4 A–D, Conv. Center

Moderator: **Brenda Nixon**, Partnerships Strand Leader, and Co-Director, Gordon A. Cain Center for Scientific, Technological, Engineering, and Mathematical Literacy, Baton Rouge, La.

Panelists:

Jennifer Bacon (jennifer.bacon@educationalequity.org), Leadership for Educational Equity, Denver, Colo.

William Katzman (wkatzman@ligo-la.caltech.edu), LIGO's Science Education Center, Livingston, La.

Louis Lopez (louis.r.lopez.civ@mail.mil), Education/STEM Outreach at U.S. Army Research, Development Engineering Command, Aberdeen Proving Ground, Md.

The Partnership Panelists represent formal and informal education institutions from a number of areas. Join them as they share strategies they have implemented to leverage their resources and increase their impact by developing strong long-term partnerships with museums, governmental agencies, and business and industry, as well as other formal and informal education entities across the spectrum. Come find out how their initiatives have created unique, successful partnerships where everyone benefits.

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9:15 AM–3:00 PM Exhibits

Exhibit Hall A, Conv. Center

Come stroll through the exposition picking up tips, product samples, and ideas to spark your imagination. Please note that no sessions are scheduled from 12 Noon to 1:30 PM during our exclusive exhibit hall hours.



9:30–10:30 AM Invited Panel

A Success Stories from Administrators

(General) Mile High Ballroom 4 E/F, Conv. Center

Moderator: **Susan Evans**, Administrators Strand Leader, and Retired Principal, Cockeysville, Md.

Panelists:

Adrienne Gifford, Director of Innovation and Technology, Open Window School, Bellevue, Wash.

Michael Grubbs, Supervisor, Technology and Engineering Education, Office of Career & Technology Education, Baltimore County Public Schools, Towson, Md.

Doug Paulson (doug.paulson@state.mn.us), STEM Specialist, MSP Grant State Coordinator, Div. of Academic Standards and Instructional Effectiveness, Minnesota Dept. of Education, Roseville

Join us as the panel constructs new connections and conversations among K–12 STEM administrators. Ideas will be shared from the perspective of both large and small districts, independent schools, and state. We will learn from each other how to communicate the need for STEM education, select and implement best practices for a successful STEM program, provide teacher development, and address the needs of our diverse schools to create a future workforce ready to solve current problems as well as ones not yet identified.

9:30–10:30 AM Presentations

M 3D Printing in the K–12 Classroom

(Grades 1–12) 107, Conv. Center

Jack Samuelson (jacksamuelson@icloud.com), Dr. STEM Express, Milwaukee, Wis.

Hear about the opportunities and challenges of 3D printing in the classroom, and the considerations involved when choosing a printer for your school.

UE Creating an Elementary School STEM Lab and Curriculum

(Grades K–6) 109, Conv. Center

Marcia Gauvin (mgauvin@wcsu.net), Woodstock Elementary School, Woodstock, Vt.

Woodstock Elementary School has taken the bold initiative of establishing one of the first full time dedicated K–6 STEM Lab and instructor. We are in the process of creating a model program that can be followed by any school! For our blog, visit wesstem-K-6.blogspot.com.

UE Kids Can Code: Introducing the Logo Programming Language to Develop Conceptual Thinking

(Grades 2–10) 112, Conv. Center

Brian Schack (schackb@umail.iu.edu), Indiana University Bloomington

Logo is a programming language to help children think logically and mathematically. This presentation demonstrates a free version that runs in your web browser. It is recommended that you bring a web-enabled device (iPhone, iPad, laptop, etc.) to try writing simple code for creating interesting graphics.

UE Using Data to Inform Professional Development on Hands-On, Inquiry-Based Science Instruction: A Curriculum, University, and District Partnership Funded by a Math-Science Partnership Grant

(Grades 3–8) 202, Conv. Center

Pam Caffery (pcaffery0217@gmail.com), Accelerate Learning, Inc., Brandon, Fla.

Mindy Pearson (@ScienceMindy; mindy.pearson@sdhc.k12.fl.us), Hillsborough County Public Schools, Tampa, Fla.

Katie McCurdy (mccurks@bay.k12.fl.us), Bay District Schools, Panama City, Fla.

We will examine how data informed PD with elementary and middle science teachers to improve their content knowledge, lesson design, and delivery skills.

LE **Engineers in the Block Area: How Building with Blocks Fosters the Growth of a Child’s Scientific Mind**

(Grades P–2) 504, Conv. Center

Erica Green (egreen@fwsu.org), Bellows Free Academy Fairfax, Vt.

Learn how to analyze block play as a global tool that can be used to develop a child’s scientific, mathematical, and engineering frame of mind.

LE **Buddy Up! Full STEAM Ahead!**

(Grades K–4) 506, Conv. Center

Jessica Priem (teachingfullsteamahead@gmail.com), Pine Ridge Elementary School, Grand Rapids, Mich.

Turn buddy time into meaningful STEM learning with little cost and planning. Leave with a year of buddy lessons with optional standards-connected recording sheets.

Pa **John C. Dunham STEM Partnership School: The Building of True Collaboration**

(General) 507, Conv. Center

Allison Kapitanoff (@Thinking_Kap1; akapitanoff@aurora.edu) and **Arin Carter** (acarter@aurora.edu), John C. Dunham STEM Partnership School, Aurora, Ill.

It took collaboration between teachers, university faculty, legislators, and corporate and not-for-profit professionals to build this school. Those partnerships maintain an innovative STEM learning environment.

Pa **Undergraduate STEM Education Scholar Program**

(College) 602, Conv. Center

Julie Cunningham (cunni2ja@cmich.edu) and **Shane Cavanaugh** (cavan1s@cmich.edu), Central Michigan University, Mount Pleasant

Hear about the STEM Education Scholar Program, a partnership between the College of Science and Technology and the College of Education and Human Services to support undergraduate students as they pursue a teacher education degree at Central Michigan University.

Pa **Extending the Learning Experience via STEAM Learning Partnerships**

(Grades 2–12) 604, Conv. Center

Cordell Carter, TechTown, Chattanooga, Tenn.

Receive an overview of TechTown Foundation’s STEAM education partnerships with persistently failing Title 1 schools in Hamilton County, Tennessee.

CANCELED

Pa **The High Tide Lifts All Boats: Value of PreK–20 Partnerships for Teaching and Learning**

(General) 606, Conv. Center

Dewayne Morgan (@USMAsker; dmorgan@usmd.edu), University System of Maryland, Adelphi

Join me for this interactive session that explores the best practices for effective STEM PreK–20 partnership development and sustainability.

M **STEM Projects for the Science Classroom**

(Grades 4–12) 706, Conv. Center

DJ West (@djwest78; djwest78@gmail.com), Schoolcraft College, Livonia, Mich.

Find out what makes a good STEM project. Get resources and projects to teach all areas of STEM.

M **NGSS EdTech: What’s Good and How to Find It**

(Grades 6–8) 707, Conv. Center

Emily Pohlonski (@epohlonski; epohlonski@novischools.net), Novi High School, Novi, Mich.

Lissa Johnson (@mosamack; lissamjohnson@gmail.com), **Maafi Gueye**, and **Lauren Stoll** (@MosaMack; lauren@mosamack.com), Mosa Mack Science, Brooklyn, N.Y.

Keith Schacht (@mysterysci), Mystery Science, Walnut, Calif.

Danny Wagner (@dannywag80; dwagner@commonsense.org), Common Sense Education, San Francisco, Calif.

Hear how to find great NGSS edtech and explore two trail-blazing, student-centered middle school websites built with NGSS in mind.

M **Chemistry Concepts STEAM-ified**

(Grades 5–12) 708, Conv. Center

Julie Smith (julieltapresident@gmail.com), Lennox Middle School, Lennox, Calif.

Hear how animations, online resources, and a paper chemistry set are used to teach NGSS chemistry disciplinary core ideas: modeling atomic structure, periodic table organization, and chemical bonding.

HS Engaging Teens in Climate Change

(Grades 9–12)

709, Conv. Center

Betsy Payne (payne@ansp.org), The Academy of Natural Sciences of Drexel University, Philadelphia, Pa.

Kathryn Woolf (kew84@drexel.edu), Drexel University, Philadelphia, Pa.

Harleen Gonzalez, Student, Central High School, Philadelphia, Pa.

Climate change is one of the most critical issues we face today, yet teens are not fully engaged with the issue. Explore a model to empower girls to be ambassadors for climate change education.

HS What's My Next? Exposing Students to Exciting Career Opportunities in Laboratory Medicine

(Grades 10–College)

710, Conv. Center

Miriam Post (www.whatsmynext.org 2nd link: www.ascp.org), University of Colorado Anschutz Medical Campus, Aurora

Whitney Smith (www.whatsmynext.org 2nd link: www.ascp.org), Children's Hospital Colorado, Aurora

Many students are unsure of what comes after high school. What's My Next exposes students to exciting career opportunities in laboratory medicine and pathology.

HS How Skyline STEM Academy Stays Current in an Evolving STEM District

(Grades 9–12)

711, Conv. Center

Rebecca Peters ([@beckypeters](https://twitter.com/beckypeters); peters_rebecca@svvsd.org), The Innovation Center, Longmont, Colo.

Heidi Ringer ([@SHS_Principa1](https://twitter.com/SHS_Principa1); ringer_heidi@svvsd.org), Skyline High School, Longmont, Colo.

We will share how Skyline High School's STEM Academy, which began in 2007, has been successful in many ways, but must continuously redefine its goals and strategies to stay current.



HS Effective Food Safety Curriculum for STEM Teachers—Motivating Students to Practice Safe Food Handling

(Grades 9–12)

712, Conv. Center

Yaohua Feng (yhfeng@ucdavis.edu) and **Christine Bruhn**, University of California, Davis

Hear about a novel educational approach designed to deliver safe food handling best practices through vivid and participatory discussions and activities.

HS NESTA Shares: STEM Games and Simulations for Earth and Space Science

(Grades 5–College)

Mile High Ballroom 1A, Conv. Center

Randy Russell (rrussell@ucar.edu), UCAR Center for Science Education, Boulder, Colo.

President: Cheryl Manning (clbmanning@mac.com), Evergreen High School, Evergreen, Colo.

Join us for a quick survey of games, simulations, and virtual labs for Earth science education from various sources. We will share both computer-based and hands-on (card, board, etc.) games.

HS NASA Astrobiology: The Search for Life Beyond Earth

(Grades 9–College)

Mile High Ballroom 1B, Conv. Center

Rachel Zimmerman Brachman (rachel.zimmerman-brachman@jpl.nasa.gov), NASA Jet Propulsion Laboratory, Pasadena, Calif.

Learn how astrobiologists at NASA's Jet Propulsion Laboratory are searching for signs of life on the icy moons of our solar system.

HS What Does English Have to Do with STEM?

(Grades 9–College)

Mile High Blrm. 1C, Conv. Center

Tressie Norton ([@TressieNorton](https://twitter.com/TressieNorton); tressie.norton@knoxschools.org), **Darryl Fannon** ([@DarrylFannon](https://twitter.com/DarrylFannon); darryl.fannon@knoxschools.org), **Sean Blevins** ([@JURORZEROEIGHT](https://twitter.com/JURORZEROEIGHT); sean.blevins@knoxschools.org), and **Misty Brown** ([@MrsMSBrown](https://twitter.com/MrsMSBrown); misty.brown@knoxschools.org), L&N STEM Academy, Knoxville, Tenn.

Luke Bell (luke.bell@knoxschools.org), Knox County Schools, Knoxville, Tenn.

Come hear from the English department of a STEM magnet school on how they have used constant innovation and advocacy—both on the part of students and themselves as professionals—to develop a unique program that inspires students by tapping into collective strengths; resulting in high achievement across subjects for all students.

9:30–10:30 AM Hands-On Workshops

UE **The Marvelous, Miraculous Circus Machine!**
(Grades 5–6) 102, Conv. Center

Karen Bell (karen@circusarts.org) and **Robin Eurich** (robin@circusarts.org), The Circus Arts Conservatory, Sarasota, Fla.

Rebekka Stasny (@ascienceteacher; stasny2r@manatee-schools.net), Electa Arcott Lee Magnet Middle School, Bradenton, Fla.

The Circus Arts Conservatory addresses Newton’s Laws of Motion through the creation of a fanciful contraption.

UE **The Movement of the Ocean**
(Grades 3–5) 105, Conv. Center

Julie Vowell (jevowell@txwes.edu), Texas Wesleyan University, Fort Worth

Marianne Phillips (marianne.phillips@tamusa.edu), Texas A&M University—San Antonio

Designed for elementary science teachers who desire to use an integrated, hands-on approach to learning science in the classroom, this workshop shares “Movement in the Ocean,” an ocean current unit developed for grades 3–5 science teachers. Take part in cooperative learning groups while engaging in STEM activities designed to help your students understand the processes involved in ocean currents.

UE **Digital “Show and Tell”: Student Use of Whiteboard Apps as a Formative Assessment**
(Grades K–8) 110, Conv. Center

Deborah Kozdras (@USFStavros; dkozdras@usf.edu), University of South Florida, Tampa

Christine Joseph (josephc15@ecu.edu), East Carolina University, Greenville, N.C.

Students’ use of free whiteboard apps provides a formative assessment tool for teachers to evaluate understanding of STEM concepts and processes.

UE **Using iPads and 21st-Century Skills to Demonstrate Understanding of NGSS Performance Expectations**
(Grades 1–7) 203, Conv. Center

Shelley Lee (leeshe@uwstout.edu), 1995–1996 NSTA President, and University of Wisconsin—Stout, Menomonie

Loretta Wilbur (lorettawilbur@gmail.com), St. Bridget Parish School, River Falls, Wis.

Learn about apps that demonstrate learning while employing 21st-century skills. Experience these apps that are used to ignite excitement about science in elementary classrooms.



—Photo courtesy of Jacob Slaton

LE **STEM Across the Curriculum (It’s eleSTEMary!)**
(Grades K–5) 205, Conv. Center

DeLene Hoffner (delene.hoffner@asd20.org), School in the Woods, Colorado Springs, Colo.

Inspire your students to read, write, experiment, and learn history while experiencing It’s eleSTEMary! Cross-curricular connections to infuse STEM into every area of your curriculum.

M **Technology and Engineering Literacy: An Interactive Exploration**

(Grades 4–8) 206, Conv. Center
Cary Snieder (carysnieder@gmail.com), Portland State University, Portland, Ore.

Shannon Garrison, Solano Avenue Elementary School, Los Angeles, Calif.

Using their own devices, attendees will explore the tasks and findings of the groundbreaking NAEP Technology and Engineering Literacy assessment to enhance instruction and learning.

LE **It’s Never Too Early for Authentic STEM Experiences**
(Grades P–3) 210/212, Conv. Center

Joel Villegas (jvillegas@pinalesa.org), Pinal County School Office Education Service Agency, Florence, Ariz.

Jo Anne Vasquez (jvasquez@stemlessonessentials.com), 1996–1997 NSTA President, and Rocks to Rainbows, LLC, Gilbert, Ariz.

Join us as we demonstrate and engage in a research-based authentic STEM unit driven by early childhood content standards.

HS **AACT Session: Building a Unit Plan Using American Association of Chemistry Teachers Resources**

(Grades 9–12) 501, Conv. Center
Kimberly Duncan (@chemduncan; k_duncan@acs.org) and **Jenn Parsons** (@ParsonsChem; j_parsons2@acs.org), American Association of Chemistry Teachers, Washington, D.C.

Join two former high school chemistry teachers as they show you how to put together a successful unit plan using resources available on the AACT website.

Pa **Kids Code: A University/K–12/Community Partnership to Engage Underrepresented Youth in Computer Science and Technology**

(Grades 2–8) 502, Conv. Center
Stacey Forsyth (@CUSciDisc; stacey.forsyth@colorado.edu) and **Eliana Colunga** (colunga@colorado.edu), University of Colorado Boulder

Strengthen computer science education through partnerships! University computer science faculty and students + STEM outreach educators + IT professionals = powerful technology experiences for underrepresented youth.

LE **Creating Scientific and Mathematical Thinkers Through Hands-On Experiences and Open-Ended Questioning**

(Grades P–K) 503, Conv. Center
Mariko Whelan (mwhelan@scottsdaleaz.gov), Scottsdale Public Library, Scottsdale, Ariz.

Come explore math and science concepts in an interactive, playful way by sharing a program we’ve designed called “Fun with Math & Science”—which is a parent/child interactive learning opportunity.

HS **NCTM Session: NCTM Principles to Action Toolkit: Resources for Supporting the Effective Mathematics Teaching Practices in High School**

(Grades 7–College) 601, Conv. Center
Melissa Boston (bostonm@duq.edu), Duquesne University, Pittsburgh, Pa.

Engage in resources from NCTM’s Principles to Action Toolkit, created to support implementation of the Effective Mathematics Teaching Practices in high school classrooms.

M **Games for Engineering Code: Learning by Design**

(Grades 3–9) 605, Conv. Center
David DeMuth (david.demuth@vcsu.edu), Valley City State University, Valley City, N.Dak.

Explore a model for using gaming principles for practicing coding alongside engineering design. This model was developed in North Dakota for students and adjacently as educator workshops.

M **Engineering Soil: It’s Not Dirt**

(Grades 5–8) 607, Conv. Center
Julie Keniry, Eastern Oregon University, La Grande
Cheri Clausen (cclausen@ontario.k12.or.us), May Roberts Elementary School, Ontario, Ore.

Go deep into a unit that opens soils to the world of engineering and applies STEM concepts to a science discipline not typically integrated with math and engineering.

M **NASA Design Challenges to Develop Critical Thinking**

(Grades 4–12) 610/612, Conv. Center
Kathleen Fredette (@kathdette; kathleen.fredette@ilead-schools.org), Maker School Network, Castaic, Calif.

Exploration by doing, participants will experience a simple and inexpensive design challenge, with discussion on how to move from easy to complex challenges as the facilitators’ and learners’ develop as practitioners.

M **Engaging ELLs Through STEM Activity**

(Grades 3–12) 702, Conv. Center
Christopher Carson (@eCALLMS; christopher.carson@ucdenver.edu), University of Colorado Denver

Joy Barnes-Johnson (@drjoybjo; drjoybjohnson@gmail.com), Princeton High School, Princeton, N.J.

NGSS science and engineering practices provide both opportunities and challenges for English language learners. Find out how teachers are making STEM activities more culturally and linguistically responsive.



M Looking at Light: Analyzing Reflectance Spectra

(Grades 6–8)

703, Conv. Center

Christine Shupla (shupla@lpi.usra.edu), Lunar and Planetary Institute, Houston, Tex.

Carol Waters (@MrsH20sScience; cwaters@pasadenaisd.org), Pasadena (Tex.) ISD

Devalyn Rogers (devrog5@gmail.com), Hoffman Middle School, Houston, Tex.

Carrie Stokes (clacystokes@comcast.net), Houston Community College, Houston, Tex.

Jan Grout (pjgrout@gmail.com), Retired Educator, Seabrook, Tex.

Use reflectance spectrometers to graph spectra, creating and comparing rock spectra to determine the Moon's composition. *Note:* Spectrometers available on loan for cost of shipping.

M Art and the Cosmic Connection: STEAM in Action

(Grades 4–8)

704, Conv. Center

Whitney Cobb (@STEM_McREL; wobb@mcrel.org), McREL International, Denver, Colo.

Monica Aiello (@EurekusSTEAM; monica@eurekus.org), Eurekus!, Denver, Colo.

Pluto! Ceres! Mars! Stunning images arrive from NASA missions to planets, asteroids, and moons. The elements of art help you hone observation skills and inspire questions.

HS Are You Ready to Be R.E.D.?

(Grades 8–12)

Mile High Ballroom 1D, Conv. Center

Joanne Aronson (aronsonj@miamicountryday.org), Miami Country Day School, Miami, Fla.

Participate in this hands-on workshop to explore how to engage and challenge students to use engineering principles to design and construct solutions to complex problems.

HS STEM Chem: Bringing Engineering into the Chemistry Classroom

(Grades 9–12)

Mile High Ballroom 1E, Conv. Center

Mauree Haage (@MAHaage; mauree.haage@gmail.com), Twin Cedars High School, Bussey, Iowa

Learn ways of incorporating engineering activities into your chemistry classroom and how this applies to NGSS and STEM.

HS Using Recreational UAVs (Drones) for STEM Activities and Science Fair Projects

(Grades 6–12)

Mile High Ballroom 1F, Conv. Center

Shelley Olds (shelley.e.olds@gmail.com), UNAVCO, Boulder, Colo.

Engage students in STEM using the “it” toy of the year: Unmanned Aerial Vehicles (UAVs or drones)! Try free teacher-developed activities for STEM learning.

HS STEM Behind Forensics

(Grades 7–12)

Mile High Ballroom 3C, Conv. Center

Jeffrey Lukens (jeffreylukens0613@gmail.com), Sioux Falls (S.Dak.) School District

From helping to determine the time of a victim's death to analyzing DNA samples from crime suspects, this workshop has it all! Come get your hands wrapped around the STEM of crime solving!

9:30–10:30 AM Exhibitor Workshops

What Does Conceptual Modeling Look Like in Grades 5–7 Classrooms?

(Grades 5–7)

301, Conv. Center

Sponsor: Delta Education/School Specialty Science

Kathleen Mills, West Seattle Elementary School, Seattle, Wash.

Join a FOSS Next Generation Program consultant to explore how students construct models within the context of physical science. Experience active investigations from two different grade levels and create models about how matter interacts. Find out how student models can be used to guide future instruction within the FOSS program.

Investigating a Cliff Model

(Grades 6–8)

302, Conv. Center

Sponsor: LAB-AIDS®, Inc.

Hethyr Tregerman, LAB-AIDS, Inc., Ronkonkoma, N.Y.

Here's your chance to engineer a coastal breakwater (from the *Issues and Earth Science* "Erosion and Deposition" unit from LAB-AIDS) and analyze the trade-offs of the design. Explore how the natural world is influenced by our engineered world, which in turn creates more societal issues that must be solved. Activities exemplify NGSS and show how SEPUP embeds the engineering practices and uses real issues to powerfully deliver content learning.

Martian Genetics: An Electrophoresis Exploration

(Grades 6–College)

303, Conv. Center

Sponsor: Edvotek, Inc.

Danielle Snowflack (info@edvotek.com), Edvotek Inc., Washington, D.C.

Explore genetics with our "out of this world" workshop! Imagine being the first scientist to explore Mars and discovering extraterrestrials. How would you use biotechnology to learn about the Martians? Discover how DNA technology can be used to explore the relationship between genotype and phenotype. Fluorescent dyes simulate DNA fragments, eliminating post-electrophoresis staining and saving classroom time! Take home a free gift and entry in a LabStation™ giveaway.

Integrating Chromebook™ with Vernier Technology

(Grades 4–12)

304, Conv. Center

Sponsor: Vernier Software & Technology

David Carter (info@vernier.com), Vernier Software & Technology, Beaverton, Ore.

Learn how to use Chromebooks with Vernier technology in this workshop featuring experiments from Vernier lab books. See how engaging experiments like "Boyle's Law" or "Grip Strength Comparison" teach students about data collection and analysis—practices that promote science inquiry and boost test scores.

The Biology of Skin Color

(Grades 9–12)

401, Conv. Center

Sponsor: HHMI BioInteractive

Megan Stine, Howard Hughes Medical Institute, Chevy Chase, Md.

Explore the evidence that the variation in human skin color is an evolutionary adaptation to the varying intensity of ultraviolet radiation in different parts of the world. HHMI BioInteractive's engaging, free classroom-ready resources weave together key concepts in biology, human biogeography, genetics, and anatomy/physiology.

Go Small to Go Big: Molecular Models in Ecology

(Grades 9–College)

402, Conv. Center

Sponsor: 3D Molecular Designs

Kim Parfitt, Central High School, Cheyenne, Wyo.

Learn how AP biology classes used detailed magnetic DNA models to amplify their field and lab research in aspen genetics. This landscape-level project was a partnership with the University of Wyoming's Berry Conservation Center.

Flinn Scientific's STEM Design Challenge™ "Build-It-Yourself" Lab Project

(Grades 7–12)

403/404, Conv. Center

Sponsor: Flinn Scientific, Inc.

Janet Hoekenga, Flinn Scientific, Inc., Batavia, Ill.

Integrate STEM scientific inquiry and engineering design principles into your science curriculum. Join Flinn Scientific in a "build-it-yourself" lab project that can actively engage your students and increase their understanding of concepts that cut across scientific disciplines. Interactive demonstrations highlight science and engineering practices such as reasoning based on the evidence. Handouts for all activities!

Ten80 Education: Innovation Through Computer Science, Racing, and Robotics Challenge

(Grades 7–12) 405, Conv. Center
Sponsor: Ten80 Education Inc.

Bebette Ryan (bdryan@ten80education.com), Ten80 Education Inc., Schuylerville, N.Y.

Ten80 Education Project-Based Learning STEM programs combine engineering and enterprise processes with the content required to turn ideas into reality. Whether for course credit or as an extracurricular program, students investigate and innovate in race engineering, design, robotics, computer science, and more. Participants will receive a sample investigation.

Imaginative Thinking, Teamwork, AND Robots, OH MY! FIRST® LEGO® League Builds More than Robots...

(Grades K–8) 406, Conv. Center
Sponsor: FIRST

Betsy Daniels (bdaniels@firstinspires.org), FIRST, Manchester, N.H.

FIRST is developing tomorrow’s innovators today. Discover how the popular FIRST LEGO League program challenges

students to research and develop a solution to a real-world problem and design/build/program a robot using LEGO MINDSTORMS®. Then channel your inner child, remember what you’ve learned, and DRIVE THAT ROBOT!

DIY Data Logging for Authentic Citizen Science Using Arduino

(Grades 7–College) 407, Conv. Center
Sponsor: SparkFun Electronics

Brian Huang, Derek Runberg, and Jeff Branson, SparkFun Electronics, Longmont, Colo.

Authentic data collection is always a tricky thing to accomplish within a class period. Come learn to use an Arduino and programmable electronics to build your own instrumentation to log data over longer periods of time that you can bring back to your classroom. Let’s collect data together!



—Photo courtesy of Jacob Slaton

10:30 AM–12 Noon Special Session Elementary STEM Showcase!

(Grades P–6) Four Seasons Ballroom 1/2, Conv. Center

Sponsored by FIRST® (For Inspiration and Recognition of Science and Technology), Pitsco Education, and TeacherGeek, Inc.

Organized by **Linda Froschauer** (fro2@me.com), 2006–2007 NSTA President, Pasadena, Calif.

Visit bit.ly/29yJSkx for a complete list of Extravaganza participants or please pick up a program at the door.

The Elementary STEM Showcase brings together more than 30 leaders in STEM education that will provide a variety of preK–6 STEM teaching strategies and resources from the new NSTA Press® publication, *Bringing STEM to the Elementary Classroom*. NGSS connections to student experiences will be highlighted during this flea market–style sharing experience where participants will engage in hands-on activities and interact with presenters about STEM investigations conducted in their classrooms.

Free book to the first 15 participants PLUS door prizes!

11:00 AM–12 Noon Presentations

UE Reimagine CODE: Computational Opportunities Delivered in Elementary

(Grades 3–5) 106, Conv. Center
Yune Tran (ytran@georgefox.edu), George Fox University, Newberg, Ore.

Explore how more than 400 elementary-aged students received interdisciplinary computational thinking lessons embedded as part of their regular school day.

M Teach STEM Content and Spark Science Career Interest with Free Online Games

(Grades 6–12) 108, Conv. Center
Lynn Lauterbach (lynnlauterbach@gmail.com), Retired Teacher, Loveland, Colo.

See how free online games get students involved in science career simulations by solving real-world science problems using the authentic tools and practices of scientists.

M Problem-Based Learning Start to Finish

(Grades 6–12) 109, Conv. Center
Jessica Noffsinger (jessica.noffsinger@adams12.org), STEM Magnet Lab School, Northglenn, Colo.

Find out how to plan a successful Problem-Based Learning unit to provide students with opportunities to work collaboratively to solve 21st-century problems.

A ITEEA Session: Integrative STEM Education: Intentional Teaching Through Engineering Design

(General) 111, Conv. Center
John Wells (jgwells@vt.edu), Virginia Tech, Blacksburg
Integrative STEM education serves as the theoretical and pedagogical premise for technological/engineering (T/E) design-based teaching and learning practices. This session will characterize the unique aspects of integrative STEM education that parallel but are not covered by other disciplines.

HS A Mobile and Global Classroom

(General) 112, Conv. Center
John Clark ([@jpgclark](https://twitter.com/jpgclark); jpgclark@gmail.com), Owensboro High School, Owensboro, Ky.

Various mobile devices can reach outside classroom walls to collaborate with professionals in other classes, schools, and scientific facilities to enrich any STEM learning experience.

M 3D Printing Waves: Creating Physical Models of Sound and Light

(Grades 6–8) 113, Conv. Center
Sharon Miller (sjmillier@aurora.edu), **Jennifer Bentley** (jbentley01@aurora.edu), and **Ashley Johnson** (ashley-ann9535@gmail.com), Aurora University, Aurora, Ill.

Several new, interdisciplinary curricular ideas will be presented connecting 3D printing and the physical science content of energy and waves.

A Green STEM in Guam: A District-Wide Initiative That Works

(Grades K–12) 202, Conv. Center
Anne Tweed (atweed@mcrel.org), 2004–2005 NSTA President, and McREL International, Denver, Colo.

Leah Beth Noholowaa ([@LeahBeth](https://twitter.com/LeahBeth); lonaholowaa@gdoe.net), Guam School District, Barrigada

Hear about the district development and implement of a district-wide STEM Strategic Plan that is effectively building and supporting STEM programs across the district. Find out how Guam has connected to island resources supporting green STEM initiatives that allow students to work on real place-based issues. Sample K–12 projects will be highlighted.

HS AACT/AAPT/NABT-Sponsored Session: Using the NGSS and the Framework to Implement Crosscutting Concepts in Discipline-Specific Courses

(Grades 9–12) 501, Conv. Center
Kimberly Duncan ([@chemduncan](https://twitter.com/chemduncan); k_duncan@acs.org), American Association of Chemistry Teachers, Washington, D.C.

Hear from representatives of the AACT, AAPT, and NABT on how to effectively help students make interdisciplinary connections in chemistry, biology, and physics courses.

Pa Teachers Bridging School and Workplace: Summer in Industry

(Grades 6–College) 507, Conv. Center
Jeff Weld ([@IowaSTEM](https://twitter.com/IowaSTEM); jeff.weld@uni.edu), Iowa Governor's STEM Advisory Council, Cedar Falls

Business and education benefit from cross-pollinating educators on the job site through summer, extracting meaningful lessons for the classroom while adding value to worksite operations.

Pa **The Colorado STEM Model: A Public-Private Partnership**

(General) 602, Conv. Center

Elizabeth Kuehl (@ColoradoSTEM; kkuehl@coloradoedinitiative.org), The Colorado Education Initiative, Denver

A unique public-private partnership to advance STEM education, the Colorado STEM Model includes representatives from state government, K–12, higher education, community partners, and is led by our industry champions.

A **STEM Innovation in Independent and Charter Schools Roundtable Discussion**

(Grades K–12) 603, Conv. Center

Adrienne Gifford (@adriennegifford; adrienneg@ows.org), Open Window School, Bellevue, Wash.

Join me for an interactive roundtable to share and discuss best practices for fostering STEM innovation in charter and independent schools.

Pa **NICERC, Cyber Innovations, the University of Louisiana at Monroe, and Robots**

(Grades 7–12) 604, Conv. Center

Edyce Stone, Ascension Christian High School, Gonzales, La.

By working with several businesses and a university, a cyber literacy and cyber science curriculum has been incorporated for STEM learning, exposing middle school and high school students to themes in cyber science.

Pa **Enhancing Student Engagement Through Real-World Relevance**

(Grades 7–College) 606, Conv. Center

Jan Sikorsky, Envision EMI, Vienna, Va.

Seeking partnerships with organizations external to the classroom adds real-world relevance to designed curriculum. Let's discuss the process of partnering with subject-matter experts.

Pa **Identifying the Right Mentoring Model for Your Program**

(Grades 5–College) 608, Conv. Center

Kristian Breton (@kristianbreton; kbreton@nyas.org), **Tiffany Kapler** (tiffany.kapler@gmail.com), and **Ernest "Trey" Greene III** (@NYASCIENCES; tgreene@nyas.org), The New York Academy of Sciences, New York, N.Y.

There are many types of STEM mentoring models available, but what fits for your school/program?

M **NGSS Instruction That Makes Thinking Visible**

(Grades 5–8) 705, Conv. Center

Kenneth Huff (kenneth.huff@roadrunner.com), Williamsville (N.Y.) Central School District

Join a member of the NGSS writing team to actively engage in the modeling of an innovative approach to science teaching and learning.

M **CCERS Partnership Model Teacher Fellowship: An Interdisciplinary Approach to STEM Education**

(Grades 6–8) 706, Conv. Center

Michelle Molina (@evalconnection; molinamichelle91@gmail.com) and **Erica Watson** (designphd@yahoo.com), Smart-Start Evaluation and Research, Irvine, Calif.

Lauren Birney (@LBIRNEY; lbirney@pace.edu), Pace University, New York, N.Y.

The Curriculum + Community Enterprise for Restoration Science (CCERS) model fellowship trains middle school teachers to engage and support their students' exploration of STEM concepts.

M **Many Approaches, Many Answers: Life Science STEM Challenges for Grades 4–10**

(Grades 4–10) 707, Conv. Center

Lisa Pike (@pikelisa; lpike@fmarion.edu), Francis Marion University, Florence, S.C.

STEM challenges for biology are hard to find (it's not rocket science)! Hear how to incorporate EDC with easy, inexpensive, content-based, standards-focused STEM challenges for grades 4–10 life science.

HS **Follow the Road to a Successful STEM Career**

(Grades 9–College) 710, Conv. Center

Kareem Burney (ksburney@outlook.com), U.S. Food and Drug Administration, Silver Spring, Md.

Hear and apply lessons from a young minority mid-career-level engineer on what post high school students should be doing in order to obtain a successful STEM career. In order to obtain a STEM career, students need to understand math and science; improve writing, interpersonal skills, and public speaking; and obtain internships. I'll share my path and lessons learned.

HS Making Data Analysis and Statistics Meaningful... and Understandable

(Grades 7–College) 712, Conv. Center
Karlheinz Haas (khaas@thepineschool.org), The Pine School, Hobe Sound, Fla.

Have you been asking whether you should trust loud claims of advertising or what some of the inherent dangers of false positives in testing are? Come explore how to assess the quality behind all those statistics.

HS Using the National Science Olympiad and STEM to Address NGSS Crosscutting Concepts and Content

(Grades 6–12) Mile High Ballroom 1A, Conv. Center
Donna Young (dlyoung.nso@gmail.com), Chandra X-Ray Center, Bullhead City, Ariz.

National Science Olympiad regional, state, and national competitions include STEM events and supporting resources that are easily incorporated into existing curricula to actively engage students.

HS The Rise of STEAM: Elevating STEM Curriculum Through the Art of Storytelling

(Grades 6–12) Mile High Ballroom 1B, Conv. Center
Aaron Willey (willeya@uncsa.edu), University of North Carolina School of the Arts, Winston-Salem

Find out how the artistic qualities of storytelling can help students construct their own knowledge to create authentic learning environments in any STEM classroom.

HS Cybersecurity Curriculum Training for Teachers

(Grades 6–12) Mile High Ballroom 1C, Conv. Center
Daniel Stein, U.S. Dept. of Homeland Security, Washington, D.C.

Discussion centers on the Cybersecurity Education and Training Assistance Program (CETAP) grant and how it provides free cyber curricula and workshops for grades 6–12 teachers. NICERC provides hands-on professional development, curricula, programs, and competitions to engage students in STEM disciplines. Project-driven curricula creates a context for the content at every level of learning.

HS Energy: A Multidisciplinary Approach for Teachers (EMAT)

(Grades 9–College) Mile High Ballroom 1F, Conv. Center
Susan Kowalski (skowalski@bscs.org), BSCS, Colorado Springs, Colo.

Get your hands on free online materials to enhance your energy content background. The resources are appropriate for teacher PD or high school students in STEM-related classes.

11:00 AM–12 Noon Hands-On Workshops

LE Don't Let It Rub You the Wrong Way: Developing Friction Concepts in Early Childhood

(Grades P–1) 102, Conv. Center
Donna Johnson (djohnson11@schools.nyc.gov), P.S. 021 Crispus Attucks, Brooklyn, N.Y.

Travis Sloane (tsloane@schools.nyc.gov), East Side Elementary School, PS 267, New York, N.Y.

What determines if a sled will go down a hill? Explore how common surface textures can affect sliding down a ramp.

UE NGSS: It's All About Inquiry

(Grades K–6) 103, Conv. Center
Barry Kluger-Bell (klugerbelle@yahoo.com), Inquiry Science Educator, Boulder, Colo.

By engaging in and analyzing an inquiry activity on dissolving Life Savers®, we will see how doing inquiry is exactly what the NGSS is about.

A Engaging School Principals in Professional Development

(General) 201, Conv. Center
Arlene Vinion-Dubiel (dubiel@sbc.edu) and **James Alouf** (alouf@sbc.edu), Sweet Briar College, Sweet Briar, Va.

We will present project activities and outcomes of a Principals' Inquiry Institute coinciding with a teacher professional development project focused on inquiry/investigation science.

M Zombies, Space, and Connecting Creativity to STEM

(Grades 5–8) 203, Conv. Center
Kait Steele (@826national; kait@826national.org), 826 NATIONAL, San Francisco, Calif.

Julius Panoriñgan (julius@826la.org), 826LA, Los Angeles, Calif.

Attention will be paid to best practices in pairing creative writing with STEM. We'll explore accessible lessons designed to boost engagement, confidence, and competency across disciplines.

HS Investigating Data Variation in 60 Minutes

(Grades 9–12) 206, Conv. Center
Aaron Osowiecki (aosowiecki@bostonpublicschools.org), Boston Latin School, Boston, Mass.

Quickly investigate data variation using Google Forms and Sheets. We will run through this lesson collecting and analyzing your own data.

Pa **STEAMology: The Power of Artful Learning**
(General) 502, Conv. Center

Michelle Shedro (michelle@think360arts.org), Think 360 Arts for Learning, Denver, Colo.

Monica Aiello (@EurekusSTEAM; monica@eurekus.org) and **Tyler Aiello** (@EurekusSTEAM; tpaiello@gmail.com), Eurekus!, Denver, Colo.

Eurekus! and Think 360 Arts will present how their partnership provides opportunities for the arts in the STEM movement through artist residencies. This workshop will provide STEAM implementation strategies, best practices, helpful tips, and concrete examples of great student work of STEAM in action. Find out about lesson plans created by Eurekus! in conjunction with NASA, focused on content standards. Engage with STEAM hands on during the Aiello's NASA program Art & the Cosmic Connection.

M **NCTM Session: Model with Mathematics, Working Across Science and Math in the Middle Grades**

(Grades 6–8) 601, Conv. Center

John Pelesko (@peleskoj; pelesko@udel.edu), University of Delaware, Newark

Experience mathematical modeling as a crosscutting approach connecting the *NGSS* and *CCSS Mathematics*. Learn about the types of modeling and how the modeling process supports and is integral to all aspects of STEM.

M **Reverse Engineering for Middle School**

(Grades 6–8) 607, Conv. Center

Elizabeth Kirner (@lbkirner; lbkirner@gmail.com), Parish Episcopal School, Midway Campus, Dallas, Tex.

Reverse engineering or disassembly is a useful way to introduce the engineering design process and practice basic engineering skills in a measured and structured setting.

M **Adding Art to STEM with Origami**

(Grades 5–8) 610/612, Conv. Center

Helen Hixon (@HelenHixon9; helenhixon9@gmail.com), Horace Mann School, Beverly Hills, Calif.

Unfold new learning in your classroom as you have fun folding paper into useful objects. Explore the relevance of origami to engineering and how it can be used to teach the *NGSS*.

M **Pedagogical Practices in Literacy to Enhance Inquiry-Based Instruction**

(Grades 5–8) 702, Conv. Center

Sondra LoRe (sondra@eurekus.org), The University of Tennessee, Knoxville

Scientific inquiry intrinsically supports literacy skills and concepts. Discover creative ways to integrate strong pedagogical practice enhancing science instructional quality and student learning.

M **Planning and Designing Safe and Sustainable Facilities for STEM-Based Science (Science Facilities 101)**

(Grades P–12) 704, Conv. Center

LaMoine Motz (llmotz@comcast.net), 1988–1989 NSTA President, and Motz Consultant Group, White Lake, Mich.

Juliana Texley (@juliana.texley; jtexley@att.net), 2014–2015 NSTA President, Boca Raton, Fla.

So you want new science facilities? Does your curriculum define your science teaching facility? With more than 15 years of conducting visits and presentations of new/renovated school science facilities, the author team of *NSTA Guide to Planning School Science Facilities* (2nd. Ed.) will present the basics of science facility planning for safe, ergonomically designed, and sustainable facilities.

HS **STEM21: Defining Curriculum in an Age of Information**

(Grades 8–12) Mile High Ballroom 1D, Conv. Center

Joy Barnes-Johnson (@drjoybjo; drjoybjohnson@gmail.com), Princeton High School, Princeton, N.J.

The *NGSS* have created new opportunities for interdisciplinary learning in the classroom. Resources for differentiated instruction and assessment in a 3-D science context will be shared.

HS **High Five: Five Ways to Make Teaching Biotechnology Easier and Cheaper**

(Grades 7–College) Mile High Ballroom 1E, Conv. Center

Valerie Lahteine, Barnstable High School, Hyannis, Mass. Make biotechnology more hands on and manageable. From reagent prep to running gels and PCR, you and your students will love these innovative ideas and solutions.

CANCELED



HS **STEM Career Filmmaking in the Classroom and Beyond**

(Grades 10–12) Mile High Ballroom 2C, Conv. Center

Jayde Lovell (@JaydeLovell, jayde@nysci.org), New York Hall of Science, Queens, NY

With internet video—students can learn and share STEM knowledge in ways that are relevant to them and impactful to their broader social communities.

HS **English, ELLs, and STEM: A Collaboration Worth Pursuing**

(Grades 9–12) Mile High Ballroom 3C, Conv. Center

Diane Carter (dhcarter@iupui.edu), Retired Educator, Indianapolis, Ind.

Collaborative projects between secondary English, science, and math courses will help English language learners to develop academic language, grasp STEM concepts, connect information, and improve communication skills.

11:00 AM–12 Noon Exhibitor Workshops

How to Incorporate Robotics into Any Learning Environment

(Grades 6–12) 301, Conv. Center

Sponsor: Frey Scientific/School Specialty Science

Dahlton Grover, PCSEdventures!.com, Inc., Boise, Idaho
Robotics can seem like an intimidating topic to jump into, let alone start teaching! That's no longer the case with easy-to-build bots and drag-and-drop computer programming apps that make robotics approachable and fun. Join PCS Edventures, leaders in STEM education, for an eye-opening workshop on how to incorporate robotics into any learning environment!

Reclaiming the Metal

(Grades 6–8) 302, Conv. Center

Sponsor: LAB-AIDS®, Inc.

Hethyr Tregerman, LAB-AIDS, Inc., Ronkonkoma, N.Y.
In this activity from the SEPUP middle level physical science program, participants role-play a scenario involving pretreatment of copper containing liquid wastes from a computer circuit board manufacturer. They examine trade-offs of metal replacement and chemical precipitation, techniques actually used in industrial applications, and in so doing, come to understand the science behind complex environmental issues.

Engineering Design Challenges in the STEM Classroom

(Grades K–12) 303, Conv. Center

Sponsor: Accelerate Learning

Sharry Whitney, Accelerate Learning, Houston, Tex.

The E in STEM is about using the Engineering Design Process (EDP) to solve problems. Use the EDP to innovate a solution using consensus and collaboration. Join us for this interactive, engaging, and hands-on workshop investigating EDP for your classroom.

Investigating Renewable Energy with KidWind and Vernier

(Grades 7–12) 304, Conv. Center

Sponsor: Vernier Software & Technology

David Carter (info@vernier.com), Vernier Software & Technology, Beaverton, Ore.

Teach engineering design principles with a focus on renewable energy using KidWind Wind and Solar Experiment kits. Collect and analyze data using a Vernier Energy Sensor with a LabQuest 2 interface or on a computer with Logger Pro software. Explore real-world renewable energy design problems with activities from our *Renewable Energy with Vernier* lab book.

Birds: Living Dinosaurs

(Grades 6–12)

401, Conv. Center

Sponsor: HHMI BioInteractive

Kathryn Fisher Hedeem and **Chris Hedeem**, Oregon City High School, Oregon City, Ore.

Did dinosaurs really go extinct? Learn about the evolutionary history of modern birds and excite your students with the idea that they see relatives of dinosaurs every day. Use HHMI BioInteractive’s free short films, interactives, and other classroom resources to teach this chapter of the evolution of life on Earth.

3D Printing for the Bioscience Classroom

(Grades 8–College)

402, Conv. Center

Sponsor: MSOE Center for BioMolecular Modeling

Tim Herman (herman@msoe.edu), MSOE Center for BioMolecular Modeling, Milwaukee, Wis.

Recent advances in 3D printing technology make these amazing machines affordable for many schools. Learn how 3D printing technology can be used to integrate NGSS science and engineering practices with crosscutting concepts and disciplinary core ideas, by creating physical models of molecular structures in your biology or chemistry classroom.

Online Active Learning in Biology with Draw it to Know it!

(Grades 4–College)

403/404, Conv. Center

Sponsor: Draw it to Know it—Biological Sciences

Adam Fisch (fisch@drawittoknowit.com), Draw it to Know it, Creations, LLC, Indianapolis, Ind.

Draw it to Know it—Biological Sciences is a suite of online educational materials that promotes active learning through drawing and is used in K–12 and postsecondary education. In this workshop, we will show you how our website (www.drawittoknowit.com) and iPhone/iPad app can bring active learning to your biology, anatomy, or physiology class.

How Can Entering $\sin(\pi/2)$ on My Calculator Turn on a Hot Plate?

(Grades 6–12)

405, Conv. Center

Sponsor: Texas Instruments

Fred Fotsch, Texas Instruments, Dallas

Come to this hands-on workshop and learn about building STEM projects and science through engineering activities using a TI-Nspire CX handheld and the TI-Innovator™ system. Learn coding, as well as building math and science by bringing engineering into the classroom, after-school clubs, or summer camps. We will build and program a basic feedback control system using a TI-Innovator and a TI-Nspire CX graphing calculator.

More Than Robots...FIRST® Tech Challenge “Drives” STEM Learning Beyond the Classroom

(Grades 7–12)

406, Conv. Center

Sponsor: FIRST

Thomas Eng (teng@firstinspires.org), FIRST, Manchester, N.H.

Your robot driver’s license awaits! This hands-on robot activity and intro to the popular FIRST Tech Challenge program will leave you wanting more. Understand why middle school/high school students worldwide call this hands-on, project-based robotics program a Sport for the Mind™. This session is a building block to the “You CAN Program a Robot” workshop.

Think Fast! Build Your Own Reaction Timer with Arduino

(Grades 6–College)

407, Conv. Center

Sponsor: SparkFun Electronics

Derek Runberg, **Jeff Branson**, and **Brian Huang**, SparkFun Electronics, Longmont, Colo.

It takes a few hundred milliseconds for the signal to get from your eyes, to your brain, and out to your limbs. Learn a little about building electronics and programming with Arduino. Come find out how to build a reaction timer for your classroom and excite curiosity in your students.



1:30–2:30 PM Presentations

M The Restoration of New York Harbor: Reconnecting Students to the Water

(Grades 6–8) 102, Conv. Center
Denise McNamara (*dmcnama@schools.nyc.gov*), Retired Director of Science, Staten Island, N.Y.
Delve into the work of the Billion Oyster Project involving New York City middle school science classes in conjunction with hands-on components taking place in New York Harbor.

Pa Enhancing STEM Education Through Partnerships to Prepare Students for NGSS

(Grades 6–College) 104, Conv. Center
Andrea Hajek (*@AndreaHajek; ahajek@nbpts.org*), National Board for Professional Teaching Standards, Arlington, Va.
Join me as I highlight a partnership between a university and a district to prepare student teachers to integrate the NGSS into their instruction.

UE Getting Started with STEM

(Grades 3–5) 106, Conv. Center
Melissa Parks, Stetson University, Deland, Fla.
Attention all new teachers—explore specific hands-on activities that check all the STEM boxes, have a bit of fun, and take away some ready-to-go STEM activities.



UE STEM Discovery Boxes

(Grades 3–7) 108, Conv. Center
Sherri Cianca, Niagara University, Niagara University, N.Y.
Classroom teachers and teacher educators will be inspired to develop low-cost, high-quality, project-based STEM discovery boxes that engage students in solving standards-based, community-specific problems.

CANCELED

UE Hearts and Minds: A Case for Elementary Robotics

(Grades P–6) 109, Conv. Center
Axel Reitzig (*@areitzig; reitzig_axel@svvsd.org*), Alpine Elementary School, Longmont, Colo.
Robotics is an amazing way to capture students' hearts and minds and to effectively integrate STEM across the curriculum.

A ITEEA Session: Integrative STEM Focal Points—Connecting the I-STEM Dots

(General) 111, Conv. Center
Barry Burke (*bburke@iteea.org*), **Jennifer Buelin** (*jkbuelin@iteea.org*), and **Steven Barbato** (*sbarbato@iteea.org*), ITEEA, Reston, Va.
Wondering how to get a team of teachers to teach Integrative STEM? This session will highlight how educators from around the country created a framework for I-STEM Education.

UE Beyond the Basics: Intentional Integration of STEM

(Grades P–8) 112, Conv. Center
Kristen Brohm, Alpine Elementary School, Longmont, Colo.
Eric Woodland (*woodland_eric@svvsd.org*), Northridge Elementary School, Longmont, Colo.
Josh Lemon (*@lemon2476; lemon_joshua@svvsd.org*), Rocky Mountain Elementary School, Longmont, Colo.
Carolyn Clifford (*@CCLiffordSTEM*) and **Alexandra Downing**, Timberline PK–8, Longmont, Colo.
Lindsey Cheney, Columbine Elementary School, Longmont, Colo.
Looking to move beyond the STEM basics? Be purposeful in integrating STEM practices and philosophies within all content areas in a meaningful and authentic way.

UE **Reading and Writing in the STEM Classroom**
(Grades 3–6) 113, Conv. Center

Jen Gutierrez (@jengutierrez18; jengutierrez@cox.net), Arizona Dept. of Education, Phoenix

Let's explore strategies for helping all students read and write like a scientist, technologist, engineer, or mathematician for deeper conceptual understanding.

LE **Preschoolers Explore Change Over Time and Living/Nonliving**
(Grades P–K) 202, Conv. Center

Betty Zan (betty.zan@uni.edu), University of Northern Iowa, Cedar Falls

Daryl Greenfield (dgreenfield@miami.edu), University of Miami, Fla.

Christine McWayne (christine.mcwayne@tufts.edu), Tufts University, Medford, Mass.

Kimberly Brenneman, Heising-Simons Foundation, Los Altos, Calif.

Discover science, technology, and engineering experiences with living and nonliving objects. Explore the concept of change over time through the eyes of preschool dual language learners.

Pa **Gains in the Education of Mathematics and Science—What GEMS Can Do for You!**

(Grades 5–12) 506, Conv. Center

Sue Whitsett, AEOP Project Director, NSTA, Arlington, Va.

Receive an overview of the AEOP GEMS programs and discover how you can incorporate similar ideas and practices into your science classroom.

Pa **STEM P3: A Statewide Programs/Policy Partnership to Advance PreK–12 STEM Education**

(General) 507, Conv. Center

Jeff Weld (@IowaSTEM; jeff.weld@uni.edu), Iowa Governor's STEM Advisory Council, Cedar Falls

Building a STEM culture across the state calls for systemic rather than piecemeal solutions—integrating classroom, community, and Capitol activities. Get details on a case study of Iowa STEM.

Pa **Bringing Imaginations to Reality**
(Grades P–12) 602, Conv. Center

Amy Fleury (@2ndgrteachamy; amy.fleury@beaufort.k12.sc.us), Michael C. Riley Elementary School, Beaufort, S.C.

Hear about a worldwide network of educators who have established partnerships with the Imagination Foundation to find, foster, and fund creativity and entrepreneurship in children.

A **Ballistic Missile Defense = Math + Science + You**
(Grades 3–College) 603, Conv. Center

Denise Walker, Doug Deason, LaRonda Conley, Missile Defense Agency, Redstone Arsenal, Ala.

At the U.S. Department of Defense Missile Defense Agency, we aim to create productive, long-term, and mutually beneficial partnerships to pursue innovative research; continuously improve the skills of our existing workforce; nurture and shape the development of our future workforce; and strengthen partner institutions. Moreover, our individual and collaborative efforts further increase the STEM workforce pipeline with U.S. citizens. Join us to learn more.

Pa **A STEM Guide: Inspiring, Motivating, and Preparing Girls in STEM**

(General) 604, Conv. Center

Violeta Garcia (@DrVioletaGarcia; violeta@stemlearningbydesign.com), STEM Learning By Design, Denver, Colo. Emphasis will be placed on the contents of *The STEM Guide for Girls*, a free resource to be released in Summer 2016 by the Women's Foundation of Colorado. This guide is a compilation of research-based strategies and resources for parents/caregivers, educators, and community organizations striving for equitable representation of women and women of color in STEM professions.

Pa **12 for Life: A Model Partnership Between Schools and Business**

(Grades 10–12) 606, Conv. Center

Rachel Sayer (@rachelsayer1; rachel.sayer@carrollcountyschools.com), Carroll County Schools, Carrollton, Ga.

Discover how Carroll County Schools has improved graduation rate and promoted STEM education in underrepresented groups through a partnership with Southwire Company.



—Photo courtesy of Jacob Slaton

Pa **eesmarts™: A Partnership in Energy Education**
(Grades 1–12) 608, Conv. Center

Gio Koch (@Gio_Koch; gkoch@crec.g), Capitol Region Education Council, Hartford, Conn.

Lisa Sarubbi (lisa.sarubbi@uinet.com), The United Illuminating Co., New Haven, Conn.

A free K–12 comprehensive energy program, eesmarts is administered by Connecticut’s investor-owned utilities in partnership with the Capital Region Education Council (CREC).

M **Authors Needed! Share Your Teaching Ideas in an NSTA Journal**

(General) 706, Conv. Center

Patty McGinnis (pattymcginnis1@gmail.com), Arcola Intermediate School, Eagleville, Pa.

Linda Froschauer (fro2@me.com), 2006–2007 NSTA President, Pasadena, Calif.

Meet with an NSTA journal editor to learn how to successfully prepare and submit an article in one of our award-winning journals.

M **Inviting “Failure” to the Classroom**
(Grades 6–8) 707, Conv. Center

Elizabeth Kirner (@lbkirner; lbkirner@gmail.com), Parish Episcopal School, Midway Campus, Dallas, Tex.

We will focus on failure as a powerful STEM learning tool for students and how to create a culture of productive failure in the classroom.

HS **PolyWhat? Understanding What a Polymer Is: Polymer 101**

(Grades 5–12) 709, Conv. Center

Sherri Rukes (sherri.rukes@d128.org), Libertyville High School, Libertyville, Ill.

Discover different strategies for introducing what a polymer is in ways you and your students can understand. Many examples and a CD of materials will be shared.

HS **Using Issues-Based Culminating Projects to Bring STEM to Introductory Chemistry**

(Grades 8–12) 710, Conv. Center

Angela Powers, Colorado State University–Pueblo

Carolyn Schwennsen (cschwenn@yahoo.com), Cate School, Carpinteria, Calif.

Learn how culminating projects can integrate knowledge from STEM disciplines, broaden perspectives on global issues, and sharpen 21st-century skills within the chemistry curriculum.

HS **Moving Toward the Practices with Problem-Based Learning**

(Grades 4–12) 712, Conv. Center

DJ West (@djwest78; djwest78@gmail.com), Schoolcraft College, Livonia, Mich.

Explore how Problem-Based Learning can support the science and engineering practices of the NGSS by involving students in both hands-on and thought-based use of these practices. Leave with sample PBLs and links to free resources.

HS **Open-Source Robotics**

(Grades 7–12) Mile High Ballroom 1A, Conv. Center

Marcus Catchpole (marcuscatchpole@gmail.com), Robot Aficionado, Colorado Springs, Colo.

Hear from an engineer on “how-to” outfit a high-value engineering classroom on a budget using free and open-source material.

HS **A Unique Ice Core Investigation That Integrates the Three Dimensions of NGSS and STEM**

(Grades 8–College) Mile High Ballroom 1B, Conv. Center

Donna Young (dlyoung.nso@gmail.com), Chandra X-Ray Center, Bullhead City, Ariz.

This open-ended investigation uses absolute and relative dating techniques and anomalies to date Icelandic and mid-latitude volcanoes, solar proton events, terrestrial events, and possibly supernovas.

HS **The Evolution of Bigfoot: Analyzing Evidence of an Alleged Species to Guide Students Through the 10 Big Questions in Evolution**

(Grades 9–12) Mile High Ballroom 1C, Conv. Center

Aaron Willey (willeya@unca.edu), University of North Carolina School of the Arts, Winston-Salem

Walk students through the 10 big questions of evolution while using current evidence in the field of Bigfoot research to provoke inquiry and critical thinking.

1:30–2:30 PM Hands-On Workshops

UE One Bag of Materials = Three Hands-On Activities = Integrating Science and Engineering in a Fun Way!

(Grades 3–5) 103, Conv. Center

Katelyn Wamsted (@girlstart), Girlstart, Austin, Tex.

Discover three standards-focused hands-on activities to incorporate science and engineering in a fun and engaging way.

Curriculum with Catapults: Upcycled Science

(Grades 2–5) 105, Conv. Center

Chris DeKay (chris@raftcolorado.org), RAFT Colorado, Denver

Catapults are fantastic for teaching experimental design and giving relevance to valuable skills. Come make things fly and discover using mundane materials for great learning.

UE STEM Lesson Guideposts™: Mapping STEM Lessons into Your Curriculum

(Grades 3–8) 107, Conv. Center

Joel Villegas (jvillegas@pinalesa.org), Pinal County School Office Education Service Agency, Florence, Ariz.

Michael Comer (michael.comer@victoryprd.com), Victory Productions, Worcester, Mass.

Jo Anne Vasquez (jvasquez@stemlessonessentials.com), 1996–1997 NSTA President, and Rocks to Rainbows, LLC, Gilbert, Ariz.

Craft STEM-focused activities through a culminating transdisciplinary experience. This interactive workshop will introduce a newly developed, research-based process for developing practical integrated STEM lessons and units using existing standards and curriculum.

UE Moon Gardens

(Grades 3–8) 110, Conv. Center

Melissa Lau (melissa.lau@piedmontschools.org), Piedmont Intermediate School, Piedmont, Okla.

We will probe how hydroponics may be the way to sustain life on a lunar or Mars station. Join me for a learning experience that will take kids to the moon and back again.

A Integrative STEM for Middle School/High School Administrators and Educators

(Grades 6–College) 201, Conv. Center

Patricia Simmons (patricia_simmons@ncsu.edu), 2011–2012 NSTA President, and National Science Foundation Fellow, Arlington, Va.

Our cross-disciplinary team will highlight the challenges and successes of designing and implementing integrative STEM for middle school and high school teachers, and how administrators can support innovative teaching and learning. Join me for discussions and NGSS-based signature activities featuring local resources for integrative STEM.

LE Engineers Play, Too!

(Grades P–3) 205, Conv. Center

Shelley Lee (leeshe@uwstout.edu), 1995–1996 NSTA President, and University of Wisconsin–Stout, Menomonie

Heidi Usgaard (husgaard@sc.k12.wi.us), St. Croix Central School District, Roberts, Wis.

Learn how to incorporate literacy and “engineering play” into early elementary classrooms and how to use “read alouds” to spark engineering thinking in play!

LE Nothing but Hot Air? Developing Concepts of Energy, Force, and Friction Through Balloon Cars

(Grades 1–3) 207, Conv. Center

Jody Hilton, Christopher Avenue Community School, Brooklyn, N.Y.

Travis Sloane (tsloane@schools.nyc.gov), East Side Elementary School, PS 267, New York, N.Y.

Test-drive these STEM activities as you design and make a balloon car, troubleshoot it, and redesign it to make it better!

LE Teacher and Child—Co-Explorers, Co-Learners

(Grades P–2) 210/212, Conv. Center

Barry Kluger-Bell (klugerb@yaho.com), Inquiry Science Educator, Boulder, Colo.

Alexandra Cruickshank (@accruick; alex.cruickshank@boulderjourneyschool.com), Boulder Journey School, Boulder, Colo.

Through hands-on activity, discussion, and video, we explore how teachers’ own exploratory learning can guide children’s learning of core ideas and engagement in science practices.

CANCELED



Pa NABT and BSCS Present: The AP Biology Academy—
Professional Development with an Impact, Part 1

(Grades 10–College) 501, Conv. Center

Jaclyn Reeves-Pepin (@jreevespepin; jreevespepin@nabt.org), National Association of Biology Teachers (NABT), Warrenton, Va.

Cindy Gay (@cindygay; cindyjgay@gmail.com), Steamboat Springs High School, Steamboat Springs, Colo.

Experience components of a successful professional development program that fosters participants' content knowledge and leadership skills to allow them to effectively lead PD.

HS AAPT Session: Balloon Science Lab—Inviting
Chemistry and Physics to the Party

(Grades 9–College) 502, Conv. Center

Rebecca Vieyra (@AAPATHQ; @RVieyraAEF; rvieyra@aapt.org), American Association of Physics Teachers, College Park, Md.

Integrate and apply chemistry and physics concepts by measuring the volume of helium in an irregular balloon using gas laws and force diagrams.

LE Primary STEM Integration K–6

(Grades P–6) 503, Conv. Center

David Lockett (@DavidJLockett; david.lockett@cityschools.net), Mitchell-Neilson Elementary School, Murfreesboro, Tenn.

How do we effectively integrate research-based STEM activities into a K–6 curriculum? Join in and find out.

Pa STEM in Life Science: Connecting to Your Local Zoo

(Grades 4–12) 601, Conv. Center

Alicia Lamfers (alamfers@denverzoo.org), Denver Zoo, Denver, Colo.

Learn how to scaffold a zoo adventure from guided lessons to investigations inspired by student interests. Leave with STEM activities to implement in your classroom.

M Middle School Engineering Challenge: Gliders

(Grades 6–8) 605, Conv. Center

Karen Saur (@Karen_Saur), Museum of Science, Boston, Mass.

Grace Andrews (gandrews@nyscience.org), New York Hall of Science, Queens

Christopher Hernandez (chernandez13@schools.nyc.gov), Robert F. Wagner Middle School, New York, N.Y.

Explore an iterative engineering process that encourages students to modify the design of a simple glider, document changes in flight distance, and optimize performance.

M Engineering from Every Angle: Engineers as Proficient in Emotional Intelligence as Well as Analytical Skills

(Grades 5–8) 607, Conv. Center

Haley Holt (@STEMSpark; @KCS_STEM; haley.holt@knoxschools.org), L&N STEM Academy, Knoxville, Tenn.

Successful engineers are proficient in engineering and human relationship skills. I'll present creative ways to include emotional intelligence in engineering to enhance student learning.

M Rocket Building Is Out of This World

(Grades 4–8) 610/612, Conv. Center

Joan Gillman (joan.gillman@calhoun.org), The Calhoun School, New York, N.Y.

For this workshop, STEM skills will be emphasized. We will design, build, and test straw rockets using a special launcher. Propel new learning as you aim to create a rocket that can fly the farthest.

M UODs (Unidentified Old Devices): Using Old-Time Inventions and Oddities to Stimulate Inventiveness

(Grades 4–9) 702, Conv. Center

Alan McCormack (amccorma@mail.sdsu.edu), 2010–2011 NSTA President, and San Diego State University, San Diego, Calif.

A collection of bizarre old-time household implements is used to promote inference skills, motivation, and scientific/engineering inventiveness of grades 4–9 children.

M **Student Investigations of Metallic Elements: A Set of STEM-Based Lessons That Explore Costs Related to Mining, Manufacturing, and Recycling of Metals**

(Grades 5–8) 703, Conv. Center

William Sumrall (*sumrall@olemiss.edu*), The University of Mississippi, University

Kelle Sumrall (@sciencerocks1ms; *kelle.sumrall@gocommodores.org*), Lafayette Middle School, Oxford, Miss. Emphasis will be placed on middle grade STEM-based lessons that explore historical aspects and mining, manufacturing, and recycling costs of metallic elements. Handouts!

M **Science Facilities 102: The Architects Have Started Without Me—What Do I Do Now?**

(Grades K–12) 704, Conv. Center

LaMoine Motz (*llmotz@comcast.net*), 1988–1989 NSTA President, and Motz Consultant Group, White Lake, Mich.

Juliana Texley (*jtexley@att.net*), 2014–2015 NSTA President, Boca Raton, Fla.

Sandra West (*sw04@txstate.edu*), Texas State University, San Marcos

Is your district planning for new science facilities? Are you involved? If not, you need to get involved before it is too late. In an advanced course (*an extension of Science Facilities 101*) the NSTA author team for *NSTA Guide to Planning School Science Facilities* (2nd Ed.) will present more detailed information and examples of safe, ergonomically correct, and functional science facilities for STEM-based science. Budgeting, working with the architect, technology, and special adjacencies will also be presented. Packet will be distributed.

HS **Infect Your Science Classroom with Math**

(Grades 6–12) Mile High Ballroom 1D, Conv. Center

Jeffrey Lukens (*jeffreylukens0613@gmail.com*), Sioux Falls (S.Dak.) School District

Integrating science and mathematics shouldn't just be a good idea, it should be the law! Come learn how easy, important, and fun it is to collect and analyze data as a part of good, solid, and responsible science education.

HS **Teaching Genetics and Evolution Through Context-Based Learning Involving Food Security Issues in Africa**

(Grades 8–12) Mile High Ballroom 1E, Conv. Center

Timothy Goodale (*tagoodal@ncsu.edu*), North Carolina State University, Raleigh

Using methods from an NSF-funded international study, this workshop will demonstrate the first of four units involving the teaching and learning of genetics and evolution through context-based methods surrounding food security issues in Africa.

HS **Framing an Integrated STEM Lesson**

(Grades 8–12) Mile High Ballroom 1F, Conv. Center

Lori Reinsvold (*lori.reinsvold@unco.edu*), University of Northern Colorado, Greeley

STEM teachers will discuss the attributes of a framework to design integrated STEM lessons, participate in lessons, and develop a lesson.

HS **Explore Building Mousetrap Vehicles to Integrate Science, Technology, Engineering, and Mathematics (STEM)**

(Grades 9–College) Mile High Ballroom 2C, Conv. Center

Karen Ostlund (@karen_ostlund; *klostlund@utexas.edu*), 2012–2013 NSTA President, and The University of Texas at Austin

Alden Balmer (*alden_balmer@roundrockisd.org*), McNeil High School, Austin, Tex.

Build a mousetrap vehicle and discover how to integrate science, technology, engineering, and mathematics by modifying variables to increase speed or distance traveled.

HS **Lesson Plan on Teaching Chemistry by Implementing Metaphorical Thinking**

(Grade 9) Mile High Ballroom 3C, Conv. Center

Cittoor Girija Navaneedhan (*girija.navaneedhan@gmail.com*), Indian Institute of Technology Madras, Tamil Nadu

Find out how to prepare lesson plans implementing metaphorical thinking—a soft thinking technique that builds higher order thinking skills. Metaphorical thinking initiates synaptic activity in the axons, which in turn enhances coordination between right and left hemispheres of the brain... bringing activation in the cerebral cortex, enabling quick understanding of the information.

1:30–2:30 PM Exhibitor Workshops

CPO Science's Optics with Light and Color: Use Light to Learn About Light with Our Link™ Learning Module

(Grades 6–12)

301, Conv. Center

Sponsor: CPO Science/School Specialty Science

Kathleen Mills, West Seattle Elementary School, Seattle, Wash.

Experience CPO's Optics with Light and Color kit with LED flashlights, laser, lenses, a mirror, and more. Try color mixing, relate it to human vision, and examine different spectra. We make studying light exciting! Take away applications of the concept of light and other electromagnetic waves in technology (STEM and NGSS).

The Science of Speed: Fusion of Competition, Creativity, and STEM Learning

(Grades 6–12)

302, Conv. Center

Sponsor: Pitsco Education

Brad Blue, Design & Innovation Lab, Minneapolis, Minn.

The Science of Speed takes STEM education and fires it down a track as fast as your students can make it go. Students design, build, test, and race CO₂ cars...and along the way, they learn physical science and engineering skills at lightning speed. Learn about it in this hour-long workshop.

Project-Based STEM/Engineering

(Grades 5–College)

303, Conv. Center

Sponsor: WhiteBox Learning

Graham Baughman (graham@whiteboxlearning.com), WhiteBox Learning, Louisville, Ky.

WhiteBox Learning is a standards- and project-based STEM/engineering learning system. WhiteBox's world-class STEM curriculum and web-based software applications allow students to research, design, analyze, and SIMULATE their designs (then build), and compete "virtually", 24/7, all around the world, from any browser. How cool is that!?! This system includes an integrated LMS/teacher dashboard.

Building STEM Foundations in the Primary Classroom

(Grades K–3)

304, Conv. Center

Sponsor: SAE International - A World In Motion Program

Meghan Stoyanoff, SAE International, Warrendale, Pa.

Looking for new ways to incorporate STEM in your classroom? Look no further than this hands-on workshop where SAE's A World In Motion staff will show you how to use literature as a springboard to introduce STEM topics such as gravity, potential and kinetic energy, friction, momentum, velocity, and acceleration.

Analyzing Authentic Biological Data to Practice STEM Skills

(Grades 9–College)

401, Conv. Center

Sponsor: HHMI BioInteractive

Natalie Dutrow, Judge Memorial Catholic High School, Salt Lake City, Utah

Make scientific research accessible to your students using HHMI BioInteractive's Data Points. Hear research stories from evolution, genetics, and ecology fields highlighting important topics like climate change and autism genetics. Learn techniques and tools to analyze data, and explore free associated materials, including short films, interactives, and classroom activities.

Connecting the Dots in Science and Math Using Salt and Water Models

(Grades 4–9)

402, Conv. Center

Sponsor: 3D Molecular Designs

Tim Herman (herman@msoe.edu), MSOE Center for Bio-Molecular Modeling, Milwaukee, Wis.

Explore states of matter using magnetic water and salt models while reinforcing math concepts of shape recognition and multiple methods of calculating volume. A simple activity demonstrates pattern recognition followed by development and testing of a hypothesis. Students will "feel" the differences in solid, liquid, and gas states of water.

Finding the Needle in the Haystack: Selecting High-Quality STEM Material

(Grades 3–5)

405, Conv. Center

Sponsor: ETA hand2mind

Olivia Hua (liv.hua@mail.mcgill.ca), McGill University, Montreal, Que., Canada

Johannes Strobel (strobelj@missouri.edu), University of Missouri, Columbia

Join us for an interactive session in which we introduce tools for picking high-quality STEM material. We will share a rubric and work through an example of designing, building, testing, and redesigning a code transmission system.

FIRST® Tech Challenge Proves You CAN Program a Robot

(Grades 7–12)

406, Conv. Center

Sponsor: FIRST

Thomas Eng (teng@firstinspires.org), FIRST, Manchester, N.H.

Using off-the-shelf Android technology in a popular Blockly programming language, be ready to “dive in” using go-at-your-own-pace instructional materials to program a robot as used in the FIRST Tech Challenge program. Once you’ve built your program, take the robot for a test-drive based on what you’ve learned. Game on!

ST[EMpower] Kits: Empower Your Students with STEM

(Grades K–2)

407, Conv. Center

Sponsor: Colorado State University Extension

Barbara Shaw (barbara.shaw@colostate.edu) and **Annette Haas** (annette.haas@colostate.edu), Colorado State University, Fort Collins

Our grades K–2 kits completely meet the underlying concepts of the Colorado Science Standards through a holistic approach to knowledge. Not only is the specific science standard thoroughly addressed, but lessons also meet many mathematics, RWC, social studies, and arts standards through this fun and engrossing way to teach science.



3:00–4:00 PM Presentations

UE Connecting and Integrating the NGSS with CCSS ELA

(Grades 3–10)

106, Conv. Center

Kevin Niemi (kjniemi@wisc.edu), University of Wisconsin–Madison

Debra Kneser (@debkneser; dmkneser65@marianuniversity.edu), Marian University–Wisconsin, Fond du Lac

Explore how science and engineering practices and disciplinary literacy skills are incorporated into the NGSS.

UE Engineering Design Failures in Elementary Classrooms: What Can You Expect and How Can You Respond?

(Grades 3–5)

108, Conv. Center

Pamela Lottero-Perdue (plottero@towson.edu), Towson University, Towson, Md.

Elizabeth Parry (@ELIZPARRY; elizabeth.parry.consulting@gmail.com), North Carolina State University, Raleigh

We will draw from research and practice to explore how students experience and teachers respond to design failure, and how “fail” words are used in the classroom.

UE Cross-Curricular Learning with a Science Focus: Optimizing Student Learning and Maximizing Efficiency of Instruction While Integrating All Aspects of STEM

(Grades 3–6)

109, Conv. Center

Donna Knoell (dknoell@sbcglobal.net), Educational Consultant, Overland Park, Kans.

Hear about effective ways to integrate cross-curricular learning with science instruction to optimize student learning and maximize opportunities to deepen understanding, yielding added time for integrated STEM exploration.

UE Structuring an Interdisciplinary STEM Unit to Support Students’ Data Analysis and Interpretation Skills

(Grades 3–5)

112, Conv. Center

Sarah Bush (@sarahbbush; sbush@bellarmine.edu), Bellarmine University, Louisville, Ky.

This integrated unit for elementary educators showcases, by means of a math-science partnership, one way teachers can support their students’ understanding of analyzing and interpreting data.

UE Real-World STEM Lessons: Model Eliciting Activities for Elementary Students

(Grades 1–5) 113, Conv. Center

Deborah Kozdras (@USFStavros; dkozdras@usf.edu), University of South Florida, Tampa

Christine Angel Danger (christine.danger@sdhc.k12.fl.us), Hillsborough County Public Schools, Tampa, Fla.

Discover how educators use Model Eliciting Activities (MEAs) to teach STEM concepts, infuse literacy, and engage students in higher order discussions and processes.

A A Systematic Model to Fuel the STEM Pipeline

(Grades 9–12) 202, Conv. Center

Nicolle Karantinos (@STEMedAZ; nkarantinos@gmail.com) and **Nicki Derryberry** (@STEMedAZ; nicki.derryberry@gmail.com), Red Mountain High School, Mesa, Ariz.

The advanced STEM program models an innovative approach to address the national STEM crisis. Be inspired to change education through this simplistic approach to build and support a STEM model to prepare future generations.

HS Bridging the Gap Between Students, Science, and the Future

(Grades 9–12) 503, Conv. Center

Amanda Hyde-Berger, Conant High School, Jaffrey, N.H.

Hear how a summer experience led to an exploration on closing the chasm between students, cutting-edge science, and their futures.

LE Increasing English Language Learner Vocabulary Through STEM

(Grades K–2) 506, Conv. Center

Adriana Guerra (adriana.guerra@venturausd.org), **Rebecca Haystead** (rebecca.haystead@venturausd.org), **Guadalupe Gomez** (guadalupe.gomez@venturausd.org), and **Jena Branstetter** (@mrsbranstetter; jena.branstetter@venturausd.org), E.P. Foster STEM Academy, Ventura, Calif.

Presenter: Nancy Escamilla, E.P. Foster STEM Academy, Ventura, Calif.

Receive an overview of how kindergarten uses the NGSS and a rigorous curriculum that includes English language learner strategies to engage ELLs, and also GATE and Special Education.

Pa Bridges to Education: A Partnership Model for Municipalities to Engage Students Through Real-World Problems

(Grades 9–College) 507, Conv. Center

Jennifer Kearns (jnkearns@sandiego.gov), The City of San Diego Council District 1, San Diego, Calif.

The City of San Diego’s “Bridges to Education” Partnership Program provides high school students with an opportunity to create solutions for real-world civil engineering or architecture projects.

Pa Harnessing the Power of Partnerships in Out-of-School-Time STEM Programs

(Grades 7–College) 602, Conv. Center

John Ristvey (jristvey@ucar.edu), UCAR Center for Science Education, Boulder, Colo.

Whitney Cobb (@STEM_McREL; wcobb@mcrel.org), McREL International, Denver, Colo.

Find out how partnerships can be established and nurtured to enrich student experiences for your STEM program through examples from two out-of-school-time programs.

A STEMification! How Do You Do That?

(Grades K–8) 603, Conv. Center

Edward Moyer and **Christelle Harding** (@ChristelleH87; charding@dps61.org), Decatur (Ill.) Public Schools

Learn how to transform your school into a STEM laboratory.

Pa Building a Regional Culture of STEM

(General) 604, Conv. Center

Adrienne Cole (acole@svsu.edu) and **Anne Tapp** (tapp_anne@svsu.edu), Saginaw Valley State University, University Center, Mich.

In order to build a culture of STEM, preK–12 teachers and students engage in real-world research at Saginaw Valley State University, as well as connect with outreach programs at The Dow Chemical Company.

Pa Providing Schools with Real-World Connections

(Grades 7–12) 606, Conv. Center

Meg John, Colorado BioScience Association, Denver

The Colorado BioScience Institute is connecting teachers and companies in the Denver metro area through summer teacher externships, research experience for teachers, and providing relevant PD. Come discuss how to engage both districts and companies, bringing both to the table to improve STEM education.

Pa **Building a Community in K–12 Outreach: Fostering Collaboration and Career Connections for STEM Events and Partnerships**

(General) 608, Conv. Center

Matthew Maurer (maurerm@rmu.edu) and **Sarah Mac-Donald** (macdonald@rmu.edu), Robert Morris University, Coraopolis, Pa.

Discussions will be held about the importance of including community stakeholders in K–12 STEM outreach events. Examples will be given of programs and community involvement.

M **How STEAM Helps STEM Students Become Problem Solvers**

(Grades 5–9) 705, Conv. Center

Abigail James (ajames@anj-online.com), University of Virginia, Charlottesville

Including the arts into STEM courses helps students develop new strategies to problem solving by developing novel approaches.

M **STEM Ahead**

(Grades 4–8) 706, Conv. Center

Stephanie Sassetti (ssassetti@oda.edu), The Out-of-Door Academy, Middle & Upper School, Sarasota, Fla.

Using the NGSS and STEM in your school on a daily basis without making an extra class is easy. Find out how to incorporate both every day with every unit by rethinking how science teachers teach science. Hear how to take simple (yet complex) units and turn them into a richer deeper unit involving STEM and core science concepts.

M **3-D Modeling with Middle School Girls**

(Grades 5–9) 707, Conv. Center

Christi Whitworth (@astronomy_PARI; cwhitworth@pari.edu), Pisgah Astronomical Research Institute, Rosman, N.C.

Hear how teams of girls design Braille materials for museum education programs using NASA altimeter data.

M **Modeling Scientific Concepts with SCRATCH**

(Grades 5–9) 708, Conv. Center

Hector Telford (hector@hu-ms2.org), Howard University Middle School of Mathematics and Science, Washington, D.C.

Explore the use of SCRATCH (developed by MIT) to model atomic structure and bonding, the solar system, cell division, and germination in plants.

HS **Building Our Nation’s Future Engineers**

(Grades 8–College) 709, Conv. Center

Scott Prosuch (sprosuch@earthlink.net), Tetra Tech, Inc., Colorado Springs, Colo.

Each year, the Society of American Military Engineers (SAME) holds three camps, giving high school juniors and seniors the opportunity to spend a week immersed in engineering. Hear from one of the volunteer instructors who oversaw a group of campers from around the world as they worked on engineering and construction challenges.

HS **Bioplastic—Going from Synthetic to Natural Polymers**

(Grades 6–12) 710, Conv. Center

Sherri Rukes (sherri.rukes@d128.org), Libertyville High School, Libertyville, Ill.

Many of the items that we use today are becoming more Earth friendly. Find out how a bioplastic is made and what plant materials are used. CD with information and activities will be provided.

M **Science for EVERYONE**

(Grades P–12) 711, Conv. Center

Amanda Oberski (@aoberski; amandaoberski@gmail.com), Brightworks, San Francisco, Calif.

Explore a new style of teaching and learning that facilitates deep interest and connection to science, technology, and design for ALL students. Can be adapted for all grade levels.

HS **Survive the Zombie Apocalypse**

(Grades 9–College) 712, Conv. Center

Becky McKinney (@NGSSMadeMeDoIt; rmckinney@euhsd.org), San Pasqual High School, Escondido, Calif.

Incorporating the NGSS and STEM into your physics class has never been more fun. Use this project to see if your students can survive the zombie apocalypse.

HS **Practical Tips in 3D Printing for STEM Classes**

(Grades 6–College) Mile High Ballroom 1A, Conv. Center

David Black (elementsunearthed@gmail.com), American Academy of Innovation, South Jordan, Utah

3D printers are all the rage in STEM classrooms, but they can be expensive paperweights if teachers don’t have a purpose and a plan for using them. We will explore ways to effectively use 3D printers in STEM classes and share tips for improving your print jobs.



HS **This Is Science, What Do You Mean I Have to Write? Literacy and Writing in Science (LAWS)**

(Grades 6–12) Mile High Ballroom 1B, Conv. Center
Rachel Murillo (rmurillo@lbschools.net) and **Heather Valdespino** (hvaldespino@lbschools.net), Ernest S. McBride High School, Long Beach, Calif.

Hear about LAWS, a supplemental writing curriculum developed for teachers, designed to engage and stimulate student inquiry and analyze scientific problems, while supporting NGSS and CCSS ELA.

HS **Add STEAM to Your Chemistry Classroom with Native Plant Extractions**

(Grades 9–College) Mile High Ballroom 1C, Conv. Center
Bev DeVore-Wedding (@bdevore; bdevorewedding@gmail.com), University of Nebraska–Lincoln

Using native plant extractions, students can identify the family of compounds responsible for the colors and use the extractions to dye a variety of fabrics, integrating art into chemistry—using both to design colorful artwork.

3:00–4:00 PM Hands-On Workshops

UE **Propel Energy Concepts by Designing and Making a Propeller-Powered Car**

(Grades 4–6) 102, Conv. Center
Gary Benenson (benenson@ccny.cuny.edu), The City College of New York, N.Y.

Help drive instruction as you design and make a rubber band–powered propeller car that illustrates concepts of force, motion, friction, energy transformation, and air flow.

UE **Design Build**

(Grades 3–12) 103, Conv. Center
Chris DeKay (chris@raftcolorado.org), RAFT Colorado, Denver

Quality challenges encourage creative and contextual thinking. Come rise to challenges and see their use in guiding students through the design process while reinforcing content.

UE **Park It! Making the STEM Connection Through a Parking Garage Challenge**

(Grades 3–6) 104, Conv. Center
Melisa Fowler (mfowler@bamaed.ua.edu), The University of Alabama, Tuscaloosa

Engage in a challenge to use everyday items in order to build the most efficient parking garage. Using STEM in the real world is emphasized.

LE **Simple Machines Made Simpler Through Mechanical Puppets and Masks**

(Grades 1–3) 105, Conv. Center
Donna Johnson (djohnson11@schools.nyc.gov), P.S. 021 Crispus Attucks, Brooklyn, N.Y.

These creations will surprise you by rolling their eyes, wiggling their ears, and sticking out their tongues, vividly illustrating concepts of levers and linkages.

UE **Effective Questioning Strategies in Engineering Activities**

(Grades 1–5) 107, Conv. Center
Chantal Balesdent (@EiE_org; cbalesdent@mos.org), Museum of Science, Boston, Mass.

How can we delve deeper into elementary students' thinking around engineering? Participants will use examples of students' work to generate questions that probe students' thinking and encourage perseverance through failure.

UE **Partner Up! STEM, STARBASE, Schools, and Preservice Teacher Education Yields a Winning Combination**

(Grades 3–6/College) 110, Conv. Center

Mary Stein (stein@oakland.edu), Oakland University, Rochester, Mich.

Mark Muzzin (mmuzzin@starbaseone.org), STARBASE One, Selfridge Air National Guard Base, Mich.

Engage in the STARBASE curriculum that awakens grade 5 students' passion for learning as it inspires teachers and preservice teachers to learn some "fun"amentals of teaching STEM.

A **Planning a STEAM Night for Your School and Community**

(Grades P–12) 201, Conv. Center

Melissa Estremera (estremem@ehsbr.org) and **Elizabeth Minton** (mintonb@ehsbr.org), Episcopal School of Baton Rouge, La.

Create your own STEAM Night, a fun night of exciting hands-on science, technology, engineering, arts, and math activities.

UE **It's Not Rocket Science; Oh Wait, Actually It Is! Engage, Empower, and Excel with Aerospace Engineering!**

(Grades 3–5) 203, Conv. Center

Alana Davis (@alanadavis1233; alana.davis@cobbk12.org), Mableton Elementary School, Mableton, Ga.

Janice Belcher (@jbelcher75; janice.belcher@cobbk12.org), Dowell Elementary School, Marietta, Ga.

Looking for ways to engage your grades 3–5 students? Empower your students with integrated STEM while teaching the basics of aerospace engineering.

HS **Using Synthetic Biology to Bring STEM into the Biology Classroom**

(Grades 6–College) 206, Conv. Center

Lynne Williams, Coronado High School, Colorado Springs, Colo.

The interdisciplinary nature of synthetic biology offers an innovated approach to STEM education through the use of ready-to-use classroom and lab activities housed at www.BioBuilder.org.

Pa **NABT and BSCS Present: The AP Biology Academy—Professional Development with an Impact, Part 2**

(Grades 10–College) 501, Conv. Center

Jaclyn Reeves-Pepin ([@jreevespepin](https://twitter.com/jreevespepin); jreevespepin@nabt.org), National Association of Biology Teachers (NABT), Warrenton, Va.

Cindy Gay ([@cindygay](https://twitter.com/cindygay); cindyjgay@gmail.com), Steamboat Springs High School, Steamboat Springs, Colo.

Jody Bintz ([@JBintzBSCS](https://twitter.com/JBintzBSCS); jbintz@bscs.org), BSCS, Colorado Springs, Colo.

Experience components of a successful professional development program that fosters participants' content knowledge and leadership skills to allow them to effectively lead PD.

HS **AAPT Session: Smartphone STEM Lab—Turn Your Smartphone into a STEM Laboratory**

(Grades 7–College) 502, Conv. Center

Rebecca Vieyra ([@AAPTHQ](https://twitter.com/AAPTHQ); [@RVieyraAEF](https://twitter.com/RVieyraAEF); rvieyra@aapt.org), American Association of Physics Teachers, College Park, Md.

Do science with free smartphone and tablet apps. Engage in activities presented in *The Science Teacher's* "Turn Your Smartphone into a Science Laboratory" (December 2015), and more! BYOD.

Pa **Engaging Youth in Agriculture Through STEM Activities**

(Grades K–12) 601, Conv. Center

Yilin Zhuang (yilinz@ufl.edu), **Norma Samuel** (nsamuel@ufl.edu), **Margaret Carden**, **Jack LeCroy** ([@MarionFFL](https://twitter.com/MarionFFL); jlecroy@ufl.edu), and **Ashley Stewart** (ashleyhkstewart@ufl.edu), UF/IFAS Extension Marion County, Ocala, Fla.

Jonael Bosques-Mendez (jonael@ufl.edu), UF/IFAS Extension Hardee County, Wauchula, Fla.

William Lester (wlester@ufl.edu), UF/IFAS Extension Hernando County, Brooksville, Fla.

The University of Florida Institute of Food and Agricultural Sciences Extension developed a one-day program to engage grade 4 students in agriculture through hands-on STEM activities. Experience this extension-based program to teach STEM disciplines in an integrative and applied approach.

M **Integrating the STEM Disciplines Through Everyday Engineering**

(Grades 4–9)

607, Conv. Center

Susan Everett (*everetts@umich.edu*), University of Michigan–Dearborn

Engage in hands-on activities that focus on three different aspects of engineering—designing and building, reverse engineering to learn how something operates, and the building and testing of models.

M **NASA Is with You When You Fly: Principles of Flight and Four Forces**

(Grades K–12)

610/612, Conv. Center

Barbara Buckner (*@bbuckner*; *barbie.buckner@nasa.gov*), NASA Armstrong Flight Research Center, Palmdale, Calif.

Suzanne Nichols (*nicholss@ohio.edu*), Ohio University Southern, Ironton

Come explore aeronautics, parts of an airplane, and four forces as you engage in hands-on, standards-focused STEM activities. Make real-world connections with NASA research.

M **Are Three Trials Enough? Analyzing Investigation Data with Large Variation: How Sample Size Can Actually Change “Conclusions”**

(Grades 6–12)

701, Conv. Center

Matthew Mirabello (*mmirabello@amnh.org*), American Museum of Natural History, New York, N.Y.

Account for sample size and variation in the data analysis and conclusion of your science investigation. Reduce “false positives” and support richer data interpretation conversations.

M **Tinkering with STEM**

(Grades 3–12)

702, Conv. Center

Kate Degner (*degnerkatherinem@sau.edu*), St. Ambrose University, Davenport, Iowa

Use tinker labs and maker spaces to address the goals of STEM education in middle school classrooms. Examples from career technical education, art, and upper elementary school classrooms will be presented. The maker challenges will range from challenges to be completed in a class period to challenges lasting the entire school year and beyond.

M **Green STEM: A Vehicle to Engage Students in STEM Through Their Natural Curiosity for the Environment**

(Grades 6–8)

703, Conv. Center

Jennifer Hammonds (*@EcoSchoolsUSA*; *hammondsj@nwf.org*), National Wildlife Federation, Reston, Va.

Take this opportunity to engage in green STEM activities and use tools to better understand and plan project-based green STEM learning experiences for your students.

M **Sneaky Math: Make Math Memorable with Projects Using Everyday Things**

(Grades 4–12)

704, Conv. Center

Cy Tymony (*@Sneakyuser*; *cy.tymony@yahoo.com*), Technical Writer, Torrance, Calif.

Ace the basics of fractions, algebra, and geometry (and even a little calculus) while staging fun activities and making math gizmos to use and share.

HS **The Burning Question: How Can STEM Be Integrated into a Traditional Secondary Math Classroom?**

(Grades 9–12)

Mile High Ballroom 1D, Conv. Center

Erica Jossi (*ejossi@ontario.k12.or.us*), Ontario Middle School, Ontario, Ore.

Karen Patton, Wallowa County ESD Region 18, Enterprise, Ore.

Explore real-world connections of weather and wildfire to contextualize learning, engage high school students, and meet standards in a traditional secondary math classroom.

HS **Use Ice Core Record Data to Plot and Date Volcanoes, Solar Activity, and Possible Supernova Events**

(Grades 7–College)

Mile High Ballroom 1E, Conv. Center

Donna Young (*dlyoung.nso@gmail.com*), Chandra X-Ray Center, Bullhead City, Ariz.

Connect the three dimensions of the NGSS using absolute and relative dating techniques with ice core data anomalies—including volcanic eruptions, solar flares, and supernovas.

HS Teaching Environmental Sustainability Using a Place-Based Watershed Modeling Application

(Grades 8–12) Mile High Blrm. 1F, Conv. Center

Melinda Daniels, Stroud Water Research Center, Avondale, Pa.

Nanette Marcum-Dietrich (*ndietrich@millersville.edu*), Millersville University, Millersville, Pa.

Melissa Hess (*melissa_hess@conestogavalley.org*), Conestoga Valley Middle School, Lancaster, Pa.

Model My Watershed is a free web-based application that invites students to explore the condition of their local watershed with a scientifically valid watershed model.

HS The STEAM Behind a NASA Mission, as Seen by a Teacher Who “Flew”

(Grades 6–12) Mile High Ballroom 3C, Conv. Center

Kathleen Fredette (*kathleen.fredette@ileadschools.org*), Maker School Network, Castaic, Calif.

Examine the collaborative STEAM professions required to make a NASA mission successful, such as NASA’s Stratospheric Observatory for Infrared Astronomy, and how you can fly!

3:00–4:00 PM Exhibitor Workshops

Capitalizing the “E” in STEM: Engineering Engaging Experiences

(Grades 4–12) 304, Conv. Center

Sponsor: ProjectEngin

Ann Kaiser (*akaiser@projectengin.com*), ProjectEngin, Barrington, R.I.

Spend some time engaging your “inner” engineer! Obtain hands-on experience of some of the approaches ProjectEngin uses to make engineering a natural part of your K–12 classroom. Learn about simple activities, engineering projects, and creative curricula designed to help you innovate to educate 21st-century problem solvers.

Patterns and Processes in Ecology

(Grades 6–12) 401, Conv. Center

Sponsor: HHMI BioInteractive

Kim Parfitt, Central High School, Cheyenne, Wyo.

Explore free resources to integrate math and writing into your ecology unit while learning about the restoration of Gorongosa National Park in Mozambique. Mini-documentaries of scientists in the field, lecture clips, animations, and classroom activities show connections between science, math, and ecological restoration projects. Participants receive free HHMI BioInteractive materials.

Constructing and Crossing Cell Membranes

(Grades 8–College) 402, Conv. Center

Sponsor: 3D Molecular Designs

Tim Herman (*herman@msoe.edu*), MSOE Center for Bio-Molecular Modeling, Milwaukee, Wis.

Hook biology and chemistry students with models that demonstrate the chemical and physical properties of water and the membranes that separate cells from the surrounding

environment. Use hands-on teaching tools to explore diffusion, osmosis, and the transmembrane proteins that facilitate the transport of polar molecules across the cell membrane.

Science Through Engineering Design

(Grades 6–12) 405, Conv. Center

Sponsor: Texas Instruments

Jeffrey Lukens, Sioux Falls (S.Dak.) School District

Fred Fotsch, Texas Instruments, Dallas

Survey a story-based science lesson that can get your students excited about project-based learning using REAL-WORLD technology. Applying science knowledge while solving design challenges through a story-based approach is a fun way to get students thinking about science (and engineering) concepts. Appropriate for middle school and high school teachers.

Roll Up Your Sleeves—We’re Programming a LEGO® Robot!

(Grades K–8) 406, Conv. Center

Sponsor: FIRST®

Betsy Daniels (*bdaniels@firstinspires.org*), FIRST, Manchester, N.H.

Hands on, you’ll experience programming and then driving a LEGO MINDSTORMS® EV3 robot! If you have an interest in science and technology and in helping kids discover and learn—bring your “CAN DO” attitude and learn firsthand how the FIRST LEGO League makes learning science and math fun.

4:30–5:30 PM Keynote Address

This Will Revolutionize Education

(General)

Four Seasons Ballroom 1/2, Conv. Center



Derek Muller (@Veritasium), Science Communicator, Filmmaker, Television Presenter, and Creator of YouTube Channel Veritasium, Los Angeles, Calif.

Welcome: Mary Gromko, NSTA President, Colorado Springs, Colo.

Presider: Jennifer Williams, Steering Committee Chairperson, 2016 STEM Forum & Expo, and Department Chair Lower School Science, Isidore Newman School, New Orleans, La.

Over the past century, the world has changed dramatically and at a pace that is only accelerating. Smart Boards, smart-phones, and smart devices are now poised to disrupt life in the home, at work, and many predict at school. But a number of historical precedents suggest the changes in education will be less dramatic than expected. Understanding why sheds light on the nature of education and on the role of teachers.

Derek Muller is an Australian-Canadian science communicator, filmmaker, and television presenter. He is best known for creating the leading science YouTube channel, Veritasium. Started in 2011, Veritasium is a science video blog featuring experiments, expert interviews, cool demos, and discussions with the public about “everything science.” The channel has over 141 million video views and 2.3 million subscribers. Derek has also appeared as a television presenter on the Australian television program Catalyst, reporting scientific stories from around the globe.

6:30–9:30 PM Educational Trip

Evening Animal Encounters at the Denver Zoo (T-1)

(Ticket Required; \$18)

Denver Zoo (Off-site)

Join your NSTA friends and colleagues for an adventurous evening after hours at Denver Zoo, where education comes alive! Experience majestic elephants in Toyota Elephant Passage and explore the wonders of aquatic life, including marine mammals, in Northern Shores. The evening will be filled with up close animal encounters and shows with some of Denver Zoo’s wild inhabitants. Enjoy dinner or snacks at Northern Shores and Kamala Café. Don’t forget to pick up a souvenir at the gift shop to remember your visit.

Ticket cost includes **round-trip bus transportation, admission for a private evening event, and associated activities.

Cash bar and restaurants open for purchases. (Note: This is NOT included in ticket cost.)

***There will be continuous shuttles running between the Convention Center and the Denver Zoo. The first bus departs the Convention Center at 6:00 PM; the last bus leaves the zoo at 9:45 PM promptly.*

If tickets are still available, please purchase them at the NSTA Registration Area.



—Photo courtesy of Denver Zoo



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—Photo courtesy of the Denver Museum of Nature & Science

Huge dinosaurs transport you back in time at the Denver Museum of Nature & Science. See page 9 for details about a special offer for STEM Forum & Expo attendees.

8:00–9:00 AM Invited Panels

More Than What's Made: Stories of Making Possibilities (Organized by Maker Ed)

(General) Mile High Blrm. 2 A/B and 3 A/B, Conv. Center

Moderator: **Steve Davee** (steve@makered.org), Chief Maker Educator, Maker Education Initiative, Emeryville, Calif.

Panelists:

Meghan Reilly Michaud (meghan@visualidentitystudio.com), RISD Museum Board, Past RISD Trustee/Alumni President, and Art Teacher, Andover, Mass.

Robert Munsey (rmunsey@k12albemarle.org), Science/Engineering Teacher, Sutherland Middle School, Charlottesville, Va.

Janella Watson (jwatson@nysci.org), Director of Early Childhood Education, New York Hall of Science, Corona

Maker education is represented by a wide diversity of approaches nurturing curiosity, agency, empathy, and a love of learning. What are some of the processes and forms of making that empower exploration, discovery, and construction of knowledge? How might making connect STEM with student interests and all areas of learning? In this panel, we'll hear powerful stories from teachers integrating making in early childhood through college settings. Together, with your questions and continued discussions, we'll build on the vast possibilities of making in education, for every child.

Pa Forming Partnerships

(General)

Mile High Ballroom 4 A–D, Conv. Center

Moderator: **Brenda Nixon**, Partnerships Strand Leader, and Co-Director, Gordon A. Cain Center for Scientific, Technological, Engineering, and Mathematical Literacy, Baton Rouge, La.

Panelists:

Jennifer Bacon (jennifer.bacon@educationalequity.org), Leadership for Educational Equity, Denver, Colo.

William Katzman (wkatzman@ligo-la.caltech.edu), LIGO's Science Education Center, Livingston, La.

Louis Lopez (louis.r.lopez.civ@mail.mil), Education/STEM Outreach at U.S. Army Research, Development Engineering Command, Aberdeen Proving Ground, Md.

The Partnership Panelists represent formal and informal education institutions from a number of areas. Join them as they share strategies they have implemented to leverage their resources and increase their impact by developing strong long-term partnerships with museums, governmental agencies, and business and industry, as well as other formal and informal education entities across the spectrum. Come find out how their initiatives have created unique, successful partnerships where everyone benefits.

9:15 AM–3:00 PM Exhibits

Exhibit Hall A, Conv. Center

Come stroll through the exposition picking up tips, product samples, and ideas to spark your imagination. Please note that no sessions are scheduled from 12 Noon to 1:30 PM during our exclusive exhibit hall hours.



9:30–10:30 AM Invited Panel

Design Thinking and Experiential Learning

(General) *Mile High Ballroom 4 E/F, Conv. Center*

Moderator: **Garrett Mason** (*garrett.mason@stmsaints.com*), Director of Innovation and Design, St. Martin's Episcopal School, Metairie, La.

Panelists:

Ela Ben-Ur (*ela.ben-ur@olin.edu*), Adjunct Professor of Design, Olin College of Engineering, Needham, Mass.

Matthew Green (*@stematthewgreen; matt.green@mead354.org*), Teacher and Makerspace Coordinator, Riverpoint Academy, Spokane, Wash.

Jessica Lura (*@msjlura; jlura@bullischarter.school.com*), Director of Strategic Initiatives and Partnerships, Bullis Charter School, Los Altos, Calif.

Lindsey Own (*lown@evergreenschool.org*), BIG Lab Makerspace Coordinator, The Evergreen School, Shoreline, Wash.

Design thinking is the buzzword in education. How does design thinking apply to teaching STEM? Is this a fad or will it be around to stay? How can teachers and schools leverage this framework to engage students in deep experiential learning to develop their knowledge of material, their mastery of skills, and their mind-set approach to learning? This diverse panel of educators representing both public and private schools as well as the spectrum of grade levels will discuss these and many other questions regarding design thinking and experiential learning in STEM education. Please bring your mobile devices if you would like to participate through a back channel discussion via Today'sMeet.



9:30–10:30 AM Presentations

UE **Life Changing: Seeing the Impacts on Students and Teachers When We STEMify Our Schools**

(Grades 3–8) *106, Conv. Center*

Thomas Meagher (*@meagher3dan; meagher3dan@gmail.com; tmeagher@owatonna.k12.mn.us*), Owatonna (Minn.) Public Schools

Explore the academic and affective impacts three schools in rural Minnesota experienced as they transitioned from traditional instruction to STEM teaching and learning over the past four years. Hear about the research data, teaching strategies, and curriculum changes that not only improved academic performance but also changed how students and teachers lived and learned through STEM education.

HS **Designing a 3-D NGSS Digital High School Biology Curriculum**

(Grades 9–12) *107, Conv. Center*

Katie Van Horne (*@dizzvh; katie.vanhorne@colorado.edu*), University of Colorado Boulder

We will share a research-based open-access NGSS unit, including how to design new NGSS units with a storyline approach focused on coherence and scientific phenomena.

UE **Integrating Science and Engineering Practices: Embedding Engineering Tasks into a Science Content Storyline**

(Grades 3–5) *108, Conv. Center*

LeeAnna Hooper (*lahooper412@gmail.com*), Penn State, University Park, Pa.

Discover exciting ways in which teachers are engaging their students in STEM by naturally integrating NGSS science and engineering practices into one coherent content storyline.

UE **Helping Children Understand the Impact of STEM and the Essential Integration of All STEM Disciplines: Explorations with Physical Structures, Plants, and Everyday Household Tools**

(Grades 3–6) *109, Conv. Center*

Donna Knoell (*dknoell@sbcglobal.net*), Educational Consultant, Overland Park, Kans.

Attention will be paid to strategies and activities to engage elementary students actively in STEM applications by constructing physical structures (bridges, ramps, etc.), by growing plants, and by exploring how everyday objects use simple machines for mechanical advantage.

UE Integrating Technology in the Inquiry-Based Classroom*(Grades K–8)* 112, Conv. Center**Ryan Mahn** (@JTSDNixa; ryanmahn@nixaschools.net), John Thomas School of Discovery, Nixa, Mo.

Learn applicable strategies and take home sample plans for integrating instructional technology into your science instruction. You don't have to be 1:1 to love technology.

UE Integrating Authentic STEM Learning into the Elementary Curriculum Through Local Field-Based Investigation*(Grades K–6)* 206, Conv. Center**Ingrid Carter, Mary Heuwinkel, Sarah Schliemann** (sschliem@msudenver.edu), and **Randi Brazeau** (rbrazeau@msudenvr.edu), Metropolitan State University of Denver, Colo. **Lisa Jackson** (lisa_jackson@engschools.net), Cherrelyn Elementary School, Englewood, Colo.

Hear about a project that facilitated students' learning through participation in various local water investigations, providing students with authentic applications and connections that focused on STEM concepts.

LE Engaging Young Scientists in the Engineering Design Process to Create a PBL That Explores the Properties and Behavior of Matter*(Grades P–3)* 503, Conv. Center**Jan Lanting** (janlanting30@hotmail.com), Thompson School District, Loveland, Colo.**Barbara Randall**, Laurene Edmondson Elementary School, Loveland, Colo.

Enhance conceptual understanding of the properties and behaviors of solids and liquids in a real-world STEM application to repurpose recycled solids.

LE Equipping General Education Teachers to Be STEM Professionals*(Grades 3–6)* 504, Conv. Center**Dwayne Morgan** (dmorgan@usmd.edu), University System of Maryland, Adelphi

Hear how scientific inquiry is an approach to STEM teaching and learning that can be realized in elementary and middle grade classrooms taught by general education teachers.

Pa Bridging the Attraction Gap: An Event-Based STEM Partnership That Gets Results*(General)* 506, Conv. Center**Cynthia Drake** (cynthiadrake@delta.edu), Delta College, University Center, Mich.**Cody Kangas** (ckangas@mtu.edu), Michigan Technological University, Houghton

Discover how to provide an engaging, collaborative, hands-on STEM exploration event that measurably excites and impacts youth, families, and educators in your community.

Pa Leveraging Partnerships to Become a Regional STEAM Leader*(General)* 507, Conv. Center**Brian Stamford** (brian.stamford@aiu3.net) and **Rosanne Javorsky** (@AlleghenyIU3; rosanne.javorsky@aiu3.net), Allegheny Intermediate Unit 3, Homestead, Pa.

Pennsylvania's Allegheny Intermediate Unit has partnered with regional foundations and businesses to provide more than \$4 million in grants and innovative professional development to educators.

Pa High School Students Become Environmental Educators*(Grades P–2/9–12)* 604, Conv. Center**Gina Smearsoll** (gina.smearsoll@cincinnatiachristian.org), Cincinnati Christian School, Junior/Senior High Campus, Hamilton, Ohio

Working with Keep Cincinnati Beautiful, high school students became environmental educators to teach preschoolers about how water pollution affects the wildlife in the Mill Creek.

Pa Rising Star Educator Program*(College)* 606, Conv. Center**Marie Steckelberg** (marie@steckelbergconsulting.com), Steckelberg Consulting, LLC, Yankton, S.Dak.**Heather Allen** and **Bridget Dupris** (bridget.dupris@bie.ed), Discovery Center, Pierre, S.Dak.

Partnerships among informal and formal education and universities strengthen preservice educators' STEM content and pedagogy and bring STEM to youth with little STEM exposure.



M **Biome Challenges That Will Blow Your Mind!**
(Grades 1–12) 706, Conv. Center
Gina Tesoriero (@stemsucceeded; ginatezoriero@gmail.com), Simon Baruch MS104, New York, N.Y.
Explore three middle school design challenges with a different twist for each grade: simple machines, biomimicry, and astronomy.

M **Engaging “At-Promise” Students in STEM Through Competitions**
(Grades 5–8) 707, Conv. Center
Julie Hasfjord (@TPSSTEM; hasfju@tulsaschools.org), Tulsa (Okla.) Public Schools
Learn practical skills for managing STEM competitions in a classroom setting and how to access your STEM Ecosystem assets while experiencing the inspiring story of a group of middle school students who transformed their school through STEM.

M **Yes! You Can Teach Computer Science with Scalable Game Design!**
(Grades 4–8) 708, Conv. Center
Ryan Rasar (@RLRasar; rrasar@nvacademy.org), Nevada Virtual Academy, Las Vegas
In scalable game design, students learn computational thinking patterns and 21st-century skills while coding video games and scientific simulations. NSF grant funded.

HS **Simulate STEM Online Through Virtual Clinical Trials Web Simulation**
(Grades 9–12) 709, Conv. Center
Lynn Lauterbach (lynnlauterbach@gmail.com), Retired Teacher, Loveland, Colo.
Expose high school students to scientific and biomedical engineering practices and careers using free online simulations that engage students in technology while designing authentic neuroscience-based clinical trials. Built-in assessment notebook.

HS **Engineering vs. Science**
(Grades 6–12) 710, Conv. Center
Becky McKinney (@NGSSMadeMeDoIt; rmckinney@euhsd.org), San Pasqual High School, Escondido, Calif.
Take a journey to discover how engineering can be incorporated into ANY science classroom.

HS **Denver Public Schools CareerConnect—Equity in STEM**
(Grades 9–12) **CANCELED** 711, Conv. Center
Kate Berger, Denver (Colo.) Public Schools
Hear how Denver Public Schools CareerConnect dramatically increased participation in STEM CTE programming for our students of color, students with special needs, and girls.

HS **NESTA Shares: Using the CLEAN Collection of Resources to Inspire Climate and Energy Solutions**
(Grades 5–College) Mile High Ballroom 1A, Conv. Center
Cheryl Manning (@clbmanning; clbmanning@mac.com), Evergreen High School, Evergreen, Colo.
Climate change challenges students to think creatively, looking beyond the immediate problems. The CLEAN collection provides numerous resources that develop skills in engineering solutions.

HS **STEM Literacy: An Innovative Way to Collaborate with Language Arts**
(Grades 9–12) Mile High Ballroom 1C, Conv. Center
Rebecca Mortensen (rwmortensen@gmail.com), Gwinnett School of Mathematics, Science, and Technology, Lawrenceville, Ga.
Curious about ways to increase students’ scientific literacy? Come learn about this approach that uses a unique collaboration between science and language arts at the Gwinnett School of Mathematics, Science, and Technology.

9:30–10:30 AM Hands-On Workshops**UE** **It's a Wrap***(Grades 4–5)**102, Conv. Center*

Catherine Beasley, Washington-Rose Elementary School, Roosevelt, N.Y.

This hands-on workshop will focus on package engineering. Participants will make soap and then design a package for their soap. This activity integrates English language arts, mathematics, social studies, as well as art.

UE **Using the Ice Age to Teach About Energy Flow and Climate Change***(Grades 3–12)**103, Conv. Center*

Patricia Higby (@FREEatUNI; *patricia.higby@uni.edu*), University of Northern Iowa, Cedar Falls

Engage students with activities demonstrating energy flows using the water cycle and cyclic changes in the amount of solar energy received and emitted by Earth.

UE **Constructing Explanations from Activities and Text***(Grades 2–8)**104, Conv. Center*

Eileen Patrick (*eileenpatrickco@gmail.com*), North Mor Elementary School, Denver, Colo.

Constructing explanations is a key practice of the NGSS. Using evidence to support your claim or thinking is critical in science and literacy. At the intersection of literacy and content, participate in a short science lesson and then learn and practice some strategies to support students in constructing claims and evidence.

UE **Beyond Spaceship Earth***(Grades 3–5)**105, Conv. Center*

Becky Wolfe (*beckyw@childrensmuseum.org*), The Children's Museum of Indianapolis, Ind.

Explore classroom STEM investigations related to the International Space Station. Human exploration of space integrates STEM disciplines from science research in micro-gravity to engineering life support systems for space travel.

UE **ASEE Session: Infusing Engineering Throughout the Elementary Day***(Grades 1–8)**110, Conv. Center*

Pamela Lottero-Perdue (*plottero@towson.edu*), Towson University, Towson, Md.

Elizabeth Parry (@ELIZPARRY; *elizabeth.parry.consulting@gmail.com*), North Carolina State University, Raleigh
Join us as we share our extensive knowledge of classroom-tested and research-based ways for elementary teachers to use engineering as an effective tool for integrating multiple content areas.

UE **Illuminate Students' Mathematical Thinking in the Science Classroom***(Grades 3–6)**201, Conv. Center*

Teresa Eliopoulos (@T_Eliopoulos; *telopoulos@achieve.org*), Achieve, Inc., Washington, D.C.

Engage in learning experiences that highlight how to integrate the *CCSS for Mathematics* into science classrooms to reinforce scientific concepts and ideas.

UE **Teaching for Invention and Creativity***(Grades 2–8/College)**203, Conv. Center*

Kenneth Wesson (*ken.wesson@schoolspecialty.com*), National Science Consultant, San Jose, Calif.

We have exited the “Information Age” and entered the “Innovation Age,” where inventive minds are at a premium. Our contemporary challenges, as well as the problems yet to surface, will all be solved by innovative thinkers deploying the STEM fields (the new educational model), not by those with the greatest capacity for memorization (the old educational model).

LE **Simple Machine: It's That Simple***(Grades P–K)**205, Conv. Center*

Jason Petula (*jpetula@millersville.edu*), Millersville University, Millersville, Pa.

Explore a STEM unit tested on kindergartners. Lesson plans will be provided for each of the five-day units. Join us and engage in one of the lessons.

LE **From Apps to ABCs: Great Technology for Early Childhood***(Grades P–1)**207, Conv. Center*

Juliana Texley (*jtexley@att.net*), 2014–2015 NSTA President, Boca Raton, Fla.

Carolyn Staudt (@cjstaudt; *cstaudt@concord.org*), The Concord Consortium, Concord, Mass.

Can preK and K children learn great practices of science and engineering through technology? Absolutely! We'll share free and highly rated inexpensive apps from many sources for basic skills and even coding! Bring your smart device, too!

LE **Blocks and Beyond: Strengthening STEM Through Spatial Understandings**

(Grades P–1) 210/212, Conv. Center
Mary Jo Pollman (*pollmanm@msudenver.edu*), Professor Emerita, Metropolitan State University of Denver, Colo. Receive research on spatial literacy, a high predictor of STEM participation, as well as new hands-on inquiry-based approaches in promoting STEM through spatial development.

HS **NABT and BSCS Present: Identify and Interpret—A Strategy to Help Students Make Sense of Difficult Information**

(Grades 8–12) 501, Conv. Center
Tamara Pennington (*tamara.pennington@weldre4.k12.co.us*), Windsor High School, Windsor, Colo. Get the steps to engage in the powerful Identify and Interpret (I2) strategy in your classroom to help your students make sense of information presented in graphs, complex figures, and data tables.

HS **AAPT Session: Brain Science Lab—Using Gelatin Circuits to Understand How Neurons Work Through Physics and Biology**

(Grades 7–College) 502, Conv. Center
Rebecca Vieyra (*@AAPTHQ; @RVieyraAEF; rvieyra@aapt.org*), American Association of Physics Teachers, College Park, Md. Model signal transmission along a model “neuron” by sending a small electric current through a vinyl tube filled with salted gelatin.

Pa **CosmoQuest: Astronomical Learner Community**

(Grades 6–12) 505, Conv. Center
Whitney Cobb (*@STEM_McREL; wcobb@mcrel.org*), McREL International, Denver, Colo. CosmoQuest—citizen scientists (you, me) traveling through our universe and contributing to real research while exploring cool activities that unpack underlying concepts. Join us!

LE **ECSTEAM**

(Grades P–1) 601, Conv. Center
Chris DeKay (*chris@raftcolorado.org*), RAFT Colorado, Denver To early learners, STEAM is everywhere. Come learn how to scaffold “play” into powerful learning experiences. Participants will play as students but think like educators.

M **Engineering Paper Bridges: Integrating Math and Science in STEM: A Model Lesson**

(Grades 6–9) 605, Conv. Center
Sherri Dennstedt (*@sdennstedt; @CCSDSTEM; sdennstedt@cherrycreekschools.org*) and **Denise Goldin-Dubois** (*@CCSDSTEM; dgoldin-dubois2@cherrycreekschools.org*), Cherry Creek School District #5, Centennial, Colo. In this two-part workshop, engage in an integrated math and science STEM lesson and then discuss integration of the NGSS with the CCSS math practices.

M **Demystifying NGSS Through Storytelling and Drawing**

(Grades 4–10) 607, Conv. Center
Christine Chopyak (*@chrischopyak; @PICTUrstrategy; @arlosoul; chrischopyak2@gmail.com*), Arlosoul, Denver, Colo. Illuminate content and practice in your classroom. Experience effective and proven strategies for using the NGSS crosscutting concepts and practices in a science investigation through storytelling and drawing.

M **NASA’s Journey to Mars: Build a Mars Rover Using NASA’s Beginning Engineering Science and Technology (BEST) Curriculum**

(Grades K–8) 610/612, Conv. Center
Barbara Buckner (*@bbuckner; barbie.buckner@nasa.gov*), NASA Armstrong Flight Research Center, Palmdale, Calif. **Suzanne Nichols** (*nicholss@ohio.edu*), Ohio University Southern, Ironton Use the Engineering Design Process to build and test a Mars Rover that will carry equipment and astronauts while learning about current NASA missions.

M **It’s All in the Genes**

(Grades 6–9) 703, Conv. Center
Patricia Wahlsten (*patriciawahlsten@mersnj.us*), Manalapan-Englishtown Middle School, Manalapan, N.J. We will incorporate the engineering design process and argumentation in connection with GMOs. Materials and modeling of lessons will be shared.

M **Building Bridges in Earthquake Country—From the Past to the Present**

(Grades 1–8) 704, Conv. Center
Lisa Ernst (*ernstl@sfsusd.edu*), Alice Fong Yu Alternative School, San Francisco, Calif. This STEAM unit, which meets the NGSS as well as the CCSS, brings a hands-on approach through creativity, critical thinking, collaboration, curiosity, communication, and collaboration.

HS **Range of Motion: Motivating Students with STEM Careers**

(Grades 5–12) *Mile High Ballroom 1D, Conv. Center*

Andrea Burrows (@SciEdBurrows; *aburrow1@uwyo.edu*), University of Wyoming, Laramie

Mike Borowczak (@mborowczak; *mike@erebuslabs.com*), Erebus Labs, Laramie, Wyo.

Participants will use their personal pictures to determine their range of motion. This hands-on engineering lesson highlights biomedical careers and the three dimensions of the NGSS.

HS **Science and Math: Data Analysis Made Easy**

(Grades 7–College) *Mile High Ballroom 1E, Conv. Center*

Karlheinz Haas (*khaas@thepineschool.org*), The Pine School, Hobe Sound, Fla.

Increase student engagement in analysis and evaluation of real data. Engage students of different ability levels in mathematical modeling with measurements not previously accessible in the classroom.

HS **Teach an Old Dog New Tricks: Engaging Older Students in STEM**

(Grades 9–12) *Mile High Ballroom 1F, Conv. Center*

Karen McDonough (*mcdonough_k@bataviaschools.org*), Batavia High School, Batavia, Ohio

Older students with limited science background may be resistant to STEM. Explore how to engage them and lead them to successfully completing an engineering project.

HS **NASA Earth Science: Real-World Connections to Data and Tools for Science Fairs**

(Grades 8–12) *Mile High Ballroom 3C, Conv. Center*

Russanne Low (*rusty_low@strategies.org*), Institute for Global Environmental Strategies, Denver, Colo.

Join me as I share NASA Earth system science resources that can be used to support educators and students as they prepare for science fair research projects. NASA develops new ways to observe and study Earth's interconnected natural systems with long-term data records, as well as provides STEM internship experiences through Intel ISEF and Odyssey of the Mind competitions. Bring a laptop/iPad/tablet.

9:30–10:30 AM Exhibitor Workshops**The STEM Design Challenge**

(Grades 4–8)

301, Conv. Center

Sponsor: Fisher Science Education

Robert Marshall (*robert.marshall@thermofisher.com*), Fisher Science Education, Pittsburgh, Pa.

Learn how to create and develop questions about force, energy, and motion for an interactive lab. Then, solve an engineering problem using creative and realistic world processes. Finally, support your understanding with fun and exciting team competition.

Chemical Batteries

(Grades 6–8)

302, Conv. Center

Sponsor: LAB-AIDS®, Inc.

Hethyr Tregerman, LAB-AIDS, Inc., Ronkonkoma, N.Y. Although we live a battery-powered lifestyle, most of us (students included) have no idea how batteries actually work. In this hands-on workshop, we will engage in an activity from *Issues and Physical Science* from LAB-AIDS. Make a wet cell battery, explore the effect of using different metal electrodes on battery output, and consider ways to reduce the number of discarded batteries in the waste stream.

The Value of Inquiry and Scientific Explanations in STEM

(Grades K–12)

303, Conv. Center

Sponsor: Accelerate Learning

Sharry Whitney, Accelerate Learning, Houston, Tex.

Engaging in inquiry with real-world phenomena followed by discourse leads to scientific explanations, which make science meaningful. Analyzing evidence to make a claim and using scientific reasoning to explain how the claim is connected—are practices of scientists.

Hands-On STEM Fun for Older Students

(Grades 4–8)

304, Conv. Center

Sponsor: SAE International—A World In Motion Program

Kenneth Francis, SAE International, Warrendale, Pa.

Looking for a hands-on way to keep upper elementary students engaged with STEM concepts? Look no further than the award-winning A World In Motion Program. This workshop will show you how to breathe new life into your classroom by challenging students to build gravity-powered vehicles.



Extinctions Past and Present

(Grades 6–12)

401, Conv. Center

Sponsor: HHMI BioInteractive

Kathryn Fisher Hedeon and **Chris Hedeon**, Oregon City High School, Oregon City, Ore.

Has the sixth mass extinction already begun? Are we losing species faster than in Earth's past? The history of Earth shows that many extinction events occurred and now we are getting a sense for how extinction rates vary. Use HHMI BioInteractive's free classroom resources to teach the science of extinction.

The Many Jobs of Proteins: Enzymes in the Spotlight

(Grades 8–College)

402, Conv. Center

Sponsor: 3D Molecular Designs

Tim Herman (herman@msoe.edu), MSOE Center for Bio-Molecular Modeling, Milwaukee, Wis.

Using 3-D physical representations, students discover that proteins are linear sequences of amino acids that spontaneously fold into complex shapes following basic principles of chemistry. This hands-on workshop explores a specific class of proteins—enzymes—to introduce the concepts of substrate, active site, specificity, and competitive/noncompetitive inhibition.

The Road to AdvancED STEM Certification

(Grades K–12)

403/404, Conv. Center

Sponsor: AdvancED

Geri Fitzgerald (gfitzgerald@advanc-ed.org), AdvancED Colorado, Alpharetta, Ga.

Lynn Seifert (lynn.seifert@pueblocityschools.us), **Drew Hirshon** (drew.hirshon@pueblocityschools.us), **Melissa Waller** (melissa.waller@pueblocityschools.us), and **Morganlee Kempf** (morganlee.kempf@pueblocityschools.us), Central High School, Pueblo, Colo.

Hear one school's journey to achieve AdvancED STEM certification. Central High School from Pueblo City Schools is the FIRST AdvancED STEM-certified school west of the Mississippi! Central High School staff will describe the process, the value of the journey, the importance of ongoing program improvement, as well as share how you can achieve AdvancED STEM certification, too!

Real-World Biotech: Hands-On DNA Applications in Forensics

(Grades 6–College)

405, Conv. Center

Sponsor: miniPCR

Sebastian Kraves (team@minipcr.com), miniPCR, Cambridge, Mass.

Looking for a real-world biotech learning experience? This hands-on crime scene investigation uses classroom-friendly PCR (polymerase chain reaction) and DNA gel electrophoresis to solve a crime mystery. You will match forensic DNA samples to a missing person's genetic material, analyze data, and leave ready to apply real-world biotech in your classroom.

National Geographic Explorers—Ideal Role Models of STEM

(Grades 3–12)

406, Conv. Center

Sponsor: National Geographic Learning

Tom Hinojosa (tom.hinojosa@cengage.com), National Geographic Learning/Cengage Learning, Littleton, Colo.

See how National Geographic provides your students with exciting examples of an integration of disciplines that removes the traditional barriers between science, technology, engineering, and mathematics, and instead focuses on innovation and the applied process of addressing questions and designing solutions to complex contextual problems using current tools and technologies.

Internet of Things 101: Connecting Electronic “Things” and the “Internet”

(Grades 9–College)

407, Conv. Center

Sponsor: SparkFun Electronics

Derek Runberg, **Brian Huang**, and **Jeff Branson**, SparkFun Electronics, Longmont, Colo.

As the Internet of Things (IoT) becomes more common technology, where do you begin in the classroom? This workshop will use the SparkFun Blynk Board and the Blynk app to build an internet-controlled gadget and a custom app for your phone.

11:00 AM–12 Noon Presentations

UE Designing and Making Your Personal Wooden Ruler Through STEAM*(Grades 4–7)**106, Conv. Center*

Elizabeth Rosenberger (*erosenberger@avenues.org*) and **Katy Garnier** (*kgarnier@avenues.org*), Avenues: The World School, New York, N.Y.

Presider: Sally Kent (*skent@avenues.org*), Avenues: The World School, New York, N.Y.

Students integrate the disciplines of STEAM when designing, prototyping, certifying (for accuracy), and using their personal wooden rulers for science, math, and art.

UE Growing STEM Leaders Through Integrated Engineering*(Grades K–5)**108, Conv. Center*

Brooke Mendenhall (*brooke.mendenhall@beaufort.k12.sc.us*) and **Amy Fleury** (*@2ndgrteachamy; amy.fleury@beaufort.k12.sc.us*), Michael C. Riley Elementary School, Beaufort, S.C.

Hear how our school has integrated the habits of leadership with the engineering design process in order to help students simultaneously develop collaboration, critical thinking, and character skills through hands-on challenges.

UE STEM Trade Books: What Makes Them Different*(General)**109, Conv. Center*

J. Carrie Launius (*@janetcarrie; janetcarrie@gmail.com*), Retiring STOM President, Saint Louis, Mo.

Juliana Texley (*jtexley@att.net*), 2014–2015 NSTA President, Boca Raton, Fla.

Give input on NSTA's new initiative on identification and selection of STEM trade books. Participants' ideas will be considered as part of NSTA's selection guidelines. Examples will be shared.

A ITEEA Session: TEAMS—Engineering the Tools of Innovation*(Grades 6–College)**111, Conv. Center*

Sandy Honour (*shonour@tsaweb.org*), Technology Student Association, Reston, Va.

Tests of Engineering Aptitude, Mathematics, and Science (TEAMS) is an annual competition for middle school and high school students designed to help them discover their potential for engineering.

UE It's eleSTEMary! Professional Development Model: Teachers Teaching Teachers!*(Grades P–5)**112, Conv. Center*

DeLene Hoffner (*delene.hoffner@asd20.org*), School in the Woods, Colorado Springs, Colo.

Emily Heinrich (*@EleSTEMary; emily.heinrich@asd20.org*), Academy School District 20, Colorado Springs, Colo.

Sandy Lamb (*sandy79lamb@gmail.com*), Retired Educator, Monument, Colo.

Bringing more STEM to preK–5 students isn't hard... "It's eleSTEMary, my Dear Watson!"

A A Model for Building a STEM Ecosystem Across a District*(General)**113, Conv. Center*

Becky Ashe (*@BeckyAshe; becky.ashe@knoxschools.org*), L&N STEM Academy, Knoxville, Tenn.

Get the outline of a school district's journey to create a STEM brand across 92 schools. Leave with useful research links, tools used to create your models, and assessments to find need in your own systems.

A Developing and Integrating Computer Coding: One School's Exploration and Development*(Grades 1–6)**202, Conv. Center*

Alexis Soffler, Charles E. Smith Jewish Day School, Rockville, Md.

Coding is new to the elementary environment. How can schools develop programs that are effective with limited resources?

Pa Broader Impact Partnerships with LIGO*(Grades 4–College)**204, Conv. Center*

William Katzman (*wkatzman@ligo-la.caltech.edu*), LIGO's Science Education Center, Livingston, La.

LIGO, a research facility, engages in multiple partnerships to achieve its broader impact goals. These partnerships and resources for finding nearby potential partners are explored.

A Learning Experiences Afforded by Makerspaces*(General)**206, Conv. Center*

Lindsey Own (*@LindseyOwn; lown@evergreenschool.org*), The Evergreen School, Shoreline, Wash.

Following the Design Thinking and Experiential Learning panel, join panelist Lindsey Own to discuss the learning that can be afforded to students with the support of a dedicated makerspace.

LE **Pint-Sized Programming**
(Grades P–3) 503, Conv. Center
Sarah Allen (@msallenteaches; sallen@indiancreekschool.org), Indian Creek School, Crownsville, Md.
Come learn how easy it can be to teach programming to our youngest students so they develop critical-thinking skills that can be used across STEM disciplines.

LE **STEMming Away from Stereotypes: Broadening Student Views on STEM Careers**
(Grades P–3) 504, Conv. Center
Anne Tapp (@tapp_anne; artapp@svsu.edu) and **Adrianne Cole** (acole@svsu.edu), Saginaw Valley State University, University Center, Mich.
Since 1957, educators and social scientists have documented students' stereotypical images of STEM professionals. Despite efforts to depict them accurately, most students do not perceive STEM professionals correctly. Strategies must be developed to change this misconception.

HS **Building Teachers' STEM Practices**
(Grades 6–12) 505, Conv. Center
Sharon Bowers (swbwmc@gmail.com), National Institute of Aerospace, Hampton, Va.
Daniel Kelly (@DanielKellyedu; dpkelly@ncsu.edu), North Carolina State University, Raleigh
Aaron Clark (aaron_clark@ncsu.edu), Durham (N.C.) Public Schools
Developing standards-based inquiry and design lessons is a challenge. Learn about flexible and practical job-embedded professional development experiences that build teachers' STEM practices.

Pa **How to Implement STEM and NGSS into Your Classroom Through the Use of NSTA Competitions**
(Grades K–12) 506, Conv. Center
Sue Whitsett (swhitsett@nsta.org), AEOP Project Director, NSTA, Arlington, Va.
Hear about various NSTA competitions and how they can bring STEM and the NGSS into the classroom, as well as give teachers and students a chance to earn recognition and prizes.

Pa **A K–5 STEM Partnership Between Dalton Elementary and Azusa Pacific University**
(Grades K–5) 602, Conv. Center
Kathleen Tallman (ktallman@apu.edu), Azusa Pacific University, Azusa, Calif.
Erin Kremer (ekremer@azusa.org), Dalton Elementary School, Azusa, Calif.
Azusa Pacific University and Dalton Elementary developed three projects to engage K–5 students in hands-on STEM activities at the elementary school and at APU.

A **Colorado STEMworks: Quality STEM Programming**
(General) 603, Conv. Center
Elizabeth Kuehl (@ColoradoSTEM; lkuehl@coloradoeducationinitiative.org), The Colorado Education Initiative, Denver
Rebecca Peters (@BeckyEPeters; peters_rebecca@svvsd.org), The Innovation Center, Longmont, Colo.
The Colorado STEMworks database is a powerful resource for Colorado educators. The programs admitted into the database met a high bar of quality and were evaluated through a process validated by WestEd. Learn why and how Colorado was the third state to replicate this process.

Pa **WGU-AMNH Partnership Pilot Program: Year 1 Results, Year 2 Progress**
(College) 604, Conv. Center
Suzanne Metlay (suzanne.metlay@wgu.edu), Western Governors University, Salt Lake City, Utah
Learn how Western Governors University and the American Museum of Natural History are partnering successfully with Seminars on Science as required coursework for WGU Teachers College students.

Pa **Aquatic Cave Ecology with Student-Built Submersible Drones**
(Grades 9–12) 606, Conv. Center
Eric Wong (ewong@mercyjaquars.com), Mercy Academy, Louisville, Ky.
Deepen your students' STEM knowledge as they build and pilot underwater drones to perform cave pool surveys in collaboration with National Park Service researchers.

HS Facilitating High School Students' Interest in STEM Careers via Problem-Based Learning

(Grades 9–12) 608, Conv. Center
Melanie LaForce (@melanielaforce; laforce@uchicago.edu) and **Elizabeth Noble** (enoble@uchicago.edu), Outlier Research & Evaluation, Chicago, Ill.

Join us as we discuss how our research is pointing to high-quality PBL as an effective strategy for increasing students' interest in STEM college majors and careers.

M Investigational Design Tool Helps Students Put STEM in Action

(Grades 6–9) 701, Conv. Center
Lynn Lauterbach (lynnlauterbach@gmail.com), Retired Teacher, Loveland, Colo.

Find out how to use a graphic organizer tool to help guide student design of their own investigations AND match it to a free online web adventure that models scientists connecting STEM to real-world science.

M Evolution for Educators

(Grades 6–8) 705, Conv. Center
Bertha Vazquez (@rdfrsTIES; bertha@richarddawkins.net), Richard Dawkins Foundation for Reason and Science, Coral Gables, Fla.

Attention will be paid to the NGSS middle school disciplinary core ideas in evolution and natural selection along with sharing activities to effectively cover these ideas.

M Science “STEMIFICATION”: Bringing Science Instruction into the 21st Century with STEM Infusions

(Grades K–12) 706, Conv. Center
Amanda Solarsh (@stemsuccessedu; amandasolarsh@gmail.com), Simon Baruch MS104, New York, N.Y.

Explore ways to successfully teach science content through STEM and NGSS infusions into the middle school science curriculum.

M Engaging Middle School Students with STEM and the Engineering Design Process

(Grades 5–8) 707, Conv. Center
Kristi Raymond (raymonkr@spsd.org), Mahoney Middle School, South Portland, Maine

Chris Hughes (hughesch@spsd.org), Memorial Middle School, South Portland, Maine

Discover how to get students to successfully complete a variety of design challenges using an Engineering Design Process that develops 21st-century skills.

M Measuring and Mapping Air Quality by Using Mobile Devices: An After-School STEM Program

(Grades 7–College) 708, Conv. Center
Ismail Marulcu (imarulcu@gmail.com), Erciyes University, Melikgazi Kayseri, Turkey

I'll introduce an after-school STEM program: Air Quality Measuring and Mapping by Using Mobile Devices. This project is funded by TUBITAK, The Scientific and Technological Research Council of Turkey.

HS Sim City in the Real World: Using STEM Practices to Model YOUR Environment

(Grades 6–12) 709, Conv. Center
Nanette Marcum-Dietrich (ndietrich@millersville.edu), Millersville University, Millersville, Pa.

Carolyn Staudt (@cjstaudt; cstaudt@concord.org), The Concord Consortium, Concord, Mass.

Melinda Daniels, Stroud Water Research Center, Avondale, Pa.

Melissa Hess (melissa_hess@conestogavalley.org), Conestoga Valley Middle School, Lancaster, Pa.

Come learn about an exciting, free online modeling application that gives anyone (age 8+) the ability to use STEM practices to explore their local watershed.

HS Using the 5E Learning Cycle Model to Facilitate an Inquiry-Oriented Lesson on Mass Transfer, Osmosis, and Diffusion

(Grades 6–12) 710, Conv. Center
Thomas Owen (tom_owen@brewsteracademy.org), Brewster Academy, Wolfeboro, N.H.

Emphasis will be placed on a series of biology lessons on mass transport, osmosis, and diffusion, using the 5E (Engage, Explore, Explain, Elaborate, and Evaluate) learning cycle model as a lesson design framework.

HS **A Systematic Model to Fuel the STEM Pipeline**
(Grades 9–12) 711, Conv. Center
Nicolle Karantinos (@STEMedAZ; nkarantinos@gmail.com) and **Nicki Derryberry** (@STEMedAZ; nicki.derryberry@gmail.com), Red Mountain High School, Mesa, Ariz.
This advanced STEM program models an innovative approach to address the national STEM crisis. Be inspired to change education through this simplistic approach to prepare future generations.

HS **Experimental Design for Students**
(Grades 6–12) 712, Conv. Center
Becky McKinney (@NGSSMadeMeDoIt; rmckinney@euhsd.org), San Pasqual High School, Escondido, Calif.
Allowing your students to design experiments can be a challenging and scary task. Use this amazing graphic organizer that works like a charm!

HS **Using Models to Teach How Crime Scene Blood Spatter Evidence Tells a Story**
(Grades 9–12) Mile High Ballroom 1A, Conv. Center
Anthony Bertino (abertino@nycap.rr.com) and **Patricia Nolan Bertino** (nolanp@nycap.rr.com), Retired Educators, Schenectady, N.Y.
Using easy-to-understand, inexpensive models, participants apply math and physics to determine blood's direction, impact angle, area of convergence and origin, and if the evidence is consistent with eyewitness accounts. Handouts!

HS **Incorporating the CCSS for Literacy in Science and Technical Subjects into Science Investigations**
(Grades 9–12) Mile High Ballroom 1C, Conv. Center
Angela Powers, Colorado State University–Pueblo
Carolyn Schwensen (cschwenn@yahoo.com), Cate School, Carpinteria, Calif.
We will highlight key STEM-related CCSS components as well as model an approach based upon the Science Writing Heuristic for incorporating literacy skills into investigations.

M **Making and Accountability in the Classroom**
(Grades K–12) Mile High Ballroom 4 A–D, Conv. Center
Robert Munsey (@munseyclass; rmunsey@k12albamarle.org), Sutherland Middle School, Charlottesville, Va.
In maker education, it is the teacher's job to facilitate learning and keep students accountable. Discussion centers on creating maker lessons and assessing student success.

HS **Making Meaning Makers in the Sciences**
(Grades 9–12) Mile High Ballroom 4 E/F, Conv. Center
Matthew Green (@stematthewgreen; matt.green@mead354.org) and **Rick Biggerstaff** (rick.biggerstaff@mead354.org), Riverpoint Academy, Spokane, Wash.
We will share Riverpoint Academy student work samples, followed by a discussion focused on how to make innovative learning a reality in public high schools.



11:00 AM–12 Noon Hands-On Workshops**UE Animals Inside & Out: Interactive Animal Science Education Activities***(Grades 3–5)**102, Conv. Center*

Elizabeth Janning (*elizabeth.janning@unl.edu*), Raising Nebraska: Your Food & the Families Who Grow It, Grand Island

Rhonda Herrick (*rherrick1@unl.edu*), Nebraska Extension in Franklin County, Franklin

Ashley Benes (*@ashbenes; ashley.benes@unl.edu*), Nebraska Extension in Cass County, Weeping Water

Darci Pesek (*darci.pesek@unl.edu*), Nebraska Extension in Jefferson County, Fairbury

Melinda Vlieger (*mvlieger2@unl.edu*), Nebraska Extension in Hall County, Grand Island

Eric Stehlik (*estehlik2@unl.edu*), Nebraska Extension in Saline County, Wilber

“Mooove” your students with activities about animal science. Animals Inside & Out is a hands-on lesson series designed for grades 3–5 youth to help them gain knowledge and understanding of the livestock industry.

UE Archeology: Engaging Students in Connecting the History and Science of Place*(Grades 2–5)**103, Conv. Center*

Lisa Brose (*@Lisa.Brose; lbrose@psdschools.org*), Dunn Elementary School, Fort Collins, Colo.

Tap your students’ natural curiosity by connecting the archaeology and geology of a place. The model is based on Rocky Mountain National Park, but applies to anywhere.

UE May the Force Be with You: A Portable Force Indicator*(Grades 4–9)**105, Conv. Center*

Tim Young (*tim.young@und.edu*), University of North Dakota, Grand Forks

David DeMuth (*david.demuth@vcsu.edu*), Valley City State University, Valley City, N.Dak.

The “Findi” device turns linear and circular motion into a visual demonstration of forces and acceleration. We connect to 5 Es (Engage, Explore, Explain, Elaborate, and Evaluate), STEM, and the NGSS.

UE Engaging Elementary Students with Engineering Design Challenges*(Grades 3–5)**107, Conv. Center*

Kim Haines (*@KimHaines10*), Dawson School, Lafayette, Colo.

Experience a hands-on engineering design challenge and explore ideas for collaboration, communication, critical thinking, and creativity that are present in classroom engineering opportunities.

UE Design Thinking and the Everyday Classroom*(Grades P–8)**110, Conv. Center*

Lindsey Cheney, Columbine Elementary School, Longmont, Colo.

Alexandra Downing and **Carolyn Clifford** (*@CCLifford-STEM*), Timberline PK–8, Longmont, Colo.

Eric Woodland (*woodland_eric@svvsd.org*), Northridge Elementary School, Longmont, Colo.

Josh Lemon (*lemon_joshua@svvsd.org*), Rocky Mountain Elementary School, Longmont, Colo.

Kristen Brohm, Alpine Elementary School, Longmont, Colo.

Using the Design Thinking Process is an important tool to advancing STEM instruction and engagement. Learn the process, see examples of preK–8 application, and plan.

UE Global STEM Expeditions: Discovering Real-World STEM Challenges While Circumnavigating the Globe*(Grades 3–6)**201, Conv. Center*

Barrington Irving, Jr., Experience Aviation and the Flying Classroom, Opa Locka, Fla.

Engage in an interactive STEM activity using pilot Barrington Irving’s global STEM expeditions as a catalyst to expose students to innovative design challenges.

UE Connecting Families Through Science, Technology, Engineering and Math (STEM) Nights*(Grades 3–5)**203, Conv. Center*

Katelyn Wamsted (*@girlstart*), Girlstart, Austin, Tex.

Receive hands-on activities to provide a positive and fun environment that encourages girls (and boys) and their families.

LE **Can You Build It? Engineering Design Challenge in the Early Elementary Classroom**

(Grades P–2) 205, Conv. Center

Erica Green (egreen@fwsu.org), Bellows Free Academy Fairfax, Vt.

Learn how an engineering design challenge combines STEM practices with collaborative problem solving and group skills to foster the natural development of young children.

LE **Will It Sink or Float? Why?**

(Grades P–3) 207, Conv. Center

Judith McDonald (judithmcdonald@bac.edu), Belmont Abbey College, Belmont, N.C.

This engaging activity provides you with a 5E (Engage, Explore, Explain, Elaborate, and Evaluate) lesson that will delight your students while exploring properties of matter—sink and float—using everyday objects.

LE **Early Childhood Fab Labs: Integration of Digital Fabrication into PreK–3 STEM Learning**

(Grades P–3) 210/212, Conv. Center

Presenter to be announced

We will cover examples of early implementation of early childhood fab labs and provides hands-on experience on how digital fabrication enhances learners' understanding of STEM.



HS **NABT and BSCS Present: Scaffolding the Practices of Science to Facilitate Student Learning**

(Grades 9–12) 501, Conv. Center

Traci Richardson, Stillwater High School, Stillwater, Okla.

Join us to learn how to scaffold the practices of science to effectively help all students learn to do science.

Pa **Exploring the TeachEngineering Digital Library: Engineering Resources for the K–12 Community**

(Grades K–12) 502, Conv. Center

Janet Yowell (janet.yowell@colorado.edu) and **Malinda Zarske** (@TeachNgeineering; malinda.zarske@colorado.edu), University of Colorado Boulder

We will share activities from TeachEngineering, a free resource for practitioners and an easily accessible publishing venue for teachers and engineering professionals who have developed curricular content. The collection houses more than 1,400 classroom-tested K–12 engineering lessons and activities that explore science and math in an age-appropriate, design-focused fashion that meets current standards.

Pa **Successful STEM-Rich Making Practices That Benefit Underserved Students**

(Grades K–9) 601, Conv. Center

Jerry Valadez (@samacademymaker; jdvscience@yahoo.com), California State University, Fresno

Engage with integrated STEM activities and learn how the Community Science Workshops successful practices create STEM-rich learning environments accessible to all kids.

UE **Innovators' Compass**

(General) 605, Conv. Center

Ela Ben-Ur (@elabenur; ela.ben-ur@olin.edu), Olin College of Engineering, Needham, Mass.

Join in to use the Innovators' Compass (www.innovatorscompass.org) to visually apply four fundamental questions of science and innovation throughout your curriculum and culture. Come try it!

M **Using a Web-Based Graphing Tool to Analyze and Interpret Local and National Weather and Climate Data for Patterns and Change**

(Grades 6–8) 607, Conv. Center

Matthew Mirabello (*mmirabello@amnh.org*), American Museum of Natural History, New York, N.Y.

Explore weather and climate data through an online graphing tool that simplifies data visualization so students can focus on analysis and interpretation.

M **3-2-1 Liftoff! Build and Launch a Satellite Using NASA’s Beginning Engineering Science and Technology (BEST) Curriculum**

(Grades K–8) 610/612, Conv. Center

Barbara Buckner (*@bbuckner; barbie.buckner@nasa.gov*), NASA Armstrong Flight Research Center, Palmdale, Calif.

Suzanne Nichols (*nicholss@ohio.edu*), Ohio University Southern, Ironton

Use each stage of the Engineering Design Process to complete a team challenge of building and launching a satellite while making connections to NASA missions.

M **Menacing Microbe or Just a Bad Rap? Bacteria, the Real Story**

(Grades 6–9) 702, Conv. Center

Patricia Wahlsten (*patriciawahlsten@mersnj.us*), Manalapan-Englishtown Middle School, Manalapan, N.J.

Integrate technology, argumentation, and hands-on labs for student exploration of microbiomes. Labs, project ideas with handouts, and free technology tools to take away.

M **Using the Local Environment to Engage Youth: How Adapting the Billion Oyster Project Can Work for Your Site**

(Grades 5–8) 703, Conv. Center

Kristian Breton (*@kristianbreton; kbreton@nyas.org*) and **Tiffany Kapler** (*tiffany.kapler@gmail.com*), The New York Academy of Sciences, New York, N.Y.

See how locales in your area can use their natural environment to engage youth in authentic research. The Academy has partnered with schools to implement a program examining how oyster habitats in the New York City harbor have been impacted in the past 100 years.

M **Build, Ignite, and Launch**

(Grades 5–12)

704, Conv. Center

Brad Blue (*bradbblue@gmail.com*), Design & Innovation Lab, Minneapolis, Minn.

Based on the scaffolded rockets and launch systems—from simple to complex—in the movie *October Sky*, students build rockets as well as ignition systems to launch their rockets.

HS **Integrating Career Awareness into STEM Classes**

(Grades 5–12)

Mile High Ballroom 1D, Conv. Center

Laura Farrelly (*@laurafarrelly; laura@courageion.com*), Courageion, Denver, Colo.

Learn about three NGSS-based lesson plans that combine hands-on experiments, multiple STEM competencies, and STEM career exploration into a cohesive unit of study.

HS **Using Problem-Based Learning to Bring Upper-Level Research to High School STEM Science Students**

(Grades 9–12)

Mile High Ballroom 1E, Conv. Center

Kent Hups (*kent.m.hups@adams12.org*), Northglenn STEM High School, Denver, Colo.

Assist the Denver Museum of Nature & Science in hands-on sorting, morphotyping, and cataloging Ice Age microfossils and exploring Problem-Based Learning concepts.

HS **Technology Tools for Visualizing Scientific Data: A Hands-On Workshop**

(Grades 6–College)

Mile High Ballroom 1F, Conv. Center

David Black (*elementsunearthed@gmail.com*), American Academy of Innovation, South Jordan, Utah

Use open-source and free software to visualize authentic online scientific data. You’ll convert altitude data of Mars and the Moon into 3-D terrains using ImageJ and Daz3D Bryce, and use the Gimp and DS9 to turn infrared data into enhanced RGB images.

HS **The Best Interactive Physics Demonstrations You and Your Students AREN’T Doing**

(Grades 8–College)

Mile High Ballroom 2C, Conv. Center

James Lincoln (*@JamesPhysics; james@physicsvideos.net*), Tarbut V’Torah Community Day School, Irvine, Calif.

How can physics demonstrations be hands on, interactive, and engaging for the next generation? Come find out more.



LE Kids Love Rocks: Using Children’s Natural Interest to Explore Earth Materials

(Grades P–1) Mile High Ballroom 3C, Conv. Center

Bob Williams, Consultant, Belmont, Tex.

Mary Hobbs (*maryhobbs@utexas.edu*), The University of Texas at Austin

Jenny Ingber (*@jingber*; *jingber@amnh.org*), American Museum of Natural History, New York, N.Y.

Unearth activities that will keep your students busy with rocks and soils. These STEM activities can be used with kids—next week.

11:00 AM–12 Noon Exhibitor Workshops

Putting the STEM in Astronomy

(Grades 6–College) 301, Conv. Center

Sponsor: Fisher Science Education

Robert Marshall (*robert.marshall@thermofisher.com*), Fisher Science Education, Pittsburgh, Pa.

Walk away with astronomy-focused STEM activities and learning tools you can implement in your classroom. Then, become familiar with how modern technology helps navigate the sky so you can focus on coordinating star parties and observing projects.

Interpreting Motion Graphs

(Grades 6–8) 302, Conv. Center

Sponsor: LAB-AIDS®, Inc.

Hethyr Tregerman, LAB-AIDS, Inc., Ronkonkoma, N.Y.

In this activity from the SEPUP middle level physical science series exploring Newton’s laws in a context of motor vehicle safety, participants are challenged to design an investigation to measure the speed of a moving cart as a function of its release point from a curved ramp. They carry out their experiment, discuss the role of speed in automobile collisions, and conclude by examining distance vs. motion graphs.

Project-Based STEM/Engineering

(Grades 5–College) 303, Conv. Center

Sponsor: WhiteBox Learning

Graham Baughman (*graham@whiteboxlearning.com*), WhiteBox Learning, Louisville, Ky.

WhiteBox Learning is a standards- and project-based, STEM/ engineering learning system. WhiteBox’s world-class STEM curriculum and web-based software applications allow students to research, design, analyze, and SIMULATE their designs (then build), and compete “virtually”, 24/7, all around the world, from any browser. How cool is that?! This grades 6–12 system includes an integrated LMS/teacher dashboard.

Ignite Your Science Classroom with 3D Bioprinting

(Grades 9–College) 304, Conv. Center

Sponsor: SE3D Education

Mayasari Lim (*mlim@se3d.com*), SE3D Education, Redwood City, Calif.

3D bioprinting is a rapidly expanding field in bio and medical industries. With SE3D’s classroom 3D bioprinter, students can gain firsthand experiences using this cutting-edge tool. This workshop showcases classroom examples that can illustrate different industry applications in bioprinting.

Student Collaboration in the Science Classroom

(Grades 6–9) 401, Conv. Center

Sponsor: AEOP eCYBERMISSION

Cheryl Long, eCYBERMISSION Outreach Specialist, NSTA, Arlington, Va.

This workshop will guide participants through aspects of the NGSS and highlight how group work can be beneficial to the science class through the use of hands-on activities.

Let’s Get Helical: Exploring DNA Structure/Function with Physical Models

(Grades 8–College) 402, Conv. Center

Sponsor: 3D Molecular Designs

Tim Herman (*herman@msoe.edu*), MSOE Center for Bio-Molecular Modeling, Milwaukee, Wis.

DNA can be viewed as a macromolecule or a source of genetic information. Explore both features with interactive DNA models and a paper bioinformatics exercise focusing on the beta subunit of hemoglobin. Examine the mutation that leads to sickle cell disease and the regulation of fetal and adult hemoglobin expression.

Hands On with SumBlox, a New STEM Toy*(Grades P–5)*

403/404, Conv. Center

Sponsor: SumBlox

Jennifer Bond, Glengary Elementary School, Walled Lake, Mich.**David Skaggs**, SumBlox, Paradise, Utah

Join us and take part in learning SumBlox games that are used to teach math in the classroom. SumBlox are wooden number-shaped blocks with the value of each number represented by its height. A free set will be given to the winner of the final competition.

Zombie Apocalypse!*(Grades 6–12)*

405, Conv. Center

Sponsor: Texas Instruments

Jeffrey Lukens, Sioux Falls (S.Dak.) School District

Become part of a zombie apocalypse! Learn about disease spread modeling using simulations and fun storylines about a zombie outbreak. Applicable for middle school and high school, this workshop is sure to scare you and your little zombies into learning how exciting Hollywood themes can be used to teach science concepts.

Integrating 360° Video Technology to Engage Students*(Grades 6–College)*

406, Conv. Center

Sponsor: Ocean First Education

Caine Delacy (caine@oceanfirsteducation.com), Ocean First Education, Denver, Colo.

Explore highly engaging 360° videos to engage students in a meaningful three-dimensional way. Ocean First Education will demonstrate use of 360° videos as a means to stimulate understanding and exploration of marine science. Learn about this new technology and how it can work effectively in your classroom!

Physical Computing, Computer Science, and Making with Arduino*(Grades 7–College)*

407, Conv. Center

Sponsor: SparkFun Electronics

Jeff Branson, Derek Runberg, and Brian Huang, SparkFun Electronics, Longmont, Colo.

Using the SparkFun Inventors Kit as an introduction to electronics, programming, and physical computing allows artists, makers, educators, and students to easily control LEDs, read sensors, and move motors. Come see the possibilities of physical computing in your STEM classroom to create the next generation of innovators with Arduino.

1:30–2:30 PM Presentations**UE Investigation or Model: Two Argument-Based Inquiry Approaches to the NGSS***(Grades 2–6)*

106, Conv. Center

Mason Kuhn (mason.kuhn@uni.edu), University of Northern Iowa, Cedar Falls

Learn about two ways to use an ABI approach to have your students engaging in argument based on evidence.

LE Design Thinking and Young Engineers*(Grades K–2)*

107, Conv. Center

Jessica Lura (@msjlura; jlura@bullischarterschool.com), Bullis Charter School, Los Altos, Calif.

Learn how the design thinking process and mind-sets can support the development of our early learners as engineers.

UE Biomimicry: A Natural Approach to Arts Integration in STEM*(Grades 3–8)*

108, Conv. Center

Jennifer Jenkin (jjenkin@dbg.org), Desert Botanical Garden, Phoenix, Ariz.

Biomimicry, using nature to solve human challenges, goes beyond STEM by incorporating art and design. Discover why and how to implement hands-on biomimicry curriculum in the classroom.

UE Integrating Science, Mathematics, and Literacy: How Can We Do This Well?*(Grades 3–8)*

109, Conv. Center

Carmen Woodhall (cmw52755@aol.com), Science Education Specialist, Winter Park, Fla.**Kay Middleton** (middletonc14@ecu.edu), East Carolina University, Greenville, N.C.

We will explore the integration of literacy in science/mathematics content areas to support the building of solid conceptual frameworks on which later learning can be built.

M NASA's "Eyes on the Solar System": Bringing the Planets to Your Classroom*(Grades 5–12)*

111, Conv. Center

Rachel Zimmerman Brachman (rachel.zimmerman-brachman@jpl.nasa.gov) and **Kevin Hussey** (@nasa_eyes; kjhussey@jpl.nasa.gov), NASA Jet Propulsion Laboratory, Pasadena, Calif.

Bring the solar system to your classroom using this free online tool from NASA. Explore planets, spacecraft, and more!

A **Shifting to a STEM Culture**
(Grades P–8) 113, Conv. Center
Stephanie Miller (*smiller@congressdistrict.org*), Congress (Ariz.) Elementary School District
In three years, Congress School District in Arizona has shifted to a STEM culture. Find out the “nuts and bolts” of how this was accomplished.

A **Leadership Strategies for Ensuring Each Student Has a STEM Future**
(Grades P–12) 202, Conv. Center
Bob Sotak (*@Scienceinquiry*; *bsotak@mac.com*), Science/STEM Education Consultant, Edmonds, Wash.
Discover strategies and tools to implement a districtwide K–12 STEM program impacting each student—identifying resources, developing a vision, and measuring progress toward that vision.

LE **Science Notebooks: An Interdisciplinary Approach**
(Grades 1–2) 206, Conv. Center
Belle Akers (*belle.akers@sacredsf.org*), Convent of the Sacred Heart, San Francisco, Calif.
Take a closer look at STEM and NGSS in action! Discover how to enrich your students’ science and engineering practices through notebooks and hands-on investigations.

LE **Getting It All In**
(Grades K–2) 504, Conv. Center
Adriana Guerra (*adriana.guerra@venturausd.org*), **Rebecca Haystead** (*rebecca.haystead@venturausd.org*), **Guadalupe Gomez** (*guadalupe.gomez@venturausd.org*), and **Jena Branstetter** (*jena.branstetter@venturausd.org*), E.P. Foster STEM Academy, Ventura, Calif.
Presider: Nancy Escamilla, E.P. Foster STEM Academy, Ventura, Calif.
Maximize student achievement across CCSS and NGSS—covering a range of standards during the regular school day.

Pa **Essential Elements of a Successful STEM Program**
(Grades 3–12) 507, Conv. Center
Darrell McDaniel (*@dmcdaniel5253*; *darrell.mcdaniel@cpsb.org*) and **Brian Fontenot** (*brian.fontenot@cpsb.org*), Calcasieu Parish Public Schools, Lake Charles, La.
This session will chronicle the development of a successful STEM program that was implemented in the under-performing, high-needs schools of Louisiana’s Calcasieu Parish School System.

Pa **STEM-ifying Your School**
(Grades K–12) 602, Conv. Center
Terry Contant (*@TerryContant*; *tcontant@learn.k12.ct.us*), LEARN, Old Lyme, Conn.
Anne Tweed (*atweed@mcrel.org*), 2004–2005 NSTA President, and McREL International, Denver, Colo.
Learn about an asynchronous adaptive online course designed to introduce educators to STEM and NGSS to help them STEM-ify their schools.

A **STEM Mix It Up: Correlated Science and Math Principals Panel**
(Grades 4–College) 603, Conv. Center
Sandra West (*sw04@txstate.edu*), Texas State University, San Marcos
Denise Kern (*denisekern@me.com*), Consultant, Spring Branch, Tex.
Sandra Browning (*browning@uhcl.edu*), University of Houston–Clear Lake, Houston, Tex.
Anna Buentello (*anna.buentello@lockhart.txed.net*), Navarro Elementary School, Lockhart, Tex.
Continued focus on STEM education requires paying attention to leadership roles of administrators who can either enhance or impede effective STEM education, including the integration of STEM. Our Mix It Up–trained principals provide insight as a result of STEM administrators PD.

Pa **Redefining Student Teaching Experiences: Collaboration Between University Education/Computer Science Students and K–12 Districts**
(Grades K–5/College) 604, Conv. Center
Yune Tran (*ytran@georgefox.edu*) and **Donna Webb** (*webbdonna18@gmail.com*), George Fox University, Newberg, Ore.
Learn the process in leveraging coding opportunities for elementary-aged students taught during the school day through a university and district partnership model.

Pa **Developing Successful Capstone STEM Learning Experiences Through Partnerships and Integration of Digital Fabrication**
(General) 606, Conv. Center
Presenter to be announced
We will cover the experiences of educators and their partners collaborating to design and implement transdisciplinary STEM Capstone experiences in schools around the world.

M Engaging Students in Successful and Novel Science Projects: Materials, Strategies, and Challenges*(Grades 5–8)* 701, Conv. Center**Ari Leventhal** (@whistlingpirate; ari_leventhal@denvergreenschool.org), Denver Green School, Denver, Colo.

Improve the quality of your students' science fair projects by building on their interests and connecting to the NGSS science and engineering practices.

M Living Through an Avatar*(Grades 2–8)* 705, Conv. Center**Juliana Texley** (jtexley@att.net), 2014–2015 NSTA President, Boca Raton, Fla.

Most of today's "iGeneration" spend many hours each day in front of a screen. Often they are living within game worlds. Join their world and learn to use it for STEM.

M Gardening for Success: Integrating Subjects and Teaching Your Standards Through Gardening*(Grades K–12)* 706, Conv. Center

Ryan Mahn (@JTSDNixa; ryanmahn@nixaschools.net), **Tracy Harris** (@tharris1214; tracyharris31973@gmail.com), and **Chris Holmes** (chrisholmes@nixaschools.net), John Thomas School of Discovery, Nixa, Mo.

Give your students a real-world education, integrating all content areas, through the production and sale of plants, flowers, and health care products.

A If They Make It, They Will Learn: The Maker Movement and K–12 STEM*(Grades P–12)* 708, Conv. Center**Jack Samuelson** (jacksamuelson@icloud.com), Dr. STEM Express, Milwaukee, Wis.

"Making" is more than tinkering, and the Maker Movement offers powerful project-based lessons for learning STEM in K–12 classrooms.

HS Modeling Is Cool! Lessons from an Antarctic Scientist*(Grades 6–12)* 709, Conv. Center**Joel Singley** (@SingleyScience; joel.singley@colorado.edu), University of Colorado Boulder

Learn strategies to incorporate Earth system modeling and public data from the world's coldest continent into effective NGSS-based three-dimensional learning activities.

HS Shop Locally: STEM in a Rural Colorado School*(Grades 6–College)* 710, Conv. Center

Laura Stuemky (stuemky@hotmail.com), **Kevin Hintz** (khintz@del-norte.k12.co.us), and **Natalie Horrocks** (nhorrocks@del-norte.k12.co.us), Del Norte High School, Del Norte, Colo.

Hear how results of a community survey were the impetus for our rural STEM program. We will share how teamwork helped our dreams become reality.

HS Guiding High School Students in an Independent Scientific Research Course*(Grades 11–12)* 711, Conv. Center**Shawndra Fordham** (shawndra.fordham@dcsdk12.org), Rock Canyon High School, Highlands Ranch, Colo.

Find out about a new course offered at Rock Canyon High School where students design and conduct their own scientific research in the field of biotechnology. You will hear from students and the instructor about this exciting course as well as gain valuable tips for facilitating a course like this at your school.

HS Investigating PBL at Inclusive STEM High Schools: An In-Depth Look at PBL in Practice*(Grades 9–12)* 712, Conv. Center

Elizabeth Noble (enoble@uchicago.edu), **Courtney Blackwell** (ckblackwell@uchicago.edu), and **Melanie LaForce** (@melanielaforce; laforce@uchicago.edu), Outlier Research & Evaluation, Chicago, Ill.

Explore the variety of approaches taken by inclusive STEM high schools in implementing three common characteristics of Problem-Based Learning.

HS Forensic Science: The Ideal STEM Course!*(Grades 9–12)* Mile High Ballroom 1A, Conv. Center

Anthony Bertino (abertino@nycap.rr.com) and **Patricia Nolan Bertino** (nolanp@nycap.rr.com), Retired Educators, Schenectady, N.Y.

Motivate and improve student skills using hands-on activities, problem solving, and critical thinking that apply STEM to solving crime. Forensic activities overview and handouts provided.

HS **Engineer Your World: Integrating Engineering Design, Computational Thinking, and 21st-Century Skills**

(Grades 9–12) *Mile High Ballroom 1B, Conv. Center*
Cheryl Farmer (cheryl.farmer@mail.utexas.edu), The University of Texas at Austin

Learn about an innovative research-based engineering curriculum that meets the NGSS, fosters computational thinking and 21st-century skill development, and builds engineering career awareness.

HS **Can Lemonade Be Used as a Buffer? Collaboration Between AP Calculus and Chemistry**

(Grades 10–12) *Mile High Ballroom 1C, Conv. Center*
Thomas Michocki (@TMichocki; tmichocki@bcps.org) and **Kimberly Burton-Regulski** (kburton@bcps.org), Eastern Technical High School, Essex, Md.

Hear how AP chemistry students determine whether lemonade from a mix meets the criteria for a buffer, and apply graph analysis from AP calculus to determine the equivalence point.

HS **Local Ecosystem Survey to Understand Resilience and Biodiversity**

(Grades 9–12) *Mile High Ballroom 2C, Conv. Center*
David Quigley (david.quigley@colorado.edu), University of Colorado Boulder

Find out about EcoSurvey, a tool used to support students in collecting, annotating, and mapping information about their local ecosystem.

M **Dazzling Deceptions: Discrepant Events That Delight and Mystify!**

(Grades 4–9) *Mile High Ballroom 4 E/F, Conv. Center*
Alan McCormack (amccorma@mail.sdsu.edu), 2010–2011 NSTA President, and San Diego State University, San Diego, Calif.

Science experiences that seem contrary to “common sense” are great motivators for kids! Discrepant events build scientific understanding and stimulate creativity.

1:30–2:30 PM Hands-On Workshops

UE **Food Waste, Aviation, and Gaming: Real-World STEM Units with Applied Student Solutions**

(Grades 3–6) *102, Conv. Center*
Hannah Maharaj, DeKalb County School District, Stone Mountain, Ga.

Engage in a learning discovery and work through portions of a STEM unit that demonstrates a comprehensive, integrated, and interactive STEM approach.

UE **Adapting STEM Lessons to Engage Students and Meet Grade-Level Standards**

(Grades 4–6) *105, Conv. Center*
Donna Rainboth (drainbot@eou.edu), Eastern Oregon University, La Grande

Explore how a wind energy STEM unit can be adapted to engage upper elementary students while meeting rigorous grade-level science and math standards.

UE **Engagement: The Essential “E”**

(Grades K–8) *103, Conv. Center*
Curtis Varnell (curtis.varnell@wscstarfish.com), Guy Fenter Education Service Cooperative, Branch, Ark.

Join me for a workshop designed for K–8 teachers who need creative science integration strategies...and who want to make science even more fun and meaningful in their classroom.

M **ASEE Session: The TeachEngineering Digital Library: Hundreds of Free, Searchable, NGSS-Focused Hands-On Engineering Lessons for K–12**

(Grades K–12) *110, Conv. Center*
Malinda Zarske (@TeachNginereng:malinda.zarske@colorado.edu), University of Colorado Boulder

Inspire your students to explore real-world applications of STEM topics through hands-on/minds-on engineering design. *TeachEngineering.org*'s more than 1,400 classroom-tested K–12 engineering lessons and activities integrate current research in engineering and technology to enhance the learning of science and mathematics fundamentals. Engage in an engineering design activity and find out how to publish your original work in this dynamic and ever-growing curricular collection and community of K–12 engineering educators.

UE **Nature Thought of It First: Biomimicry**

(Grades 4–9) *104, Conv. Center*
Sandy Lamb (@Colorado_CAST; sandy79lamb@gmail.com), Retired Educator, Monument, Colo.

DeLene Hoffner (@Colorado_CAST; delene.hoffner@asd20.org), School in the Woods, Colorado Springs, Colo.
The awe and wonder of nature brings inspiration for STEM innovations! From seed to parachute, from bats to snar navigation, come investigate more ideas for students!

UE **The Shadow Knows: Explore Primary and Secondary Colors by Making and Using Colored Shadows***(Grades 4–6)*

201, Conv. Center

Gary Benenson (benenson@ccny.cuny.edu), The City College of New York, N.Y.

Mix colors with LEDs and then block some light to create colored shadows, to explore additive primary and subtractive secondary colors.

UE **Uniting Engineering and Science: Engineering Design Challenges That Inspire Inquiry***(Grades 1–5)*

203, Conv. Center

Kathryn Hutchinson (@eie_org), Museum of Science, Boston, Mass.

Engineer a solution to a design challenge and reflect on how integrating science with engineering promotes authentic inquiry with your elementary students.

LE **Teaching Engineering, Motion, and Energy Through Rube Goldberg***(Grades 1–5)*

205, Conv. Center

Elaine Sevin (elainesevin@newmanschool.org), Isidore Newman School, New Orleans, La.

This introduction to STEM for elementary classrooms will allow participants to explore motion and energy while creating their own Rube Goldberg machine using found objects.

HS **AACT/AAPT/NABT Session: One Lab Three Ways: Determining the Percent of Body Fat of a Sausage “Cadaver”***(Grades 9–12)*

501, Conv. Center

Rebecca Vieyra (@AAPTHQ; @RVieyraAEF; rvieyra@aapt.org), American Association of Physics Teachers, College Park, Md.

Determine the percent of fat of a sausage, and analyze how this lab can be done in the context of a biology, chemistry, or physics course. Discover links to the NGSS, too.

Pa **Using Partnerships to Bring Upper-Level Research to High School STEM Science Classrooms***(Grades 9–12)*

502, Conv. Center

Kent Hups (kent.m.hups@adams12.org), Northglenn STEM High School, Denver, Colo.

Dig in and assist the Denver Museum of Nature & Science in hands-on sorting, collecting, and cataloging Ice Age microfossils and exploring partnership ideas. See what Colorado looked like 100,000 years ago.

Pa **Connecting Careers to the Classroom: Bring STEM Professions to Life***(Grades 4–12)*

503, Conv. Center

Danielle Stollak (@firsthandphilly; dstollak@sciencecenter.org) and **Maya Heiland** (@firsthandphilly; mheiland@sciencecenter.org), University City Science Center, Philadelphia, Pa.

Connect your students to real-world STEM skills by exploring innovative solutions that will engage STEM professionals in the classroom.

HS **NCTM Session: Model with Mathematics, Working Across Science and Math in High School***(Grades 9–College)*

601, Conv. Center

John Pelesko (@peleskoj; pelesko@udel.edu), University of Delaware, Newark

Experience mathematical modeling as a crosscutting approach connecting the NGSS and CCSS *Mathematics* for high school students. Learn about the types of modeling and how the modeling process supports and is integral to all aspects of STEM.

M **Modeling in STEM Education with Examples from Climate Modeling***(Grades 6–College)*

605, Conv. Center

Randy Russell (rrussell@ucar.edu), UCAR Center for Science Education, Boulder, Colo.

Engage in activities for teaching scientific modeling as it relates to various scientific disciplines, with specific examples drawn from climate modeling.

M **Swipe Right; It’s a Match! Scientific Investigations and Engineering Design***(Grades 1–12)*

607, Conv. Center

Jeannie Gargiulo (jeanniegargiulo@gmail.com), Simon Baruch MS104, New York, N.Y.

How do you teach design when students are unfamiliar with scientific investigations? Explore ways to fuse these two processes to support students’ understanding.

M NASA’s Beginning Engineering, Science, and Technology (BEST)

(Grades 5–9) 610/612, Conv. Center

Kat Balch (*katrine.a.balch@nasa.gov*) and **Maria Chambers** (*maria.a.chambers@nasa.gov*), NASA Marshall Space Flight Center, Huntsville, Ala.

Let’s use the engineering design process to solve a simulated real-world issue of designing an environmentally friendly green propellant. This activity is from the NASA’s BEST (Beginning Engineering, Science, and Technology) Next Generation educational guide. *Note:* Hands-on activities available to the first 80 participants.

M Can You Design the Most Efficient Wind Turbine?

(Grades 6–12) 702, Conv. Center

Tim Blesse (*tim.blesse@dmns.org*), Denver Museum of Nature & Science, Denver, Colo.

Jessie Herman (*jessica.herman@schoolspecialty.com*), CPO Science/School Specialty Science, Kansas City, Mo.

Design, construct, and test wind turbines using the engineering cycle and an experimental design teaching strategy called the Post-It Note tool. Help your students to design more systematically.

M Digging Deep with Concepts to Integrate for STEM

(Grades 6–12) 703, Conv. Center

Karol Stephens (*krhstephens@yahoo.com*), Consultant, Fayetteville, Ga.

Use concepts and practices of mathematics and science and include technology and engineering to deepen understanding and engagement for students. Try a productive strategy!

HS Transitioning to a Greener Society: Building STEM Skills Through Interdisciplinary Activities

(Grades 9–12) Mile High Ballroom 1D, Conv. Center

Sarah Pidgeon (*sarah@solar1.org*), Solar One, New York, N.Y.

Take part in inquiry-based, easy-to-replicate activities that inspire curiosity and develop foundational knowledge of climate change and careers in the emerging green technology sector.

HS STEM Challenge! Getting Students Thinking!

(Grades 9–11) Mile High Ballroom 1E, Conv. Center

Judith Lucas-Odom, Chester High School, Chester, Pa.

Complete activities that will help your students engage in designing models to help them understand how engineers build bridges, cars, and roads that are more efficient.

1:30–2:30 PM Exhibitor Workshops

Going Digital in Elementary STEM Education

(Grades 1–5) 301, Conv. Center

Sponsor: Fisher Science Education

Robert Marshall (*robert.marshall@thermofisher.com*), Fisher Science Education, Pittsburgh, Pa.

Learning how and why scientists gather data can be a terrific introduction to core ideas and scientific practices but presents challenges for young learners. Revisit the basics of capturing data, go digital, and then investigate STEM resources paired with hands-on activities you can implement to make your classroom productive, fun, and exciting.

We’re All Engineers in the Science Classroom

(Grades 6–12) 302, Conv. Center

Sponsor: ArduSat

Ben Neiswender (*ben.n@ardusat.com*), ArduSat, Salt Lake City, Utah

We want to help teachers of all abilities confidently bring coding and new technology to life in their classrooms. This workshop will navigate you through the new science and engineering practices of the NGSS using the ArduSat Space Board. This board includes nine sensors and learning resources to guide you.

FUNDamentals of Wind Energy Education

(General) 303, Conv. Center

Sponsor: University of Northern Iowa FREE

Birgitta Meade, Luther College, Decorah, Iowa

Patricia Higby (*patricia.higby@uni.edu*), University of Northern Iowa, Cedar Falls

We will read Kamkwamba’s picture book *The Boy Who Harnessed the Wind* and then light an LED lamp by blowing on a model wind turbine. We’ll also use a solar panel to make the turbine a fan, discover what’s inside the motor, and explore what factors make the best turbine blades. These materials were developed and tested by the Fabulous Resources for Energy Education program at the University of Northern Iowa.

Finding the Needle in the Haystack: Selecting High-Quality STEM Material

(Grades 3–5)

304, Conv. Center

Sponsor: ETA hand2mind

Olivia Hua (*liv.hua@mail.mcgill.ca*), McGill University, Montreal, Que., Canada

Johannes Strobel (*strobelj@missouri.edu*), University of Missouri, Columbia

Join us for an interactive session in which we introduce tools for picking high-quality STEM material. We will share a rubric and work through an example of designing, building, testing, and redesigning a code transmission system.

Telling Stories with David Goodsell's Watercolor Molecular Landscapes

(Grades 9–College)

402, Conv. Center

Sponsor: MSOE Center for BioMolecular Modeling

Tim Herman (*herman@msoe.edu*), MSOE Center for BioMolecular Modeling, Milwaukee, Wis.

Use these amazing landscapes to explore cell structure and illustrate where in the cell protein synthesis and other important processes occur. You can also tell molecular stories such as “Your Flu Shot in Action,” tracing the production of an antibody protein all the way to its release into the circulation.

The BEST Approach to Inspiring Interest in STEM Through Robotics

(Grades 5–12)

403/404, Conv. Center

Sponsor: BEST Robotics, Inc.

Nikki Baird, STEM School and Academy, Highlands Ranch, Colo.

Thomas Roell, DSST Byers, Denver, Colo.

Carolyn Bauer, Rocky Mountain BEST, Highlands Ranch, Colo.

Rosemary Mendel (*rosemary.mendel@bestinc.org*), BEST Robotics, Inc., Allen, Tex.

BEST is inspiring students to pursue STEM through an annual robotics competition that is free to schools. Join us to hear about the BEST Award that teaches business skills in conjunction with STEM. Also, find out how teachers and mentors get trained to coach teams as you meet students and drive a BEST robot on a real game field segment.

An Easier Path to Coding and STEM Projects

(Grades 6–12)

405, Conv. Center

Sponsor: Texas Instruments

Jeffrey Lukens, Sioux Falls (S.Dak.) School District

Fred Fotsch, Texas Instruments, Dallas

Blinking an LED or building your own sound system starts with a basic understanding of programming. This session will have you coding in a short time using familiar classroom technology while experiencing the applications of input and output control. Middle school and high school appropriate; no coding experience necessary.



3:00–4:00 PM Presentations

M NASA eClips™ Address Middle School Students' Misconceptions

(Grades 6–9)

107, Conv. Center

Tami Byron (tami.byron@nn.k12.va.us), Newport News (Va.) Public Schools

Hear how short student-produced video segments are paired with interactive whiteboard learning experiences to target and address common middle school student misconceptions building foundational NGSS content and practices.

UE STEM and Outdoor Learning

(Grades 3–5)

108, Conv. Center

Karen Stanfield (karen.stanfield@gscs.org), Cowan Road Elementary School, Griffin, Ga.

Students remain highly engaged when their interest levels are piqued using an outdoor learning environment. We will discuss strategies for integrating all STEM components and a deeper understanding of NGSS disciplinary core ideas as well as making real-world sustainable partnerships via your local community.

UE Making STEM a Mind-Set: A Road Map for Change

(Grades P–5)

109, Conv. Center

Ellen Darensbourg (edarensbourg@schools.nyc.gov), **Rebecca Lugo** (@rlodegaard; rlugo10@schools.nyc.gov), and **Tashawna Praddy** (tpaddy@ps354.org), The Jermaine L. Green STEM Institute of Queens, Jamaica, N.Y.

We will share the journey of our transformation into a STEM-themed magnet school, and detail the shifts in curriculum, partnerships, fund-raising, and more that we made to ensure that we earned the right to wear the STEM name on our school. For as we like to say at the STEM Institute of Queens, STEM is who we are, not just what we do.

A ITEEA Session: Integrative STEM Education—Engaging in I-STEM Professional Learning Communities

(General)

111, Conv. Center

Barry Burke (bburke@iteea.org) and **Jennifer Buelin** (jkbuelin@iteea.org), ITEEA, Reston, Va.

What is I-STEM? This session will focus on the opportunities that exist to bring professional learning communities to schools, districts, and states.

UE The Effects on Students' Learning Concentration in Connecting Picture Books with Nature and Science Technology Curriculum in Elementary Schools in Taiwan

(Grades 5–6)

112, Conv. Center

Ruei-Ping Chang, Texas A&M University, College Station
Review findings from a Taiwanese study designed to explore the effects of using picture books on grades 5–6 students' learning concentration in science classrooms.

CANCELED

A Reimagining the Secondary Science Sequence—Physics First!

(Grades 7–College)

113, Conv. Center

Edward Moyer, Decatur (Ill.) Public Schools

How do we move our science instruction into the modern era? Reimagining the order of the sciences is one place to start. So, let's start.

A Triumphs and Deltas: Our Ongoing Journey Toward an Integrated STEM Curriculum at a K–8 Magnet School

(Grades K–8)

202, Conv. Center

Heather Harkins, **Nicole Vitello**, **Nicole Bay** (@nbay_chbsa; nbay@windham.k12.ct.us), and **Jennifer Geragotelis** (jgeragotelis@windham.k12.ct.us), Charles H. Barrows STEM Academy, North Windham, Conn.

We'll discuss our STEM school profile. Several teachers will present highlights of their NGSS- and CCSS-based curriculum at their grade level.

HS AACT Session: American Association of Chemistry Teachers—Supporting New Teachers of Chemistry

(Grades 9–12)

501, Conv. Center

Kimberly Duncan (@chemduncan; k_duncan@acs.org) and **Jenn Parsons** (j_parsons2@acs.org), American Association of Chemistry Teachers, Washington, D.C.

Join us for a tour of the large and growing collection of resources available from AACT, including classroom materials, professional learning, multimedia, and a periodical.

HS **Hooking Students on STEM Learning by Using Practical Case Studies***(Grades 9–College)*

503, Conv. Center

Carmelle Rogers (*carmelle.rogers@wgu.edu*), Western Governors University, Salt Lake City, Utah

Having a hard time piquing and maintaining the interest of your students? Make science practical by using case studies that integrate STEM concepts.

LE **STEM in the Primary Classroom***(Grades K–2)*

506, Conv. Center

Jen Gutierrez (*@jengutierrez18*; *jengutierrez@cox.net*), Arizona Dept. of Education, Phoenix

Supporting young children's instinctive desire to explore STEM ideas and phenomena has lasting benefits. Come investigate how interdisciplinary STEM teaching and learning supports all students.

Pa **Full STEAM Ahead: Designing and Implementing a STEAM-Based Initiative with All Constituents***(Grades P–8)*

507, Conv. Center

Holli Joyal (*hollijoyal1701@gmail.com*), Irvine, Calif.

Teri Bock (*teriebock@ologn.org*), **Elizabeth Ahlgrim** (*@Ahlgrim_gr5_OLG*; *bobandelizabethahlgrim@gmail.com*), and **Tisha Jackson** (*tishajackson03@gmail.com*), Our Lady of Grace Catholic School, Noblesville, Ind.

Journey to a small Catholic school in Indiana—that through the generosity of donors opened a woodshop, robotics lab, and maker space—and share our successes, failures, and dreams as our whole community has embraced STEAM for our students.

A **Becoming a STEM-Focus School: STEM by Design***(Grades P–12)*

603, Conv. Center

Rebecca Peters (*@beckypeters*; *peters_rebecca@svvsd.org*), The Innovation Center, Longmont, Colo.**Kristen Brohm** (*brohm_kristen@svvsd.org*), Alpine Elementary School, Longmont, Colo.**Carolyn Clifford** (*@CCliffordSTEM*) and **Alexandra Downing**, Timberline PK–8, Longmont, Colo.**Eric Woodland** (*woodland_eric@svvsd.org*), Northridge Elementary School, Longmont, Colo.**Josh Lemon** (*@lemon2476*; *lemon_joshua@svvsd.org*), Rocky Mountain Elementary School, Longmont, Colo.**Lindsey Cheney**, Columbine Elementary School, Longmont, Colo.

Join us for a panel discussion on becoming a STEM-focus school. Hear about our model; strategic plan; the evolution, challenges and successes; and involvement of staff during transition.

Pa **Equity in STEM Education Roundtable***(General)*

604, Conv. Center

Jerry Valadez (*@samacademymaker*; *jdvscience@yahoo.com*), California State University, Fresno**Lisa Ernst** (*ernstl@sfsud.edu*), Alice Fong Yu Alternative School, San Francisco, Calif.

The Equity in STEM Education Roundtable includes conference participants in the development of a framework that NSTA will use in developing strategies for equity and inclusion.

Pa **Building Partnerships to Connect Classroom to Career***(Grades 6–College)*

606, Conv. Center

John Sepich (*colosciinfo@yahoo.com*), Community Liaison, Denver, Colo.**Glen Zollman** (*@STEM_Jobs*; *glen.zollman@stemjobs.com*), STEM Jobs, Moon Township, Pa.

This interactive panel discussion focuses on partnerships between K–12 educators, colleges, and employers so students can better connect their classroom experience to STEM careers.

M **Engineering Deeper Understanding of Science***(Grade 8)*

701, Conv. Center

Jessica Noffsinger (*jessica.noffsinger@adams12.org*), STEM Magnet Lab School, Northglenn, Colo.

Discover how integrating engineering and science can deepen student understanding of the NGSS. Take away project ideas ranging from lava lamps to Martian Landers.

HS **Trellis Education: A New Model for Exceptional Secondary STEM Teacher Recruitment, Preparation, and Growth***(Grades 9–College)*

706, Conv. Center

Sadie Skiles (*@TrellisEdu*; *sadie.skiles@ousd.org*), Oakland Technical High School, Oakland, Calif.

Trellis is a six-year model to recruit, prepare, and grow exceptional secondary STEM teachers—a positive feedback loop that includes a cycle of mentorship, graduate degree, and national board certification.

HS **Innovating with Infographics**

(Grades 7–College)

710, Conv. Center

Rosemary Davidson (rosembdavidson@gmail.com), St. Joseph's Academy, Saint Louis, Mo.

Rob Lamb (@lambchop1198; rob.lamb@psdr3.org), Pattonville High School, Maryland Heights, Mo.

Joseph Polman (@joepolman; joseph.polman@colorado.edu), University of Colorado Boulder

Discover how infographics can be incorporated into the learning environment, increasing the 21st-century STEM literacy of students and deepening understanding of visuals, graphics, mathematical relationships, data, and information.

HS **Corrosion: Chemistry Made Simple, Relevant, and Fun**

(Grades 6–12)

Mile High Ballroom 1B, Conv. Center

Sherri Rukes (@sherrirukes; sherri.rukes@d128.org), Libertyville High School, Libertyville, Ill.

Join me for labs, demonstrations, and examples that make reactivity, oxidation/reduction, and corrosion engineering exciting, practical, and easy to teach and learn. STEM connections and a CD of information.

HS **Put Some STEAMpunk in Your STEM!**

(Grades 6–College)

Mile High Ballroom 1C, Conv. Center

David Black (elementsunearthed@gmail.com), American Academy of Innovation, South Jordan, Utah

Incorporating art and history into your STEM programs can enrich and engage students. We will explore combining inquiry science with writing, sculpture, fine art, and digital media technologies. Examples will include student projects to build steampunk costumes and junk sculptures, design tie-dyed shirts with natural dyes, and make homemade iron-gall ink.

HS **Empowering East Africans to Confront Challenges in Food Security and Health Through Innovative Extension and Education Models**

(Grades 8–College)

711, Conv. Center

Timothy Goodale (tagoodal@ncsu.edu), North Carolina State University, Raleigh

Dwight Allen, Emeritus Eminent Scholar, Old Dominion University, Aurora, Colo.

Receive an overview of the cutting-edge research ongoing in Africa and the United States that will provide context for potential STEM careers as well as current and future teacher professional development and student competitions/challenges.

HS **The Apple/Start-Up/Studio Model**

(Grades 9–College)

Mile High Ballroom 3C, Conv. Center

Thom Ingram (@icsvvsd; ingram_thom@svvsd.org), The Innovation Center, Longmont, Colo.

The Innovation Center of St. Vrain Valley School District models its teaching after tech start-ups. While these companies look like product firms, they are actually artist studios, with master craftspeople and apprentices. Find out how to bring this innovation into your classroom.

3:00–4:00 PM Hands-On Workshops

UE **Tinkering in the Classroom: Design Thinking in Science**

(Grades 1–6)

102, Conv. Center

Jamie Long (jlong@villagetechschoools.org), Village Tech Schools, Cedar Hill, Tex.

“Design thinking,” common building materials, and a few household tools bring authentic STEM challenges into your classroom. A kid who tinkers is a great thinker!

UE **Exploring CCSS ELA Goals and EEI with Globe Earth Sciences Through Musical Arts**

(Grades K–4)

103, Conv. Center

Bo Lebo, New Education Options, Inc., Sherman Oaks, Calif.

Find out how NEO uses the arts with STEM (waterbuddy.org) to build comprehension in ELA through STEM and STEAM. This is a three-part workshop whose goal is to explore the application of effective research-supported strategies for CCSS ELA and California Education and the Environment Initiative (EEI) goals. Warning! We may write, observe, sing, or share...and make up a way to stay in touch.



UE NGSS: What Are They All About?

(Grades K–8)

104, Conv. Center

Eileen Patrick (eileenpatrickco@gmail.com), North Mor Elementary School, Denver, Colo.

Come construct a visual to better understand NGSS with their three dimensions and how to read some of the documents. Building supplies for the first 40 attendees.

UE Seed Bombs: Changing the World One Fragrant Explosion at a Time

(Grades 4–College)

105, Conv. Center

Kimberly Rickards, Conservation Biologist, Denver, Colo.

Hear the latest buzz on pollinators. Join me for a practical activity and learn about the plight of pollinators, the importance of their role, and a way we can contribute to their survival.

M ASEE Session: Using Our Heads to Protect Our Brains—Contextualized Middle School Engineering Challenges

(Grades 5–8)

110, Conv. Center

Chantal Balesdent (@EiE.org) and **Kathryn Hutchinson** (@eie_org), Museum of Science, Boston, Mass.

Come join this hands-on/minds-on workshop exploring innovative approaches that use engineering challenges to build confidence, enthusiasm, and engagement in middle school learners.

LE Kindergarten STEM Labs

(Kindergarten)

207, Conv. Center

Adriana Guerra (adriana.guerra@venturausd.org), **Rebecca Haystead** (rebecca.haystead@venturausd.org), **Guadalupe Gomez** (guadalupe.gomez@venturausd.org), and **Jena Branstetter** (@mrsbranstetter; jena.branstetter@venturausd.org), E.P. Foster STEM Academy, Ventura, Calif.

Presider: Nancy Escamilla, E.P. Foster STEM Academy, Ventura, Calif.

Acquire hands-on experience of a partial investigation and walk away with an integrated CCSS and NGSS lesson.

LE Exploring Children’s (PreK–2) Physical Science Knowledge and Understanding

(Grades P–2)

210/212, Conv. Center

Jenny Ingber (@jingber; jingber@amnh.org), American Museum of Natural History, New York, N.Y.

Mary Hobbs (maryhobbs@utexas.edu), The University of Texas at Austin

Bob Williams, Consultant, Belmont, Tex.

Engage in performance assessment activities developed to explore what preK–2 children know and can do in physical science.

Pa Rigorous Citizen Science and Environment-Based Learning Makes for a Partnership of Global Proportions

(Grades 6–12)

502, Conv. Center

Jennifer Hammonds (@EcoSchoolsUSA; hammondsj@nwf.org), National Wildlife Federation, Reston, Va.

Richard Wagner (wagnerri@msudenver.edu) and **Janelle Johnson** (jjohn428@msudenver.edu), Metropolitan State University of Denver, Colo.

This is an opportunity for educators to integrate The GLOBE Program’s rigorous science-based citizen science with the National Wildlife Federation’s Eco-Schools USA student-led actions for sustainability.

Pa NCTM Session: Common Ground in Mathematics and Science Teaching: Effective STEM Teaching Practices

(Grades 6–12)

601, Conv. Center

Michael Steele (steelem@uwm.edu), University of Wisconsin–Milwaukee

I’ll introduce the eight research-based Effective Mathematics Teaching Practices introduced in the National Council of Teachers of Mathematics’ Principles to Actions: Ensuring Mathematical Success for All. We will examine narrative and video cases from mathematics and science classrooms and identify evidence of the eight teaching practices and how they can be adapted for both mathematics and science. Finally, I’ll share preliminary work on a math and science professional development project that brings together high school math and science teachers around these practices.

M Dropsonde Wind Tunnel Activity and Engineering in the Atmospheric Sciences

(Grades 4–College) 605, Conv. Center

Randy Russell and **Marc Mueller** (*marcm@ucar.edu*), UCAR Center for Science Education, Boulder, Colo.

Eileen Carpenter (@AtmosNews), Mesa Laboratory, Boulder, Colo.

Explore engineering education activities related to atmospheric science, featuring the dropsonde wind tunnel activity. Dropsondes are instrument packages dropped by parachutes from aircraft.

M PBL Workshops On Deck

(Grades 6–8) 607, Conv. Center

Kenya Wilson (@kenya_wilson31; *kenyawilson@lancasterisd.org*), Lancaster (Tex.) ISD

Join me for engaging Problem-Based Learning and STEM lesson-planning solutions. Participants receive planning decks to implement student-driven instruction with integrated content, critical thinking, and authentic learning.

M Mars, Here We Come!

(Grades 4–9) 610/612, Conv. Center

Joan Gillman (*joan.gillman@calhoun.org*), The Calhoun School, New York, N.Y.

NASA’s MAVEN Satellite has made some amazing discoveries about the “Red Planet.” Come participate in an activity that identifies similarities found in both the landscapes of Earth and Mars.

M Heating Things Up: Using CER with Seasonal Data

(Grades 6–8) 702, Conv. Center

Christine Shupla (*shupla@ipi.usra.edu*), Lunar and Planetary Institute, Houston, Tex.

Carol Waters (@MrsH20sScience; *cwaters@pasadenaisd.org*), Pasadena (Tex.) ISD

Devalyn Rogers (*devrog5@gmail.com*), Hoffman Middle School, Houston, Tex.

Carrie Stokes (*clacystokes@comcast.net*), Houston Community College, Houston, Tex.

Jan Grout (*pjgrout@gmail.com*), Retired Educator, Seabrook, Tex.

Students collaborate to analyze seasonal data, graphing temperatures for different cities, and then use a Claims, Evidence, Reasoning (CER) strategy to propose a hypothesis for the patterns.

HS Talking Points

(Grades 6–College) Mile High Ballroom 1D, Conv. Center

Erica Johnson, Rose E. Robinson Middle School, Kingsport, Tenn.

Walk away with “paired passages” after participating in a fast-paced interactive workshop that shares an ELA strategy to engage students in CCSS-focused scientific argument.

HS How to Engage Students in the Scientific Adventure

(Grades 7–College) Mile High Ballroom 1E, Conv. Center

Marita Beard (@ms_beard; *mbeard@cuhsd.org*), Leigh High School, San Jose, Calif.

Join me for engaging hands-on NGSS-focused guided inquiry labs in which students design an investigation and analyze meaningful data to answer an open-ended question.

HS Build a Mini Van de Graaff Generator

(Grades 10–12) Mile High Ballroom 1F, Conv. Center

Joseph Sencen (*sencenj@norwalkps.org*), Norwalk High School, Norwalk, Conn.

Spark new learning in your classroom by building a mini Van de Graaff generator.

HS CSI: Roadkill: Rider University’s Summer STEM Academy

(Grades 8–College) Mile High Ballroom 2C, Conv. Center

Peter Hester (*phester@rider.edu*), Rider University, Lawrenceville, N.J.

Experience a slice of a two-week summer STEM Academy immersion program for high school students through a hands-on skull ID lab and infrared camera activity.



3:00–4:00 PM Exhibitor Workshops**Is Cancer in My DNA?***(Grades 10–College)*

301, Conv. Center

Sponsor: Fisher Science Education

Robert Marshall (*robert.marshall@thermofisher.com*), Fisher Science Education, Pittsburgh, Pa.

Through a complete hands-on session, help Jane determine if she has a genetic predisposition to colon cancer. Learn how genetic mutations can cause cancer and the role genes have in cancer risk by examining family history, comparing DNA sequencing and lab analysis in this real-life STEM career-focused case study.

Genes, Genomes, and Personalized Medicine*(Grades 8–College)*

402, Conv. Center

Sponsor: MSOE Center for BioMolecular Modeling

Tim Herman (*herman@msoe.edu*), MSOE Center for BioMolecular Modeling, Milwaukee, Wis.

Introduce students to the science of genomics and personalized medicine with interactive DNA models and gene maps. We will tell a “genomic story” of how whole genome sequencing has been used to reach a molecular diagnosis of a disease.

4:30–5:30 PM Closing Session**Wrap Up/Strand Leaders’ Reports***(General)*

Mile High Ballroom 4 A–D, Conv. Center

Strand Leaders’ Reports

Jennifer Williams, chairperson of the STEM Steering Committee, will lead strand leaders through brief reports and summaries of the two-day experience. This is an opportunity to hear some of the highlights you may have missed.

Steering Committee:

Jennifer Williams, Steering Committee Chairperson, and Department Chair, Lower School Science, Isidore Newman School, New Orleans, La.

Mariano Lizano Alpizar, Lower Elementary/Early Childhood Strand Leader and Spanish Dual-Language Kindergarten Teacher, Sherwood Forest Elementary School, Bellevue, Wash.

Dedric McGhee, Upper Elementary Strand Leader, and STEM Manager (Science, Mathematics, Health, Physical Education, Lifetime Wellness), Shelby County Schools, Memphis, Tenn.

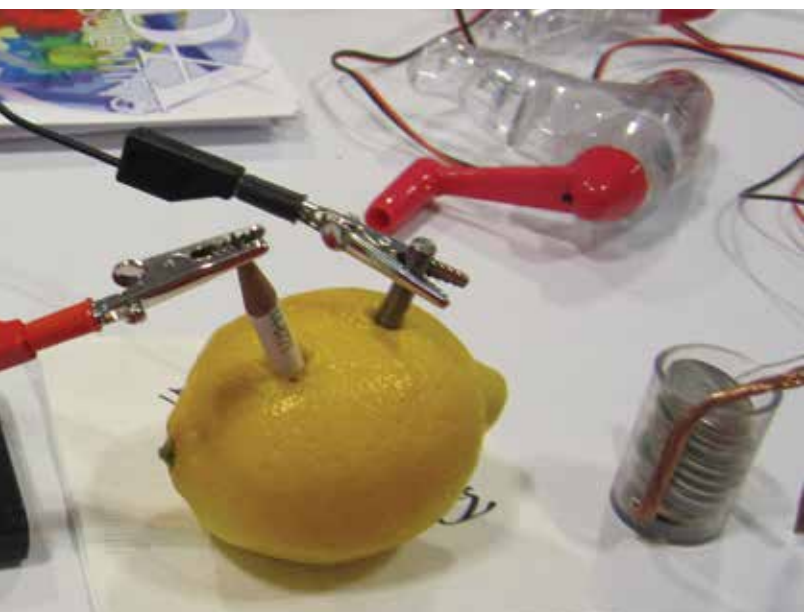
Kenneth William, Middle Level Strand Leader, and STEM Teacher, Oxon Hill Middle School: Fort Washington, Md.

Garrett Mason, High School Strand Leader, and Director of Innovation and Design, St. Martin’s Episcopal School, Metairie, La.

Brenda Nixon, Partnerships Strand Leader, and Co-Director, Gordon A. Cain Center for Scientific, Technological, Engineering, and Mathematical Literacy, Louisiana State University, Baton Rouge

Susan Evans, Administrators Strand Leader, and Retired Principal, Cockeysville, Md.

Tera Jones, Honorary Steering Committee Member, and STEM Coordinator/Recruitment Specialist, Denver (Colo.) Public Schools



Exhibitors

Some exhibitors have classified their products by grade level.

Elementary	E
Middle School	M
High School	HS
College	C

Scan the QR code for a map display of the Exhibit Hall on our conference app.



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Accelerate Learning—STEMscopes #541
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E-mail: javier@acceleratelearning.com
Website: www.acceleratelearning.com

Built on a digital platform, enhanced by print, and brought to life in hands-on kits, STEMscopes PreK–12 is an all-in-one STEM solution for NGSS and non-NGSS states. Developed in the lab by teachers for teachers, STEMscopes

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Alpharetta, GA 30009-8000
Phone: 888-413-6996, x5646
Website: www.advanc-ed.org

AdvancED provides institutions, as well as programs within institutions, with a research-based framework; their awareness for continuous improvements; and assessment of the quality, rigor, and substance of their STEM educational programs. The standards and indicators clearly define the qualities and components vital to creating and sustaining superior student-centered K–12 STEM teaching and learning programs.

AEOP eCYBERMISSION and GEMS #533
1840 Wilson Blvd. E, M, HS, C
Arlington, VA 22201
Phone: 703-312-9365
E-mails: missioncontrol@ecybermission.com;
aeopgems@nsta.org
Website: www.usaeop.com

The National Science Teachers Association administers and provides support to U.S. Army STEM programs/partnerships to engage students in real-world experiences. Come learn about eCYBERMISSION, a STEM competition

free to grades 6–9 students, as well as GEMS, a summer STEM enrichment program held at specific U.S. sites for grades 3–12 teachers.

American Association of Chemistry Teachers #428
1155 16th St., NW E, M, HS
Washington, DC 20036

AACT provides classroom resources, professional development, and networking opportunities for K–12 teachers of chemistry.

American Association of Physics Teachers #426
1 Physics Ellipse HS, C
College Park, MD 20740
Phone: 301-209-3311
E-mail: eo@aapt.org
Website: www.aapt.org

The American Association of Physics Teachers (AAPT) is a professional membership association dedicated to enhancing the understanding and appreciation of physics through teaching. AAPT offers numerous physics-based resources and events for high school science teachers and their students. We're dedicated to help physics teachers reach success in their classroom.

American Society for Engineering Education (ASEE) #432
 1818 N St. NW, Suite 600
 Washington DC 20036
 Phone: 202-331-3500
 Website: www.asee.org

The American Society for Engineering Education is committed to furthering education in engineering and engineering technology. This mission is accomplished by promoting excellence in instruction, research, public service, and practice; exercising worldwide leadership; fostering the technological education of society; and providing quality products and services to members.

ARC Science Simulations #434
 1122 Denver Ave. E, M, HS, C
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 E-mail: jessica@ardusat.com
 Website: www.ardusat.com

Ardusat is an interactive STEM program providing open curriculum resources, an Experiment Platform for students to build experiments, and professional development. Our resources range from using Arduino and sensors, to running experiments from space.

BEST Robotics, Inc. #634
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 Georgetown, TX 78627
 Phone: 469-630-2525
 E-mail: rosemary.mendel@bestinc.org
 Website: www.bestinc.org

BEST is a national nonprofit whose mission is to inspire students to pursue careers in engineering, science, and technology through participation in a sports-like science and engineering-based robotics program. Organized in hubs in 21 states, with a corps of volunteers at each hub, BEST charges no fees to schools or students for participation in our annual competition.

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 E-mail: p.spears@comcast.net
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 Website: www.bricks4kidz.com/435

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Bright Schools Competition #532
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 Arlington, VA 22201
 Phone: 703-312-9282
 E-mail: brightschools@nsta.org
 Website: brightschoolscompetition.org

The goal of the Bright Schools program is to create a STEM learning experience that will help students, parents, and teachers better understand the link between light and sleep. Through the Bright Schools Competition, students in grades 6–8 will select a sleep science topic and select one of three exploration options to create an original project.

Camp Invention #529
 3701 Highland Park NW E, M
 North Canton, OH 44720
 Phone: 800-968-4332
 E-mail: berickson@invent.org
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Become a part of something big...join us on our mission to recognize inventors and invention, promote creativity, and advance the spirit of innovation and entrepreneurship. By hosting Camp Invention or Invention Project, you are partnering with the only nationally recognized nonprofit enrichment program backed by The National Inventors Hall of Fame.

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 Website: www.carneysandoe.com

Carney, Sandoe & Associates is an educational recruitment firm that places teachers and administrators in K–12, private, independent, international, and like-kind (charter, magnet, pilot, and merit) schools across the nation and worldwide. Since 1977, we have placed over 31,500 teachers and administrators in exciting and rewarding positions.

Exhibitors

Circuit Scribe #535
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Austin, TX 78758
Phone: 713-397-6888
E-mail: stephanie@electroninks.com
Website: www.circuitscribe.com

Circuit Scribe offers simple, safe, and fun educational kits for home or school centered around our proprietary conductive ink pen. The conductive pen performs at a high level, and our modules are durable with our workbooks providing hours of engaging education.

Colorado Mining Association Education Foundation, Inc. #732
E, M, HS
216 16th St., Suite 1250
Denver, CO 80202
Phone: 720-250-6635
E-mail: coordinator@allaboutmining.org
Website: www.allaboutmining.org

CMAEF in conjunction with the Colorado School of Mines offers K–12 educators an on-line lecture series, complete with quizzes, lesson plans, and insights, three days on the CSM campus for lecture review and five days of mine/mill site tours culminating in six CEUs from CSM.

Colorado State University Extension #229
E
1311 S. College Ave.
4040 Campus Delivery
Fort Collins, CO 80523
Phone: 970-491-0893
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Our grades K–2 kits completely meet the underlying concepts of the Colorado Science Standards through a holistic approach to knowledge. Not only is the specific science standard thoroughly addressed, lessons meet many of mathematics, RWC, social studies, and arts standards as well through this fun and engrossing way to teach science.

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449 UCB
Boulder, CO 80309
Phone: 303-492-5670
E-mail: outreach@cires.colorado.edu
Website: cires.colorado.edu/education-outreach/

The Cooperative Institute for Research in Environmental Sciences (CIRES) is a partnership between the CU Boulder and NOAA. We offer free teacher professional development, hands-on learning projects for K–12 students, research opportunities for community college students, and virtual learning opportunities for the public.

Common Sense Education #828
E, M, HS
650 Townsend, Suite 435
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Website: www.commonsense.org/education

Common Sense Graphite has 2,500+ apps, games, and websites rated and reviewed by teachers and experts for learning potential. Educators can search by subject, grade, and standard. The site also has ready-made lesson plans and teacher tips on how to integrate technology to help you transform your classroom.

Couragion #341
M, HS, C
Denver, CO 80218
Phone: 720-460-1744
E-mail: info@couragion.com
Website: www.couragion.com

Couragion's mission is to inspire kids to pursue skills, degrees, and careers in STEM. The Couragion app provides career exploration and readiness using diverse role models, videos, and self-reflection. Couragion enables kids to see STEM careers firsthand and to assess how such careers fit their own interests and values.

Creative Discovery Museum #726
E, M
321 Chestnut St.
Chattanooga, TN 37402
Phone: 423-290-4641
E-mail: jwr@cdmfun.org
Website: www.cdmfun.org

Creative Discovery Museum (Chattanooga, Tennessee) is working with the BioEnergy Science Center (BESC) in Oak Ridge, Tennessee, on a biofuels/alternative energies project called Farming For Fuels. FREE materials, including curriculum, hands-on activities, "Road Trip Challenge" software app, website (www.learnbiofuels.org), and distance learning lesson information are available to educators! Come by our booth and see what free STEM materials might work well in your classroom!

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Draw it to Know it #542
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Draw it to Know it: Biological Sciences is a suite of online educational materials that promotes active learning through drawing. It has been used across the globe in K–12 and postsecondary education and is the ultimate active learning approach to biology and the anatomy and physiology of the human body.

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 E-mail: marie.girardot@austin.utexas.edu
 Website: engineeryourworld.org

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Phone: 202-615-1823
E-mail: delecia.elleer@gcu.edu
Website: www.gcu.edu/college-of-doctoral-studies.php
Founded in 1949, Grand Canyon University is a private, Christian University with innovative doctoral programs designed to prepare learners for leadership in their professions, communities, and society. Our dynamic online learning, community integrated dissertation process, and collaborative environment support a successful and meaningful doctoral journey.

Grove #839
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 Phone: 301-215-8619
 E-mail: octavainij@hhmi.org
 Website: www.hhmi.org/biointeractive

HHMI's BioInteractive team develops free resources based on real data, highlighting research practices. Our short films, virtual labs, apps, and print materials combine important science with engaging presentation. These multimedia resources developed, vetted, and field-tested by educators and scientists—are all free and tied to national curriculum standards

International Technology and Engineering Educators Association (ITEEA) #425
 1914 Association Dr. E, M, HS, C
 Reston, VA 20191-1538
 Phone: 703-860-4738
 E-mail: sbarbato@iteea.org
 Website: www.iteea.org

ITEEA's mission is to advance technological and engineering capabilities for all people and to nurture and promote the professionalism of those engaged in these pursuits. ITEEA seeks to improve public understanding of technology and engineering through Integrative STEM Education and its contributions to the world in which we live.



KaBOOM! #328
 4301 Connecticut Ave. E, M, HS
 Suite ML-1
 Washington, DC 20008
 Phone: 202-464-6185
 E-mail: GoOutandPlay@kaboom.org
 Website: www.kaboom.org/rigamajig

KaBOOM! is the national nonprofit dedicated to bringing balanced and active play into the daily lives of all kids, particularly those growing up in poverty in America.

KitHub #335
 PO Box 39873 E, M
 Los Angeles, CA 90039
 Phone: 213-514-7482
 E-mail: tara@kithub.com
 Website: www.kithub.cc

At KitHub, we whole-heartedly believe that kids are capable and interested in learning about STEM subjects, but may be limited by a lack of access and mentorship. KitHub empowers educators and parents to help kids dive into hands-on, fun, and creative STEM projects in the classroom and at home by providing theme-based kits and easy-to-follow lesson plans and instructions.

Kodo Kids #239
 155 Alter St., Unit A
 Broomfield, CO 80020
 Phone: 844-563-6543
 E-mail: info@kodokids.com
 Website: www.kodokids.com

Kodo Kids designs and creates investigation-based materials for childhood education environments. Kodo's products are grounded in play and promote creativity, critical thinking, and problem solving. Kodo also provides professional development opportunities that support the intentional use of open-ended materials and strategies for educators and children.

LAB-AIDS®, Inc. #724
 17 Colt Court M, HS
 Ronkonkoma, NY 11779
 Phone: 804-325-1241
 E-mail: metheridge@lab-aids.com
 Website: www.lab-aids.com

We believe students should experience science and be encouraged to question how it relates to them and the world around them. We do this by providing students with hands-on activities that excite them in science, integrate math, and are relevant to their own lives.

Exhibitors

lectrify

1890 Bryant St., Suite 411
San Francisco, CA 94110
Phone: 650-504-6254
E-mail: lectrifyit@gmail.com
Website: www.lectrify.it

We offer standards-based engineering toolkits for K–6 classrooms! Our hands-on circuit kits make it easy for educators to introduce science and engineering concepts through open-ended creative projects that are easy to use for beginners while flexible for experts. Curriculum and classroom sets available.

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Mid-continent Research for Education and Learning (McREL) is a nonprofit organization that helps students, teachers, and leaders flourish by providing research-based PD and coaching, strategic consulting, and systemic improvement services.

#324
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Cubelets are a fast and easy way to inspire kids to become better thinkers. These innovative robot blocks are a classroom-tested teaching tool that enhances lessons with hands-on activities and coding exercises.

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As an instructional materials development laboratory, we create student-centered, hands-on kits and models for the molecular biosciences. Through our professional development experiences, teachers learn active teaching skills and are involved in developing and field testing new kits. Ask about our outreach programs—SMART Teams and Science Olympiad Protein Modeling Event.

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We're developing the leading digital library of 3D-printable manipulatives for K–12 STEM education backed with vetted, standards-focused curriculum. Our library of over 100 kits covers all STEM subjects and grades to provide hands-on learning solutions for all levels.

National Association of Biology Teachers (NABT) #427
 M, HS, C
 PO Box 3363
 Warrenton, VA 20188
 Phone: 202-962-3939
 E-mail: office@nabt.org
 Website: www.nabt.org

Established in 1938, the National Association of Biology Teachers (NABT) continues to be recognized as a leader in life science education. Thousands of educators have joined NABT to share experiences and expertise with colleagues from around the world, keep up with trends and developments in the field, and grow professionally.

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Serving K–12 teachers for over 75 years, Nasco's family of 14 educational catalogs includes thousands of products in STEM-related areas such as science, mathematics, arts and crafts, cooperative games, and more. To see our full line of products or to receive a free catalog, please visit www.enasco.com or call 1-800-558-9595.

National Council of Teachers of Mathematics (NCTM) #429
 E, M, HS
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NCTM is the global leader and foremost authority in mathematics education, ensuring that all students have access to the highest quality mathematics teaching and learning. We envision a world where everyone is enthused about mathematics, sees the value and beauty of mathematics, and is empowered by the opportunities mathematics affords.

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The National Flight Academy (NFA) is a fully-immersive, aviation-themed learning adventure for grades 7–12 students that focuses on inspiring youth to take a greater interest in science, technology, engineering, and mathematics. The NFA's capstone program is a six-day, five-night deployment aboard *AMBITION*, a state-of-the-art 100,000+ square-foot virtual aircraft carrier.

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Boston, MA 02210
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National Geographic Learning, a part of Cengage Learning, provides quality preK–12, academic, and adult education instructional solutions for reading, science, social studies, ESL/ELD, advanced, honors, electives, career and technical education, and professional development. See our new catalog at NGL.Cengage.com/catalogs.

National Institute of Biomedical Imaging and Bioengineering, NIH #734
31 Center Dr., Room 1C14 HS, C
Bethesda, MD 20892
Phone: 301-496-8859
E-mail: info@nibib.nih.gov
Website: www.nibib.nih.gov

The National Institute of Biomedical Imaging and Bioengineering (NIBIB) supports research to create biomedical technologies to improve health. Stop by our booth to play our bioengineering game, watch cool videos, and learn about other free science education resources.

The NEED Project #641
8408 Kao Circle E, M, HS
Manassas, VA 20110
Phone: 703-257-1117
E-mail: rlamb@need.org
Website: www.need.org

The NEED Project, an energy education non-profit, partners with Shell to provide energy education and curriculum to K–12 teachers.

Nomad Press #538
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Website: www.oceanfirsteducation.com

Ocean First Education provides innovative online marine science courses for middle school through adult learners. Our team of educators, scientists, and researchers are committed to increasing awareness of marine environments and engaging students through interactive experiences. We aim to inspire students, teachers, and the community to become stewards of the sea.

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PhET simulations actively engage students in science and math, impacting millions of students today and pioneering innovations in teaching, learning, and assessment. Our new HTML5 simulations run in any modern web browser and are translated into many languages.

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Pitsco is your STEM resource. Every product we engineer, every activity we write, every curriculum we develop, and every solution we design is provided for the purpose of helping students around the world use their hands to engage their minds to learn and succeed—in the classroom and in life!

PlayMada Games #539
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PlayMada Games is a devoted team of educators, designers, and developers on a mission to bring game-based learning experiences into high school science classrooms. We create digital games that give students a deepened understanding of fundamental scientific concepts while exploring systems of science through play.

Play-Well TEKnologies #330
 224 Greenfield Ave. E, M
 Suite B
 San Anselmo, CA 94960
 Phone: 508-246-3852
 E-mail: jessi@play-well.org
 Website: www.play-well.org

Play-Well provides LEGO®-inspired engineering classes for kids ages K–8. We teach over 100,000 kids each year all across the nation. Our programs illustrate STEAM concepts through hands-on-learning.

Project Learning Tree #227
 2000 M St. NW E, M, HS
 Washington, DC 20036
 Phone: 202-765-3641
 E-mail: ebackman@plt.org
 Website: www.plt.org

Project Learning Tree is an award-winning environmental education program designed for teachers and other educators, parents, and community leaders working with youth from preschool through grade 12.

Project Paradigm #243
 1015 El Medio Ave. E, M, HS
 Pacific Palisades, CA 90272
 E-mail: jeff@projectparadigm.org
 Website: www.projectparadigm.org

The Paradigm Challenge is a competition that inspires students ages 4–18 to use STEM skills plus kindness, creativity, and collaboration to create new ideas to help solve real-world problems. Over 50,000 students participated in 2016. We provide video/print lessons, \$50,000 in teacher grants, and 100 student prizes up to \$100,000.



ProjectEngin #446
 22 Anchorage Way E, M, HS
 Barrington, RI 02806
 Phone: 401-578-8281
 E-mail: akaiser@projectengin.com
 Website: www.projectengin.com

ProjectEngin provides professional development and curriculum designed to support the inclusion of engineering in K–12 education. We work with teachers and schools to make engineering a natural part of your STEM courses. Our services include workshops and embedded coaching, along with project and full course design.

Regent University #540
 1000 Regent University Dr. E, M, HS, C
 Virginia Beach, VA 23464
 E-mail: edadmission@regent.edu
 Website: www.regent.edu

The School of Education, through its commitment to excellence in teaching, research, and service, provides a biblically based Christian education to equip men and women in mind, heart, and character for lives of educational and transformational leadership. Includes online programming, Ed.D., M.Ed. STEM, and others.

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 Denver, CO 80221-1099
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 Website: www.regis.edu

Regis University is proud to stand among the 28 Jesuit colleges and universities in the United States, which share the Jesuit vision of a values-centered education that shapes intelligent decision-making and strengthens commitment to community service.

Roller Skating Association International #841
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 Indianapolis, IN 46278
 Phone: 317-347-2626
 E-mail: editor@rollerskating.com
 Website: www.rollerskating.com

As the voice of the roller skating industry, we strive to promote the success of our member roller skating centers by providing educational and professional resource tools, as well as fostering the advancement of roller skating.

Exhibitors

- SAE International** #831
400 Commonwealth Dr. E, M
Warrendale, PA 15096
Phone: 724-772-7180
E-mail: meghan.stoyanoff@sae.org
Website: www.sae.org
- SAE International's A World In Motion (AWIM) program is a hands-on STEM program that brings science, technology, engineering, and math to life in the classroom for students in K–8. We have children's literature to introduce students to STEM as well as project-based units where students work in design teams.
- SE3D Education** #339
PO Box 2833 HS, C
Redwood City, CA 94064
Phone: 650-288-6635
E-mail: mlim@se3d.com
Website: www.se3d.com
- SE3D Education builds 3D bioprinters and NGSS-focused curriculum for the education market. Our classroom 3D bioprinter is an excellent addition to any science laboratory and makerspace to bring exciting bioscience exploration into a student project.
- School Specialty Science** #625/#627
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- School Specialty Science brings together the very best curriculum with FOSS® and CPO Science, classroom resources, equipment, and furniture with Delta Education and Frey Scientific. Together, these effective teaching and learning solutions serve all the needs of preK–12 science teachers, curriculum specialists, and administrators.
- SmartSchool Systems** #439
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Kingwood, TX 77339
Phone: 866-722-2051
E-mail: david@smartschoolsystems.com
Website: www.smartschoolsystems.com
- SmartSchool Systems provides easy-to-use technology for the science classroom. We offer a wide variety of robotics as well as data loggers and the award-winning SmartMicro-Scope handheld digital microscopes.
- Solar One** #826
37 W. 26th St. M, HS
New York, NY 10010
Phone: 212-505-6050
E-mail: fiscal@solar1.org
Website: www.solar1.org
- Solar One's Green Design Lab (GDL) is a curriculum and program that uses the school building as a teaching tool to explore sustainability. Hands-on and project-based, the GDL program engages students in inquiry-based learning and inspires them to take action through school greening initiatives.
- South Dakota State University** #241
Avera Health Science 351 E, M, HS, C
Brookings, SD 57007
Phone: 605-688-6274
E-mail: matt.miller@sdsstate.edu
Website: www.sdsstate.edu/chem
- South Dakota State University offers a Master's program in chemistry and hosts the ChemEd 2017 conference at SD State. This online program focuses on topics covered in secondary chemistry curriculum. We will show a variety of safe demonstrations to engage students in the classroom. Stop by and learn about our programs, ChemEd 2017, and our curriculum.
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E-mail: education@sparkfun.com
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- STEAM Education©** #838
PO Box 1122 E, M, HS, C
Marion, VA 24354
E-mail: bookings@steamedu.com
Website: www.steamedu.com
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- STEM JobsSM** #729
420 Rouser Rd. M, HS
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E-mail: ellen.pomerantz@stemjobs.com
Website: www.stemjobs.com
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 Website: www.sumblox.com

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 Schuylerville, NY 12871
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SumBlox is a company dedicated to the development of premier math learning products. SumBlox teaches numeracy in a new and fun way. These hands-on manipulatives have a unique design that allows children to grasp concepts earlier and retain them longer through engaging activities and meaningful play.

Ten80 develops and publishes K–12 science, technology, engineering, and mathematics (STEM) curriculum, trains educators in the art of STEM and organizes events that motivate students to engage and learn over time. Ten80 is a team of education and STEM professionals who saw the need for a more integrated, interactive way of teaching science and mathematics back in the 1990s.

StoneOak Media, LLC **#747**
 E, M
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 San Antonio, TX 78260
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 E-mail: d.mckee@stoneoakmedia.com
 Website: www.stoneoakmedia.com

StoneOak Media develops affordable STEM-focused, curriculum-aligned, augmented reality enabled educational products. Makers of *The Rockwell Adventures* activity books: *Solar System Expedition*, *Water Cycle Engineer*, and more, StoneOak Media has a singular focus on delivering educational solutions that make learning immersive, engaging, and fun.

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Tests of Engineering Aptitude Mathematics and Science (TEAMS) **#226**
 M, HS
 1914 Association Dr.
 Reston, VA 20191
 Phone: 703-860-9000
 E-mail: shonour@tsaweb.org
 Website: teams.tsaweb.org

TEAMS is an annual STEM competition challenging students to work collaboratively and apply their math and science knowledge in practical, creative ways to solve real everyday engineering challenges.



Exhibitors

Texas Instruments #443
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Dallas, TX 75265
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E-mail: ti-cares@ti.com
Website: education.ti.com

Texas Instruments provides free classroom activities that enhance math, science, and STEM curricula; technology that encourages students to develop a deeper understanding of concepts; and professional development that maximizes your investment in TI technology. Visit education.ti.com.

Texas State University #447
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San Marcos, TX 78666-6150
E-mail: kf19@txstate.edu
Website: www.txstate-epdc.net

The NASA STEM Educator Professional Development Collaborative is a project led in collaboration with Texas State University. We aim to maintain and build upon the best of the existing NASA professional development offerings and to work closely with NASA to pilot and subsequently implement other innovative, high-impact approaches to new audiences of formal and informal educators.

Transforming Teaching Through Implementing Inquiry #435
M, HS
510-E Poe Hall, Campus Box 7801
Raleigh, NC 27695-7801
Phone: 919-515-1771
E-mail: aaron_clark@ncsu.edu
Website: www.stemteacherlearning.com

STEM Teacher Learning provides professional development for technology education teachers. It began as a National Science Foundation (NSF) funded four-year full research and development project. STEM Teacher Learning uses cyber infrastructure and the worldwide web to significantly enhance the delivery and quality of professional development (PD) for grades 6–12 engineering, technology, and design educators.

U.S. Navy Recruiting #247
C
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Website: www.extended.unco.edu

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University of Northern Iowa FREE #528
E, M, HS
CEEE 12 CM 0293
Cedar Falls, IA 50614
Phone: 319-273-6012
E-mail: highby@uni.edu
Website: www.uni.edu/ceee/free

Fabulous Resources for Energy Education (FREE) from the University of Northern Iowa assists K–12 educators with online STEM activities, economical renewable energy kits, and online and face-to-face professional development. Our mission is to help teachers empower their students to build a better, safer, healthier world using renewable energy sources.

Vernier Software & Technology #624
E, M, HS, C
13979 SW Millikan Way
Beaverton, OR 97005
Phone: 888-837-6437
E-mail: info@vernier.com
Website: www.vernier.com

Vernier Software & Technology is a leading innovator of scientific data-collection technology. Focused on STEM, Vernier is dedicated to developing creative ways to teach and learn using hands-on science. Vernier creates easy-to-use and affordable science interfaces, sensors, and graphing/analysis software. Vernier's technology-based solutions enhance STEM education, increase learning, and build students' critical-thinking skills.

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E-mail: sales@whiteboxlearning.com
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Engage your students in the complete engineering design process. WhiteBox Learning provides a standards-based, web-based, activity-based, STEM learning system. Gliders 2.0, Rover 2.0, Structures 2.0, Prosthetics 2.0, Mousetrap-Car 2.0, GreenCar 2.0, Rockets 2.0, Dragster 2.0, and SurvivalShelter 2.0 allow students to build, analyze, and simulate their designs—and compete “virtually,” 24/7 all around the world... how cool is that?!

Zula International #228
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767 5th Ave., 12th Floor
New York, NY 10153
Phone: 800-848-4198
E-mail: info@zula.com
Website: www.zula.com

Zula International is a leading provider of STEM educational products and professional development designed to promote critical thinking skills and foster exploration. Zula's STEM Exploration Program provides all the curriculum, tools, and materials needed to immediately incorporate inquiry-based science, math, and language arts for preK–5 students.

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3D Molecular Designs, LLC (Booth #633)

Thursday, July 28	9:30–10:30 AM	402, Conv. Center	Go Small to Go Big: Molecular Models in Ecology (p. 34)
Thursday, July 28	1:30–2:30 PM	402, Conv. Center	Connecting the Dots in Science/Math Using Salt and Water Models (p. 48)
Thursday, July 28	3:00–4:00 PM	402, Conv. Center	Constructing and Crossing Cell Membranes (p. 55)
Friday, July 29	9:30–10:30 AM	402, Conv. Center	The Many Jobs of Proteins: Enzymes in the Spotlight (p. 66)
Friday, July 29	11:00 AM–12 Noon	402, Conv. Center	Let's Get Helical: Exploring DNA Structure/Function with Physical Models (p. 74)

Accelerate Learning–STEMscopes (Booth #541)

Thursday, July 28	11:00 AM–12 Noon	303, Conv. Center	Engineering Design Challenges in the STEM Classroom (p. 40)
Friday, July 29	9:30–10:30 AM	303, Conv. Center	The Value of Inquiry and Scientific Explanations in STEM (p. 65)

AdvancED (Booth #740)

Friday, July 29	9:30–10:30 AM	403/404, Conv. Center	The Road to AdvancED STEM Certification (p. 66)
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AEOP eCYBERMISSION (Booth #533)

Friday, July 29	11:00 AM–12 Noon	401, Conv. Center	Student Collaboration in the Science Classroom (p. 74)
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Ardusat (Booth #546)

Friday, July 29	1:30–2:30 PM	302, Conv. Center	We're All Engineers in the Science Classroom (p. 80)
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BEST Robotics, Inc. (Booth #634)

Friday, July 29	1:30–2:30 PM	403/404, Conv. Center	The BEST Approach to Inspiring Interest in STEM Through Robotics (p. 81)
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Colorado State University Extension (Booth #229)

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CPO Science/School Specialty Science (Booth #627)

Thursday, July 28	1:30–2:30 PM	301, Conv. Center	CPO Science's Optics with Light and Color: Use Light to Learn About Light with Our Link™ Learning Module (p. 48)
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Delta Education/School Specialty Science (Booth #625)

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Edvotek, Inc. (Booth #525)

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ETA hand2mind (Booth #534)

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FIRST® (Booth #325)

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Thursday, July 28	11:00 AM–12 Noon	406, Conv. Center	More Than Robots...FIRST® Tech Challenge “Drives” STEM Learning Beyond the Classroom (p. 41)
Thursday, July 28	1:30–2:30 PM	406, Conv. Center	FIRST® Tech Challenge Proves You CAN Program a Robot (p. 49)
Thursday, July 28	3:00–4:00 PM	406, Conv. Center	Roll Up Your Sleeves—We’re Programming a LEGO® Robot! (p. 55)

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Friday, July 29	11:00 AM–12 Noon	301, Conv. Center	Putting the STEM in Astronomy (p. 74)
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Flinn Scientific, Inc. (Booth #725)

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Thursday, July 28	11:00 AM–12 Noon	301, Conv. Center	How to Incorporate Robotics into Any Learning Environment (p. 40)
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Howard Hughes Medical Institute (HHMI) BioInteractive (Booth #628)

Thursday, July 28	9:30–10:30 AM	401, Conv. Center	The Biology of Skin Color (p. 34)
Thursday, July 28	11:00 AM–12 Noon	401, Conv. Center	Birds: Living Dinosaurs (p. 41)
Thursday, July 28	1:30–2:30 PM	401, Conv. Center	Analyzing Authentic Biological Data to Practice STEM Skills (p. 48)
Thursday, July 28	3:00–4:00 PM	401, Conv. Center	Patterns and Processes in Ecology (p. 55)
Friday, July 29	9:30–10:30 AM	401, Conv. Center	Extinctions Past and Present (p. 66)

LAB-AIDS®, Inc. (Booth #724)

Thursday, July 28	9:30–10:30 AM	302, Conv. Center	Investigating a Cliff Model (p. 34)
Thursday, July 28	11:00 AM–12 Noon	302, Conv. Center	Reclaiming the Metal (p. 40)
Friday, July 29	9:30–10:30 AM	302, Conv. Center	Chemical Batteries (p. 65)
Friday, July 29	11:00 AM–12 Noon	302, Conv. Center	Interpreting Motion Graphs (p. 74)

miniPCR (Booth #733)

Friday, July 29	9:30–10:30 AM	405, Conv. Center	Real-World Biotech: Hands-On DNA Applications in Forensics (p. 66)
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MSOE Center for BioMolecular Modeling (Booth #635)

Thursday, July 28	11:00 AM–12 Noon	402, Conv. Center	3D Printing for the Bioscience Classroom (p. 41)
Friday, July 29	1:30–2:30 PM	402, Conv. Center	Telling Stories with David Goodsell’s Watercolor Molecular Landscapes (p. 81)
Friday, July 29	3:00–4:00 PM	402, Conv. Center	Genes, Genomes, and Personalized Medicine (p. 87)

National Geographic Learning (Booth #338)

Friday, July 29	9:30–10:30 AM	406, Conv. Center	National Geographic Explorers—Ideal Role Models of STEM (p. 66)
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Ocean First Education (Booth #735)

Friday, July 29	11:00 AM–12 Noon	406, Conv. Center	Integrating 360° Video Technology to Engage Students (p. 75)
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Pitsco Education (Booth #739)

Thursday, July 28	1:30–2:30 PM	302, Conv. Center	<i>The Science of Speed: Fusion of Competition, Creativity, and STEM Learning</i> (p. 48)
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ProjectEngin (Booth #446)

Thursday, July 28	3:00–4:00 PM	304, Conv. Center	Capitalizing the “E” in STEM: Engineering Engaging Experiences (p. 55)
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SAE International – A World In Motion Program (Booth #831)

Thursday, July 28	1:30–2:30 PM	304, Conv. Center	Building STEM Foundations in the Primary Classroom (p. 48)
Friday, July 29	9:30–10:30 AM	304, Conv. Center	Hands-On STEM Fun for Older Students (p. 65)

SE3D Education (Booth #339)

Friday, July 29	11:00 AM–12 Noon	304, Conv. Center	Ignite Your Science Classroom with 3D Bioprinting (p. 74)
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SparkFun Electronics (Booth #825)

Thursday, July 28	9:30–10:30 AM	407, Conv. Center	DIY Data Logging for Authentic Citizen Science Using Arduino (p. 35)
Thursday, July 28	11:00 AM–12 Noon	407, Conv. Center	Think Fast! Build Your Own Reaction Timer with Arduino (p. 41)
Friday, July 29	9:30–10:30 AM	407, Conv. Center	Internet of Things 101: Connecting Electronic “Things” and the “Internet” (p. 66)
Friday, July 29	11:00 AM–12 Noon	407, Conv. Center	Physical Computing, Computer Science, and Making with Arduino (p. 75)

SumBlox (Booth #824)

Friday, July 29	11:00 AM–12 Noon	403/404, Conv. Center	Hands-On with SumBlox, a New STEM Toy (p. 75)
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Ten80 Education Inc. (Booth #230)

Thursday, July 28	9:30–10:30 AM	405, Conv. Center	Ten80 Education: Innovation Through CompSci, Racing, and Robotics Challenge (p. 35)
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Texas Instruments (Booth #443)

Thursday, July 28	11:00 AM–12 Noon	405, Conv. Center	How Can Entering Sin ($\pi/2$) on My Calculator Turn on a Hot Plate? (p. 41)
Thursday, July 28	3:00–4:00 PM	405, Conv. Center	Science Through Engineering Design (p. 55)
Friday, July 29	11:00 AM–12 Noon	405, Conv. Center	Zombie Apocalypse! (p. 75)
Friday, July 29	1:30–2:30 PM	405, Conv. Center	An Easier Path to Coding and STEM Projects (p. 81)

University of Northern Iowa FREE (Booth #528)

Friday, July 29	1:30–2:30 PM	303, Conv. Center	FUNdamentals of Wind Energy Education (p. 80)
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Vernier Software & Technology (Booth #624)

Thursday, July 28	9:30–10:30 AM	304, Conv. Center	Integrating Chromebook™ with Vernier Technology (p. 34)
Thursday, July 28	11:00 AM–12 Noon	304, Conv. Center	Investigating Renewable Energy with KidWind and Vernier (p. 40)

WhiteBox Learning (Booth #433)

Thursday, July 28	1:30–2:30 PM	303, Conv. Center	Project-Based STEM/Engineering (p. 48)
Friday, July 29	11:00 AM–12 Noon	303, Conv. Center	Project-Based STEM/Engineering (p. 74)

Schedule at a Glance

Lower Elementary/Early Childhood Strand

Thursday

9:30–10:30 AM	P–2	107, Conv. Center	Engineers in the Block Area: How Building with Blocks Fosters the Growth of a Child’s Scientific Mind (p. 29)
9:30–10:30 AM	K–4	107, Conv. Center	Buddy Up! Full STEAM Ahead! (p. 29)
9:30–10:30 AM	P–3	210/212, Conv. Center	It’s Never Too Early for Authentic STEM Experiences (p. 31)
9:30–10:30 AM	P–K	503, Conv. Center	Creating Scientific and Mathematical Thinkers Through Hands-On Experiences and Open-Ended Questioning (p. 32)
9:30–10:30 AM	K–5	205, Conv. Center	STEM Across the Curriculum (It’s eleSTEMary!) (p. 31)
11:00 AM–12 Noon	P–1	102, Conv. Center	Don’t Let It Rub You the Wrong Way: Developing Friction Concepts in Early Childhood (p. 38)
1:30–2:30 PM	P–K	202, Conv. Center	Preschoolers Explore Change Over Time and Living/Nonliving (p. 43)
1:30–2:30 PM	P–3	205, Conv. Center	Engineers Play, Too! (p. 45)
1:30–2:30 PM	1–3	207, Conv. Center	Nothing but Hot Air? Developing Concepts of Energy, Force, and Friction Through Balloon Cars (p. 45)
1:30–2:30 PM	P–2	210/212, Conv. Center	Teacher and Child—Co-Explorers, Co-Learners (p. 45)
1:30–2:30 PM	P–6	503, Conv. Center	Primary STEM Integration K–6 (p. 46)
3:00–4:00 PM	1–3	105, Conv. Center	Simple Machines Made Simpler Through Mechanical Puppets and Masks (p. 52)

Friday

9:30–10:30 AM	P–3	503, Conv. Center	Engaging Young Scientists in the Engineering Design Process to Create a PBL That Explores the Properties and Behavior of Matter (p. 61)
9:30–10:30 AM	3–6	504, Conv. Center	Equipping General Education Teachers to Be STEM Professionals (p. 61)
9:30–10:30 AM	P–K	205, Conv. Center	Simple Machine: It’s That Simple (p. 63)
9:30–10:30 AM	P–1	207, Conv. Center	From Apps to ABCs: Great Technology for Early Childhood (p. 63)
9:30–10:30 AM	P–1	210/212, Conv. Center	Blocks and Beyond: Strengthening STEM Through Spatial Understandings (p. 64)
9:30–10:30 AM	P–1	601, Conv. Center	ECSTEAM (p. 64)
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11:00 AM–12 Noon	P–3	504, Conv. Center	STEMming Away from Stereotypes: Broadening Student Views on STEM Careers (p. 68)
11:00 AM–12 Noon	P–2	205, Conv. Center	Can You Build It? Engineering Design Challenge in the Early Elementary Classroom (p. 72)
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11:00 AM–12 Noon	P–3	210/212, Conv. Center	Early Childhood Fab Labs: Integration of Digital Fabrication into PreK–3 STEM Learning (p. 72)
11:00 AM–12 Noon	P–1	Mile High Blrm. 3C, Conv. Center	Kids Love Rocks: Using Children’s Natural Interest to Explore Earth Materials (p. 74)
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1:30–2:30 PM	K–2	504, Conv. Center	Getting It All In (p. 76)
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3:00–4:00 PM	P–2	210/212, Conv. Center	Exploring Children’s (PreK–2) Physical Science Knowledge and Understanding (p. 85)

Upper Elementary Strand

Thursday

9:30–10:30 AM	K–6	109, Conv. Center	Creating an Elementary School STEM Lab and Curriculum (p. 28)
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9:30–10:30 AM	3–8	202, Conv. Center	Using Data to Inform Professional Development on Hands-On, Inquiry-Based Science Instruction: A Curriculum, University, and District Partnership Funded by a Math-Science Partnership Grant (p. 28)
9:30–10:30 AM	5–6	102, Conv. Center	The Marvelous, Miraculous Circus Machine! (p. 31)
9:30–10:30 AM	3–5	105, Conv. Center	The Movement of the Ocean (p. 31)
9:30–10:30 AM	K–8	110, Conv. Center	Digital “Show and Tell”: Student Use of Whiteboard Apps as a Formative Assessment (p. 31)
9:30–10:30 AM	1–7	203, Conv. Center	Using iPads and 21st-Century Skills to Demonstrate Understanding of NGSS Performance Expectations (p. 31)
11:00 AM–12 Noon	3–5	106, Conv. Center	Reimagine CODE: Computational Opportunities Delivered in Elementary (p. 36)
11:00 AM–12 Noon	K–6	103, Conv. Center	NGSS: It’s All About Inquiry (p. 38)
1:30–2:30 PM	3–6	113, Conv. Center	Reading and Writing in the STEM Classroom (p. 43)
1:30–2:30 PM	3–5	103, Conv. Center	One Bag of Materials = Three Hands-On Activities = Integrating Science and Engineering in a Fun Way! (p. 45)
1:30–2:30 PM	3–8	107, Conv. Center	STEM Lesson Guideposts™: Mapping STEM Lessons into Your Curriculum (p. 45)
1:30–2:30 PM	3–8	110, Conv. Center	Moon Gardens (p. 45)
1:30–2:30 PM	3–10	106, Conv. Center	Connecting and Integrating the NGSS with CCSS ELA (p. 49)
1:30–2:30 PM	3–5	108, Conv. Center	Engineering Design Failures in Elementary Classrooms: What Can You Expect and How Can You Respond?(p. 49)
1:30–2:30 PM	3–6	109, Conv. Center	Cross-Curricular Learning with a Science Focus: Optimizing Student Learning and Maximizing Efficiency of Instruction While Integrating All Aspects of STEM(p. 49)
1:30–2:30 PM	3–5	112, Conv. Center	Structuring an Interdisciplinary STEM Unit to Support Students’ Data Analysis and Interpretation Skills(p. 49)
3:00–4:00 PM	1–5	113, Conv. Center	Real-World STEM Lessons: Model Eliciting Activities for Elementary Students(p. 50)
3:00–4:00 PM	4–6	102, Conv. Center	Propel Energy Concepts by Designing and Making a Propeller-Powered Car (p. 52)
3:00–4:00 PM	3–12	103, Conv. Center	Design Build (p. 52)
3:00–4:00 PM	3–6	104, Conv. Center	Park It! Making the STEM Connection Through a Parking Garage Challenge (p. 52)
3:00–4:00 PM	1–5	107, Conv. Center	Effective Questioning Strategies in Engineering Activities (p. 52)
3:00–4:00 PM	3–6/C	110, Conv. Center	Partner Up! STEM, STARBASE, Schools, and Preservice Teacher Education Yields a Winning Combination (p. 53)
3:00–4:00 PM	3–5	203, Conv. Center	It’s Not Rocket Science; Oh Wait, Actually It Is! Engage, Empower, and Excel with Aerospace Engineering! (p. 53)

Friday

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9:30–10:30 AM	3–5	108, Conv. Center	Integrating Science and Engineering Practices: Embedding Engineering Tasks into a Science Content Storyline (p. 60)

Schedule at a Glance Upper Elementary Strand

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9:30–10:30 AM	K–8	112, Conv. Center	Integrating Technology in the Inquiry-Based Classroom (p. 60)
9:30–10:30 AM	K–8	112, Conv. Center	Integrating Technology in the Inquiry-Based Classroom (p. 61)
9:30–10:30 AM	K–6	202, Conv. Center	Integrating Authentic STEM Learning into the Elementary Curriculum Through Local Field-Based Investigation (p. 61)
9:30–10:30 AM	4–5	102, Conv. Center	It's a Wrap (p. 63)
9:30–10:30 AM	3–12	103, Conv. Center	Using the Ice Age to Teach About Energy Flow and Climate Change (p. 63)
9:30–10:30 AM	2–8	104, Conv. Center	Constructing Explanations from Activities and Text (p. 63)
9:30–10:30 AM	3–5	105, Conv. Center	Beyond Spaceship Earth (p. 63)
9:30–10:30 AM	1–8	110, Conv. Center	ASEE Session: Infusing Engineering Throughout the Elementary Day (p. 63)
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11:00 AM–12 Noon	G	109, Conv. Center	STEM Trade Books: What Makes Them Different (p. 67)
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11:00 AM–12 Noon	3–5	102, Conv. Center	Animals Inside & Out: Interactive Animal Science Education Activities (p. 71)
11:00 AM–12 Noon	2–5	103, Conv. Center	Archeogeology: Engaging Students in Connecting the History and Science of Place (p. 71)
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1:30–2:30 PM	4–9	104, Conv. Center	Nature Thought of It First: Biomimicry (p. 78)
1:30–2:30 PM	4–6	105, Conv. Center	Adapting STEM Lessons to Engage Students and Meet Grade-Level Standards (p. 78)
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Schedule at a Glance Upper Elementary Strand

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3:00–4:00 PM	P–5	109, Conv. Center	Making STEM a Mind-Set: A Roadmap for Change (p. 82)
3:00–4:00 PM	5–6	112, Conv. Center	The Effects on Students’ Learning Concentration in Connecting Picture Books with Nature and Science Technology Curriculum in Elementary Schools in Taiwan (p. 82)
3:00–4:00 PM	1–6	102, Conv. Center	Tinkering in the Classroom: Design Thinking in Science (p. 84)
3:00–4:00 PM	K–4	103, Conv. Center	Exploring CCSS ELA Goals and EEI with Globe Earth Sciences Through Musical Arts (p. 84)
3:00–4:00 PM	K–8	104, Conv. Center	NGSS: What Are They All About? (p. 85)
3:00–4:00 PM	4–C	105, Conv. Center	Seed Bombs: Changing the World One Fragrant Explosion at a Time (p. 85)

Middle Level Strand

Thursday

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9:30–10:30 AM	4–12	706, Conv. Center	STEM Projects for the Science Classroom (p. 29)
9:30–10:30 AM	6–8	707, Conv. Center	NGSS EdTech: What’s Good and How to Find It (p. 29)
9:30–10:30 AM	5–12	708, Conv. Center	Chemistry Concepts STEAM-ified (p. 29)
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9:30–10:30 AM	3–9	605, Conv. Center	Games for Engineering Code: Learning by Design (p. 32)
9:30–10:30 AM	5–8	607, Conv. Center	Engineering Soil: It’s Not Dirt (p. 32)
9:30–10:30 AM	4–12	610/612, Conv. Center	NASA Design Challenges to Develop Critical Thinking (p. 32)
9:30–10:30 AM	3–12	702, Conv. Center	Engaging ELLs Through STEM Activity (p. 32)
9:30–10:30 AM	6–8	703, Conv. Center	Looking at Light: Analyzing Reflectance Spectra (p. 33)
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11:00 AM–12 Noon	6–8	113, Conv. Center	3D Printing Waves: Creating Physical Models of Sound and Light (p. 36)
11:00 AM–12 Noon	5–8	705, Conv. Center	NGSS Instruction That Makes Thinking Visible (p. 37)
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1:30–2:30 PM	P–8	112, Conv. Center	Beyond the Basics: Intentional Integration of STEM (p. 42)
1:30–2:30 PM	6–8	605, Conv. Center	Middle School Engineering Challenge: Gliders (p. 46)
1:30–2:30 PM	5–8	607, Conv. Center	Engineering from Every Angle: Engineers as Proficient in Emotional Intelligence as Well as Analytical Skills (p. 46)
1:30–2:30 PM	4–8	610/612, Conv. Center	Rocket Building Is Out of This World
1:30–2:30 PM	4–9	702, Conv. Center	UODs (Unidentified Old Devices): Using Old-Time Inventions and Oddities to Stimulate Inventiveness (p. 46)

Schedule at a Glance Middle Level Strand

1:30–2:30 PM	5–8	703, Conv. Center	Student Investigations of Metallic Elements: A Set of STEM-Based Lessons That Explore Costs Related to Mining, Manufacturing, and Recycling of Metals (p. 47)
1:30–2:30 PM	K–12	704, Conv. Center	Science Facilities 102: The Architects Have Started Without Me—What Do I Do Now? (p. 47)
3:00–4:00 PM	5–9	705, Conv. Center	How STEAM Helps STEM Students Become Problem Solvers (p. 51)
3:00–4:00 PM	4–8	706, Conv. Center	STEM Ahead (p. 51)
3:00–4:00 PM	5–9	707, Conv. Center	3-D Modeling with Middle School Girls (p. 51)
3:00–4:00 PM	5–9	708, Conv. Center	Modeling Scientific Concepts with SCRATCH (p. 51)
3:00–4:00 PM	P–12	711, Conv. Center	Science for EVERYONE (p. 51)
3:00–4:00 PM	4–9	607, Conv. Center	Integrating the STEM Disciplines Through Everyday Engineering (p. 54)
3:00–4:00 PM	K–12	610/612, Conv. Center	NASA Is with You When You Fly: Principles of Flight and Four Forces (p. 54)
3:00–4:00 PM	6–12	701, Conv. Center	Are Three Trials Enough? Analyzing Investigation Data with Large Variation: How Sample Size Can Actually Change “Conclusions” (p. 54)
3:00–4:00 PM	3–12	702, Conv. Center	Tinkering with STEM (p. 54)
3:00–4:00 PM	6–8	703, Conv. Center	Green STEM: A Vehicle to Engage Students in STEM Through Their Natural Curiosity for the Environment (p. 54)
3:00–4:00 PM	4–12	107, Conv. Center	Sneaky Math: Make Math Memorable with Projects Using Everyday Things (p. 54)

Friday

9:30–10:30 AM	1–12	706, Conv. Center	Biome Challenges That Will Blow Your Mind! (p. 62)
9:30–10:30 AM	5–8	707, Conv. Center	Engaging “At-Promise” Students in STEM Through Competitions (p. 62)
9:30–10:30 AM	4–8	708, Conv. Center	Yes! You Can Teach Computer Science with Scalable Game Design! (p. 62)
9:30–10:30 AM	6–9	605, Conv. Center	Engineering Paper Bridges: Integrating Math and Science in STEM: A Model Lesson (p. 64)
9:30–10:30 AM	4–10	607, Conv. Center	Demystifying NGSS Through Storytelling and Drawing (p. 64)
9:30–10:30 AM	K–8	610/612, Conv. Center	NASA’s Journey to Mars: Build a Mars Rover Using NASA’s Beginning Engineering Science and Technology (BEST) Curriculum (p. 64)
9:30–10:30 AM	6–9	703, Conv. Center	It’s All in the Genes (p. 64)
9:30–10:30 AM	1–8	704, Conv. Center	Building Bridges in Earthquake Country—From the Past to the Present (p. 64)
11:00 AM–12 Noon	6–9	701, Conv. Center	Investigational Design Tool Helps Students Put STEM in Action (p. 69)
11:00 AM–12 Noon	6–8	705, Conv. Center	Evolution for Educators
11:00 AM–12 Noon	K–12	706, Conv. Center	Science “STEMIFICATION”: Bringing Science Instruction into the 21st Century with STEM Infusions (p. 69)
11:00 AM–12 Noon	5–8	707, Conv. Center	Engaging Middle School Students with STEM and the Engineering Design Process (p. 69)
11:00 AM–12 Noon	7–C	708, Conv. Center	Measuring and Mapping Air Quality by Using Mobile Devices: An After-School STEM Program (p. 69)
11:00 AM–12 Noon	K–12	Mile High Blrm. 4 A–D, Conv. Center	Making and Accountability in the Classroom (p. 70)
11:00 AM–12 Noon	6–8	607, Conv. Center	Using a Web-Based Graphing Tool to Analyze and Interpret Local and National Weather and Climate Data for Patterns and Change (p. 73)
11:00 AM–12 Noon	K–8	610/612, Conv. Center	3-2-1 Liftoff! Build and Launch a Satellite Using NASA’s Beginning Engineering Science and Technology (BEST) Curriculum (p. 73)
11:00 AM–12 Noon	6–9	702, Conv. Center	Menacing Microbe or Just a Bad Rap? Bacteria, the Real Story (p. 73)

Schedule at a Glance Middle Level Strand

11:00 AM–12 Noon	5–8	703, Conv. Center	Using the Local Environment to Engage Youth: How Adapting the Billion Oyster Project Can Work for Your Site (p. 73)
11:00 AM–12 Noon	5–12	704, Conv. Center	Build, Ignite, and Launch (p. 73)
1:30–2:30 PM	5–12	111, Conv. Center	NASA’s “Eyes on the Solar System”: Bringing the Planets to Your Classroom (p. 75)
1:30–2:30 PM	5–8	701, Conv. Center	Engaging Students in Successful and Novel Science Projects: Materials, Strategies, and Challenges (p. 77)
1:30–2:30 PM	2–8	705, Conv. Center	Living Through an Avatar (p. 77)
1:30–2:30 PM	K–12	706, Conv. Center	Gardening for Success: Integrating Subjects and Teaching Your Standards Through Gardening (p. 77)
1:30–2:30 PM	4–9	Mile High Blrm. 4 E/F, Conv. Center	Dazzling Deceptions: Discrepant Events That Delight and Mystify! (p. 78)
1:30–2:30 PM	K–12	110, Conv. Center	ASEE Session: The TeachEngineering Digital Library: Hundreds of Free, Searchable, NGSS-Focused Hands-On Engineering Lessons for K–12 (p. 78)
1:30–2:30 PM	6–C	605, Conv. Center	Modeling in STEM Education with Examples from Climate Modeling (p. 79)
1:30–2:30 PM	1–12	607, Conv. Center	Swipe Right; It’s a Match! Scientific Investigations and Engineering Design (p. 79)
1:30–2:30 PM	5–9	610/612, Conv. Center	NASA’s Beginning Engineering, Science, and Technology (BEST) (p. 80)
1:30–2:30 PM	6–12	702, Conv. Center	Can You Design the Most Efficient Wind Turbine? (p. 80)
1:30–2:30 PM	6–12	703, Conv. Center	Digging Deep with Concepts to Integrate for STEM (p. 80)
3:00–4:00 PM	6–9	107, Conv. Center	NASA eClips™ Address Middle School Students’ Misconceptions (p. 82)
3:00–4:00 PM	8	701, Conv. Center	Engineering Deeper Understanding of Science (p. 83)
3:00–4:00 PM	5–8	110, Conv. Center	ASEE Session: Using Our Heads to Protect Our Brains—Contextualized Middle School Engineering Challenges (p. 85)
3:00–4:00 PM	4–C	605, Conv. Center	Dropsonde Wind Tunnel Activity and Engineering in the Atmospheric Sciences (p. 86)
3:00–4:00 PM	6–8	607, Conv. Center	PBL Workshops On Deck (p. 86)
3:00–4:00 PM	4–9	610/612, Conv. Center	Mars, Here We Come! (p. 86)
3:00–4:00 PM	6–8	702, Conv. Center	Heating Things Up: Using CER with Seasonal Data (p. 86)

High School Strand

Thursday

9:30–10:30 AM	9–12	709, Conv. Center	Engaging Teens in Climate Change (p. 30)
9:30–10:30 AM	10–C	710, Conv. Center	What’s My Next? Exposing Students to Exciting Career Opportunities in Laboratory Medicine (p. 30)
9:30–10:30 AM	9–12	711, Conv. Center	How Skyline STEM Academy Stays Current in an Evolving STEM District (p. 30)
9:30–10:30 AM	9–12	712, Conv. Center	Effective Food Safety Curriculum for STEM Teachers—Motivating Students to Practice Safe Food Handling (p. 30)
9:30–10:30 AM	5–C	Mile High Blrm. 1A, Conv. Center	NESTA Shares: STEM Games and Simulations for Earth and Space Science (p. 30)
9:30–10:30 AM	9–C	Mile High Blrm. 1B, Conv. Center	NASA Astrobiology: The Search for Life Beyond Earth (p. 30)
9:30–10:30 AM	9–C	Mile High Blrm. 1C, Conv. Center	What Does English Have to Do with STEM? (p. 30)
9:30–10:30 AM	9–12	501, Conv. Center	AACT Session: Building a Unit Plan Using American Association of Chemistry Teachers Resources (p. 32)
9:30–10:30 AM	7–C	601, Conv. Center	NCTM Session: NCTM Principles to Action Toolkit: Resources for Supporting the Effective Mathematics Teaching Practices in High School (p. 32)
9:30–10:30 AM	8–12	Mile High Blrm. 1D, Conv. Center	Are You Ready to Be R.E.D.? (p. 33)

Schedule at a Glance High School Strand

9:30–10:30 AM	9–12	Mile High Blrm. 1E, Conv. Center	STEM Chem: Bringing Engineering into the Chemistry Classroom (p. 33)
9:30–10:30 AM	6–12	Mile High Blrm. 1F, Conv. Center	Using Recreational UAVs (Drones) for STEM Activities and Science Fair Projects (p. 33)
9:30–10:30 AM	7–12	Mile High Blrm. 3C, Conv. Center	STEM Behind Forensics (p. 33)
11:00 AM–12 Noon	G	112, Conv. Center	A Mobile and Global Classroom (p. 36)
11:00 AM–12 Noon	9–12	501, Conv. Center	AACT/AAPT/NABT-Sponsored Session: Using the NGSS and the Framework to Implement Crosscutting Concepts in Discipline-Specific Courses (p. 36)
11:00 AM–12 Noon	9–C	710, Conv. Center	Follow the Road to a Successful STEM Career (p. 37)
11:00 AM–12 Noon	7–C	712, Conv. Center	Making Data Analysis and Statistics Meaningful...and Understandable (p. 38)
11:00 AM–12 Noon	6–12	Mile High Blrm. 1A, Conv. Center	Using the National Science Olympiad and STEM to Address NGSS Crosscutting Concepts and Content (p. 38)
11:00 AM–12 Noon	6–12	Mile High Blrm. 1B, Conv. Center	The Rise of STEAM: Elevating STEM Curriculum Through the Art of Storytelling (p. 38)
11:00 AM–12 Noon	6–12	Mile High Blrm. 1C, Conv. Center	Cybersecurity Curriculum Training for Teachers (p. 38)
11:00 AM–12 Noon	9–C	Mile High Blrm. 1F, Conv. Center	Energy: A Multidisciplinary Approach for Teachers (EMAT) (p. 38)
11:00 AM–12 Noon	9–12	206, Conv. Center	Investigating Data Variation in 60 Minutes (p. 38)
11:00 AM–12 Noon	8–12	Mile High Blrm. 1D, Conv. Center	STEM21: Defining Curriculum in an Age of Information (p. 39)
11:00 AM–12 Noon	7–C	Mile High Blrm. 1E, Conv. Center	High Five: Five Ways to Make Teaching Biotechnology Easier and Cheaper (p. 39)
11:00 AM–12 Noon	9–12	Mile High Blrm. 3C, Conv. Center	English, ELLs, and STEM: A Collaboration Worth Pursuing (p. 40)
1:30–2:30 PM	G	706, Conv. Center	Authors Needed! Share Your Teaching Ideas in an NSTA Journal (p. 44)
1:30–2:30 PM	6–8	707, Conv. Center	Inviting “Failure” to the Classroom (p. 44)
1:30–2:30 PM	5–12	709, Conv. Center	PolyWhat? Understanding What a Polymer Is: Polymer 101 (p. 44)
1:30–2:30 PM	8–12	710, Conv. Center	Using Issues-Based Culminating Projects to Bring STEM to Introductory Chemistry (p. 44)
1:30–2:30 PM	4–12	712, Conv. Center	Moving Toward the Practices with Problem-Based Learning (p. 44)
1:30–2:30 PM	7–12	Mile High Blrm. 1A, Conv. Center	Open-Source Robotics (p. 44)
1:30–2:30 PM	8–C	Mile High Blrm. 1B, Conv. Center	A Unique Ice Core Investigation That Integrates the Three Dimensions of NGSS and STEM (p. 44)
1:30–2:30 PM	9–12	Mile High Blrm. 1C, Conv. Center	The Evolution of Bigfoot: Analyzing Evidence of an Alleged Species to Guide Students Through the 10 Big Questions in Evolution (p. 44)
1:30–2:30 PM	9–C	502, Conv. Center	AAPT Session: Balloon Science Lab—Inviting Chemistry and Physics to the Party (p. 46)
1:30–2:30 PM	6–12	Mile High Blrm. 1D, Conv. Center	Infect Your Science Classroom with Math (p. 47)
1:30–2:30 PM	8–12	Mile High Blrm. 1E, Conv. Center	Teaching Genetics and Evolution Through Context-Based Learning Involving Food Security Issues in Africa (p. 47)
1:30–2:30 PM	8–12	Mile High Blrm. 1F, Conv. Center	Framing an Integrated STEM Lesson (p. 47)
1:30–2:30 PM	9–C	Mile High Blrm. 2C, Conv. Center	Explore Building Mousetrap Vehicles to Integrate Science, Technology, Engineering, and Mathematics (STEM) (p. 47)
1:30–2:30 PM	9	Mile High Blrm. 3C, Conv. Center	Lesson Plan on Teaching Chemistry by Implementing Metaphorical Thinking (p. 47)
3:00–4:00 PM	9–12	503, Conv. Center	Bridging the Gap Between Students, Science, and the Future (p. 50)
3:00–4:00 PM	8–C	709, Conv. Center	Building Our Nation’s Future Engineers (p. 51)
3:00–4:00 PM	6–12	710, Conv. Center	Bioplastic—Going from Synthetic to Natural Polymers (p. 51)
3:00–4:00 PM	9–C	712, Conv. Center	Survive the Zombie Apocalypse (p. 51)
3:00–4:00 PM	6–C	Mile High Blrm. 1A, Conv. Center	Practical Tips in 3D Printing for STEM Classes (p. 51)
3:00–4:00 PM	6–12	Mile High Blrm. 1B, Conv. Center	This Is Science, What Do You Mean I Have to Write? Literacy and Writing in Science (LAWS) (p. 52)
3:00–4:00 PM	9–C	Mile High Blrm. 1C, Conv. Center	Add STEAM to Your Chemistry Classroom with Native Plant Extractions (p. 52)

Schedule at a Glance High School Strand

3:00–4:00 PM	6–C	206, Conv. Center	Using Synthetic Biology to Bring STEM into the Biology Classroom (p. 53)
3:00–4:00 PM	7–C	502, Conv. Center	AAPT Session: Smartphone STEM Lab—Turn Your Smartphone into a STEM Laboratory (p. 53)
3:00–4:00 PM	9–12	Mile High Blrm. 1D, Conv. Center	The Burning Question: How Can STEM Be Integrated into a Traditional Secondary Math Classroom? (p. 54)
3:00–4:00 PM	7–C	Mile High Blrm. 1E, Conv. Center	Use Ice Core Record Data to Plot and Date Volcanoes, Solar Activity, and Possible Supernova Events (p. 54)
3:00–4:00 PM	8–12	Mile High Blrm. 1F, Conv. Center	Teaching Environmental Sustainability Using a Place-Based Watershed Modeling Application (p. 55)
3:00–4:00 PM	6–12	Mile High Blrm. 3C, Conv. Center	The STEAM Behind a NASA Mission, as Seen by a Teacher Who “Flew” (p. 55)

Friday

9:30–10:30 AM	9–12	709, Conv. Center	Simulate STEM Online Through Virtual Clinical Trials Web Simulation (p. 62)
9:30–10:30 AM	6–12	710, Conv. Center	Engineering vs. Science (p. 62)
9:30–10:30 AM	9–12	711, Conv. Center	Denver Public Schools CareerConnect—Equity in STEM (p. 62)
9:30–10:30 AM	5–C	Mile High Blrm. 1A, Conv. Center	NESTA Shares: Using the CLEAN Collection of Resources to Inspire Climate and Energy Solutions (p. 62)
9:30–10:30 AM	9–12	Mile High Blrm. 1C, Conv. Center	STEM Literacy: An Innovative Way to Collaborate with Language Arts (p. 62)
9:30–10:30 AM	8–12	501, Conv. Center	NABT and BSCS Present: Identify and Interpret—a Strategy to Help Students Make Sense of Difficult Information (p. 64)
9:30–10:30 AM	7–C	502, Conv. Center	AAPT Session: Brain Science Lab—Using Gelatin Circuits to Understand How Neurons Work Through Physics and Biology (p. 64)
9:30–10:30 AM	5–12	Mile High Blrm. 1D, Conv. Center	Range of Motion: Motivating Students with STEM Careers (p. 65)
9:30–10:30 AM	7–C	Mile High Blrm. 1E, Conv. Center	Science and Math: Data Analysis Made Easy (p. 65)
9:30–10:30 AM	9–12	Mile High Blrm. 1F, Conv. Center	Teach an Old Dog New Tricks: Engaging Older Students in STEM (p. 65)
9:30–10:30 AM	8–12	Mile High Blrm. 3C, Conv. Center	NASA Earth Science: Real-World Connections to Data and Tools for Science Fairs (p. 65)
11:00 AM–12 Noon	6–12	505, Conv. Center	Building Teachers’ STEM Practices (p. 68)
11:00 AM–12 Noon	9–12	608, Conv. Center	Facilitating High School Students’ Interest in STEM Careers via Problem-Based Learning (p. 69)
11:00 AM–12 Noon	6–12	709, Conv. Center	Sim City in the Real World: Using STEM Practices to Model YOUR Environment (p. 69)
11:00 AM–12 Noon	6–12	710, Conv. Center	Using the 5E Learning Cycle Model to Facilitate an Inquiry-Oriented Lesson on Mass Transfer, Osmosis, and Diffusion (p. 69)
11:00 AM–12 Noon	9–12	711, Conv. Center	A Systematic Model to Fuel the STEM Pipeline (p. 70)
11:00 AM–12 Noon	6–12	712, Conv. Center	Experimental Design for Students (p. 70)
11:00 AM–12 Noon	9–12	Mile High Blrm. 1A, Conv. Center	Using Models to Teach How Crime Scene Blood Spatter Evidence Tells a Story (p. 70)
11:00 AM–12 Noon	9–12	Mile High Blrm. 1C, Conv. Center	Incorporating the CCSS for Literacy in Science and Technical Subjects into Science Investigations (p. 70)
11:00 AM–12 Noon	9–12	Mile High Blrm. 4 E/F, Conv. Center	Making Meaning Makers in the Sciences (p. 70)
11:00 AM–12 Noon	9–12	501, Conv. Center	NABT and BSCS Present: Scaffolding the Practices of Science to Facilitate Student Learning (p. 72)
11:00 AM–12 Noon	5–12	Mile High Blrm. 1D, Conv. Center	Integrating Career Awareness into STEM Classes (p. 73)
11:00 AM–12 Noon	9–12	Mile High Blrm. 1E, Conv. Center	Using Problem-Based Learning to Bring Upper-Level Research to High School STEM Science Students (p. 73)
11:00 AM–12 Noon	6–C	Mile High Blrm. 1F, Conv. Center	Technology Tools for Visualizing Scientific Data: A Hands-On Workshop (p. 73)
11:00 AM–12 Noon	8–C	Mile High Blrm. 2C, Conv. Center	The Best Interactive Physics Demonstrations You and Your Students AREN’T Doing (p. 73)

Schedule at a Glance High School Strand

1:30–2:30 PM	6–12	709, Conv. Center	Modeling Is Cool! Lessons from an Antarctic Scientist (p. 77)
1:30–2:30 PM	6–C	710, Conv. Center	Shop Locally: STEM in a Rural Colorado School (p. 77)
1:30–2:30 PM	11–12	711, Conv. Center	Guiding High School Students in an Independent Scientific Research Course (p. 77)
1:30–2:30 PM	9–12	712, Conv. Center	Investigating PBL at Inclusive STEM High Schools: An In-Depth Look at PBL in Practice (p. 77)
1:30–2:30 PM	9–12	Mile High Blrm. 1A, Conv. Center	Forensic Science: The Ideal STEM Course! (p. 77)
1:30–2:30 PM	9–12	Mile High Blrm. 1B, Conv. Center	Engineer Your World: Integrating Engineering Design, Computational Thinking, and 21st-Century Skills (p. 78)
1:30–2:30 PM	10–12	Mile High Blrm. 1C, Conv. Center	Can Lemonade Be Used as a Buffer? Collaboration Between AP Calculus and Chemistry (p. 78)
1:30–2:30 PM	9–12	Mile High Blrm. 2C, Conv. Center	Local Ecosystem Survey to Understand Resilience and Biodiversity (p. 78)
1:30–2:30 PM	9–12	501, Conv. Center	AACT/AAPT/NABT Session: One Lab Three Ways: Determining the Percent of Body Fat of a Sausage “Cadaver” (p. 79)
1:30–2:30 PM	9–C	601, Conv. Center	NCTM Session: Model with Mathematics, Working Across Science and Math in High School (p. 79)
1:30–2:30 PM	9–12	Mile High Blrm. 1D, Conv. Center	Transitioning to a Greener Society: Building STEM Skills Through Interdisciplinary Activities (p. 80)
1:30–2:30 PM	9–11	Mile High Blrm. 1E, Conv. Center	STEM Challenge! Getting Students Thinking! (p. 80)
3:00–4:00 PM	9–12	501, Conv. Center	AACT Session: American Association of Chemistry Teachers—Supporting New Teachers of Chemistry (p. 82)
3:00–4:00 PM	9–C	503, Conv. Center	Hooking Students on STEM Learning by Using Practical Case Studies (p. 83)
3:00–4:00 PM	9–C	706, Conv. Center	Trellis Education: A New Model for Exceptional Secondary STEM Teacher Recruitment, Preparation, and Growth (p. 83)
3:00–4:00 PM	7–C	710, Conv. Center	Innovating with Infographics (p. 84)
3:00–4:00 PM	8–C	711, Conv. Center	Empowering East Africans to Confront Challenges in Food Security and Health Through Innovative Extension and Education Models (p. 84)
3:00–4:00 PM	6–12	Mile High Blrm. 1B, Conv. Center	Corrosion: Chemistry Made Simple, Relevant, and Fun (p. 84)
3:00–4:00 PM	6–C	Mile High Blrm. 1C, Conv. Center	Put Some STEAMPunk in Your STEM! (p. 84)
3:00–4:00 PM	9–C	Mile High Blrm. 3C, Conv. Center	The Apple/Start-Up/Studio Model (p. 84)
3:00–4:00 PM	6–C	Mile High Blrm. 1D, Conv. Center	Talking Points (p. 86)
3:00–4:00 PM	7–C	Mile High Blrm. 1E, Conv. Center	How to Engage Students in the Scientific Adventure (p. 86)
3:00–4:00 PM	10–12	Mile High Blrm. 1F, Conv. Center	Build a Mini Van de Graaff Generator (p. 86)
3:00–4:00 PM	8–C	Mile High Blrm. 2C, Conv. Center	CSI: Roadkill: Rider University’s Summer STEM Academy (p. 86)

Partnerships Strand

Thursday

8:00–9:00 AM	G	Mile High Blrm. 4 A–D, Conv. Center	Forming Partnerships (p. 27)
9:30–10:30 AM	G	507, Conv. Center	John C. Dunham STEM Partnership School: The Building of True Collaboration (p. 29)
9:30–10:30 AM	C	602, Conv. Center	Undergraduate STEM Education Scholar Program (p. 29)
9:30–10:30 AM	2–12	604, Conv. Center	Extending the Learning Experience via STEAM Learning Partnerships (p. 29)
9:30–10:30 AM	G	606, Conv. Center	The High Tide Lifts All Boats: Value of PreK–20 Partnerships for Teaching and Learning (p. 29)
9:30–10:30 AM	2–8	502, Conv. Center	Kids Code: A University/K–12/Community Partnership to Engage Underrepresented Youth in Computer Science and Technology (p. 32)
11:00 AM–12 Noon	6–C	507, Conv. Center	Teachers Bridging School and Workplace: Summer in Industry (p. 36)

Schedule at a Glance Partnerships Strand

11:00 AM–12 Noon	G	602, Conv. Center	The Colorado STEM Model: A Public-Private Partnership (p. 37)
11:00 AM–12 Noon	7–12	604, Conv. Center	NICERC, Cyber Innovations, the University of Louisiana at Monroe, and Robots (p. 37)
11:00 AM–12 Noon	7–C	606, Conv. Center	Enhancing Student Engagement Through Real-World Relevance (p. 37)
11:00 AM–12 Noon	5–C	608, Conv. Center	Identifying the Right Mentoring Model for Your Program (p. 37)
11:00 AM–12 Noon	5–8	203, Conv. Center	Zombies, Space, and Connecting Creativity to STEM (p. 38)
11:00 AM–12 Noon	G	502, Conv. Center	STEAMology: The Power of Artful Learning (p. 39)
1:30–2:30 PM	6–C	104, Conv. Center	Enhancing STEM Education Through Partnerships to Prepare Students for NGSS (p. 42)
1:30–2:30 PM	3–5	106, Conv. Center	Getting Started with STEM (p. 42)
1:30–2:30 PM	3–7	108, Conv. Center	STEM Discovery Boxes (p. 42)
1:30–2:30 PM	P–6	109, Conv. Center	Hearts and Minds: A Case for Elementary Robotics (p. 42)
1:30–2:30 PM	5–12	506, Conv. Center	Gains in the Education of Mathematics and Science—What GEMS Can Do for You! (p. 43)
1:30–2:30 PM	G	507, Conv. Center	STEM P3: A Statewide Programs/Policy Partnership to Advance PreK–12 STEM Education (p. 43)
1:30–2:30 PM	P–12	602, Conv. Center	Bringing Imaginations to Reality (p. 43)
1:30–2:30 PM	G	604, Conv. Center	A STEM Guide: Inspiring, Motivating, and Preparing Girls in STEM (p. 43)
1:30–2:30 PM	10–12	606, Conv. Center	12 for Life: A Model Partnership Between Schools and Business (p. 43)
1:30–2:30 PM	1–12	608, Conv. Center	eesmarts™: A Partnership in Energy Education (p. 44)
1:30–2:30 PM	10–C	501, Conv. Center	NABT and BSCS Present: The AP Biology Academy—Professional Development with an Impact, Part 1 (p. 46)
1:30–2:30 PM	4–12	601, Conv. Center	STEM in Life Science: Connecting to Your Local Zoo (p. 46)
3:00–4:00 PM	9–C	507, Conv. Center	Bridges to Education: A Partnership Model for Municipalities to Engage Students Through Real-World Problems (p. 50)
3:00–4:00 PM	7–C	602, Conv. Center	Harnessing the Power of Partnerships in Out-of-School-Time STEM Programs (p. 50)
3:00–4:00 PM	G	604, Conv. Center	Building a Regional Culture of STEM (p. 50)
3:00–4:00 PM	7–12	606, Conv. Center	Providing Schools with Real-World Connections (p. 50)
3:00–4:00 PM	G	608, Conv. Center	Building a Community in K–12 Outreach: Fostering Collaboration and Career Connections for STEM Events and Partnerships (p. 51)
3:00–4:00 PM	10–C	501, Conv. Center	NABT and BSCS Present: The AP Biology Academy—Professional Development with an Impact, Part 2 (p. 53)
3:00–4:00 PM	K–12	601, Conv. Center	Engaging Youth in Agriculture Through STEM Activities (p. 53)

Friday

8:00–9:00 AM	G	Mile High Blrm. 4 A–D, Conv. Center	Forming Partnerships (p. 59)
9:30–10:30 AM	G	506, Conv. Center	Bridging the Attraction Gap: An Event-Based STEM Partnership That Gets Results (p. 61)
9:30–10:30 AM	G	507, Conv. Center	Leveraging Partnerships to Become a Regional STEAM Leader (p. 61)
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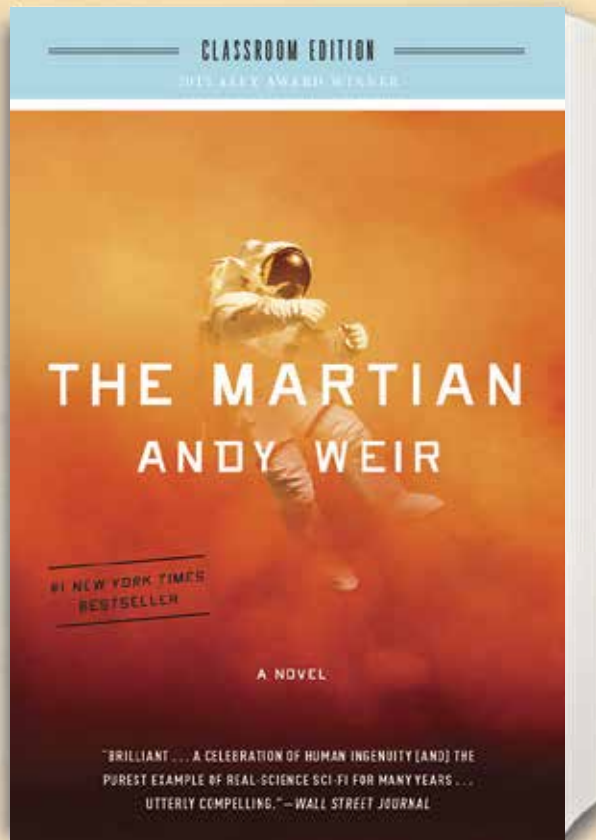
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