WSST Conference 2023

[A] All Science Disciplines [M] Assessment [B] Biology/Life Science [H] Biotechnology [C] Chemistry

[E] Earth Science [I] Engineering [V] Environmental [F] Fieldtrip [G] General Science [L] Leadership

[P] Pedagogy/Teaching Strategies [Y] Physics [S] Social [1] STEM [W] Workshop

MARCH 9 • THURSDAY

7:30am – 4:30pm		**Thursday Registration**	Registration Booth
8:00am – 8:50am	A	**Snapshot 1: Dialogues: For ELL and Struggling Readers, Incorporating Quantum Science Into Your Classroom with TeachQuantum, and Earth and Sky: A Collaborative Partnership between UW-Whitewater and Horwitz-DeRemer Planetarium** *Speakers: Lisa Swaney, Robert Benjamin, Greg Bisbee, Craig Berg, Mallory Conlon* Dialogues: For ELL and Struggling Readers: Getting students who are not enamored with science to read is a challenge. Dialogues are a source for helping struggling readers and ELL students to read, write and communicate about science. Incorporating Quantum Science Into Your Classroom with TeachQuantum: Learn more about TeachQuantum, an NSF-funded research and curriculum development experience for teachers dedicated to bringing NGSS-aligned quantum science modules into middle and high school STEM classrooms. We describe a new set of programs for middle school students at the Horwitz-DeRemer Planetarium developed in collaboration with the University of Wisconsin-Whitewater. Each grade level attends a planetarium show selected to address NGSS standards for that class, followed by a sky talk given by a professional astronomer, and ending with an open question & answer session for the students. Sixth graders watch a show on "Seeing" which covers light and vision, followed by a sky show demonstrating parallax and how it relates to mapping out the Milky Way. Seventh graders view "Lucy's Cradle" to learn about the history of humans on Earth, followed by a discussion of galaxies and Citizen Science. Eighth graders see "Supervolanoes" and learn about the cause and history of extinction events, and how to prevent them from happening in the future. We describe supporting materials developed for these programs and how you can take advantage of these offerings. These programs have been supported the University of Wisconsin-Whiteater College of Letters & Sciences and the Wisconsin Space Grant Consortium.	O&P
8:00am – 8:50am	B	**Hydroponics in the Classroom- Growing Local Food** *Speakers: Michelle Howe* Participants will be introduced to the hydroponics systems and how it works. Participants will learn about the variety of produce that can raised hydroponically and how it can be incorporated into their school. Final information will be shared on how to find FREE money to help pay for the hydroponic system.	HOI I
8:00am – 8:50am	V	**Connecting Generations to Wisconsin's Natural World** *Speakers: Lindsey Taylor* The Natural Resources Foundation of Wisconsin connects generations to Wisconsin's lands, waters, and wildlife through conservation, education, engagement, and giving. Learn more about the Foundation's work during this presentation, including its grantmaking for environmental education, outreach initiatives, partnership on conservation and education projects from local to landscape-scale, and its diversity, equity, and inclusion initiatives.	HOI F

8:00am – 8:50am P **School's Out - Time for STEM** HOI E

Speakers: Dolly Ledin

The Wisconsin Afterschool Network is part of a national effort to promote STEM in OST (Out of School Time) programs, including afterschool and summer programs at schools, community and youth centers, camps, etc. We will share goals and characteristics of quality OST STEM programs and show how alignment between school day and OST can extend and amplify classroom STEM learning. A new WSST mini-grant will provide resources for collaboration between WSST members and OST educators. We will provide examples of potential projects and get your ideas for ways that collaborative projects could provide more holistic STEM experiences for students in your region.

8:00am – 8:50am P **Using Discourse in the Science Classroom to Deepen Student Thinking** Q&R

Speakers: Karli Kurth, Andrea Christianson

One of the major shifts called for in NGSS instruction is student to student discourse to help students wrestle with and deepen their understanding of science phenomena. In “Ambitious Science Teaching” the authors discuss how to connect discourse moves with the goal of the science conversation to increase the cognitive demand of the students. The School District of Beloit science teachers and instructional coaches have been working on embedding these talk moves into the science classroom. We still have work to be done, to continue to increase our student outcomes, but we are seeing a deeper understanding of science by our students. Come to this session to learn about these talk moves and how we have used them to help our students make sense of the world around them.

8:00am – 8:50am P **Using Text for Authentic Purposes: Literacy Learning in Phenomenon-Based Science** HOI J

Speakers: Ryan King, Kevin Anderson

In this session, we will engage participants in meaningful and local science where we’ll use a variety of texts and dialogue as key parts of our learning. We’ll then step back and discuss some overarching principles for effective phenomenon-based science, which includes the use of various text types, student creation of texts, and student dialogue. This type of instruction better engages and builds the scientific identity of all students, especially when texts are used that represent diverse voices.

8:00am – 9:00am B **DNA Discovery Using 3DMD models** HOI H

Speakers: Stephanie Ruder

I will be showing the participants how I use various 3D Molecular Designs kits to teach DNA's structure and function in my PLTW Principles of Biomedical Science classes. This can easily be converted to any Biology class. I will be discussing how I have the students explore the structure of DNA using the dynamic DNA models and showing them the DNA starter kit from 3DMD. From there I will show the participants how I tie the structure of DNA with they Dynamic DNA models to the DNA in the flow of genetic information kit and also the Chromosome connections kits. The flow of genetic information kit shows the students how DNA is replicated and the steps of protein synthesis which I will discuss how I use this kit with the DNA models. The chromosome connections kit allows students to see DNA in action with genetics. The NGSS standard that this will connect to is HS-LS1 From Molecules to organisms: structures and process.

8:00am – 9:50am W **Workshop: Earth Science for the Middle School** M&N

Speakers: Jenny Trewyn, Susanne Fleischman

Two 6th-grade science teachers from the Burlington Area School District would like to share with you experiments they have tested, tweaked, created, and reconfigured. Sharing the knowledge of these experiments will allow participants the ability to use these ideas right now in their classroom of earth science. These

Experiments include:
-testing the difference between saltwater and freshwater using flasks
-The density differences of saltwater as you travel to the bottom of the ocean using test tubes
-Create a watershed with aluminum foil then use pollutants to see how pollution affects the entire watershed
-Using starburst the starburst will travel through all three types of rocks in the rock cycle.
-Using play dough to create a volcano with eruptions for baking soda and water, then take the experiment one step further and become a vulcanologist and create a history of the volcano by taking core samples

8:00am – 9:50am W **Workshop: Evaluating High Quality Instructional Materials** K&L

Speakers: Kim Lemberger

How much does your district have to pay for high-quality instructional materials? Not a penny, especially when you know where to find Open Educational Resources (OER). OER are any type of educational material that are freely available for teachers and students to use, adapt, share, and reuse. But be careful. Not all free resources are high-quality, especially when it comes to meeting today's standards in science.

In this workshop you will:
-experience a high-quality science lesson from an OER
-discuss criteria and use tools to evaluate some OER materials
-learn how to find high-quality instructional materials to compliment your instruction

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9:00am – 9:50am B **Science shows that Grandma was right: Extracellular vesicles explain why we get sick from the cold weather.** HOI F

Speakers: Brenda del Moral

New information has emerged recently about extracellular vesicles (the other “EV”) and their importance in warding off pathogens in our nasal mucosal barrier during the cold and dry Wisconsin winter. Even though EVs are released by most cells and organisms across the kingdoms, scientific understanding of the role and application of EVs has shifted due to new evidence on cell-cell communication and host-pathogen interactions. This presentation is designed to update teachers about the latest applications of EVs in everything from disease detection to therapeutics, and especially to provide an example of how science can take a long time to demonstrate why our grandmas were right to make us wear scarves in winter. EVs as an example of NGSS standards LS1-1, LS1-2, and LS4-1 will be demonstrated throughout the presentation.

9:00am – 9:50am B **Learn to Love Your Mosquitoes!** HOI I

Speakers: Lyric Bartholomay, Greg Bisbee

It is doubtful that any critter on the planet receives as much loathing per gram as the mosquito. We spend enormous amounts of time, money, and resources trying to eradicate—or at least control—local populations of this common insect. Despite this, most people know very little about mosquitoes—where they come from, how they live, and the roles they play in our environment. This series of lessons and labs gets students interested and excited about our little Dipteran friends. Learn about mosquitoes and their lifestyles, their roles ecologically, and how to use them effectively in the classroom.

9:00am – 9:50am E **Angling for Access - Exploring how Solar Panels Generate Electricity in Wisconsin** HOI H

Speakers: Robert Wild, Gina Smith

During this session participants will examine KEEP’s newest kit - the Solar Tilt Kit and explore how it can be used to enrich student learning. Robert Wild, High School Science Educator in Deerfield, will share his experience with the kit and the lessons he used with his students. Participants will determine how they can build their own lessons around the kit (or adapt Bob’s) to engage students in learning about solar electricity generation while they hone the science and engineering practices of asking questions, analyzing and interpreting data, and constructing an explanation.

Gina Smith, KEEP Resource Specialist, will build upon the experiences Bob shares by encouraging educators to create opportunities to extend the scope of learning beyond solar electricity generation to develop identity and agency in students by including conversations about equity and climate. The inclusion of these topics reinforce NGSS standards related to science and engineering being human endeavors that use multiple approaches to create new knowledge and solve problems.

9:00am – 9:50am I **Developing Junior Engineers by focusing on the SEPs from NGSS** HOI J

Speakers: Tom Gantt

Egg drop and more! Learn how to take this activity, and other projects to the next level with SEPs and phenomenal problem-based learning. Teachers engage in student-driven Engineering Internships that incorporate all aspects of the new Science & Engineering Practices from the NGSS standards as well as Disciplinary Core Ideas from the domains of earth, life and physical sciences.

Working as students to construct an understanding of science ideas from investigation and text and apply those science ideas in designing solutions to an engineering problem. Participants then test and/or evaluate their solutions to see how well they meet a set of design criteria.

This exciting session will inspire educators with hands-on activities (real egg drop), using digital tools, active reading, dynamic discussion, and reflection on their own teaching practices. Teachers will leave armed with the ability to integrate phenomena-based science instruction around real-world problem solving into their classrooms.

Objectives:

Support teachers with a deeper understanding of the Science and Engineering Practices.
Engage teachers with phenomena-based instruction, model units and lessons.
Provide teachers with usable free resources.

9:00am – 9:50am V **Snapshot 2: Albedo & the Physics of Climate Change, Exploring Energy with the Wisconsin Energy Institute, Renew Our Schools: A School Wide Place-Based Energy Conservation Competition, and Don't CREATE Your Own Energy Lessons!** O&P

Speakers: Cierra Atkinson, Allison Bender, Haddie McLean, Wendy Stelzer, Scott Liddicoat

Albedo & the Physics of Climate Change: Overview of albedo experiment and accompanying lesson materials with connections to the polar vortex and climate change in Wisconsin. Additional information about other physics opportunities in and out of the classroom.

Exploring Energy with the Wisconsin Energy Institute: Join us to learn how to bring the excitement of renewable energy to your students via lessons, field trips, events, and the Wisconsin KidWind Challenge.

Renew Our Schools: A School Wide Place-Based Energy Conservation Competition: Renew Our Schools is a powerful place-based school energy conservation competition that motivates students and staff about responsible energy use and saves school districts money.

Don't CREATE Your Own Energy Lessons! Get them free, complete, and classroom tested, from the CREATE (Center for Renewable Energy Advanced Technological Education) website. Lesson author Scott Liddicoat will review the ease with which you may access and use renewable energy teaching materials available on the CREATE website.

9:00am – 9:50am V **They Do What with Water?** HOI E

Speakers: Nate Tillis

Water is the most basic necessity to sustain life, but many are not aware of the processes or people that deliver water and protect the environment from water pollution. The Great Lakes region is a global hotbed for water related professions and innovation. Treatment of water in municipal facilities has become more complex and automated than ever before and a new wave of water professionals will be needed to steward us to a sustainable future.

Attendees will learn the basic wastewater treatment technologies and be able to:

• associate water treatment microorganisms to biology
• understand basic water chemistry, how and why chemicals are added for treatment
• understand ecological cycles of water and nutrients
• identify the mechanical equipment needed for water treatment

Finally, attendees will learn career pathways related to water treatment. It is known that chemist, biologist, engineers, and mechanics are needed to operate a facility, but also programmers, sales, managers, accountants, and agriculturalist and other non-water related disciplines have specialized skills for the water industry.

9:00am – 9:50am P **Social Sciences & Critical Thinking: Making Informed Sense of How People Interact with PBS's Above The Noise** HOI G

Speakers: Michael Hartwell

So much of our current media coverage is based on partisan opinions and bombastic, attention-grabbing content, devoid of thoughtful, fact-based perspectives. As overwhelming and dismaying as this can be for adults, just imagine what it is like for young people! What if we could teach students to use the social sciences to be better, more considerate consumers of modern media? Using PBS's award-winning collection Above The Noise and its related content, educators can give students the opportunity to leverage the research and facts behind the controversial headlines and trending topics to better inform their interpretations and opinions of what's happening in the world around them. From gun control to performative activism and everything in between, come learn about all the engaging, accessible ways social science interacts with contemporary issues and can support your students' growth to being stronger critical thinkers.

9:00am – 9:50am S **Newcomer/Retiree Meeting** Grand Terrace Café

9:00am – 10:00am C **Teaching Chemical Bonding with Legos** Q&R

Speakers: Stephanie Ruder

This session will show the participants how I use Legos in my chemistry classroom to teach ionic and covalent bonding along with chemical reactions. I recieved a front and center grant last year and would like to share what I used this money to purchase and how I use it in my classroom. The participants will get to use my classroom legos to model/ go through the activities that I do with my students. This relates to NGSS standard HS-PS1-4 Matter and its interactions.

9:10am – 11:45am F **Fieldtrip 1: Discovery Building**

Discovery Connections – Have you played Jenga and had coffee with a Bioengineer, Data Scientist, or Virologist?

Start the session with a fresh cup of coffee at café tables with scientists from the Wisconsin Institute for Discovery and the Morgridge Institute for Research. We will hang out, play Jenga, and talk about creativity and persistence as it relates to lab life and classroom life. After the coffee and games we will head for short lab tours and tours of the Discovery Building at UW-Madison. We will complete the visit with ways for educators to stay connected with scientists through programs like the Wisconsin Science Festival, PBS-WI Meet the Lab, Summer Camps, and Research Experiences for Teachers.

9:25am – 11:45am F **Fieldtrip 2: Purple Cow**

Purple Cow Organics is committed to improving soil health through its products that use diverse biology. Check out the processing location for Purple Cow Organics products from start to finish!

10:00am – 10:50am B **COVID Vaccines and Treatments** Q&R

Speakers: Jessica Heckman

This science explained session will discuss how the mRNA and protein subunit vaccines for COVID-19 work and why we need multiple doses. It will also explain how the anti-viral medications work to disrupt the virus life cycle. There will be hands on opportunities for the audience to participate in activities and case studies that they could use to bring these topics to their own classes. The information in this presentation can be easily combined into units on genetics, evolution and cell biology. My learning objectives are at the end of the sessions participants 1) Understand how COVID-19 vaccines and anti-viral medications work 2) Can discuss how COVID-19 evolves, enters and replicates inside our cells 3) Obtain ideas for how they can incorporate this information into their own classrooms to make their students more educated and empowered on the topic of COVID-19 vaccines and anti-viral medications.

10:00am – 10:50am B **Take the Mess and Stress Out of Bacterial Transformation** HOI I

Speakers: Whitney Hagins

Simplified prep and innovative technology makes your bacterial transformation work for you, not the other way around. In this workshop, you will perform transformation in a few simple steps without the water bath and ice bucket, and use a new innovative media plate that comes pre-made. See how this lab will let you spend your time teaching and analyzing data, not prepping.

10:00am – 10:50am B **Pests and Pathogens of WI Forests** HOI E

Speakers: Jake Griffin

Our Wisconsin forests are experiencing multiple invasions of tree pests and pathogens. These systems provide an opportunity for examining fundamental concepts in ecology and ecosystem science, as well as an opportunity to explore our complex human relationship with forests. Educators in both biology and environmental studies can utilize conceptual frameworks such as systems thinking and ecosystem services to leverage their own local forests as a living laboratory, applying NGSS to lessons on environmental change.

10:00am – 10:50am B **Exploring OpenSciEd High School Materials** HOI F

Speakers: Jayne Ryczkowski, Chad Janowski

Learning objectives for participants in this session are to explore each of the levels of the high school OpenSciEd curriculum that has currently been released. We would like participants to compare this curriculum to their current lessons and identify how they can utilize the curriculum or infuse the lessons within their current pedagogy. The presentation will begin with an overview of the high school program and specific outlines of the units at each level. Activities will provide time for educators to discuss their current curriculum and how it compares to the OpenSciEd curriculum. We are hoping to have educators in the same content area to form small groups and have discussions regarding the new curriculum. NGSS standards for each of the units will also be outlined. Einstein Project will also provide testimonials from teachers we have worked with that currently teach and/or are piloting the middle school OpenSciEd program and provide information on upcoming opportunities for professional development with the OpenSciEd program.

10:00am – 10:50am B **Wisconsin Waterfowl Association's Wood Ducks in Our Schools Program** O&P

Speakers: Jessica Peterson

Jessica has teamed up with The Wisconsin Waterfowl Association (WWA) to build and test an environmental science unit about wetland habitats that is centered on wood ducks. The unit aims to increase awareness of wetland habitats and species and is made to be easily adjustable to match your students' age and the different time constraints in varied classrooms. The curriculum has been piloted in a few middle schools and is now freely availible through the WWA. In fact, the WWA is sponsoring a booth at the conference to give away the curriculum and some wood duck nesting boxes to schools interested in using the program.

In this session, Jessica will give an overview of the curriculum and highlight some potential ways it could be incorporated into your school. She will also spend a little time sharing wood duck nest box stories and best practices for keeping and maintaining nest structures for these beautiful residents of Wisconsin.

10:00am – 10:50am E **Wisconsin Earth Science/Geology NGSS High School Storyline writing team invitation** HOI H

Speakers: Dennis Rohr

This is your invitation to help organize a team of high school earth science teachers who will join forces to develop collaborative student-centered, phenomenon-based storylines that will address the NGSS high school standards for Earth Science/Geology. This team will then meet virtually in the future to help develop storylines that are focused on Wisconsin's geologic past and future, along with addressing climate change and groundwater issues. The initial goal is to build two storylines that would cover a semester long high school Earth Science class. Wisconsin has so much to offer in its geologic past from volcanoes, mountain ranges, earthquakes, plate collisions, rift valley, glaciers, river systems, the Great Lakes, and some of the most plentiful groundwater resources in the world. Be part of the change and help shift high school Earth Science / Geology from topical learning to phenomenon-based storylines.

10:00am – 10:50am E **Fun with Rocks and Soil** HOI J

Speakers: Jenn Scott

This interactive session will allow teachers to explore four lessons that show fun, engaging ways to introduce the rock cycle and soils to students through and agricultural lens. Teachers will model the lesson activities during the session. First teachers will use crayons to demonstrate the processes involved in rock formation, then they will explore soils to determine what characteristics each have, then they will perform a dance to reinforce the concept of soil texture followed by a fun experiment, and finally teachers will explore erosion and ways farmers prevent it. These lessons focus on the following standards: ESS2A.4,5, ESS2.E.4, PS1.A.4, ESS2.C.m
Learning Objectives:
1. Model the rock cycle using crayons
2. Introduce and explore soil characteristics
3. Conduct experiments to explore soil texture
4. Engage in active learning to reinforce soil texture concept
5. Evaluate the effects of erosion and develop ideas to prevent it from happening

10:00am – 10:50am 1 **Makerspace Roundtable** Grand Terrace Café

Speakers: Karyl Rosenberg

10:00am – 10:50am W **Workshop: Family-Centric STEM Outreach: Lessons from The ROSE Project** M&N

Speakers: Bernardo Traversari

Since 2009, the Office of Science Outreach at Edgewood College has built partnerships with schools and community organizations serving underrepresented groups in STEM to increase access to science education. Our approach is unique in that we focus on the holistic support of elementary and middle-school-aged children through the experiences of their caregivers. If children do not have positive experiences in STEM as they grow up—including witnessing their community engage in science, hearing their parents talk about science issues, and receiving encouragement to study STEM—they will be ill-prepared to take advantage of resources that await them later in life. We've implemented this approach through our ROSE (Resources and Opportunities in Science Education) Project, which aims to provide caregivers from underrepresented backgrounds with opportunities in science education for themselves and their children, via both our Classic ROSE model and Community STEM Fellows program. This session will explore some of the lessons learned throughout the implementation of our ROSE Project and will offer attendees an opportunity to share their own experiences in family-centric STEM outreach. We will also host an interactive activity whereby attendees will work in groups to reimagine what family-centric STEM outreach can (and should) look like in Wisconsin.

10:00am – 12:00pm I **Workshop: Have a Blast With Soda Bottle Rockets** K&L

Speakers: James Broetzmann

For 23 years I have built soda bottle rockets with my 7th and 8th grade students. After they have graduated, some have come back to tell me this was their favorite project in any science class! In this workshop you will build a soda bottle rocket from inexpensive materials, learn how these rockets can be incorporated into a variety of science curricula (aeronautics, rocketry, force and motion, engineering, physical science, etc.), and why this will be such a memorable project for your students. I will bring my homemade rocket launcher so you may see how to build one, and show drone footage of my most recent rocket launch that was filmed and edited by one of my 8th grade students. You and your students will truly have a blast building and launching soda bottle rockets!

11:00am – 11:50am M **Fitting Standards Based Grading Into A Traditional Points-Based Grade Scale** HOI G

Speakers: Nick Wall, Julie Lundeen

The goal of our standards based classroom focuses on helping students collect knowledge, not points. But fitting this standards based format into a rigid A, B, C, D, F points-based grade system is challenging, especially if you are SBG pioneers in your school. We will walk you through our SBG journey from start to current practices and share our research and experiences, along with a few examples and lessons learned.

11:00am – 11:50am B **WSST Book Study: Understanding Climate Change** HOI H

Speakers: Andrea Christianson, Jamie Groark

Do you teach climate science in your middle school or high school courses? The WSST Professional Development Committee invites you to join us for our final conversation on the National Science Teaching Association's book Understanding Climate Change: Grades 7-12 by Laura Tucker and Lois Sherwood. This resource includes a 9-part lesson sequence exploring the science of climate change with ample opportunity for critical thinking and evaluation of evidence. Each year WSST hosts a book study in collaboration with WI DPI science consultant, Kevin Anderson. Participating WSST members and PAEMST applicants are provided with a copy of the book in the fall. Help us wrap us this year's study and learn how you can participate next year.

11:00am – 11:50am B **Workshop: Teaching Human Ecology with Models and Simulations** HOI E

Speakers: Stephanie Ruder

One of the NGSS Cross Cutting Concepts is Systems and Systems Models. Models and simulations can be used effectively in the science classroom to better understand ecological concepts and cause-and-effect relationships in nature, including how human activities can change the physical landscape, affect ecosystems on land and in water, and alter the atmosphere.

In this hands-on session, the presenter will lead participants in activities that will give their students practice in collecting and interpreting data to better understand their local and global environment and human impacts on ecosystems. They will create 3-D representations of global land use, model amounts and sources of fresh water, simulate world population growth trends, and more. The presenter will discuss how to implement these activities as part of broadening students' understanding of DCI ESS3: Earth and Human Activity and LS2: Interactions, Energy and Dynamics Within Ecosystems. Participants will receive lesson plans and background materials in an electronic format with matches to Wisconsin Standards for Science.

11:00am – 11:50am C **Lab-Based Tests: A How To!** Q&R

Speakers: Adam Hall, Warren Brewer, Molly Dixon, Erin Otte-Meyer

Interested in doing a lab practical but don't know where to get started? This session will include an in-depth explanation of our team's process from start to finish. We will discuss our PLC process and how we tie our labs skills and content together to create more well-rounded assessments. Through this process, our students have shown to be more confident in their abilities in the lab setting.

The session will give participants an opportunity to work with with others to start developing their own lab-based assessments. Presenters will be facilitating these small group discussions.

Learning Objectives:
1. Attendees will be able to recognize that lab based assessments are possible in the high school setting.
2. Attendees will be able to discuss how this approach would work in their own school setting.
3. Attendees will receive at least one example of a lab-based test and be able to ask questions.

11:00am – 11:50am E **Using Our Local Environment to Engage Students in Science: Place-based Education** O&P

Speakers: Jennifer Schlobohm

Are you interested in guiding students in their journey to gain scientific literacy and skills while helping them become empowered citizens? Place-based education is known to engage students in science while building knowledge of their local environment. During this presentation you will learn how I have used a local stream as a resource for getting students involved in science, while having some time to collaborate with your peers to develop ideas of your own! I created a unit where we answer the question: Why is Rowan Creek healthy? During this unit students use the stream as an outdoor lab, where we collect data on water quality, riparian health and forest health. In the classroom we analyze and interpret the data, construct two scientific arguments, and communicate our findings through scientific writing. Throughout this unit, I have noticed that students become more involved in the learning process when it is relatable to their personal life. This presentation will include break out groups, where teachers work together to brainstorm local resources and develop ideas to bring place-based science curriculum to their classroom. After the break out groups, we will come together and discuss our ideas.

11:00am – 11:50am G **Make Time for Science with Project-Based Learning** HOI I

Speakers: Terra Tarango

If we treat content areas as silos, we'll simply never find time for Science. In this session, discover how to create authentic learning experiences that increase engagement, develop critical and creative thinking skills, and connect across all content areas. Be the teacher that transforms everyday lesson plans into memorable learning experiences without spending hours of prep time. Come with a willingness to try something new; leave with project ideas that engage students not only in learning, but in making their world a better place!

• Understand how cross-curricular instruction saves time
• Determine characteristics of authentic learning experiences
• Explore 2 projects, lesson by lesson, making connections to your science content
• Discover process for creating your own project-based learning units

11:00am – 11:50am P **How to Enhance STEM Preparedness in a middle school classrooms?** HOI J

Speakers: Lalitha Murali

Do you ever wonder how to help students build their understanding of scientific concepts and skills? Science communication and outreach are essential for training the next generation of scientists and raising public awareness for science. Come and learn how two educators are providing effective science, technology, engineering, and mathematics (STEM) educational outreach to students in classrooms. You will learn about various tools and resources that will spark new ideas or projects, guide students through the scientific method, and free professional development courses that are offered by UW system.

11:00am – 11:50am P **Who Wants To Be A Science SEL-ionaire?** HOI F

Speakers: Michelle Bulin, Kelli Abar

Everything is SEL!

Believe it or not, you teach SEL everyday, even in Science! Join Michelle Bulin, SEL Coach from Necedah Middle and High Schools and Kelli Abar from UW Superior to learn about the history and basics of Social Emotional Learning in a fun, gameshow format with prizes! We'll talk best practices, share ideas, and provide you with a ton of resources to take back and use right away.

12:35pm – 12:50pm F **Fieldtrip 3: Yara Bay Distillery**

Madison's first distillery Learn about the chemistry behind the distillery process and enjoy a sampling of products!

12:40pm – 12:55pm F **Fieldtrip 4: UW Geology**

Explore the Geology Museum and take a peek into Wisconsin's deep history! On your visit you can touch rocks from a time when there were volcanoes in Wisconsin; see corals, jellyfish and other sea creatures that used to live and swim where we now walk; and stand under the tusks of a mastodon while imagining yourself in the Ice Age.

1:00pm – 1:50pm A **Elementary Roundtable** Grand Terrace Café

Speakers: Marcia Gardner, Shelley Petzold

1:00pm – 1:50pm B **Student Space Flight Experiment Program, 75 grams of payload to the ISS and counting.** HOI J

Speakers: Mark Dilley

The Student Spaceflight Experiments Program (SSEP) is a program of the National Center for Earth and Space Science Education (NCESSE). Over the past six years, it has become an integral part of iForward's Science Curricular Scope and Sequence Grades 5-9, with the potential for some aspects to become part of our cross disciplinary curriculum K-12. The primary learning activity of SSEP is experimental design and writing of proposals for potential 15-gram experimental packages that are launched to the ISS with astronauts and students performing experimental actions in tandem.

As part of our journey, we have aligned our SSEP curriculum with the NGSS while addressing several major language arts learning outcomes. Making the activities and curriculum accessible to all learners is an ongoing challenge. The primary focus of this presentation will be on what the students experience as part of our cross-disciplinary SSEP curriculum and the rewards for those that have their experiments selected for flight as well as those who do not.

1:00pm – 1:50pm B **PFAS in our World** HOI E

Speakers: Jim Baumann, Karen Mesmer

Participants will learn about PFAS in drinking water sources in Wisconsin and how it affects our lives. The phenomenon of a community needing to use bottled water is presented. Participants examine data to try and construct an explanation for why they can't drink their well water. They then use a web viewer to find other places with the same problem. A PFAS expert will talk about sources of PFAS in the state and discuss unanswered questions about the products and their effect on us and our environment. This connects to the DCI ESS3.C: Human Impacts on Earth Systems: Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats… (MS-ESS3-3). Participants will be analyzing and interpreting data to find patterns of where PFAS is found and see the effects of releasing it into areas around Wisconsin.

1:00pm – 1:50pm B **Workshop: Bring Wisconsin Wildlife Into Your Classroom With Snapshot Wisconsin** K&L

Speakers: Mackenzie McBride, Taylor Peltier, Claire Viellieux

Snapshot Wisconsin is a statewide community science project that leverages a network of trail cameras to monitor wildlife. At this event, program staff will introduce Snapshot Wisconsin and walk you through one of the free lesson plans designed to work with the project. The session will conclude with a demonstration of how to utilize the Snapshot Wisconsin Data Dashboard, an interactive data visualization tool that makes Snapshot wildlife data directly available to the public.

All Snapshot Wisconsin lesson plans are free and outline curriculum connections in each educator handout, including NGSS (April 2013), Common Core (2010), AP Biology (2012-2013), IB Biology (2016), Environmental Science (2013), Environmental Systems & Societies, and Wisconsin's Standards for Science.

Learning Objectives:
-Learn about Snapshot Wisconsin and how to get involved as a community scientist
-Learn about how Snapshot wildlife data is used to support management decisions at the Wisconsin Department of Natural Resources
- Learn about how to access Snapshot Wisconsin's free lesson plans and incorporate them into your classroom or educational programming
-Learn about how to access and explore the Snapshot Wisconsin Data Dashboard as well as how it can be used to teach about science and math concepts, data literacy, and science communication

1:00pm – 1:50pm C **Driving Question Board Using Jamboard** M&N

Speakers: Stacey Balbach

Learn how to use a Driving Question Board on a Jamboard to engage and drive student learning in your classroom.

1:00pm – 1:50pm C **Science Concepts Illustrated: Mixing Demonstrations and Particulate Diagrams for Improved Learning** HOI F

Speakers: Matthew L Miller

The SCI Squad, or Science Concepts Illustrated, has been an outreach group led by faculty in the departments of physics and chemistry & biochemistry at South Dakota State University. The group has been actively engaging in outreach across the northern plains to K-12 schools, national and state science teacher conferences, children's science museums, and other public community events. But I have been combining these activities in my campus classes with particulate diagramming to create a more lasting impression on students. This presentation will combine various demonstrations and the use of particulate diagramming to enhance learning using typical demonstrations. We will practice this technique to show how these methods can be utilized simultaneously in the classroom. Examples of demonstrations included will be the simulation of sea glaciers and the resulting ocean currents, properties of gases using bubbles and balloons, and more. The overall goal is to show that combining pedagogic methods can lead to enhanced learning.

1:00pm – 1:50pm V **Dive into the School of Freshwater Sciences** O&P

Speakers: Liz Sutton

The School of Freshwater Sciences at UW-Milwaukee is the first school in the nation dedicated solely to the study of freshwater and is a launch pad for critical and fascinating freshwater research. We are the largest academic research institution on the Great Lakes, and UWM’s freshwater expertise has been key to advancing Milwaukee’s reputation as a world water hub.

For more than 50 years, the faculty and scientists have been conducting internationally recognized freshwater research across five essential themes: human and ecosystem health, freshwater system dynamics, freshwater technology, freshwater policy and economics, and weather and atmospheric sciences. You’ll find our researchers at work at sea, in the field, and in the lab from the Great Lakes of North America to the Great Lakes of Africa.

This workshop is an introduction to current research and ways that you and your students can get involved through the outreach department including the Lake Sturgeon Bowl, the Remotely Operated Vehicle (ROV) Competition, teacher professional development, the UWM Water Ambassadors, and more.

1:00pm – 1:50pm P **Sensemaking with Phenomenon Questioning Technique** HOI I

Speakers: Dr. Rebecca Prokopf

To make science learning engaging, accessible and important to all students, students must have authentic, relevant opportunities to actively make sense of the world and beyond.

To facilitate this kind of sensemaking, teachers can leverage the Phenomenon Questioning Technique to teach students valuable science and engineering practices including asking questions and defining problems.

In this session, participants will experience and unpack the Phenomenon Questioning Technique and will be able to apply it in their classroom.

1:00pm – 1:50pm P **So effective, the viruses stole it! Investigate the structure and function of CRIPSR Systems** HOI H

Speakers: Mark Arnholt

This hands-on workshop will introduce teachers to instructional tools that have resulted from a 5-year NIH SEPA project focused on the Science and Ethics of Genome Editing. The workshop will begin with a discussion of why it is important to introduce today's students to this new technology, and how it can be connected to what is already being taught. This discussion will include a comparison of the CRISPR Cas9 endonuclease with a restriction enzyme. Workshop participants will have an opportunity to examine a 3D printed model of the Cas9 protein. They will see how a guide RNA is used to program the Cas9 to recognize and destroy a specific DNA sequence found in a bacteriophage. Using the Cas9: Making the Cut kit, teachers will explore the details of how the guide RNA is used to interrogate a 20 bp sequence of DNA to determine if it matches the sequence of a bacteriophage. We will then discuss new evidence from UC-Berkely about CRISPR-like systems in viruses and their potential for genome editing.

2:00pm – 2:50pm A **Middle School Roundtable** Grand Terrace Café

Speakers: Miranda Dahlke

2:00pm – 2:50pm B **Integrating Hands-On Hydroponics in Dynamic Science Education** HOI E

Speakers: Terry Wetzel

Hydroponic farming with the Flex Farm by Fork Farms brings science concepts to life for kids across the K-12 spectrum. These farms allow students to own the process of growing plants from seed to harvest all within a self-contained system, indoors and year round. Fork Farms' full curriculum package builds on that hands-on experience with NGSS-aligned lesson plans. These lessons expose students to core concepts across biology, plant science, and sustainability while integrating language arts, analytical reasoning, art, and more. Learn about how to incorporate hydroponics into your required lesson plans, in addition to integrating your harvest into community outreach, entrepreneurship, and other projects to stretch your students beyond the classroom.

2:00pm – 2:50pm B **Workshop: The Power of Yeast** M&N

Speakers: Patrice Simpson

Science instruction is shifting from simply learning content to focusing on the importance of why and how something happens. It's now driven by phenomena that piques student curiosity and supports student agency in learning. By design, the Next Generation Science Standards helps students direct this curiosity and learn the science behind the phenomena they observe by first showing them why it is important to learn it. Through inquiry, students cycle through asking questions and solving problems to determine why and/or how phenomena occur and, as they engage in problem solving, are able to understand science knowledge by relating it to the world around them. In this Power of Yeast activity, educators will participate in an inquiry activity as they set up and observe fermentation processes in varied environments to help provide an initial understanding of a modern biochemical model of cellular life. Participants will receive a ready to go lesson activity that can replicate in High School biology, chemistry, and physics classes.

2:00pm – 2:50pm B **One Stop Shop: See what a Day at Retzer can Offer** Q&R

Speakers: Jayne Jenks, Lisa Swaney

In this educational era where it is hard to find funding, bussing and substitutes, you need to make the most of your field trip opportunities as they can be limiting. Well, we can help you with that as we are truly a unique one stop educational shop that offers plenty of options that can be catered to your group no matter the size. Retzer Nature Center offers nature center programs, recycling programs, and nature hikes. The Horwitz-DeRemer Planetarium owned by the School District of Waukesha and located in the nature center offers planetarium programs and outreach programs, as well. All of these programs are aligned to standards (Wisconsin State Standards or Next Generation Science Standards) and support classroom objectives. Even more, these programs can be tailored to your group. Program options range from the youngest of learners (4K) through high school. Many of these programs are part of an environmental education curriculum that was developed by the School District of Waukesha, Waukesha County Parks and Land Use Department and Carroll University. This cooperative effort is free and available to all. Come learn how to tap into this great resource.

2:00pm – 2:50pm C **Linking laboratory observations and changes at the molecular level using hand-held models**

Speakers: Anne-Marie Nickel HOI H

Explore interactions between particles using the hand-held water kit models created by 3DMD by following a set of guided-inquiry learning activities modelled after the Process Oriented Guided-Inquiry Learning (www.pogil.org) model of instruction. These activities connect particle interactions with material properties such as viscosity, solubility, boiling point, and surface tension. Each participant will examine molecular level particle interactions using the water kit models and relate those to macroscopic laboratory observations using those chemicals. Extensions of the activity include those that might involve solvent selection for industrial processes and EPA regulations. Participants will gain sample activities to use in their classes, discuss extensions of the activity to real-world applications, evaluate hand-held model representations for their impact on learning, experience activities that could be used in a virtual or in-person setting, gain example preparation requirements, consider possible modifications for successful employment in a variety of settings, and discuss connections to NGSS standards such as PS1: Matter and Its Interactions (PS1.A: Structure and Properties of Matter) and PS2: Motion and Stability: Forces and Interactions (PS2.B: Types of Interactions).

2:00pm – 2:50pm E **Beyond the Classroom: Exploring the Ice Age National Scenic Trail** HOI J

Speakers: Sarah Pearce, Amy Lord

The Ice Age National Scenic Trail is an educational trail by nature. Its multitude of biomes, created by the receding glaciers, are natural classrooms all throughout Wisconsin. The Ice Age Trail sparks wonder and awe as it takes hikers past world-renowned glacial features and provides a lifetime of learning.

The Ice Age Trail Alliance wants to partner with your school/school district to give your students the opportunity to rub shoulders with glacial features in a way that brings the pages of their textbooks (or tablets) to life. It is also a great opportunity to stretch legs and minds as your classroom takes a break from screen time, breathes fresh air, and absorbs a new perspective.

Join the Ice Age Trail Alliance to learn more about their youth education programs available to schools and school districts. Saunters and Think Outside are platforms to engage students of all ages in field experiences along the Ice Age Trail. In this session, we will discuss the history and glacial significance of the Ice Age National Scenic Trail, introduce the Saunters and Think Outside programs, share stories from those who have participated, and answer questions about how your school can get involved.

2:00pm – 2:50pm I **Engineering Tomorrow: Students today. Engineers tomorrow.** HOI G

Speakers: Lisa Peck, Ann Viegut

Learn about the impact Engineering Tomorrow virtual labs can have in your classroom! Our eighteen STEM labs are developed by engineers and modeled on the cutting-edge work of experts in the field. During each lab, students have the opportunity to work with professional engineers over video conferencing or via in-person events at Northcentral Technical College in Wausau. Students gain powerful insights into the impactful work that engineers perform on a daily basis. Engineering Tomorrow employs students from the nation’s top colleges and universities to mentor middle and high school students and to work alongside engineers to develop and enhance our curriculum. Supported by Wisconsin engineers, we deliver our STEM labs at no cost and provide all equipment and supplies. Participants in this session will have the opportunity to learn about Engineering Tomorrow, interact with Zoom lab hosts, see an introductory session, view lab materials and have their questions answered. Come and see if one of our STEM labs is a fit for your students!

2:00pm – 2:50pm V **The R-A-D Future: Exploring Shifts in Wisconsin Inland Fisheries** O&P

Speakers: Becca Henningsen, Benjamin Vasquez

Walleye are culturally and economically important sportfish in Wisconsin. However, walleye declines have been observed in some inland Wisconsin lakes. Resource managers try to maintain quality walleye fisheries amidst declines, but effective management requires a better understanding of the mechanisms directly involved in population declines. Walleye declines in Wisconsin are coincident with increases in bass and panfish abundance, water temperature, and water clarity. We will discuss how these ecological changes over time may influence walleye populations. One half of this presentation will focus on biotic changes, and the second half will focus on abiotic changes. Our first learning objective is to explore the relationship between bass and panfish abundance and walleye dynamic rates. Our second learning objective is to inform how changing water temperatures and water clarity may influence walleye habitat use. Both of our current research objectives may identify mechanisms responsible for changes in walleye population status. Additionally, we will discuss potential changes in Wisconsin fisheries following the resist-accept-direct framework. We are eager to share our preliminary results which may be of interest to both anglers and scientists!

2:00pm – 2:50pm P **Let's Fix Lame Teacher Observations** HOI F

Speakers: Traci Murphy, Jobe Youssi, Craig Berg

Learn how to use a new and cutting-edge online app to create and complete a self-observation and reflection that one can use to counter inaccurate teacher observations that do not represent your skills. This observation incorporates data and evidence that can be used to measure and highlight your growth in teaching and also be used as an integral part of analyzing your teaching when crafting your submission for the National Board Certification.

2:00pm – 4:00pm B **Workshop: Bring CRISPR/Cas to your class with innovative approaches** K&L

Speakers: Ally Huang

In this workshop, teachers will learn about several different ways to teach about CRISPR/Cas and its applications. This workshop will give teachers many options of how to teach this topic in their classroom, from free resources like videos, to free hands-on paper models, all the way to hands-on lab activities that put the power of CRISPR/Cas directly into student hands and allow them to target genes themselves!

We will first walk the teachers through the two hands-on CRISPR/Cas labs activities. Both of these lab activities give students the opportunity to use authentic CRISPR/Cas systems to target specific DNA sequences and visualize the result of that targeting. We will also feature free educational resources designed to make CRISPR/Cas accessible to biology students of all levels. This includes paper models, webinars, presentations, worksheets, and additional readings.

NGSS
HS-LS1-1
HS-LS3-1
HS-LS3-2

3:00pm – 3:50pm **Connecting with the People, Places & Programs in STEM at UW-Madison** HOI H

Speakers: Liz Jesse, Tom Zinnen

Come explore how you and your students can connect better with the people, places and programs in research & science outreach at UW-Madison, Wisconsin's public land-grant research & extension university. Learn how to schedule a multi-site field trip to campus to venues such as the Geology Museum, the Physics Museum, UW Space Place, the Wisconsin Energy Institute, DC Smith Greenhouse, and the Biotech Center. See how you can use the BadgerTalks speakers bureau to bring UW-Madison researchers to your community. Find out how to connect with UW-Madison places spangled across Wisconsin, such as Upham Woods in the Dells, Trout Lake Station in Vilas County, Kemp Natural Resources Station in Woodruff, the Arboretum in Madison, and the network of Ag Research Stations all across Wisconsin. Check out more resources online and on the air through PBS Wisconsin and Wisconsin Public Radio, and your local county Extension office including Wisconsin 4-H, all part of UW-Madison's commitment to our public-service mission of advancing & enhancing lifelong learning for all. Remember, as residents & as sales-taxpayers, your students are co-owners & co-funders of the 8th-largest research university by R&D budget in the US. So come connect with us, and help us connect with you!

3:00pm – 3:50pm **Using Interactive Science Binders in the Middle School Classroom** HOI E

Speakers: James Broetzmann

When I began teaching 24 years ago, I wrote notes on the board and my students copied those same notes into their notebooks.The students hated it, and so did I. My back was often to my students as I wrote on the board, and when I turned around to expand upon what I wrote, my students had a difficult time engaging in any type of meaningful discussion as they were still writing down the notes. I knew I needed to do something different. I co-taught with a new 8th grade teacher who introduced to me interactive science notebooks. After using them for several years with a great deal of success, I modified them into interactive science binders. My students now enjoy taking notes! In the presentation, I will lead participants through a typical note-taking day in one of my classes in which they read a short assignment, use a note-taking guide to pull out the most important information from that reading, and finish with a follow-up activity that reinforces what was learned in that day's lesson. Turn note-taking into a fun, interactive experience by using interactive science binders in your classroom!

3:00pm – 3:50pm **WSST Fermenters Unite** O&P

Speakers: Ray Scolavino

Annual meeting of those that have a hobby of fermenting. Hopefully people bring samples of their foods and beverages

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3:00pm – 3:50pm B **From Classroom to Workforce - Applied Forestry Curriculum for High School** HOI F

Speakers: Jared Schroeder

“When am I ever going to use this?” “Why are we learning math, this is a science class?” When students ask you these questions, the answer is “applied curriculum.” The Wisconsin Forestry Center at UW-Stevens Point is developing an interdisciplinary workforce-focused curriculum to give students authentic experiences in the field of forestry. Students will earn industry-recognized certificates, giving them a head start in the forestry workforce and earning them credits to be applied to two- or four-year colleges. During this presentation you will discover what this curriculum can do for your students and what tools will be available to support it, including mobile sawmills to immersive simulators.

3:00pm – 3:50pm B **Workshop: Human Impact on Biodiversity** HOI J

Speakers: Brittney Zierten, Lynn Kurth, Kelly Kramer

How can a change in human action impact carbon sequestration, biodiversity and soil health? In this investigation teachers will look for patterns in ecosystem diversity to determine cause and effect relationships for the services provided for by those ecosystems. The presentation will include information on Nourish the Future (a national education initiative developed by science teachers for science teachers, sponsored by the National Corn Growers Association and United Soybean Board). Presenters will also share lessons curated on the Nourish the Future website dealing with biodiversity (Freshwater plankton biodiversity investigation, Mesofauna biodiversity investigation). Participants will actively participate in analyzing samples and calculating Simpson’s Index of Diversity. Lessons connect to HS-LS2-2 (Using mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales). During the workshop teachers will investigate soil ecosystems, calculate Simpson’s Index of Diversity, and determine cause and effect relationships between human impact and ecosystem services.

3:00pm – 3:50pm B **Where have all the birds gone? And why are some still here?** HOI G

Speakers: Ben Zuckerberg, Dolly Ledin

Objective: Teachers will learn how to use Wisconsin’s Breeding Bird Atlas to have students investigate changes in Wisconsin’s bird ranges over time. Teachers will examine data to compare range changes with patterns of climate change and explore life histories to explain differences among species. We will discuss questions that could be investigated with this data set and provide background information on current research on the impacts of modern climate change on bird populations, including global trends such as poleward shifts.

3:00pm – 3:50pm C **Workshop: Ensuring Access and Equity for All Doesn’t Have to be Rocket Science!** M&N

Speakers: Patrice Simpson

The Next Generation Science Standards call for science teachers to provide all students with challenging, rich, and engaging science experiences. In creating equitable spaces where all students’ experiences are validated and their different abilities are incorporated, we help to make them feel safe and valued in our classes. When students feel safe and valued, they are more likely to participate in classroom and small group discussions and have a much more meaningful and engaging classroom experience. During this session, participants will take on the role of a consultant for NASA and will design a system to model a rocket launcher. We will highlight tools to support Gender Equity, Economically Disadvantaged Youth, English Learners, Students with Disabilities, and Advanced and Gifted Learners. Participants can immediately implement strategies with their students by using the workshop resources suggested and great take-aways. This really is rocket science but ensuring access and equity doesn’t have to be.

3:00pm – 3:50pm	V	**Connect, Explore, and Engage with Schoolyard Science** *Speakers: Victoria Rydberg* Educators will examine big ideas that connect NGSS and the state's environmental education standards. By digging into each of the standard strands—Connect, Explore, Engage—educators will gain an understanding of what the standard is, develop implementation ideas for school yards and community, and identify resources available to support their teaching. The session will include large and small group discussion. An emphasis on Gholdy Muhammad's five pursuits will be included throughout the presentation. Elementary educators will be grateful for interdisciplinary opportunities. Middle school educators will appreciate the application of science to the real world to combat the ever present "why do we have to learn this" question. High school educators will find ways to engage students who may have previously thought "science was not for them" by connecting to their place. Kevin Anderson and I have been working together for years to draw connections across our standards areas and participants will receive a "Big Ideas Across Science, Social Studies, and Environmental Education" handout in addition to a myriad of other resources. For scheduling purposes, I will also be hosting a booth for Green & Healthy Schools so it would be ideal to not have this presentation during a main exhibit time.	Q&R
3:00pm – 3:50pm	P	**Meet your WSST District 1 Director** *Speakers: Erik Duhn* This is an informal session that will start with myself briefly introducing myself, my role as a director, and my journey here at WSST, followed by an opportunity to hear from other members in your district. In this session we plan to network and share ideas on ways we can stay connected throughout the year, plan socials, and other professional development opportunities based on the needs specifically for educators/enthusiasts in our district.	Grand Terrace Café
4:00pm – 4:15pm	S	**Newcomers Meet up**	Grand Terrace
4:00pm – 6:00pm	A	**Equipment Adoption** *Speakers: Ray Scolavino*	Madison Ballroom
4:00pm – 6:00pm	E	**Rock Raffle** *Speakers: Dennis Rohr* The actual raffle will take place between 5:30-6:00pm.	Madison Ballroom
4:00pm – 6:00pm	S	**Vendors Social**	Madison Ballroom
6:15pm – 8:15pm	S	**Membership Social hosted by President of WSST** *Speakers: Kristin Michalski* Come have some tailgating fun with your fellow WSST members! President Kristin Michalski invites you to come join us for Thursday evening for our annual membership social! Have a little fun and some great conversations with other science teachers while playing bags and listening to a DJ. We invite you to wear your favorite team apparel for this event. Enjoy free food and beverages as well and a chance to win great door prizes including Madison Mallards and Forward Madison FC tickets.	Grand Terrace

[A] All Science Disciplines [M] Assessment [B] Biology/Life Science [H] Biotechnology [C] Chemistry

[E] Earth Science [I] Engineering [V] Environmental [F] Fieldtrip [G] General Science [L] Leadership

[P] Pedagogy/Teaching Strategies [Y] Physics [S] Social [1] STEM [W] Workshop

MARCH 10 • FRIDAY

7:00am – 4:00pm		**Friday Registration**	Registration Booth
8:00am – 8:50am	A	**DEI and Culture of Belonging in WSST** *Speakers: Wendy Herrmann, Sara Krauskopf* WSST has secured the services of Ridley Consulting Group to assist with the implementation of intentional Diversity, Equity, and Inclusion (DEI) work to create a Culture of Belonging and increase WSST membership. This session will present the DEI concepts and language for this process. The session time includes discussion, Q&A, and reflection for application in WSST and beyond.	HOI H
8:00am – 8:50am	B	**How culture and science intertwine using the Taino of Puerto Rico** *Speakers: Jamie M Lauer* Using hurricane restoration efforts from local scientists on the island and cultural experts, learn how to create more global activities for STEM students to solve. I will outline how one scientist created land based nurseries to restore coral reefs/sea urchin populations. Using the history of the Taino, I am able to create unique lessons using soil, art and forensic science. Attendees will learn how a teacher inspired research trip can change the course of a classroom and provide many uniques ways to engage students.	HOI J
8:00am – 8:50am	B	**Teaching mRNA Vaccines … and the future of therapeutic mRNAs.** *Speakers: Tim Herman* We deciphered the genetic code and understood the flow of genetic information from DNA to RNA to protein in the 1960's. Why has it taken us so long to begin thinking about therapeutic RNA – i.e. using mRNA as a vaccine or as a cancer therapy? We will explore this question as we tell the story of the process of science that led to an effective mRNA vaccine for COVID-19 – in less than one year from the initial report of the nucleotide sequence of CoV-2 RNA genome. Teachers will be introduced to a mRNA vaccine design activity in which their students will be challenged to design the COVID-19 mRNA vaccine while examining (i) the uridine to pseudouridine modification as well as (ii) the surprising consequence of codon optimization of the CoV-2 nucleotide sequence.	Q&R
8:00am – 8:50am	C	**Workshop: Quasicrystals: Breaking all the Rules** *Speakers: Shelly Grandell, Anne Lynn Gillian-Daniel* The discovery that some solid substances could form without long range symmetry was once thought of as preposterous. Thanks to the work of materials scientists, we now know quasicrystals can be created and give us a new way to think about how solids form. In this hand-on session, explore the impossible using art, color, math and culture explore the curiosity that drove the discovery and further understanding of quasicrystals and their applications. We will guide you through a creative, student-led exploration of periodicity of traditional crystalline structures, identifying and creating rules of symmetry…all to show them how to break them. These rebellious materials have driven the innovations of non-stick frying pans, LEDs and surgical instruments. These applications make our lives more convenient, safer and efficient.. Until recently, they were thought only to exist in the lab, but exciting discoveries reveal they can surprisingly, be found in nature. Come find out where! The answer is out of this world… MS-PS1-3 MS-PS1-5 HS-PS1-7 HS-PS1-6	HOI F

8:00am – 8:50am E **CALLING ALL CARBONS** HOI E

Speakers: Linda Culpepper, Lisa Kelp

Objective: Students understand the major processes by which carbon moves from one reservoir to another in Earth's carbon cycle and how these processes affect the level of CO2 in the atmosphere.
SEP: Developing and Using Models, Planning and Carrying Out Investigations, Analyzing and Interpreting Data, Constructing Explanations, Engaging in Argument from Evidence
CCC: Cause and Effect, Systems and System Models, Energy and Matter, Structure and Function, Stability and Change
Presentation: This activity helps students understand the major processes by which CO2 is added to and subtracted from the Earth's atmosphere. In groups, students use a set of Carbon Cards and sort them into groups based on whether each process is a CO2 source or contributes to a CO2 sink.

8:00am – 8:50am P **Cultivating Genius in Science: Equity Framing from Dr. Gholdy Muhammad** HOI I

Speakers: Leigh Kohlmann, Alice Severson, Kevin Anderson

Building on the work of Dr. Gholdy Muhammad in her inspiring book, Cultivating Genius, we'll focus on how to bring equity to the forefront in lesson design. Specifically, we'll look at the strong strategies of an OpenSciEd unit and share an example of how to make it better connect to students' identities and help them find joy in science learning. We'll also discuss the criticality aspect of Dr. Muhammad's framework, noting how students can use science to change the world around them and reduce inequities.

8:00am – 8:50am P **Perceiving the Military as a Source of Equity** Grand Terrace Café

Speakers: Erik Duhn

Many of our students do not have the aspiration, desire, or dreams to go to college. Whether it is money, the want to get out of school, or the thought of leaving home behind, many students want to join the military. What can we do to help those in that situation? As an educator and a member of the Wisconsin Air National Guard I have the unique experience of seeing the other side of the military. Join me as I recount my experience of enlisting into the national guard. Come explore the differences between active duty military and the reserves, explore the military requirements that all armed forces have to adhere to, and see how we can best serve our students who seek this route.
In this presentation I will be presenting images of military training and my experience. I will be asking for audience input about former military experience. I will be answering questions pertaining to my own military experience and whatever questions other teachers may have about the process of joining the military.

8:00am – 8:50am P **Protocols for Student Success with Science and Engineering Practices** HOI G

Speakers: Rachael Coleman, Lynn Gutzwiller

Come to experience how these Science and Engineering Protocols can revolutionize and simplify your science instruction. Protocols are tools designed to offer structured processes to support focused and productive conversations, build collective understanding, and guide students to a deeper learning experience. Designed in grade bands, these protocols can be used with any science lesson and aligned with the grade appropriate NGSS. The protocols will take students through a scaffolded set of questions and tasks to help them apply the science and engineering practices at grade level. For example, students would use a protocol to work through the process of analyzing data by first marking changes in data, second noting what the changes mean, and finally identifying patterns in the data. Students are then given writing prompts to explain what the data shows and means.

During this presentation participants will see how these science protocols can help students lead their own learning. The session will begin with a model lesson using the protocols and provide training for their successful implementation in the classroom. Participants will leave with a digital copy of the protocols and all the tools necessary to begin using them immediately.

8:00am – 8:50am P **Sugarin' Off ! An opportunity for integrated and tasty outdoor learning** O&P

Speakers: Rae Grosman, Karyl Rosenberg

Sugarin' Off ! An opportunity for integrated and tasty outdoor learning: Learn how two high schools at far corners of Wisconsin have used making maple syrup as a positive outdoor learning opportunity.

8:00am – 8:50am W **Workshop: Experience the pedagogy of OpenSciEd with Carolina Biological** K&L

Speakers: Bob Friedel, Erik Benton, rick.brost@carolina.com

"Experience the pedagogy of OpenSciEd for middle school by engaging in a model lesson from the new Carolina Certified Version. In this workshop, teachers delve into the four elements of the anchoring phenomenon routine and experience firsthand how this strategy motivates students to explore and make scientific connections to real-world phenomena.

The anchoring phenomenon featured in this workshop is from the OpenSciEd Unit 6.1: Light & Matter. The workshop begins with observing a video of the real-world phenomenon of a one-way mirror. Participants document what they observe on a notice and wonder chart. Next, they explore a model of the phenomenon to begin to identify key elements of the phenomenon to investigate. Using the experience with the model, participants begin to make sense of the phenomenon as they work together to develop a consensus model and identify related phenomenon. In the final part of the anchoring phenomenon routine participants develop a driving question board based on their experiences and determine the next element of the phenomenon to investigate. The workshop concludes with an examination of all five of the instructional routines in OpenSciEd unit using the science storyline for Unit 6.1: Light & Matter."

8:00am – 9:50am B **Workshop: What's In the Trunk? An Elephant Conservation Expedition** M&N

Speakers: Amy Fassler

Elephant populations are facing threats from many sources, including illegal ivory poaching. This workshop introduces participants to the work of scientists who are tracking African elephant populations and identifying factors leading to their decline. The workshop session will integrate concepts of population ecology, biodiversity, ethics, and molecular ecology. The workshop will emphasize integration of NGSS science practices including: asking questions and defining problems, developing and using models, planning and carrying out investigations, analyzing and interpreting data, and constructing explanations and designing solutions.

Participants will run gel electrophoresis to determine where illegal poaching is occuring, bringing an engaging story and biotechnology skills to their students. In this hands-on session participants will

Analyze DNA samples from confiscated ivory to determine the length of each fragment; the number of base pairs.

Reference STR chart to find the number of short tandem repeats and genotype based on the estimated band sizes from your electrophoresis

Identify the elephant population the tusks came from by comparing the genotype to an elephant DNA database compiled from dung samples representing various forest and savannah elephant populations.

Finally, we will compile data to determine the location of ivory poaching hotspots!

8:00am – 3:00pm **Vendor Hall** Madison Ballroom

9:00am – 9:50am **Newcomer Meeting** Grand Terrace

9:00am – 9:50am B **Hands on Modeling: Cell Synapse** Q&R

Speakers: Tanya Monet-Bakken

In this workshop, we will explore the components of cell membranes to better understand how cells send and receive signals. Participants will get to work with a “Synapse Construction Kit” to manipulate the cell membrane components to demonstrate gated channels, leak channels, pumps, vesicles, and exocytosis. This model works well in lessons on general cells structure/function, nerve transmission, and cell communication. This ties into cell homeostasis in numerous ways.

There will also be time to brainstorm how teachers could see themselves using this activity in their own classrooms including specifics on how homeostasis can be connected.

9:00am – 9:50am B **Workshop: Enzymes in action: A hands-on teaching module for high school biology classes** O&P

Speakers: Danielle Bendt, Oana Martin

In this workshop participants will explore a three-lesson hands-on module designed to teach enzyme activity in a biology course. The experiments focus on the role of enzymes as catalysts in biochemical reactions and on applications of enzymes in biotechnology. Experiments with catalase highlight the components of an enzymatic reaction and factors that influence enzyme activity, such as temperature, pH and substrate concentration. Students complete the hands-on experiments, collect and interpret data and use modern techniques such as micropipetting. Applications of enzymes in the food biotechnology industry are illustrated with chymosin (rennin), the enzyme used in the cheese making process. An overview of the biomanufacturing of chymosin using recombinant DNA technology is provided, as well as a computer model to illustrate aspects of the enzymatic activity. These lessons align with the NGSS standards HS-LS1-6. Workshop attendees will perform the three experiments presented in this teaching module and have priority sign-up for free Enzymes in Action Kits for their classrooms.

9:00am – 9:50am B **Workshop: Beginner Biotech: Micropipetting Art and Gel Electrophoresis for Middle and High Schools** K&L

Speakers: Ally Huang

This workshop will show science teachers at the middle and high school levels a few easy ways how they can bring biotechnology to their classrooms and use them as part of a strong STEM curriculum.

First, we will show teachers how to micropipette and complete a few colorful and engaging micropipetting art activities. We will also go over other free micropipetting resources we have, as well as cover the different types of micropipettes for every budget.

Next, we will show the teachers the technique of gel electrophoresis using our super affordable Bandit™ STEM Electrophoresis Kit. We will also cover the accompanying high quality curriculum, allowing teachers to perform molecular biology labs on a budget that cover topics such as Mendalian genetics.

With our goal of making science accessible to everyone, everywhere, we hope to give workshop participants the knowledge and resources they need to bring biotech into their classrooms.

Upon completion of this presentation, participants will:
-Learn how to use a micropipette and explain why it is an important biotech technique
-Learn how to run gel electrophoresis and understand the science behind how this biotech technique works
-Have the knowledge and resources they need to bring biotech into their classrooms

9:00am – 9:50am V **Freshwater Salinization: Ecosystem Impacts and Human Health** HOI H

Speakers: Allison Madison

Participants will analyze salinity levels and trends in Wisconsin surface and groundwater, discuss the various contributors and impacts of salinization, and learn about how this problem is being addressed in Wisconsin and across the US.

Instructional resources include a Data Nugget for high school students and a WI DPI-developed inquiry lesson for elementary and middle school classrooms. Online videos address various aspects of this multifaceted issue: science, policy, the proactive approach of many municipalities, best practices, etc. WI Salt Wise staff is excited to work with teachers across the state to increase student awareness and advocacy efforts in their schools and communities.

Spoiler alert: Ion exchange, driven by elevated salinity levels, is occurring in soils and bedrock and creating novel chemical cocktails in our groundwater. Research indicates that current US standards aren't protective of vulnerable species.

9:00am – 9:50am V **Math in the Environment: A Call to Action** HOI E

Speakers: Michael Hartwell, Jami Hoekstra Collins

Challenge your students to think critically about environmental issues such as water conservation and plastic use by examining topics from different perspectives. Empower young people with the facts behind real life issues that affect their lives. Help students draw informed conclusions while inspiring media literacy and civic engagement.

Build the background knowledge of your students by inviting them to view, discuss and consider various episodes of Above the Noise (a public media series based in San Francisco). Expand students' interests with active investigations where they measure, graph and assess information to organize and share mathematical, environmental data as a path to action with justification for positive change. Learn how PBS LearningMedia's Cyberchase collection as well as the PBS Wisconsin's Meet the Lab: Data Decoders can give your students the inspiration and tools to take environmental action.

9:00am – 9:50am V **Teaching with Animal Artifacts** HOI J

Speakers: Shelly Rudnick-Peterson

In this session a collection of animal artifacts will be presented, along with specific questions to be used in evaluating those artifacts. Participants in the session will act as "students", evaluating how the structure of an animal body part plays a role in the survival of that animal. While interacting with these materials, students are making direct connections between the structure of a specific body part, and the function of that part. (NGSS Crosscutting Concept – Structure & Function). Students also engage in the practice of Engaging in Argument from Evidence when they use specific evidence about an artifact to support their inference about its use. This lesson can be extended to the outdoors by having students evaluate habitat(s) to determine if they would be suitable for an animal based on its specific traits. While using actual artifacts is ideal, we will explore with participants how pictures, drawings, or models could be used to achieve the same result. This activity is typically used with Middle School, but can be easily adapted for older or younger students.

9:00am – 9:50am P **Keeping the Wonder Alive in Elementary Science** HOI I

Speakers: Sue VanDenLangenberg

Our district recently engaged in a major science curriculum writing initiative. Throughout this journey, bringing science into elementary classrooms in a way that is meaningful, engaging, and connected to learning in other subjects has been a goal. Come learn how the science curriculum was used to help keep science wonder alive and a central part of elementary learning within our district. In this session, we will share the resources and books we are using to make science come alive, connections to our literacy and math curricula, and how to make exploration a key part of elementary science for our district.

9:00am – 9:50am P **Meet your WSST District 5 Director** Grand Terrace Café

Speakers: Sara Krauskopf

This is an informal session to meet your District 5 Director, learn about a Director's role and other ways to get involved with WSST. During most of this session we will network and brainstorm ways we can stay connected throughout the year through socials and professional development opportunities that meet the needs of science educators and enthusiasts in our district. Come to meet new people, reconnect with colleagues you didn't realize work near you, and share ideas.

9:00am – 9:50am P **Research Quest Investigations - Phenomenal, Interactive, and Free** HOI G

Speakers: Rachael Coleman, Lynn Gutzwiller

Teachers will use Research Quest, the award-winning, free, online investigations, to learn how to engage their students in some of the most intriguing mysteries of our time. They will gather evidence, engage in robust debate to reason with their evidence, and develop explanations to communicate their ideas - all while using 3D technology to access many of the museum's rich fossil, artifact and biologic resources. Participants will examine opportunities for supporting collaborative student-driven work to gather empirical data by making quantitative and qualitative observations of real museum objects with video-based modeling provided by research scientists. They will also explore strategies for making student thinking visible as students move from using intuitive to increasingly complex critical thinking skills. These strategies provide important supports to guide students as they weigh the quality and strength of their evidence and use that evidence to develop their explanations and construct arguments. Participants will receive access to supporting materials designed for classroom teachers and their students - including learning assessment tools for both. These tools provide research-based exemplars for promoting 3D science in the classroom and building capacity among students in using the practices detailed in the NRC Framework and NGSS.

9:00am – 9:50am W **Workshop: Let’s build nanogenerators to create sustainable energy from motion!** HOI F

Speakers: Anne Lynn Gillian-Daniel, Shelly Grandell

In this hands-on workshop, participants will use simple materials to build their own triboelectric nanogenerator (TENG), a state-of-the-art device that converts static electricity into usable energy. These devices produce renewable energy from kinetic energy sources and have the potential to eliminate or reduce batteries for small electronic devices. Participants will uncover the fundamental physics behind the operation of these devices by building a nanogenerator of their own using everyday materials. This engaging activity provides opportunities to explore: 1) various forms of energy and how humans can capture these for beneficial purposes, 2) electricity and simple circuits, and 3) how size and scale can impact the design of devices and be used to our advantage. We will provide helpful tips to ensure your students successfully construct these devices, along with extensions to the activity for further inquiry and engineering design challenges. We will discuss examples of how researchers are currently applying this technology to reduce our carbon footprint and aid in human health, along with discussion points around theoretical optimization of energy production using the TENGs. This engaging activity is an excellent and straightforward way to bring cutting-edge research into the hands of students.
NGSS: HS-LS2-7, HS-PS3-3, MS-PS1, MS-PS3

9:10am – 10:45am F **Fieldtrip 6: UW-Madison Energy Institute**

The Wisconsin Energy Institute (WEI) is the home for cross-disciplinary energy research at UW–Madison. Within its state-of-the-art laboratories, scientists and engineers are working together to find solutions that will help transition the world to cleaner energy sources. During this hour-long tour, you’ll have the chance to meet with several WEI scientists, learn about their research, tour a lab, and get an overview of the free energy-education resources available at WEI to help you bring UW–Madison back to your classroom.

For entering the lab, please wear long pants and closed-toed shoes.

9:30am – 11:15am F **Fieldtrip 5: Henry Vilas Zoo**

Join us at the Henry Vilas Zoo in a Critter Connection! Meet some of our ambassador animals in a program geared for science teachers, then spend some time exploring the zoo!

10:00am – 10:50am A **Snapshot 3: Student Engagement with Arts Integration in Science and Inclusive Teaching Strategies in STEM - A Community of Practice Model** O&P

Speakers: Bernardo Traversari, Stacey Markon

Student Engagement with Arts Integration in Science: Engage students with science and arts integration. Hear an overview of our program, collaboration process, and experience a hands-on clay modeling activity.

Over the past two decades, science, technology, engineering, and mathematics (STEM) faculty have striven to make their teaching practices more inclusive and welcoming to the wide diversity of students who enter college. However, the resources available for faculty to develop these skills (including time and funding) and implement best-practices in their classrooms are not prevalent at most higher education institutions. In addition, engaging in this type of professional development usually requires a concerted effort by motivated faculty members to design, plan, and implement workshops/in-person sessions/informal discussions/etc. on their own – a task which is not always feasible when considering other responsibilities and commitments.

To tackle this issue, we will be implementing a Community of Practice (CoP) for STEM faculty and students at Edgewood College to discuss inclusive teaching strategies in the sciences and to create a peer-to-peer guide on how to best implement these strategies in a variety of settings. This project is unique in that it will take advantage of the extensive network of faculty interconnected through the Bonner Foundation and Bonner Leaders Program at Edgewood College and will be a joint undertaking between the Office of Science Outreach, STEM faculty, and undergraduate students at Edgewood College.

10:00am – 10:50am B **Biology Roundtable** Grand Terrace Café

Speakers: Shannon Previte

10:00am – 10:50am B **Getting the letters out- Modeling Sanger Sequencing** Q&R

Speakers: Mark Arnholt

Learn how a polymerase chain reaction and some clever biochemistry allowed scientists to begin sequencing genomes while using physical classroom models to determine an unknown genetic sequence with ddNTPs. The activity is set up so that there is a time for front-loading of the information, kinesthetic manipulative time where the teachers work with the model, and finally an extension to understand how Sanger sequencing has both been historically utilized and where research tools have progressed. See how to make biotechnology accessible for a wide range of high school students. Connections to NGSS LS3-HS1, MOD-HS7, and CE-HS3.

10:00am – 10:50am B **Balancing NGSS Alignment with Local Needs** HOI J

Speakers: Craig Kohn

Despite nearly a decade since the release of NGSS, there is little evidence of large-scale changes in US science instructional practices. This is partly due to local challenges and district expectations, which frequently affect teachers' abilities to implement NGSS-aligned instruction in their classrooms. We argue that for NGSS to be successful, implementation must address both the interests of students and the needs of educators. Through a research-practice partnership in a southeast Wisconsin high school, we are developing "proof of concept" curricular resources to reduce the stress, cost, and time involved with NGSS alignment. Our open-source materials are freely available to teachers and were developed using the findings of recent large scale education research projects. Our preliminary data show that we were able to achieve NGSS-aligned outcomes for over 90% of assessed students. Participating teachers reported that these materials reduced their workload and enhanced their effectiveness while being responsive to numerous district expectations. In this workshop, we will summarize the research behind these materials, clarify the goals of NGSS, provide examples of curricular content, and guide participants through sample classroom activities. Attendees will leave the workshop with access to curricular resources they can download and modify for use in their own classrooms.

10:00am – 10:50am B **Days of Wonder** HOI G

Speakers: Jami Hoekstra Collins

Be prepared to teach the process of science inquiry in the great outdoors on any day of the year. Bring active, environmental outdoor learning to your students with this collection of NGSS aligned activities and corresponding resources from PBS. Media-enhanced classroom activities invite students outside to pursue their own questions, inquiry and local understanding of the natural area around their school.

This multimedia collection of lessons will develop students' content knowledge while teaching them the process of science inquiry. Featured topics localized to Wisconsin include: Adaptation, Animals, Animal Survival, Biodiversity, Ecosystems, Habitats, Human Impact and Weather. Teachers will walk away from this session with their own Days of Wonder collection of ready to use materials for engaging students with a variety of active, joyful outdoor learning experiences.

10:00am – 10:50am B **Workshop: Genes in Space: Genetics on the International Space Station, Free Loaner Equipment, Curriculum, and More!** K&L

Speakers: Ally Huang

Genes in Space is a free annual contest that launches student-designed research projects to space. We invite students in grades 7-12 to design DNA experiments that address challenges faced by space travelers. Each year, one winning project is selected to fly to the International Space Station (ISS), where it will be carried out by astronauts. Participants will develop the skills needed to bring the cutting edge of biology and space exploration into their classrooms. We will provide hands-on training in the use of the same molecular biology tools that are used to carry out Genes in Space experiments aboard the ISS, and introduce ways to implement these tools, such as PCR technology, with students. Specifically, participants in this session will: 1) learn about the ISS as a venue for cross-disciplinary scientific research 2) explore how their students can become involved in authentic space biology research, 3) complete a classroom activity using one of the tools currently aboard the ISS, and 4) walk away with free classroom resources they can use to engage their students through space biology and biotechnology. Join us to learn how you can use the contest to engage your students in authentic research, and to learn how you can access free Genes in Space classroom resources, including biotechnology equipment loans.

10:00am – 10:50am I **Developing Models- Engineering Roller Coasters in the Classroom** HOI E

Speakers: Amy Baranowski, Chaz Kochevar, Frances Weiss, Kristin Kyde

Participants in this session will learn about a roller coaster engineering activity and have hands on time to try out the activity! This engineering activity includes building a roller coaster model, gathering data using the model, analyzing the limitations of the model, and communicating the findings some the model. In addition to the activity, participants will learn how to assess the activity using NGSS aligned rubrics developed by teaching staff. Activity is designed for middle school, but can be adapted for any grade level!

10:00am – 10:50am P **The OpenSciEd Instructional Model: Routines for Advancing Students Through a Storyline** HOI I

Speakers: Cynthia Weller

Using a storyline approach, a logical sequence of lessons that are motivated by students' questions that arise from their interactions with phenomena, we'll navigate through the OpenSciEd model using five routines - activities that play specific roles in advancing the storyline with structures to help students achieve the objectives of those activities.

10:00am – 12:00pm B **Workshop: Where Have All the Fish Gone? – An Exploration of Human Activity on Wisconsin Waters** M&N

Speakers: Lynn Markham, Gina Smith, Steve Schmidt

Who owns Wisconsin lakes? Whose job is it to protect them? If lakeshore development is a free-for-all, we degrade lakes. When lakeshores are developed, some trees and native plants are replaced by impervious (hard) surfaces. Driveways, rooftops, and other hard surfaces decrease the ability of the shoreland areas to serve their natural functions. Tree and native plant removal eliminates the food sources and shelter on which wildlife depend. Water can no longer soak into the ground, which increases storm water runoff that carries pollutants and sediments to lakes and streams. Fish eggs die when they are covered in a blanket of silt from runoff and erosion. So, what are we doing in Wisconsin to protect lakes and keep them healthy? In this workshop participants will examine the effect of human activities on Wisconsin lakes and rivers and the fish that live there. Participants will learn how to protect these resources as they participate in a research-based fish activity and runoff experiment, both of which can be easily replicated with their students. Participants will also build their own water runoff models. Materials to build the models will be provided to all pre-registered participants. Cost $10; Participants encouraged to bring a box or tote over 12” long to transport their model following the workshop

10:00am – 12:00pm W **Workshop: Constructing Phenomena Based Storylines** HOI H

Speakers: Kevin Anderson, Dennis Rohr, Chad Janowski

Many teachers, myself included, have spent far too many hours looking for better materials to use in their classrooms. Is it possible to take the best of your existing curriculum and transform it into a phenomena-based storyline unit? Absolutely! The journey to increased student engagement and deeper understanding begins with shifting to storylines that unfold over time and keep your students asking questions and making sense of science. Discover ways to restructure your instructional sequence and use the most impactful materials that you have already developed. Access the tools and resources used by Ambitious Science Teaching, NGSS Storylines, Model Based Inquiry, OpenSciEd, and others to create your own personalized High Quality Instructional Materials!

10:00am – 12:00pm W **Workshop: Improv to Improve: Experience how Improvisation activities can be used for effective communication and community building** HOI F

Speakers: Anne Lynn Gillian-Daniel, Shelly Grandell

During this interactive workshop, participants will practice using improvisational activities and games designed to improve their communication skills in a fun and encouraging environment. The activities presented in the workshop can also be used to help students build a learning community in the classroom. The activities and games will enable participants to practice: 1) vocal and visual communication, 2) active listening skills, 3) responding quickly to unexpected situations, 4) story telling skills. All attendees are expected to fully participate in the workshop.

NGSS Practice: Obtaining, Evaluating, and Communicating Information (all grade levels)

11:00am – 11:50am **Higher Education Roundtable** Grand Terrace Café

Speakers: Joel Donna

11:00am – 11:50am A **Snapshot 4: Using Argument Driven Inquiry to Move from CER to CEJ, Graphical Analysis skills - ChartyParty, Introduction to eCYBERMISSION, Using eLogs to Showcase Student Learning,** O&P

Speakers: Kathy Biernat, Ken Budill, Shannon Previte, Hayley Parsons, Sara Dobish, Carey Dieleman, Vicki Ramus, Becky Kocha

Guide your students to a deeper understanding of scientific argumentation by moving from Claims Evidence Reasoning to Claims Evidence Justification to improve scientific argumentation. In this session, learn how to have students use more than just a list of data in their "evidence" section, but to analyze and interpret that data. In the justification section, students tie their experiment to the scientific principles and answers the question, "so what?" - why does this information matter to us? Participants will have an opportunity to compare student responses in CER and CEJ

If your students struggle with graphing scientific data, picking out data points or even determining graphical trends - this session is for you. A fun game, Charty Party (all ages) will be used/shown - with template to make own version.
Focus on graphing in science, independent vs dependent variables, and even share sites/resources to access real data being collected for your students to analyze.

Introduction to eCYBERMISSION: Looking to engage 6-9th grade students in STEM with teamwork and community-based projects? Learn about the resources available with this no-cost, online STEM competition.

Using eLogs to Showcase Student Learning: eLogs are a tool to let students showcase their learning throughout a unit by documenting phenomenon, learning targets, labs, and modelling to connect to the benchmarks.

11:00am – 11:50am B **Using Phage Steering to Experience Natural Selection** HOI J

Speakers: Zach Pratt

Bacteriophages, or phages, are viruses that use bacteria as hosts for their replication. Like all viruses, phages require a receptor on the surface of a host cell in order to infect the host. Infecting a population of bacteria, such as Escherichia coli, to a single bacteriophage will select for phage-resistant clones. These clones have different phenotypes and genotypes from the original population. In other words, phages are an environmental pressure that selects for adaptations in bacteria that allow them to grow in the presence of the phages. In this presentation, participants should plan to enjoy the wonder, smells, and sights of microbiology as they experience a lab that has been used to teach natural selection to students in AP Biology. This lab is adaptable to other courses that embed into their curriculum the NGSS science practices, natural selection and adaptation, and the crosscutting concepts of cause and effect and structure and function. Participants will leave with an understanding of how bacteriophages can be used to model natural selection and how they can teach this topic in their classroom.

11:00am – 11:50am B **Workshop: Use molecular tools to find antibiotic resistance genes in environmental DNA** K&L

Speakers: Ally Huang

Join a national monitoring program tracking the spread of antibiotic resistance in the environment. Learn how students can collect soil samples based on their own hypotheses about antibiotic resistance hotspots, extract total environmental DNA from soil, use the molecular methods of PCR and gel electrophoresis to test their samples for evidence of tetracycline resistance, and finally then contribute their data to a national database of antibiotic resistance surveillance.

This lab has been developed in conjunction with the PARE (Prevalence of Antibiotic Resistance in the Environment) project. The PARE project engages students to test and report the prevalence of tetracycline-resistant bacteria from soil at diverse geographic sites, engaging students in one of the great environmental and health challenges of our time. Learn more about the PARE project: https://sites.tufts.edu/ctse/pare

Upon completion of this presentation, participants will:
Learn how their students can join a national wide monitoring program to test for antibiotic resistance genes and participate in citizen science
Learn about an advanced lab activity with unknown outcomes that can be used for independent research projects in the classroom
Understand how the molecular methods of PCR and gel electrophoresis can be used to test for antibiotic resistance in the environment

NGSS: HS-LS1-1; HS-LS3-1; HS-LS3-2; HS-LS4-4; HS-LS4-5; HS-LS2-7

11:00am – 11:50am B **"Why does the egg turn white when I cook it?" and other Stories: Modeling Protein Structures and Disruptions to their Systems** Q&R

Speakers: Choi Maner

In this hands-on session, participants will explore and demonstrate NGSS Science Practice 2: developing and using models and Cross-cutting Concept 6: structure and function. Using the Amino Acid Starter kit, they will model and visualize the formation of primary, secondary and tertiary protein structures. Each table group will also build quaternary structures and manipulate their models further to demonstrate and explain how environmental factors can disrupt the molecular structure and denature proteins. They will also illustrate how mutations can impact the structure and function of these biological molecules. This will be followed by a discussion of strategies on how this activity can be implemented in different grade and subject levels, including other phenomena that these models can demonstrate and explain. The objective is for attendees to bring these ideas to their classroom and help their students have a better appreciation and understanding of biomolecular processes while keeping them engaged and curious about explaining complex biological phenomena.

11:00am – 11:50am I **NOT YOUR USUAL ELEMENTARY STEM WORKSHOP: MAKE A RIDE FOR ONE OF YOUR TOYS**

Speakers: Linda Culpepper, Lisa Kelp HOI I

This hands-on workshop challenges participants to make a vehicle to move a toy or other small object using motors, wheels, wires, and other equipment. This activity is one of 10 engineering design challenges in the Electric Motors Catalyst, a STEM curriculum for grades K-5 that comes complete with equipment, lesson plans, assessments, embedded support for ELA, and is NGSS focused. The program is distributed by Lab-Aids. Lesson samples and literature will be distributed.

11:00am – 11:50am P **Making Project Based Learning Work** HOI G

Speakers: Claire Bernatz

Audience members will learn why PBL is not only important, but how to implement in their classrooms. Project based learning is an impactful strategy to help students make authentic real world connections to the science they are doing, and it can happen at any level. However, starting project based learning can be intimidating if you don't know where to begin, and carriers such as cost, supplies, and logistics can be roadblocks many teachers endure. This all level presentation would be demonstrating the WHY behind PBL and how to start incorporating it into classrooms, while making connections to how this supports the NGSS engineering standards.

Through this presentation, the audience would replicate what testing anxiety can look like in stuents, model what that test would look like in a PBL format, see clear examples of how it works in other classrooms, as well as receive instructions on how to implement it into their own settings.

Because this topic is PBL, it is important to me that this also feels like how it would work in a traditional classroom setting. So much of the presentation is rooted in tangible learning and group discussion.

11:00am – 11:50am P **Using Benchmark Science Data to Drive Instruction in Middle School** HOI E

Speakers: Meridith Falkavage, Susan Spencer, Cam Dary

Knowing when and how to use assessment data to inform and drive instructional decisions is important for all teachers. Come learn how we implemented benchmark assessment and the tools (including spreadsheets) we use to help teachers break down student learning and make decisions about what to do next. Our benchmarks were written specifically for our scope and sequence as we implemented a new curricular resource. We can then use the benchmark data to evaluate student strengths and gaps not only for DCIs but also for the SEPs and CCCs. In this session you will hear about the process used to create the benchmark from administrators in the district, how instructional coaches and teacher work together to evaluate the data and make instructional moves in the science classroom.

12:00pm – 1:00pm A **Keynote: Dietram Scheufele** Grand Terrace

Dietram A. Scheufele holds the John E. Ross Chair in Science Communication at UW–Madison, and is Co-PI of the Center for Nanotechnology in Society at Arizona State University. An elected fellow of the American Association for the Advancement of Science and the Wisconsin Academy of Sciences, Arts & Letters, he is listed by Microsoft Academic Search as one of the ten most cited researchers in the communication discipline. His most recent work focuses on the role that social media and other emerging modes of communication play in our society. Scheufele has been a tenured faculty member at Cornell University, a Shorenstein fellow at Harvard University, and a DAAD Visiting Professor at the Technische Univeristy-Dresden.

1:00pm – 1:50pm A **Exploratorium** Madison Ballroom

Speakers: Ray Scolavino

1:30pm – 3:35pm F **Fieldtrip 7: Capital Brewery**

Learn about the chemistry of the brewery process at Capital Brewery! The brewery is committed to sustainability by it's use of local products and solar energy. Come tour the brewery and learn with us!

2:00pm – 2:50pm A **Snapshot 5: Wisconsin Crop Progress Reports- A local and state wide data source state based data and story source, The WSST Story- 65 years of institutional and individual memories, and A Problem-Solving Experiment** O&P

Speakers: Kevin Mason, Greg Matthias, Zach Pratt, Karyl Rosenberg, Tara Rose

USDA Crop Progress reports are sources of current agricultural and environmental data which are freely available by joining the list serve. The data includes descriptions of specific crop conditions as well as environmental data like precipitation, temperature and soil moisture. This data can be used as a sources for climate monitoring and as a focus for uniquely local conditions. Archived data is useful for historical comparisons, both local and statewide. Examples of possible data use will be shared, ideas for additional data used will be gladly entertained.

The WSST Story- 65 years of institutional and individual memories: WSST was founded in 1958 by a small group of interested science educators. Over the years it has grown into one of the largest subject area organizations in Wisconsin. How can current members' stories be added to the ongoing WSST story?

A Problem-Solving Experiment: This presentation will introduce a problem-solving experiment using Beer's Law to find the concentration of tartrazine in a high school chemistry class.

2:00pm – 2:50pm B **Connect With Elementary Life Science DCIs through Forestry Education** HOI J

Speakers: Nicole Filizetti

Teaching in and about Wisconsin’s forests can help students learn about the Life Science Disciplinary Core Ideas in a meaningful and relevant way. Participants in this session will get a hands-on introduction to the LEAF Program’s Forestry Education Curriculum, looking at indoor and outdoor lessons that have strong connections to the Life Science DCIs for grades K-5. We will also have a discussion about how these lessons can be implemented in a way that supports three-dimensional learning in the elementary classroom. After attending this session participants will be able to identify one or more LEAF lessons that fits into and complements their existing science curriculum, and explain how they can use forestry education concepts to foster three-dimensional learning. Participants will receive download instructions for LEAF’s K-12 Forestry Lesson Guide as well as a paper copy of LEAF’s Urban Forest Lesson Guide.

2:00pm – 2:50pm B **Cooking With Sunshine: Connecting Students to Agriculture through STEM** HOI G

Speakers: Heidi Schleicher, Jenn Scott

Cooking with Sunshine: Connecting students to agriculture through STEAM
Using the book, Cooking with Sunshine, the Farming for the Future Foundation has created hands-on lessons for educators in grades 4-5 to dig into the process of photosynthesis. Our interactive STEAM Kits can be loaned to teachers around the state! In our session educators will explore activities centering around plant anatomy and processes involved in photosynthesis including capillary action, atoms and molecules, leaves, and trees. Throughout all these activities we will discuss the connections between the plants and agriculture in Wisconsin.

Objectives for participants:
1. Explore the Cooking with Sunshine STEM Kit
2. Model student lab activities
3. Explain agricultural connections to the science taught
4. Participate in small group discussions

Standards addressed: LS1.A, LS1.C, LS2.B, PS3.D. CC4.3-5, CC5.3-5, CC6.3-5 SEP2.3-5

2:00pm – 2:50pm B **Making Sense of Cell Differentiation and Gene Expression** HOI I

Speakers: Billee Procknow

Audience will participate in a hands-on activity modeling how selective gene expression works. Unique activity materials allow for a tangible representation of a highly abstract concept while the lesson provides connections for students to understand the real-life context. This activity often results in elated, “oh! I get it now!” student responses.

2:00pm – 2:50pm B **Empathy for Wildlife: A Science and Social-Emotional Learning Tool** Q&R

Speakers: P. Vandermuese, Shannon Hillard, Christa Marlowe, Courtney Cordova

Explore strategies for incorporating empathy best-practices into your classroom science curriculum. These strategies are currently used in zoos and aquariums to generate interest in learning and spur conservation actions. We will discuss the different steps of the empathy bridge model through local zoo at-school and field trip programming. We will apply empathy to conservation-based lessons and projects for use within the classroom. This session will include small group activities, interactive practice, and discussion. After attending this session, you will be able to:

• Identify the different steps of the “empathy bridge” and what role each step can serve in their curriculum as well as how to connect it to the NGSS.

• Incorporate empathy into curriculum right away with concrete examples, as well as longer-term project and departmental strategies.

• Connect empathy best-practices with actionable conservation efforts and projects that can be completed in-class or as independent study projects.

• Assess the efficacy of empathy best-practices within your curriculum.

2:00pm – 2:50pm L **Leading Systemic Change in Science Education within a K-12 Public School District** HOI E

Speakers: Kelley Grorud, Meridith Falkavage

Three years ago, the state of science learning in our district was suboptimal. Elementary science instruction was inconsistent, course and lab materials across grade levels were shared or missing, and the curriculum was unclear. Through a learning framework, we developed a new vision, curriculum, piloted new resources, and found opportunities for teachers to engage in professional learning around science and science instruction. We have a long way to go, but science is a consistent center of core instruction at all levels, with equitable practices at the heart of the work we do. We will highlight key aspects of our change process, and share what we have learned (including what we still have yet to do). We will include stories shared directly from some of the teachers and coaches in our system who have been strategic partners in this work.

2:00pm – 2:50pm P **Engaging Students in Science Discourse in the Elementary Classroom** M&N

Speakers: Suzy Zietlow

This session will focus on strategies for science discourse (science notebooking and discussions) for the elementary classroom. Participants will practice several strategies for nature journaling that can be used both in the 4-walled classroom and the outdoor classroom. These strategies will encourage learners to make observations, ask questions and make connections. Participants will then explore several apps and websites that complement science notebooking and prompt discussions. Finally, participants will brainstorm ways to incorporate these strategies and tools within their units of instruction, including establishing rubrics and anchor charts.

2:00pm – 2:50pm P **Student Engagement with Arts Integration in Science** HOI F

Speakers: Renee Schumacher, Stacey Markon

How can we reach students? This presentation will highlight how we chose to engage students in artistic expression of their knowledge to deepen their comprehension and thus their learning. Developing models is a science and engineering practice in which students use models to represent their ideas and explanations. Our students use artistic models based on evidence to show relationships, describe phenomena, and generate data. This alternative way for students to demonstrate their knowledge took the form of clay modeling, black light and watercolor painting, and simple LED circuit projects; just to name a few. During the projects, real time feedback could be given to push students to deeper learning and/or redirect them to the learning goal. Not only that, it was a wonderful way to build relationships with students who normally do not have a creative outlet in science class. Plus, no art degree was needed from the teacher (who can only draw stick figures). We hope to show you some of the things that we have learned, student work samples, and the collaboration process. To give you a taste of what the projects look like, you will be given a hands-on clay modeling activity to demonstrate phase changes.

2:00pm – 2:50pm Y **Physics Roundtable** Grand Terrace Café

Speakers: Terry Schwaller, Kristin Michalski

2:00pm – 4:00pm B **Workshop: Interactive Video Builder-HHMI Biointeractive's New Video Editing Tool!** K&L

Speakers: Dawn Norton, Amy Fassler

Participants will learn about free HHMI Biointeractive resources, including
the comprehensive video and animation library that can be used with the interactive tool.

Participants will learn how to select and create probing questions that target NGSS practices such as developing and using models, analyzing an interpreting data, and engaging in argument from evidence.

Participants will use the video builder tool to embed questions and create their own interactive video that will enhance the learning or assessment experience for students.

2:00pm – 4:00pm W **Workshop: Infusing Effective and Equitable Grading Practices into Science** HOI H

Speakers: Stacey Balbach, Frank Devereaux, Latricia Johnson, Kevin Anderson

In this workshop, participants will reflect on their whys for grading practices and collaboratively wrestle with many of the how-to sticking points, like giving zeroes or retakes, communicating with parents, and making it work with student information systems. We'll also look at proficiency scales/rubrics together and collaboratively determine what will best support student feedback and learning.

Learners will 1) better understand the whys and hows of standards based grading, while building up networks of like-minded educators, and 2) evaluate and create actual learning progressions and rubrics used in this process.

Through our discussion, we'll wrestle with how/whether to make all three dimensions of the NGSS come through in rubrics and how to tease those apart.

3:00pm – 3:50pm B **SARS-CoV-2 – The life of the virus outside and inside a human body** HOI F

Speakers: Heidi Horn, Donika Rakacolli

The word coronavirus did not generate an immediate recognition three years ago unless one was specialized in infectious diseases. However, since the beginning of this worldwide disease, the word elicits apprehension and often confusion. Although both human and animal coronaviruses have been known for quite a while, this particular virus presented with a slew of new features that lead to the severe infections, many lingering symptoms, and millions of deaths. In this discussion we will try to bring up to date information about the most known aspects of this infection. The general structure of the virus and particularly of the parts that stimulate an immune response will be described. We will follow the pathway of virus attachment and entry into the human cells and some of the ways it causes damage to many organs as disparate as the lungs, brain, and blood vessels. We will explore the response of the immune system to the different variants of the virus and how the vaccines fit in that response. We will also have an interactive activity regarding the variants and vaccines that can be used in the classroom.

3:00pm – 3:50pm B **Got Geometry, Trigonometry, Algebra, and Graphs in the Environmental Sciences? Take a Look at These Forestry Examples** M&N

Speakers: Paul Doruska

This presentation will examine a host of quantitative applications that are frequently used in the environmental sciences/forest management - examples you might perhaps bring into your classroom. Attendees will learn/see how (a.) the area of a circle is utilized during the forest inventory process, when calculating a key forest measure known as basal area, and when determining the volume of wood in a log, (b.) the tangent function is used to measure tree heights, (c.) the cosine and/or arc tangent function are used to find true horizontal distances when on sloped terrain, (d.) an algebraic equation and its corresponding graph are used to estimate site quality and estimate tree height growth into the future, and (e.) a second algebraic equation and its corresponding graph is used to assess the level of "crowding" in a forest and guide when it should be thinned of some trees to keep it healthily growing into the future. So grab your hard hat if you have one and let's figuratively head to the woods!

3:00pm – 3:50pm E **WESTA Earth Science SHARE swap** Grand Terrace Café

Speakers: Beth Allcox, Ken Budill, Shannon Previte

This session will focus on storylines in Earth Science, websites provided to get you started and resources/files shared to continue to process. Come if you have great ideas/lessons to share or come to recieve ideas! Bring a computer

3:00pm – 3:50pm E **Teach Middle School "Earth and Human Activity" DCIs through Forestry Education** HOI J

Speakers: Nicole Filizetti

The middle school Disciplinary Core Ideas about Earth and Human Activity ask students to investigate issues related to human impact on the environment, sustainable resource use, and climate change. These concepts can be taught in a relevant and meaningful way as part of a unit on forestry. Participants in this session will get a hands-on introduction to LEAF and Project Learning Tree (PLT), looking at indoor and outdoor forestry education lessons that have strong connections to the Earth and Space Science DCIs for middle school. We will also look at connections Life Science DCIs, and have a discussion about how these lessons can be implemented in a way that supports three-dimensional learning. After attending this session participants will be able to identify one or more LEAF or PLT lessons that fits into and complements their existing middle school science curriculum, and explain how they can use forestry education concepts to foster three-dimensional learning. Participants will receive download instructions for LEAF's K-12 Forestry Lesson Guide, as well as Project Learning Tree handouts and a paper copy of LEAF's Urban Forest Lesson Guide.

3:00pm – 3:50pm I **Naval Engineering for Grades 4-6** O&P

Speakers: Patrick Young

Reading "The Girl with a Mind for Math", participants will learn about the career of Raye Montague, an African American who broke many barriers to pioneer computer-aided ship design and become the first female program manager for the US Navy.

Lessons are provided for using free, online software (Tinkercad) to design ships to realistic specifications while exercising NGSS standards for Engineering Design. Separate design challenges are provided for each grade (4th, 5th, and 6th) that include grade-appropriate use of mathematics. If a 3-D printer is available, teachers may allow students to print their finished designs.

As Wisconsin is home to an active shipbuilding industry, the final discussion will be about STEM careers and the possibility of partnering with industry to obtain grants for classroom projects related to naval engineering.

3:00pm – 3:50pm V **The Ins and Outs of Implementing a Forest Ecology Field Trip** Q&R

Speakers: Steve Schmidt, Amy Workman, Hayley Parsons

This pedagogy session will include the ins and outs of creating, implementing, and funding a field trip to a forest ecosystem in Wisconsin through a visual presentation with hard copy resources. This presentation will be centered around an example field trip where students from Baraboo High School visited Upham Woods Outdoor Learning Center. While working in groups, students assumed different roles of scientists on a research team attempting to answer the essential question, How are the habitats on the north and south sides of Blackhawk Island different? This field trip was funded by the Wheels to Woods Grant which is supported by WSST as well as the Nature Net, Nature Express Grant. Baraboo High School operates under a Standards Based Grading system and this field trip included a graded assignment that was connected to school standards as well as the Science Cross Cutting Concept Standard 9. Interpret cause and effect relationships (HSSCI9). The presenters for this session will include the Baraboo teacher who organized this trip, the director of Upham Woods, and the LEAF K-12 Forestry Education Program - Outreach Specialist. Participants will be able to recognize the benefits of forest based field trips and understand the steps of implementation.

3:00pm – 3:50pm P **Be a Part of WINGS 2023** HOI E

Speakers: Dennis Rohr, Chad Janowski

Is it time for a recharge? Science teaching can be exhilarating and rewarding. It can also be tough to help all students develop a deep understanding of complex science concepts. Wisconsin's premiere professional development learning opportunity is coming once again! Veteran educators might reminisce about the impact that Science World had on their careers. WSST's current leaders can speak about the incredible networking and learning that took place at Science Futures. Now you can be a part of the Wisconsin Institute for Next Generation Science (WINGS)!

The WSST professional development committee is planning a transformational experience that will fuel your passion for delivering high quality science learning experiences for your students. It will also serve as a professional retreat, giving you opportunities to reflect on the impact that you are having in the profession and the next moves you can make to lead the future in your own classroom or beyond. Other than a small registration fee, this experience will be fully funded by WSST and other sponsors. With all that you have done for kids, let us do something for you!

3:00pm – 3:50pm P **Culture and Belonging in WSST: Discussing Results from Our Science Educator Survey** HOI I

Speakers: Wendy Herrmann, Sara Krauskopf, Kevin Anderson

WSST hired an outside consultant to support our DEI work, particularly in thinking about culture and climate in the organization. Part of that will be conducting a culture and climate survey in January 2023. This work will inform our strategic planning during the summer of 2023. We would like to share the survey results during a session at the conference and get feedback and ideas from attendees.

3:00pm – 3:50pm P **Using Primary Sources to Enhance Scientific LIteracy** HOI G

Speakers: Kathy Biernat

The National Science Teaching Association's position statement on the Nature of Science emphasizes the importance of understanding science through a three-dimensional approach to learning and developing scientific literacy. Inquiry drives science to explain phenomena in natural and human systems. Using primary sources in science instruction enhances science literacy skills acquisition. Primary sources like drawings, lab notebooks, photographs and journals from the history of science can provide insights into not only how discoveries were made, but also extend to a better understanding of the concepts behind them. Evidence for investigating phenomena of the past through newspaper articles, satellite images, historical records and video recordings allows students to dive deeply into natural events and scientific advances. Utilizing primary source data, in real-time, including weather, climate, earthquake, land use and sea-surface data, helps students observe changes in the natural world and develop a deeper understanding of the related science concepts, connecting the present with both the past and the future. Thoughtful selection of primary sources also supports culturally relevant teaching and place-based learning. Through an interactive presentation format, participants will examine lesson examples, explore resources, and identify primary sources for implementation in their own classrooms.

4:00pm – 5:00pm **WSST Town Hall Meeting** HOI H

Speakers: Kristin Michalski

Learn more about the inner workings of WSST and hear updates from WSST President, Kristin Michalski. All members who attend the Town Hall meeting will be entered in a raffle to win prizes donated by our sponsors!

5:00pm – 6:00pm S **WSST Membership Friday Social** Grand Terrace

5:15pm – 5:45pm A **Keynote: Bassam Shakashiri "Enhancing Classroom Learning and Fostering Community Appreciation of Science"** Grand Terrace

Speakers: Bassam Shakashiri

Science and society have a social contract that enables great intellectual achievements but comes with mutual expectations of benefiting the human condition and protecting our planet. Teachers have an awesome responsibility to nourish and nurture their students. Enabling personal growth and fulfillment of one's human potential are crucial elements to the success of our educational mission. Scientists and teachers do what we do because it interests us, it satisfies our curiosity, and we enjoy it. Let us share this enjoyment with everyone. Let us aim to engage people in meaningful and thoughtful explorations of science, to share core values, to develop a deeper public understanding of science and to influence attitudes. As I share observations and convictions I will also do a few demonstrations. Come learn about combustion, liquids that glow in the dark, and other spectacular scientific phenomena. You will sit at the edge of your seat and will see science in action. Long Live the Wisconsin Idea in the 21st Century!

6:00pm – 7:30pm S **Milton Pella Banquet** Madison Ballroom

The Milton Pella Banquet is a more formal social where WSST awards and grants are presented to deserving participants. The banquet is a great way to wind down, enjoy a fine dinner and show your appreciation and support to the award recipients. Pre-registration is required for the dinner.

8:00pm – 11:00pm S **Post Banquet Membership Social** Essen Haus (514 E Wilson St, Madison, WI 53703)

Come out and enjoy post banquet drinks to network and socialize with other WSST members. Free drinks

[A] All Science Disciplines [M] Assessment [B] Biology/Life Science [H] Biotechnology [C] Chemistry

[E] Earth Science [I] Engineering [V] Environmental [F] Fieldtrip [G] General Science [L] Leadership

[P] Pedagogy/Teaching Strategies [Y] Physics [S] Social [1] STEM [W] Workshop

MARCH 11 • SATURDAY

7:00am – 9:00am		**Saturday Registration**	Registration Booth
8:00am – 8:50am	B	**Epigenetics: Tweaking your genetic destiny.** *Speakers: Tim Herman* After we teach genetics, and then molecular genetics, we should go one step further and teach epi-genetics – the modification of histone proteins and DNA that leads to regulation of gene expression. After a brief discussion of the many histone modifications that regulate the accessibility of different genes to transcription factors, we will spend most of our time in this session exploring the modification of CpG nucleotides. Teachers will be introduced to two physical models of DNA base-pairs that highlight the structural consequences of this modification and its impact on gene regulation. Using newly created foam-based Base-Pair models, we will closely examine the chemical structures of the pyrimidine bases and explore how (and why) (i) uridine (U) in RNA was converted to thymine(T) in DNA and how (ii) methylation of Cytosine in the CpG dinucleotide results in altered gene expression. And finally, we will discuss how lifestyle choices --- diet and exercise --- can alter the genetic destiny that was handed to you by your parents.	Q&R
8:00am – 8:50am	B	**Evolution for Educators** *Speakers: James Finch, Alison Peterson* A middle school science teacher will typically cover many areas of science within his/her annual curriculum, including earth science, physical science, and life science. It is virtually impossible to become an expert in all of these areas, at least not initially. The purpose of TIES is to inform interested middle school science teachers about the most up-to-date concepts of natural selection, common ancestry, and diversity in order for them to confidently cover the topics in their classrooms and fulfill their curriculum requirements. TIES provides science teachers with innovative professional development opportunities, often in collaboration with biology professors and scientists researching current evolutionary trends. TIES also has ready-to-use online resources for the classroom, including presentation slides, labs, guided reading assignments, and an exam. We connect science teachers with the experts in the field of evolutionary biology, both in person and online. Our staff provides teachers with an e-mail helpline if they have questions or are looking for specific lessons. Check out our website at www.tieseducation.org. Our presentation will guide teachers through our website, allow them to try out the best online activities on evolutionary science available, and send them home with many hands-on activities that are aligned with the NGSS Standards on Biological Evolution: Unity and Diversity.	O&P
8:00am – 8:50am	B	**Get Your Hands On Plants!** *Speakers: Greg Bisbee* While I do appreciate all critters, some of my favorite people are plants! This presentation will feature many of my favorite plant-based labs. These labs address multiple concepts in biology and/or environmental courses and can be carried out with a minimum of specialized or expensive equipment. While some of these can not feasibly be conducted during the presentation, we will perform parts of several labs. Participants will receive full printouts of all labs mentioned.	HOI J

8:00am – 8:50am B **Knock Knock? Who is there? Scientists! Is this science practice something you do as a scientist?** HOI I

Speakers: Michael Hartwell, Travis Tangen

Are your science classroom science practices similar to what scientists do in the lab? Find out first hand with an interactive session with UW-Madison scientists featured in PBS Wisconsin Education's Meet The Lab. The teacher attendees will lead the way with some examples of classroom science and engineering practices. The scientists will respond with how these science and engineering practices relate to their work and point to any examples that are available on the PBS-WI Meet the Lab collection of seven science and engineering labs.

*Participants who are already familiar with the Meet the Lab collection will benefit from this session but all participants are welcome to attend and learn more about how the Meet the Lab collection can integrate into your science teaching.

8:00am – 8:50am V **Innovative Approaches to Great Lakes Literacy and Marine Debris Prevention** M&N

Speakers: Allyson Mills, Linh Hoang, Anne Moser, Ginny Carlton

Participants experience three Wisconsin Sea Grant projects. 1) Me and Dubry: A Play in Poetry is a whimsical, participatory theatrical script created by the nationally recognized American Players Theatre focused on marine debris impacts and prevention approaches. 2) The Trash Trunk and Plastic Panic are free loanable educational kits available through the Wisconsin Water Library. The Trash Trunk contains lessons and classroom supplies addressing: What is Marine Debris? What Are Its Impacts? and What Can Be Done?. The Plastic Panic kit models the movement of materials, including micro-plastics, through a wastewater treatment plant and discusses the importance of keeping these emerging contaminants out of the environment. 3) Track and Act a project within the NOAA Marine Debris Tracker app is a community science geo-location data collection tool designed to document the types and quantities of debris in the environment. This project was developed in collaboration with teachers from the Howard-Suamico and Pulaski school districts and the Inland Seas Education Association.
NGSS Disciplinary Core Idea: ESS3C: Human Impacts on Earth Systems;
NGSS Practices: Developing and Using Models; Obtaining, Evaluating, and Communicating Data
NGSS Crosscutting Concepts: Stability and Change; Influence of Engineering, Technology and Science on Society and the Natural World

8:00am – 8:50am S **Retiree Meeting** Grand Terrace Café

Speakers: Karyl Rosenberg

Come and meet with other retired science teachers to share stories, plans, needs and opportunities. Meet old friends and make some new ones. Feel free to drop in anytime during the hour.

8:00am – 10:00am B **Workshop: The Case of the Missing Babysitter--Real Science and a Criminal Investigation** K&L

Speakers: Julie Srenaski, Ann Mathu, Mary Gillis, Charles Hatfield

In the mid-1900s, an abduction occurred in Wisconsin which caught the attention of media all over the Midwest. The subsequent search and investigation involved hundreds of people, and thousands of hours. Because it was an ordinary young girl, doing and ordinary task (babysitting), in an ordinary, peaceful city, the case was particularly electrifying to "ordinary children throughout the area.
In the process of creating, testing, and improving this classroom project, we have learned from our students how important that sense of connection is. Perhaps we should not be surprised that they demonstrated their interest and concern by an almost universal and sincere effort to solve this case. This classroom-tested unit places middle school students in the middle of the investigation; scouring the crime scene for clues--using the best available technology available for that day. More importantly, students are challenged to use methods that directly integrate scientific inquiry, standard lab procedures, good technological resources, organizational skills, and discipline into a "real world" experience. NEW BOOK AND LAB MANUAL INCLUDED!

9:00am – 9:50am B **Promoting Science Appreciation** O&P

Speakers: Alison Peterson

Science makes lives better. In innumerable ways and across all of humanity, individual lives are longer, healthier, and fuller due to the advances of science. Yet science gets too little credit for its massive contributions to human wellbeing. Our lessons teach students appreciation for science. They include teacher notes, curriculum standards, student response sheets, rubrics, and lesson plan documents. It's all free! Our ScienceSaves lessons highlight the history of scientific discovery, data analysis, graphing, and engineering. The workshop will introduce the idea behind ScienceSaves, briefly introduce the 18 lessons on our page, and give the attendees time to dig deeper into the individual lessons. For example, our lesson on CRISPR features this brand new, exciting technology. In this lesson, students will research other life-saving medical inventions which we may now take for granted, such as organ transplants, artificial hearts, blood transfusions, antibiotics, and vaccines.
Check out our free lessons and $15,000 scholarship opportunity for high school seniors at www.sciencesaves.org. All resources include NGSS Standards and Practices.

9:00am – 9:50am B **Accessible & Engaging Science for Middle Schoolers w/ PBS Wisconsin's Meet The Lab Collection** HOI I

Speakers: Michael Hartwell

We all know how intimidating the field of STEAM can be to young people. Thankfully, PBS Wisconsin has something to help make STEAM feel more exciting and less frightening: Meet the Lab is a collection of educational resources for middle school science classrooms that introduces learners to relevant real-world issues, cutting edge research, and the human element—the people working together to research, innovate, and solve problems using science. Come learn about this incredible resource and all the ways it might be used in Wisconsin classrooms!

9:00am – 9:50am P **Is There a Place for Artificial Intelligence in the Science Classroom?** Q&R

Speakers: Brian Bartel

AI tools like Lensa AI, ChatGPT and DALL·E 2 have recently exploded for consumer use in apps and online. These tools can quickly generate and re-mix images, answer complex questions (like essay questions), analyze (or create) large data sets and much more.

However, early results indicate that these tools might have some inherent biases from limited training sets and human programming, resulting in some disturbing and misleading outcomes. Furthermore, these tools call into question the ownership of creative content - who really owns a work of art created by a machine learning algorithm?

In this session, we'll explore some popular AI tools, how they can be used (and abused) in the science classroom, and consider the ethics behind their creation and use.

9:00am – 9:50am 1 **Introduction to Wisconsin Science Olympiad** HOI J

Speakers: Nicole Dallman

Science Olympiad is the largest nation-wide interscholastic science competition between middle and high schools, challenging students in STEM education. In Wisconsin, three types of tournaments occur throughout the season. Invitationals are a great starting point to practice and improve on events. These tournaments can include teams from adjacent states. All teams compete in a Regional tournament to qualify for the State tournament. The top scoring team at the State tournament is eligible to participate in the National Science Olympiad competition. Teams consist of up to 15 students. In Wisconsin, 28 events are offered in all disciplines of STEM including: Earth science, life science, chemistry and physics, inquiry, and technology.

During the presentation, students and coaches will explain Science Olympiad and how the standards-based events, an extension of the skills students learn in class, prepares them for ACT exams, college, and future careers. Teamwork, communication and collaboration are valuable skills they learn and develop. The variety of STEM events will be discussed and students will demonstrate some of these events. There is nothing like seeing firsthand how Science Olympiad impacts a student's life. Team and tournament structure will be presented, as well as information on starting a team. Questions are encouraged.

9:00am – 11:00am W **Workshop: Chemistry Learning Environments Anchored in Phenomena (ChemLEAP)** M&N

Speakers: Adam Schafer, Ryan Stowe

Chemistry courses, according to the Next Generation Science Standards, should focus on helping students make sense of the world by connecting molecular behavior to observable events. By carefully orienting class work toward constructing and refining causal accounts for phenomena, a learning environment can bound student sensemaking and support students' use of science and engineering practices. This workshop will engage participants in reflecting on pedagogical tools and practices supportive of students' molecular-level sensemaking.

10:00am – 10:50am B **Using Illinois Storylines for the first time in our General Biology classes** HOI I

Speakers: Tom Davies

Our Biology Team started using the Illinois Storylines this school year for our General Biology classes. This storyline based/phenomenon driven, NGSS aligned, curriculum is a student centered approach to teaching Biology. While we are not experts, we would like to share the story of our transition. We will walk you through some example activities, tell you about some of our successes and our struggles as well as tell you how you can learn more and try it yourself. By the way, the curriculum is free!

10:00am – 10:50am P **"It's hard to explain. It's easier to point and show." English Learners Constructing Science Explanations Using the WIDA Standards** Q&R

Speakers: Ruslana Westerlund

The new 2020 edition of the WIDA Standards is very ambitious and it expects that English Learners will construct science explanations and arguments. To support students' in constructing science explanations, this presentation will debunk the myth of pre-teaching vocabulary and that all language of science is the technical language of textbooks. Instead, this presentation positions language as a meaning-making resource which is shaped by the context of where the language takes place and how objects present in the environment help with communication or how to scaffold students' language when those objects are no longer available. To do that, we'll learn an approach called the Mode Continuum that helps move students' language and reasoning from the "here and now, you and me" language of hands-on learning to language for constructing explanations (SEP 6: Constructing Explanations and Designing Solutions). This approach helps all students, but is especially beneficial to English Language Learners. The objectives for the presentation are 1) participants will reflect on how language changes along the continuum; 2) participants will learn how to be intentional about teaching language in the moment; 3) participants will practice ways of moving students to explain a phenomenon and not merely recount an experiment.

10:00am – 10:50am P **Book Study: Make Just One Change: Teach Students to Ask Their Own Questions** O&P

Speakers: Shelley Petzold

Learn how to increase students' ownership of their learning by directly teaching them how to ask quality questions. Join colleagues across the state for a Book Study. Together we will practice this practical strategy and learn to apply it to all elementary grade levels and all subject areas. We meet both online and in person at the WSST conference.

10:00am – 10:50am Y **Using NASA's X-Planes to Teach Real-World STEM** K&L

Speakers: Steve Kirsche, Lisa Wininger, April Lanotte

NASA's return to the utilization of full-scale X-Planes to push the limits of aeronautics is revolutionizing the future of our airspace. More sustainable aviation, better supersonic technologies, and more are being tested and shared with the aviation industry and international regulators. What we are doing is the future of aviation and we invite classrooms, educators, and students to help us imagine and create the future.

This session will take educators through NASA's research process and introduce them to our current technological developments, challenges, and milestones, particularly in regards to our X-Planes. They will then be introduced to a wide variety of hands-on activities to teach students about the science of sound, electricity basics, sustainability, and ways for students to utilize the Engineering Design Process. The session concludes with opportunities for participants and their students to continue to follow along with NASA's emerging aeronautics missions and see the evolution of aeronautics first-hand.

Objectives for this session include:

1. Introduction to NASA aeronautics and our current missions and programs.
2. Exploration of a variety of activities to help teach the concepts of sound waves, frequency, and amplitude.
3. Activities that introduce students to electricity and circuits.
4. Introduction to our materials that teach and enforce literacy in the STEM classroom.
5. Provide information and opportunities for educators to access cutting-edge STEM resources, engage in current citizen science opportunities, and stay connected with NASA's wide variety of educational offerings.

10:00am – 10:50am 1 **Coaching Strategies for Starting a Wisconsin Science Olympiad Team** HOI J

Speakers: Paul Nelson, Meredith Smith, Nicole Williams, Nicole Dallman

Starting a team can be very overwhelming and there is not one "correct" way to manage and organize a team. Some schools are large and have an army of resources and experts to help them and some schools are small and run with one adult. It doesn't matter what size your school is, if you even have enough students for a full team, or if you start really slow; it matters that you start a team. When you start a team you are making a difference for your students and opening a whole new world for them. It is amazing to hear stories of how Science Olympiad shaped who these students become as individuals as well as their career paths.

During the presentation, coaches will share various ways to manage a team including structuring practices, determining which students are on which events, how to manage funding, etc. Copies of sample organizational paperwork along with state and national resources will be shared with all attendees.

Questions are encouraged.

11:00am – 11:50am **Why science: Reconnecting to your deeper purposes for teaching** M&N

Speakers: Joel Donna

Let's spend some time thinking more deeply about what brings you joy in teaching and how your work in teaching science improves the lives of your students and works to build a better world. At the end of this session, you'll leave with more clarity on your goals for teaching science which will help you better persevere when the days are difficult and help you advocate for science education.

11:00am – 11:50am B **Illinois Storyline - Biology - Sharing Session** HOI J

Speakers: Dennis Rohr, Sonja Gasper, Tom Davies

Looking for a way to increase student engagement in your classroom? Confused about the latest buzzwords like "student centered learning" and no time to write new lesson plans and assessments? Imagine your principal popping in unannounced for your observation to find a class actively engaged in the lesson while working with their peers. Come hear about Illinois Storylines from teachers who are using them daily to teach first year biology. True to our classrooms, attendees will be immersed in active learning while veteran storyline teachers guide them sharing their combined eight years of experience in this NGSS aligned curriculum. By the end of the presentation, teachers will feel confident in jumping into using Illinois Storylines. Veteran storyline teachers are encouraged to attend as well to network and share their experiences.

11:00am – 11:50am C **Workshop: Exploring the Environmental Impact of Concrete Production** K&L

Speakers: Kathryn Mehltretter

Through the classroom activity presented, students can learn about the environmental impact of concrete production and explore possible solutions. A possible solution being explored by researchers is adding calcium carbonate to the concrete. During the workshop, teachers will make calcium carbonate, a concrete ingredient, using calcium hydroxide and carbon dioxide. They will compare the calcium carbonate conversion using carbon dioxide from their breath with carbon dioxide from dry ice. This comparison can be assessed qualitatively using a hydrochloric acid test. Teachers will also be introduced to a unit plan where the calcium carbonate can be used to make mortar samples to illustrate how the calcium carbonate can be used in concrete. This classroom activity is applicable to chemistry or engineering courses. An example of a relevant Next Generation Science Standard is: “HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.” This activity is being developed in collaboration with Dr. Bu Wang’s lab in the Department of Civil and Environmental Engineering at the University of Wisconsin-Madison.

11:00am – 11:50am I **Building Energy Modeling with Sketchbox** HOI I

Speakers: Dave Vigliotta, Jim Reichling

Building Energy Modeling for Students with Sketchbox

This presentation introduces Sketchbox™, a free energy modeling tool that calculates energy use in buildings. Sketchbox™ can run online from a Chromebook with no downloads needed. This workshop is ideal for targeting NGSS science and engineering practices such as developing and using models and analyzing and interpreting data. Sample lessons will be presented, online tutorials are available, and the platform is ideal for student exploration of building science and various careers ranging from architecture to engineering. Sketchbox was created by Slipstream—a nonprofit organization based in Madison, WI, and curriculum is from the Center for Renewable Energy Advanced Technological Education (CREATE).

See: https://slipstreaminc.org/sketchbox and https://createenergy.org/

11:00am – 11:50am V **Outdoor Classroom** O&P

Speakers: Suzy Zietlow, Melissa Wimmler

Presenters will share ideas and strategies for teaching elementary standards including NGSS and curriculum in an outdoor classroom. Presenters will describe the benefits of using an outdoor classroom and nature to teach NGSS. Presenters will explain how to utilize a science notebook, math tools, mentor texts, and other resources to deepen student understanding. Presenters will share tips and suggestions for planning and preparing for outdoor classroom lessons and how to modify current lesson plans. Presenters will explain how to make connections between student learning in the classroom and outdoor classroom. Presenters will share photographs, videos, student examples, and teacher resources. Attendees will learn how to start teaching in an outdoor classroom or how to extend their current outdoor classroom practices. Attendees will be able to ask questions, share their own experiences, review resources and plan an outdoor classroom lesson.

12:00pm – 2:00pm **WSST Board Meeting** HOI E

This Board meeting is open to all members.