

# Peak Area Leadership in Science (PALS) 2019-2020

## Professional Development Workshops\* for Science Teachers

Meetings are FREE! Reservations (and cancellations) required!\*\*

To make reservations register online at [www.sciencehubs.org](http://www.sciencehubs.org)

or contact Tammy Johnnie at [rsvp@sciencehubs.org](mailto:rsvp@sciencehubs.org) or 719-337-1552 (cell)

Date/Day/Time	Topic	Location	Contact Hours /Sem Credit***
<b>Aug. 24, 2019</b> (Sat.) 7:30am–4:30 pm	<b>Exploring Science Processes at the Florissant Fossil Beds National Monument</b> Jeff Wolin and Kevin Jauregui	<b>Florissant Fossil Beds</b> Meet Bus at Cheyenne Mountain Junior High School by 7:15 am.	<b>7.5 / 0.5</b>
<b>Sept. 18, 2019</b> (Wed.) 4 pm - 8 pm	<b>Waste Water Treatment &amp; Water Quality with Colorado Springs Utilities</b> Sandy Williams - Water Quality Lab & Brendan Cavanaugh - Water Treatment	<b>CSU - Water Quality Laboratory &amp; Water Resource Recovery Facility @ 701/809 East Las Vegas Street, Colo Spgs 80903</b>	<b>3.75 / 0.25</b>
<b>Sept. 28, 2019</b> (Sat.) 8:00 am–4:00 pm	<b>The Uplift of Mountains – Fault Patterns along the Front Range</b> Dr. Steve Getty	<b>Colorado Springs Area</b> Meet Bus at Cheyenne Mountain Junior High School by 7:45 am.	<b>7.5 / 0.5</b>
<b>Oct. 19, 2019</b> (Sat.) 7:00 am – 5:00 pm	<b>Life - Pushing the Limits @ DMNS</b> Tim Blesse and Staff DMNS	<b>DMNS (Denver, CO)</b> Meet Bus at Discovery Canyon Campus - D20 by 7:00 am	<b>7.5 / 0.5</b>
<b>Nov. 9, 2019</b> (Sat.) 8:30 am – 12:30 pm	<b>From the Nile to the Colorado - Hippos and Water Conservation</b> Stacey Graham, Cheyenne Mountain Zoo	<b>Cheyenne Mountain Zoo</b> Meet at the front entrance to Cheyenne Mountain Zoo	<b>3.75 / 0.25</b>
<b>Dec. 7, 2019</b> (Sat.) 8 am – 4:15 pm	<b>Building a Culture of Argumentation in YOUR Science Classroom</b> Tim Blesse and Robert Payo, DMNS	<b>Sand Creek High School</b>	<b>7.5 / 0.5</b>
<b>Jan. 25, 2020</b> (Sat.) 9 am – 5 pm	<b>Chemistry of Textiles and of Fuels</b> Gary Balaich, Ron Furstenau & Abby Jennings	<b>USAFA Chemistry Department</b> Meet at the front entrance to the USAFA Cadet Fieldhouse	<b>7.5 / 0.5</b>
<b>Feb. 11, 2020</b> (Tues.) 4 pm – 8 pm	<b>Mars Connections at the Space Foundation Discovery Center</b> Staff, SFDC	<b>US Space Foundation Discovery Center</b>	<b>3.75 / 0.25</b>
<b>Mar. 11, 2020</b> (Wed) 4 pm – 8 pm	<b>Fascinating Fingerprints</b> Myra Valdez, Terrie Watts, Sandy Smith	<b>Discovery Canyon Campus</b>	<b>3.75 / 0.25</b>
<b>Apr. 16, 2020</b> (Thurs.) 4 pm – 8 pm	<b>Physics in the Natural World - Little Shop of Physics</b> Brian Jones & Sheila Ferguson	<b>Discovery Canyon Campus</b>	<b>3.75 / 0.25</b>
<b>May 2, 2020</b> (Sat.) 7:30 am – 12:00 pm	<b>Cave Exploration with CaveSim and Cave of the Winds</b> Dave Jackson & Jackson Fulcher, CaveSim and Staff, Cave of the Winds	<b>Cheyenne Mountain Junior High School &amp; Cave of the Winds</b>	<b>3.75 / 0.25</b>
Generous funding for these workshops provided by: <b>The Mikkelson Foundation &amp; The Mikkelson Education Fund</b> <b>USAFA K12 STEM Outreach Program</b>		<b>TOTAL</b>	<b>60 hrs / 4 sem credits</b>

**Sessions offered January – May 2020 are dependent on funding.**

\* The information above is subject to change! See our web-site [www.sciencehubs.org](http://www.sciencehubs.org) for a detailed flyer posted around the date of the previous month's meeting and for any updates to the information above.

\*\* **NEW** - Reservations are accepted for any meeting at any time. Sign up for all of the workshops you'd like to attend at any time and mark your calendar. PLEASE... if you cannot attend, contact Tammy ASAP, as we may have a waiting list and/or may have to pay in advance for your spot.

\*\*\* Documentation will be provided free for active participation in any hub meeting. In order to receive college credit you must earn a minimum of 7.5 hours or 0.5 semester credits. No college credit is given for only 3.75 hours or 0.25 semester credits. College credit only earned in increments of 0.5 semester credits. Hours/credits accumulate for the current school year only – no carry over for prior or future school years. Documentation / credit available at the end of the school year, typically in July.

----- 2019-2020 PALS Workshops (Hub Meetings) Info  
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Semester One

**PALS August Hub Meeting**

**Sat, Aug 24 Full Day [7:30 am - 4:30 pm] 0.5 sem hrs / 7.5 contact hours**

Title: **Exploring Science Processes at the Florissant Fossil Beds National Monument**

Presenters: **Jeff Wolin and Kevin Jauregui**

Description: **Join us as we explore science processes at the Florissant Fossil Beds National Monument. Learn about geology as you hike the Petrified Forest Loop. Look for evidence of scientific processes during activities in the visitor's center and in the educational center. Participate in a Paleobotany Activity which can be adapted for your own classroom. Search for fossils to take home at the nearby Fossil Quarry. You will receive teacher resources and materials and may be one of the lucky winners of a door prize!**

Tentative Agenda:

<b>7:30 AM</b>	<b>Bus departs from CMJHS</b>
	<b>Participants will participate in an activity on the bus</b>
<b>8:30 AM</b>	<b>Arrival / bathrooms</b>
<b>8:45 AM</b>	<b>Meet in Covered Amphitheater</b>
	<b>Interpretive Talk and NPS Quiz Game - Jeff Wolin</b>
<b>9:30 AM</b>	<b>Get ready for Hike</b>
<b>9:40 AM</b>	<b>Interpretive Hike on Petrified Forest Loop (Geology Focus) - Kevin Jauregui</b>
<b>11:00 AM</b>	<b>Divide into two groups.</b>
	<b>Group one: Watch park film to learn about the geology and history of the National Monument</b>
	<b>Group two: Explore visitor center and scavenger hunt to find scientific processes in exhibits about scientific discoveries.</b>
	<b>Groups switch at 11:20</b>
<b>11:50 AM</b>	<b>Lunch (w/ some sing-a-long science songs) - Jeff Wolin</b>
	<b>Announcements, Door prizes</b>
<b>12:30 PM – 1:40 PM</b>	<b>Yurt Fossil Activities - Kevin Jauregui</b>
	<b>(including Paleobotanist Activity and/or other hands-on science activities)</b>
<b>1:45 PM</b>	<b>Load Bus and Head to Quarry</b>
<b>2:00 PM – 3:15 PM</b>	<b>Fossil Quarry – search for fossils with Kevin Jauregui</b>
<b>3:15 PM</b>	<b>Evaluations</b>
<b>3:25 PM</b>	<b>Load bus and return to school by 4:30</b>
	<b>Participants will participate in an activity on the bus</b>

4:30 PM

Arrive CMJHS

### **PALS September Hub Meeting**

**Wed, Sept 18    Evening                    [4:00 pm - 8:00 pm]    0.25 sem hrs / 3.75 contact hours**

Title:                    **Waste Water Treatment & Water Quality with Colorado Springs Utilities (CSU)**

Presenters:            **Sandy Williams (Water Quality) & Brendan Cavanaugh (Water Treatment)**

Description:            **This program combines the CSU popular classroom presentation on the biology & chemistry of your water supply with the Water Quality Laboratory Tour. This experience teaches you the history of water quality, our complex local water system, water treatment processes and water quality testing. Participate in the “Would You Drink It?” challenge and test mystery water samples for general water chemistry (pH, turbidity, total dissolved solids, and chlorine) before touring the Water Quality Laboratory with a CSU chemist. This workshop exposes individuals to sophisticated instrumentation and sampling techniques and allows plenty of time for questions and answers. You will also be provided with hands-on activities on water quality topics that you can implement in your classes.**

### **Another PALS September Hub Meeting**

**Sat, Sept 28    Full Day                    [8:00 am - 4:00 pm]    0.5 sem hrs / 7.5 contact hours**

Title:                    **The Uplift of Mountains – Fault Patterns along the Front Range**

Presenter:            **Dr. Steve Getty, Geologist/Teacher and Director, Quantitative Reasoning Center, Colorado College**

Description:            **Chains of mountains are a prominent feature of many parts of Earth. Mountain formation is a key part of the growth of continents, development of energy resources that we use, evolution of ecosystems, and patterns of regional climate. This HUB course will investigate several types of fault patterns connected with uplift along the Front Range of the Rocky Mountains in Colorado Springs. We will visit the Garden of the Gods and Glen Eyrie. In additional activities, we will explore how uplift along the Front Range compares globally with other tectonic settings and the current growth of mountains there.**

## **PALS October Hub Meeting**

**Sat, Oct 19      Full Day      [7:00 am - 5:00 pm]      0.5 sem hrs / 7.5 contact hours**

Title:      **Life - Pushing the limits@ DMNS. How humans and animals push the extremes to achieve phenomenal feats.**

Presenters:      **Tim Blesse, Teacher Programs Coordinator, DMNS and other DMNS staff**

Description:      **In this 4-component workshop about how life pushes the limits, participants (YOU !) will:**

- (1) learn about how the human brain works to get into a “flow state” condition which drives us to push the limits of extremes and maximize performance.**
- (2) take an action-packed ride (virtual) through the world of extreme sports! YOU will be put to the test as you jump, fly, dive, climb, and explore some of the riskiest activities in the world. Physical, multimedia, and creative challenges place YOU inside the minds and bodies of extreme athletes and their passions, such as wingsuit flying, ice and rock climbing, parkour, and free diving.**
- (3) be presented with inspiring stories as YOU (virtually) journey around the globe to follow remarkable dogs that save lives and share a powerful bond with their human partners.**
- (4) participate in a phenomena-based field trip in which YOU are presented with a real-life phenomena and must gather and utilize evidence in order to make a claim based on scientific reasoning.**

Tentative Agenda:

<b>7:15</b>	<b>Bus departs Discovery Canyon Campus</b>
<b>7:15- 8:30</b>	<b>Travel by bus to Denver Museum of Nature and Science</b>
<b>8:30- 9:45</b>	<b>How “Flow State” in the brain affects performance- Presentation by Tim Blesse (DMNS)</b>
<b>9:30- 11:00</b>	<b>Exhibit (interactive): Extreme Sports- Beyond Human Limits</b>
<b>11:15- 12:30</b>	<b>IMAX- Superpower Dogs</b>
<b>12:30-1:15</b>	<b>Lunch and self-guided exploration of exhibits</b>
<b>1:15- 3:30</b>	<b>Phenomena-based field-trips (choice of 1):</b> <ol style="list-style-type: none"><li><b>a) Prehistoric Journey</b></li><li><b>b) Exhibition Health</b></li><li><b>c) Wildlife Populations</b></li></ol>
<b>3:30- 5:00</b>	<b>Bus returns to Colorado Springs. Participants complete a debrief activity</b>

## **PALS November Hub Meeting**

**Sat, Nov 9      Half Day      [8:30 am - 12:30 pm]      0.25 sem hrs / 3.75 contact hours**

Title:      **“From the Nile to the Colorado” - Exploring Hippos and Water Conservation at the Cheyenne Mountain Zoo**

Presenter:      **Stacey Graham, Director of EdVenture Programs, Cheyenne Mountain Zoo & other CMZ staff**

Description:      **Coloradans and hippos have something in common. We all need water, and sometimes it is in short supply for both of us. Join the Cheyenne Mountain Zoo team in exploring all things hippo, including natural history, conservation, adaptations, and meeting the zoo's resident hippos. We will also be diving into water conservation both in Africa and here in Colorado, and how you and your students can be better water stewards for the planet.**

## **PALS December Hub Meeting**

**Sat, Dec 7      Full Day      [8:00 am - 4:15 pm]      0.5 sem hrs / 7.5 contact hours**

Title:      **Building A Culture of Argumentation in Your Science Class**

Description:      **Too often teacher workshops focus on crafting a good viable argument and not on having the argument. How do we help students to lower their resistance and feel safe to engage in lively discourse and critique? How do we create an environment that stimulates deeper, richer interaction? Interactions that employ quality evidence and quantitative reasoning? Enjoy a day of “arguing” with your peers as you participate in a series of activities that model specific research-based instructional strategies designed to get your students engaged in richer, more productive discourse.**

Presenters:      **Tim Blesse, Teacher Programs Coordinator, Denver Museum of Nature and Science  
Rob Payo, Teacher Programs Coordinator, Denver Museum of Nature and Science**

----- 2019-2020 PALS Workshops (Hub Meetings) Info -----  
Semester Two

**PALS January Hub Meeting**

Sat, Jan 25      Full Day      [9:00 am - 5:00 pm]      0.5 sem hrs / 7.5 contact hours

Title:                      Chemistry of Textiles and Fuels

Presenters:            Dr. Gary Balaich, Dr. Ron Furstenau, Dr. Abby Jennings,  
USAFA Chemistry Department

Description:            Looking for connections between chemistry and our world?  
Look no further. Join Drs. Balaich, Furstenau, and Jennings as  
they take you on a learning journey through the chemistry of  
both textiles and fuels. Learn about how textile fibers (polymers)  
are made, analyzed and dyed. You'll even get to make, analyze  
and dye some textiles yourself! Hear about the differences  
between gasoline, diesel and aviation fuels. Synthesize and  
analyze biodiesel and some fuel blends using various lab  
techniques (viscosity measurements, Fourier Transform Infrared  
Spectroscopy (FTIR), gas chromatography/mass spectrometry  
(GCMS), and calorimetry).

Tentative Agenda:    "Chemistry of Textiles" and "Chemistry of Fuels"

0915                      Meet participants on the south steps of the Cadet Field House; escort to  
Chemistry Conference Room (2N189)

0945-1015              Introductions, refreshments, admin items in Chemistry Conference Room

1015-1115              Presentation: "Chemistry of Textiles" (Dr. Abby Jennings)

*Dr. Jennings will talk about how major types of fabrics for textiles are made  
and dyed. This talk will include a discussion behind the chemistry of fiber  
synthesis and dye synthesis and selection.*

1115-1130              Break, Chemistry Conference Room (2N189)

1130-1330              Laboratory Experiments

Group A: Synthesis and Analysis of Fuels (Dr. Balaich & Dr. Furstenau)

Group B: Synthesis, Analysis, and Dyeing of Textiles (Dr. Jennings & Dr. Furstenau)

*"Synthesis and Analysis of Fuels": In this series of labs, participants will  
synthesize biodiesel and biodiesel petroleum diesel blends. Different  
techniques will then be used to analyze the fuels, including viscosity  
measurements, Fourier Transform Infrared Spectroscopy (FTIR), gas  
chromatography/mass spectrometry (GCMS), and calorimetry.*

***“Synthesis, Analysis, and Dyeing of Textiles”:* In this series of labs, participants will synthesize several polymers, analyze the polymers/textiles using a variety of methods, and dye some fabrics.**

- 1330-1430** Working Lunch Break in Lecture Hall  
Presentation: “Chemistry of Fuels” (Dr. Gary Balaich)
- During lunch, Dr. Balaich will discuss the chemistry behind fuels, including the differences between gasoline, diesel, and aviation fuels, as well as octane number.*
- 1430-1630** Laboratory Experiments  
Group A: Synthesis, Analysis, and Dyeing of Textiles (Dr. Jennings & Dr. Furstenau)  
Group B: Synthesis and Analysis of Fuels (Dr. Balaich & Dr. Furstenau)
- 1630-1700** Final wrap-up of the day’s events (2N189), including door prizes and evaluations
- 1700** Depart chemistry area for Cadet Field House

## **PALS February Hub Meeting**

**Tues, Feb 11 Evening [4:00 pm - 8:00 pm] 0.5 sem hrs / 7.5 contact hours**

Title: **Mars Connections at the Space Foundation Discovery Center**

Presenters: **Science Educators, Space Foundation Discovery Center**

Description: The Space Foundation is looking forward to hosting the Pikes Peak Area Leadership in Science(PALS) for their HUB teacher professional development this February . . . and we have QUITE the adventure in store for you! Join us as we travel beyond low-Earth orbit and discover the mission ahead of us on our Science on a Sphere, as NASA prepares to send astronauts, “Back to the Moon and On to Mars!” Next, we will code a fleet of robots to retrieve water ice from the polar ice caps on Mars, and then deliver that water ice to the location of the first human habitat on the surface of Mars! Finally, we will land the first humans SAFELY on Mars, working within budgetary parameters and design constraints to achieve the impossible!!!

## **PALS March Hub Meeting**

**Wed, March 11 Evening [4 pm - 8 pm] 0.5 sem hrs / 7.5 contact hours**

Title: **Fascinating Fingerprints**

Presenters: **Terrie Watts, Forensic Science Teacher, Discovery Canyon Campus High School, D20**  
**Myra Valdez, former FBI Forensic Scientist**  
**Sandy Smith, Forensic Science Teacher, Falcon Homeschool Academic Program, D49**

Description:

Fingerprints are a key piece of evidence found at crime scenes. What makes fingerprints so important? Join us as we discuss and explore the world of fingerprints. Learn about fingerprints from a former FBI agent. Participate in labs where you will process and analyze fingerprints using different techniques. Experience a design lab where you and your students can learn more about collecting and processing fingerprints. Each participant will take a fingerprint kit back to use in their own classroom.

## **PALS April Hub Meeting**

**Thurs, April 16 Evening [4:00 pm - 8:00 pm] 0.5 sem hrs / 7.5 contact hours**

Title:

**Physics in the Natural World - Little Shop of Physics**

Presenters:

**Brian Jones and Sheila Ferguson**

Description:

The natural world is full of seeming puzzles: Hippos spend their lives in water, and they look quite chubby, but they aren't fat, and they can't swim. Seals breathe air like all mammals, but they actually exhale before they take a deep dive. And there are animals possessed of what seem like superpowers: There are snakes who have a second set of vision organs that let them see in complete darkness. A dolphin can stun a fish with sound. The hairs on the body of a bee give it a "sixth sense" that lets the bee tell, from a distance, that a flower has been recently visited by another bee. A shark can sense your heartbeat. A dog can tell, from another dog's growl, how big it is.

In this session we'll use physics as a tool to explain and explore the natural world, using it to explore all of these topics, and more. As with all Little Shop of Physics workshops, it will be active. We'll spend our time making measurements and observations, sharing ideas and hypotheses, and then we'll connect all of this back to the living world. Along the way, we'll show you some superpowers that you possess. You can see beyond the rainbow. You have a rudimentary sense like that of a honeybee. And you, too, size up animals by their growls, whether you realize it or not!

## **PALS May Hub Meeting**



Sat, May 2      Half Day      [7:30 am - 12 pm]      0.5 sem hrs / 7.5 contact hours

Title:      Caves, bats, and rock-eating bacteria: exploring CaveSim (and Cave of the Winds) to learn science

Presenters:      CaveSim:                  Dave Jackson, CaveSim creator  
   Jackson Fulcher, CaveSim educator  
   Cave of the Winds:      Staff

Description:      **CaveSim: From physics, to chemistry, to biology, CaveSim programs teach a wide variety of science lessons, all centered around the theme of cave exploration. Come join us to experience our mobile cave system, and see how we teach students to love science by allowing them to feel the joy of exploration. We'll show you how we teach bat biology, epidemiology, and statistics using bat games, and how we use our 12' vertical caving tower to teach forces, friction, pulleys, and other physics concepts. You'll gain a better understanding of how CaveSim programs can integrate with your curriculum, and you'll come away with activities that you can do in your own classroom.**

**Cave of the Winds: After your early morning experience with CaveSim you will travel to the Cave of the Winds where you will participate in ONE of the following tours:** (You must indicate which tour you will take when you sign up for the hub meeting.)

- **Caving 101 - “Take An Exciting Cave Trek! Explore the wild, undeveloped depths of the Manitou Grand Caverns on a 2 hour guided tour that involves an assortment of crawling, climbing, and walking through wet and muddy passages of various sizes. On this tour, you will crawl/climb/walk for nearly a mile while learning basic spelunking skills as well as the history and geology of the cave.” ([caveofthewinds.com](http://caveofthewinds.com))**  
Please wear clothing you won't mind getting dirty and possibly ruined by the mud in the cave. You will also need to bring a flashlight and/or headlamps, a change of clothes, and extra pair of shoes.

or

- **Discover Tour! - “Explore the electrically lit portion of the Cave of the Winds on a 60 minute guided walking tour which includes 15 rooms, a 1/2 mile of concrete walkways, and 196 stairs. On this family-friendly tour, you will learn about the history and geology of the cave while being shown some of its most beautiful formations.” ([caveofthewinds.com](http://caveofthewinds.com))** The cave is always around 54 degrees Fahrenheit, so you may need a light sweater or

jacket. Wear comfortable clothing, such as a long sleeve shirt and pants, and good walking shoes.

Tentative Agenda:

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|----------------------|---|
| <b>7:30 - 7:45</b>   | <b>Introductions &amp; Administrivia</b>  |
| <b>7:45 - 9:30</b>   | <b>CaveSim Activities</b>   |
| <b>9:30 - 10:00</b>  | <b>Group A (taking Caving 101 Tour) leave CMJHS to arrive at Cave of the Winds in time for the 10 am tour. This tour is quite rigorous.</b> |
| <b>9:30 - 10:30</b>  | <b>Group B (taking Discovery Tour) participate in more CaveSim activities</b>   |
| <b>10:30 - 11:00</b> | <b>Group A (taking Discover Tour) leave CMJHS to arrive at Cave of the Winds in time for the 11 am tour.</b>                                |
| <b>12:00 noon</b>    | <b>All participants depart Cave of the Winds</b>  |