

Peak Area Leadership in Science (PALS)

----- 2022-2023 PALS Hub Meetings Info -----

Semester ONE

Title: **Dinosaur Freeways, Cretaceous Seaways, and Fossil Traces in Swampy Places**

Meeting: # 1

Day, Date, Time: Saturday, August 20, 2022 8:00am - 5:30pm

Contact Hours: 5 hours - 10am - 3pm

Food: BYO lunch, drinks(water, soda) and snacks provided

Location: Dinosaur Ridge, 16831 W Alameda Pkwy, **Morrison**, CO 80465
Triceratops Trail, Golden CO

Presenters: Dinosaur Ridge Staff

Description: Join us on a journey to explore one of the world's most famous dinosaur fossil localities: Dinosaur Ridge ! We will begin with a visit to the Dinosaur Ridge Visitor Center and then take a bus tour where an expert guide will interpret the dinosaur tracks and bone fossils, local history, and geology seen along the Dinosaur Ridge Trail. After a byo lunch we'll travel to Golden, CO where we'll take a guided hike along the Triceratops Tracks trail. Triceratops Trail is a 1.5-mile, gravel hiking trail that winds between large, vertical walls of sandstone in old clay mining pits. The two guided tours/hikes include: Dinosaur Tracksite, Triceratops Tracks, Dinosaur Bone Quarry, Raptor Tracks, Geologic Overlook, Palm Fronds and Bird Tracks, Duckbills, Carnivores and Raindrops.

Agenda:

- 8:00 depart CMJHS
- 10:00 arrive at the center, visit exhibits, rest rooms.
- 10:30 depart for a 90 min tour with 2 guides to Dinosaur Ridge.
- 12:00 return to center for picnic lunch and restrooms
- 12:40 leave for Golden
- 1:00 tour (with guides) the Triceratops Trail.
- 2:30 return to bus
- 2:45 stop at center for restrooms, do evaluations and door prizes
- 3:15 depart for Colorado Springs
- 5:15 arrive at CMJHS

Title: **Exploring Connections to the Standards through Local Phenomena**

Meeting: # 2

Day, Date, Time: Thursday, September 8, 2022 4pm - 7pm

Contact Hours: 2.5 hours - 4:30pm - 7:00pm

Food: ½ hour light dinner provided at 4 pm, drinks (water and soda) provided

Location: Falcon Homeschool Program @ the Campus, 6113 Constitution Ave, Colorado Springs, CO 80915

Presenters: Heather Hubbard (Colorado Parks and Wildlife) and Maya Garcia (Colorado Department of Education)

Description: Join Colorado Parks and Wildlife and Colorado Department of Education to learn how

you can use locally available phenomena, such as droughts and drought modeling tools, to engage students in making sense of phenomena in their local community. During the workshop, we will unpack CAS Science aligned instructional practices, and engage with the Colorado Essential Skills and Science and Engineering Practices. We will discuss media resources, and authentic data sets, and model the selection of locally relevant phenomena.

Title: **Implementing the Standards in HS Science**
Meeting: # 3
Day, Date, Time: Saturday; September 17, 2022 8am - 1:30pm
Contact Hours: 5 hours
Food: BYO lunch - ½ hour, drinks(water, soda) and snacks provided
Location: Sand Creek High School, 7005 N. Carefree Circle, Colorado Springs, CO 80922
Presenters: Beth Kochevar, Andy Smith, Robin Walters, Science Teachers @ SCHS
Description: During this workshop, participants will explore a variety of classroom approaches to address science content standards and science practices. Current high school science teachers will share how they use Argument Driven Inquiry in Chemistry, Phenomenon-based Storyline in Biology, and Modeling Curriculum in Physics/Physical Science. Educators will have the opportunity to experience lessons to get a feel for the approach and gain understanding of how lessons are structured together to make connections that facilitate sense-making by learners.

Title: **Geo Maker Institute: Mapping, Making and Storytelling**
Meeting: # 4
Day, Date, Time: Saturday, October 1, 2022 8am - 1:30 pm
Contact Hours: 5 hours
Food: 1/2 hour lunch (BYO), drinks(water, soda) and snacks provided
Location: Sand Creek High School, 7005 N. Carefree Circle, Colorado Springs, CO 80922 **(NEW !)**
Presenter: Heidi Ragsdale, Stem is My Future, LLC.
Description: Participants will have a clear idea of the opportunities for classroom use of Digital StoryMaps and storytelling across the curriculum. Through this deep dive into the world of StoryMaps, educators will leave the session with resources to directly implement into their curriculum no matter the grade or STEM/GIS content. The session lesson will introduce teachers to the purpose of StoryMaps, provide access to existing Science StoryMaps, and will include direct instruction on how to build their own StoryMaps to include it in their science content delivery. Mapping tools from National Geographic and ESRI will be included. Please bring a phone with QR and/or a laptop. Session is by STEM is My Future.

Title: **Wild about Elk**
Meeting: # 5
Day, Date, Time: Saturday, October 8, 2022 2 pm - 11 pm (includes travel time)
Contact Hours: 5 hours (4pm - 9pm)
Food: BYO sack dinner - ½ hour working dinner, drinks(water, soda) and snacks provided
Location: Mueller State Park, 21045 CO-67, Divide, CO 80814
Presenters: Linda Groat (Colorado Parks and Wildlife), Martha Alvarez (Palmer High School)
Description: Elk are an important part of many ecosystems in Colorado. In this workshop,

participants will learn about ecological connections elk have with their environments, including diseases that impact this animal. The workshop will conclude with a hike that allows participants the opportunity to experience elk bugling.

Title: **Redesigning High School Science Investigations: to make more powerful 3-D learning experiences for students**

Meeting: # 6
Day, Date, Time: Saturday, November 12, 2022 8:30am - 2pm
Contact Hours: 5 hours
Food: BYO lunch - ½ hour, drinks (water, soda) and snacks provided
Location: Sand Creek High School

Presenters: Tim Blesse, Brandon Davis
Teacher Professional Development Consultants, Denver Museum of Nature and Science

Description: With the shift to three-dimensional science teaching called for by the new state and national standards, we want our students to spend less time in class “Learning About” scientific phenomena and more time “Figuring Out” what causes them.

Using hands-on lab experiences, provides students the opportunity to use the eight practices of science and engineering to develop their own explanations for phenomena, and design their own solutions to problems. **Transforming science education into a method of discovery, not only imitates what real scientists do, but it adds a sense of student agency and ownership that “cookie-cutter” labs never did.** But the shift to this type of teaching has gotten ahead of the available curricular materials. In particular hands-on laboratory experiences seem to be lacking.

In this workshops you will be given opportunities to actively collaborate as you:

- A. **Look at some currently existing lab experience model resources**, already designed to be phenomenon-driven and take time to start **integrating the ones you like** into your current biology courses
- B. **Collaboratively Redesign some of your existing labs**. Most existing labs were intended to **demonstrate** a science concept or principle using a real-life phenomenon. With a little clever backward-design, we will take these labs and turn them into experiences where students **design and carry out their own investigations**, unpacking phenomena in order to discover basic biological principles.
- C. **Learn some evidence-based principles about how to guide, rather than direct, student investigations**. Strategies like: Questioning, Building in uncertainty, Analyzing for reliability, Recognizing different types of biological questions (e.g. comparative, Correlative) The difference between experimental and nonexperimental investigations.

Title: **Grouper Moon Project + STEM- Conservation of an endangered species using Technology**

Meeting: # 7
Day, Date, Time: Wednesday, November 30, 2022 4pm - 7pm
Contact Hours: 2.5 hours
Food: ½ hour light dinner provided at 4 pm, drinks (water, soda) also provided
Location: Colorado Parks and Wildlife classroom, 4255 Sinton Rd, Colorado Springs, CO 80907
Presenter: Hilary Penner, Education and Conservation Program Manager, Reef Environmental Education Foundation (REEF) www.REEF.org

Description: The Grouper Moon Project is a conservation science partnership between Reef Environmental Education Foundation (REEF) and the Cayman Islands Department of Environment (DoE) with

scientists from Scripps Institution of Oceanography at UC San Diego and Oregon State University, aimed at studying Nassau grouper (*Epinephelus striatus*) - a social and ecological cornerstone of Caribbean's coral reefs.

Learning Outcomes:

- Confidently access and integrate NGSS aligned REEF lessons into their existing curriculum
- Provide background information to their students about Grouper Moon Project
- Share how scientists work in the field, collect data, and use scientific and engineering design process

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| Agenda: | 4-4:30 | Welcome and light dinner, Administrivia |
| | 4:30- 5:00 | The Grouper Moon Project Slideshow for Background Information |
| | 5:00-5:45 | Grades 6-8 Lesson Demonstration + STEM Challenge Information |
| | 5:45- 6:00 | Break |
| | 6:00- 6:45 | High School Lesson Demonstration + Live stream Event Information |
| | 6:45-7:00 | Raffle / Questions and evaluations |

Title: Ute People and STEM Practices

Meeting: # 8

Day, Date, Time: Monday, December 5, 2022 4pm - 7pm

Contact Hours: 2.5 hours

Food: ½ hour light dinner provided at 4 pm, drinks (water, soda) also provided

Location: @ the Campus (D49), 6113 Constitution Ave, Colorado Springs, CO 80915.

Presenters: Rose Banzhaf, SE Environmental Education Leadership Council

Description: History Colorado has Take Out Programs that allow classes to use photographs and objects to explore stories, contributions, and changes of different communities and industries of Colorado in your classroom at your own pace. Their latest Take Out Program is how the Ute People used STEM practices. Come explore activities with focuses of water filtration, transportation, patterns in art, science for food, and engineering for shelter.

Semester TWO

Title: Chemistry of Art and Color

Meeting: # 9

Day, Date, Time: Saturday, 21 January 2023 8:15 am - 2:00 pm

Contact Hours: 5 hours

Food: BYO working lunch, light breakfast, drinks (water, soda) and snacks also provided

Location: USAFA Chemistry Department

Presenters: Dr Jennings, Dr Kelly, Dr Jefferies, Dr Furstenau

Description: Join us to take a closer look at the chemistry of art and color. Participants will learn about the history of paint pigments and the chemistry behind making pigments. We will learn to analyze paint samples using a Scanning Electron Microscope and/or MALDI, an advanced mass spectrometry technique. We will learn about art restoration, making crayons, and will make our

own paint pigment. Like most of the Science HUB activities at the USAF Academy, we will make sure we have something for everyone, with emphasis on middle and high school teachers. We will provide activities that (1) expand participants' knowledge base; (2) provide the opportunity to do experiments that can be used in their classrooms, either as a demonstration or as a student lab; and (3) provide the opportunity to do experiments in a research-style environment using advanced equipment.

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| Topics and Agenda: | 0815 | Meet participants on the south steps of the Cadet Field House; escort to Chemistry Conference Room (2N189) |
| | 0815-0900 | Travel to Chemistry Conference Room, Refreshments |
| | 0900-0915 | Introductions, admin items in Chemistry Conference Room |
| | 0915-1000 | Presentation: "Chemistry of Pigments" - Dr Abby Jennings <i>Dr Jennings will talk about the history of paint pigments and the chemistry behind making the pigments.</i> |
| | 1015-1015 | Break, Chemistry Conference Room (2N189) |
| | 1015-1100 | Laboratory Experiments #1 Group A: Analyzing Paint Samples (Dr Jennings, Dr Kelly) Group B: Art Restoration and Cleaning or Making Crayons (Dr Jefferies) Group C: Making a Paint Pigment (Azurite; Dr Furstenau) |
| | 1100-1145 | Laboratory Experiments #2 Group A: Art Restoration and Cleaning or Making Crayons Group B: Making a Paint Pigment Group C: Analyzing Paint Samples |
| | 1145-1245 | Working Lunch with Presentation: "The Chemistry of Art Restoration" - Dr Jefferies or Dr Kelly |
| | 1245-1330 | Laboratory Experiments #3 Group A: Making a Paint Pigment Group B: Analyzing Paint Samples Group C: Art Restoration and Cleaning or Making Crayons |
| | 1330-1400 | Final wrap-up of the day's events (2N189) |
| | 1400 | Depart chemistry area for Cadet Field House |

(Note: "Analyzing Paint Samples" will involve the use of the Scanning Electron Microscope and/or MALDI, an advanced mass spectrometry technique. Both are really cool!)

Title: **Creating the Future: Genetic Engineering and Synthetic Biology**

Meeting: # 10

Day, Date, Time: Saturday, February 4, 2023 8am - 1 pm

Contact Hours: 5.0 hours

Food: BYO working lunch

Location: USAFA Biology Department

Presenters: USAFA iGEM Team Cadets, Vicki Morrison, Dr. Kristi McElmurry, Dr. Balboni, Mel Grogger, Catherine Jarriel, Dr. Travis Tubbs, Dr. Jordan Steel and AFRL- Dr. Hung and Dr. Sanaz, Dr. Katharine Bates

Description: Through a mixture of presentations and hands-on activities by the United States Air Force Academy Biology department participants will be introduced to genetic engineering and synthetic biology.

Agenda:

| Time | Event | Activity | POC |
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| 8am | Breakfast and Introduction to Genetic Engineering | Genetic engineered bracelets | USAFA iGEM Team Cadets |
| 8:30am | Biocementation engineering | Make Sand Molds/Castles | Vicki Morrison |
| 9am | Nanobody Technology/Plasmids | Start transformation | Dr. Kristi McElmurry |
| 10am | LSRC genetic engineering | Microscopes- look at algae Finish Transformation | Dr. Balboni, Mel Grogger, Catherine Jarriel |
| 11am | Space Bioengineering (Plants and gravity) | 3D scan plants | Dr. Travis Tubbs |

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| 11:30am | PFAS genetic engineering | Watch music videos | Dr. Steel and AFRL- Dr. Hung and Dr. Sanaz |
| 12pm | Lunch/ Discussion of Genetics Education | Punnett Square Olympics! | Dr. Bates |
| 1pm | End of the Workshop | | |

Title: **Conversations with a Forensic Pathologist**

Meeting: # 13

Day, Date, Time: Wednesday, March 15, 2023 4pm - 7pm

Contact Hours: 2.5 hours

Food: ½ hour light dinner provided at 4 pm, drinks (water, soda) also provided

Location: Sand Creek High School

Presenters: Deborah G. Johnson, MD, MS, Pikes Peak Forensics, PC

Description: During the first part of the presentation, participants will learn what forensic pathology is, what an autopsy is, definitions of cause and manner of death, a look at the job description of a Coroner or Medical Examiner, how it's determined who gets an autopsy, what is a death certificate and how it's filled out. The second part of the presentation will focus on the opioid epidemic and its causes through a detailed look at one woman's death in hospital despite the use of naloxone, and why, even though there is a readily available opioid antidote, so many people are still dying, especially when fentanyl is involved.

Title: **Lionfish Invasion. Why is this an issue?**

Meeting: # 12

Day, Date, Time: Wednesday, March 22, 2023 [rescheduled from ~~Wednesday, March 1, 2023~~ 4pm - 7pm]

Contact Hours: 2.5 hours

Food: ½ hour light dinner provided at 4 pm, drinks (water, soda) also provided

Location: Colorado Parks and Wildlife classroom, 4255 Sinton Rd, Colorado Springs, CO 80907

Presenter: Hilary Penner, Education and Conservation Program Manager, Reef Environmental Education Foundation (REEF), www.REEF.org

Description: **Invasive Lionfish Program: Human Impact, Ecological Impact and Engineering Design**
 Lionfish Invasion. Why is this an issue? Known for their show stopping appearance, venomous spines and damage to local reefs, invasive lionfish are the first non-native marine fish to become established in the Atlantic. Lionfish pose a significant threat to local marine ecosystems due to widespread predation of native species, prolific reproduction and lack of controlling predators. However, early detection and rapid removal can help control their populations and reduce their damage. REEF has been working with Federal, State, and local partners as well as divers and dive operators, public aquaria, and foreign fisheries departments to enact rapid response protocol and removals and to assist with scientific investigations related to lionfish and other non-native marine species. Join us as we explore the Invasive Lionfish Program and related REEF lessons that you can use in your classroom!

Learning Outcomes:

- Confidently access and integrate NGSS aligned REEF lessons into your existing curriculum
- Provide background information to their students on the Invasive Lionfish Program: Human Impact, Ecological Impact and Engineering Design
- Share how scientists work in the field, collect data, and use scientific and engineering design process

Topics and Agenda:

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| 4:00 - 4:30 | Welcome and light dinner, Administrivia |
| 4:30 - 5:00 | The Invasive Lionfish Project Slideshow for Background Information |
| 5:00 - 5:45 | Grades 6-8 Lesson Demonstration, Crime Fish Investigation |

5:45 - 6:00 Break
6:00 - 6:45 High School Lesson Demonstration, Research Project Sample
6:45 - 7:00 Questions, Evaluations and Door Prizes

Title: **Continuing chemistry and biochemistry education at UCCS:
focused teaching and research at an undergraduate-centered
regional university**

Meeting: # 14
Day, Date, Time: Saturday, April 15, 2023 8:00 am - 1:30 pm
Contact Hours: 5.0 hours
Food: BYO lunch - ½ hour, drinks (water, soda) also provided
Location: UCCS, Dept of Chemistry and Biochemistry

Presenters: [Linda Cummings](mailto:lcumming@uccs.edu) (lcumming@uccs.edu)
Description: Join us as we explore the teaching and research capabilities of the Department of Chemistry & Biochemistry at UCCS. You will learn more about the student-centered, active learning teaching environment at this small school that prioritizes student success, and examine the undergraduate-led research the UCCS faculty are completing in the areas of analytical chemistry (whiskey flavor-profile analysis, “forever chemical” analysis in Fountain Creek), physical chemistry (nanotechnology with carbon nanotubes), and biochemistry (DNA, protein, and membrane structure analysis). Among the highlights will be tours of the technological resources available to undergrads, hands-on laboratory experiences, and one-on-one discussions with Chemistry/Biochemistry faculty and current students. Come explore how local high school teachers can benefit from collaborative interactions with UCCS.

Title: **Local Water Wonders: Water Education with Colorado Springs Utilities**

Meeting: # 11
Day, Date, Time: : Wednesday, April 19, 2023 [~~rescheduled from Wednesday, February 15, 2023 4pm - 7pm~~]
Contact Hours: 2.5 hours
Food: ½ hour light dinner provided at 4 pm, drinks (water, soda) also provided
Location: Conservation and Environmental Center, 2855 Mesa Road
Mesa Conference Room - Parking in back on the east side of building
Presenter: Birgit Landin, Community Education Specialist, Colorado Springs Utilities
Description: Colorado Springs Utilities supplies an average of 68 million gallons of purified water to the community every day. This program will provide an overview of our complex water system, how we treat water to make it potable including advanced treatment processes for potential future water recycling purification and introduce local teachers to the water education materials and resources available from Colorado Springs Utilities. Attendees will receive a complimentary Water Activities Teacher Resource Guide, filled with activities and lesson plans that can be easily implemented in the classroom.

Title: **Birds Galore**

Meeting: # 15
Day, Date, Time: Saturday, April 29, 2023 8am - 1:30pm
Contact Hours: 5.0 hours
Food: BYO lunch - ½ hour, drinks (water, soda) also provided
Location: Fountain Creek Nature Center, 320 Peppergrass Ln, Fountain, CO 80817
Presenters: Staff, Fountain Creek Nature Center

Description:

Fountain Creek Nature Center is a home, even if just a temporary one, for many birds in the Pikes Peak Region. Come join us at this workshop to learn about the birds and how they interact with the local ecosystems. Explore topics including “birding 101”, raptors in the Pikes Peak region, bird flu, effects of light pollution on bird migration, and opportunities for citizen science participation focused on birds.