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Newsletter of the **Idaho Academy of Science and Engineering**

Contents:

STEM Matters Morphs to Monthlong Celebration Throughout February	2
Advanced Research Agency Funds Two INL Net-Zero Research Projects	5
BSU Professor, Partners Aim to Advance the Future of Semiconductor Manufacturing	8
BSU Receives Award for Open Researcher and Contributor Identifier Work	9
Starting Small: Three Microgrid Projects Bring Clean Energy to Army in Kuwait	10
Cybersecurity Scholarships Benefit U of I Students Locking in Positions with Federal Agencies	12
ISU Geologist Helping NASA Prepare for 2025 Crewed Moon Mission	13
BYU-Idaho Seeks to Improve Courses through Unique Program	15
How Old Was That Tree?	18
The College of Idaho, Orma J. Smith Museum of Natural History, Annual Report Highlights	19
Three Minute Thesis Competition	23
Science in St. Louis: Cybersecurity, A Leader's Perspective from the Field	24
The College of Idaho Planetarium – Symposium: Roving Mars	25
Smart Cities REU at UNLV	26
Opportunity for Early Career Professionals – NASA Planetary Science Summer School	27
Seminar – Advancing DNA Diagnostics: The Science and Applications of DNA-Targeting Invader Probes	29
National Association of Academies of Science: Invitation to Participate in Mentoring Events	31
Csll fo Nominations: Sigma Xi Fellows	32
ISGC Review Committee Signup	33
ISTPF Call for Fellows	33
2022-2023 Idaho Academy of Science and Engineering Officers	34
IASE Miscellaneous Contact Information	35

***** SUPPLEMENT: IASE 63rd Symposium and Annual Meeting – Call for Abstracts *****

Upcoming 2023 Events

(Please Volunteer & Mark Your Calendar)

February	11:	MathCounts Southeast Idaho Chapter Competition, Idaho State University, Pocatello
February	17-23:	Future City National Finals, Washington, DC
February	19-25:	National Engineers Week
February	24:	Eastern Idaho Science & Engineering Fair, Idaho State University, Pocatello
February	25:	MathCounts Southwest Idaho Chapter Competition, Boise State University, Boise
March	03:	Western Idaho Science & Engineering Fair, Boise State University, Boise
March	10:	Northern Idaho Science & Engineering Fair, University of Idaho, Moscow
March	11:	MathCounts Idaho State Competition, Boise State University, Boise
April	21-22:	IASE Symposium, Idaho College of Osteopathic Medicine, Meridian
May	13-19:	Regeneron International Science & Engineering Fair, Dallas
May	14-15:	MathCounts National Competition, Orlando

Idaho STEM Action Center will be spotlighting the She Can STEM event in Pocatello at Idaho State University's Eames Complex Feb. 10 during STEM Matters Month.

STEM Matters Morphs to Monthlong Celebration Throughout February

Idaho Governor declares February 2023 STEM Matters Month

In its eighth year, STEM Matters has morphed from a one-day celebration at the Idaho State Capitol to a weeklong virtual event during the height of the COVID-19 pandemic to a monthlong statewide celebration during February 2023.

Idaho STEM Action Center hosted a kickoff at Trailhead, a Boise co-working space for entrepreneurs and business professionals, Wednesday where Idaho Gov. Brad Little read his proclamation declaring February STEM Matters Month.

"In our ever-changing economy, Idaho STEM Action Center is uniquely situated to connect young Idahoans with the education and training our industry leaders want in a workforce," Gov. Little said. "From logging to computer science, mining to healthcare, or teaching to business, the skills that STEM education fosters will propel Idaho students into high-paying, meaningful careers."

Other state and business leaders were in attendance and discussed the importance of STEM education in today's technology- and knowledge-based economy.



Idaho Gov. Brad Little addresses the crowd. (Photo by Otto Kitsinger for Idaho STEM Action Center)



INL STEM education and early workforce development program manager Jennifer Jackson addresses the crowd. (Photo by Otto Kitsinger for Idaho STEM Action Center)

"Here is why STEM really matters: INL conducts world-class research, but to continue making scientific breakthroughs, we need to prepare a STEM workforce for the future," Jennifer Jackson, STEM education and early workforce development program manager at INL and chair of the STEM Action Center board, said. "Our partners all over the state also need a STEM prepared workforce. Idaho's economy depends on it. STEM education is an essential early workforce development strategy for Idaho."

Deni Hoehne, director of talent development at WinCo Foods and chair of the Idaho Workforce Development Council, concurred, emphasizing STEM is everywhere.

"Every job is a STEM job," Hoehne said. "And the 37 members of the council constantly talk about that every time we're together -- what can we also be doing and thinking about STEM? For example, I am in the retail grocery industry. Do you know that the cart clerk operates a robot? The manager of a grocery store uses probably five different pieces of software just to get the products on the shelf right. The space planning department uses geometry constantly to figure out how many gelatin boxes can really fit if



Deni Hoehne, director of talent development at WinCo Foods and chair of the Idaho Workforce Development Council, addresses the crowd. (Photo by Otto Kitsinger for Idaho STEM Action Center)

we also add some pudding there. It's all about geometry. If you want to teach your kids STEM, go to the grocery store. It's right there in front of them every day."

Tiam Rastegar, Trailhead's CEO and executive director and co-chair of Boise Entrepreneur Week, Idaho's largest entrepreneur-focused event, said its partnership with Idaho STEM Action Center is crucial to the event's Youth Innovation Challenge. The competition tasks students with proposing solutions to real-world problem statements BEW has sourced from its community partners, including local business and community leaders.

"I really wanted to take this opportunity to bring to life what STEM really means to Trailhead: It's about planting seeds," Rastegar said. "These are our future entrepreneurs who will help us build businesses right here in Idaho."

STEM Action Center executive director Caty Solace said early STEM education is paramount.

"The 'action' that the STEM Action Center is all about is that long game," Solace said. "Looking at Idaho's youth and saying, 'Okay, how do we spark excitement about the world of work for them tomorrow?'"

Watch a stream of the event at www.youtube.com/live/YqWF2qT58jc?feature=share courtesy of Idaho Public Television.

As part of STEM Matters Month, Idaho STEM Action Center is hosting virtual discussions with leading employers and helping spotlight other events statewide that highlight careers in science, technology, engineering, and math. Visit stem.idaho.gov/stem-matters for more details about the events happening during STEM Matters Month.

According to Solace, STEM knowledge and skills are important to the future of Idaho.

"STEM learning helps students develop creative thinking, problem solving, innovation, and collaboration skills," she said. "These durable skills are in high demand by Idaho employers that want to solve problems in our communities and beyond."

Solace said STEM jobs in Idaho are projected to grow 15.4 percent by 2030, outpacing the national average of STEM job growth at 10 percent, and that 90 percent of jobs will require digital literacy within a decade.

"STEM jobs are incredibly interesting and include careers in healthcare, engineering, software development, finance, agriculture, and construction," she said. "In addition to being personally rewarding, they're financially rewarding, too, with STEM jobs paying nearly twice as much as non-STEM jobs."

Participants are encouraged to use the hashtag #STEMMattersIdaho when posting about STEM Matters Month to social media, as well as #Idaho and #STEM.

About Idaho STEM Action Center

Idaho STEM Action Center is an education and growth catalyst helping educators, businesses, families, and communities prepare the workforce of tomorrow. An incubator, connector, and advocate of STEM thinking and initiatives, the agency provides resources, support, and problem solving that spark innovation and offer paths to prosperity based on Idahoans' shared values of hard work, collaboration, self-determination, family, and community stability. Learn more at stem.idaho.gov and visit stem.idaho.gov/support-us/foundation to make a tax-deductible donation to its 501(c)(3) nonprofit foundation to enhance the investment the state has made in Idaho's STEM community. Contributions provide greater access to STEM camps for children, student competitions, and many other life-shaping programs.



Idaho Gov. Brad Little declared February 2023 STEM Matters Month. (Photo by Otto Kitsinger for Idaho STEM Action Center)

Text of Idaho 2023 STEM Matters Month Proclamation

WHEREAS, talent development for a highly skilled workforce is critical to Idaho and the nation's competitiveness; and

WHEREAS, Idaho students require a strong foundation in science, technology, engineering, and mathematics (STEM) skills to succeed in growing Idaho's economy; and

WHEREAS, the Idaho STEM Action Center was founded to prepare Idahoans for STEM connected career opportunities; and

WHEREAS, the Idaho STEM Action Center, Idaho State Department of Education, the Idaho State Board of Education, Idaho Workforce Development Council, Idaho employers, and higher education have partnered to establish pipelines to STEM careers; and

WHEREAS, educators, employers, students, parents, and others will come together Feb. 1-28, 2023, across the state to highlight Idaho's deep passion for STEM knowledge, career awareness, and STEM integration into their educational environment as they prepare students to compete in today's technology and knowledge-based economy; and

NOW, THEREFORE, I, BRAD LITTLE, Governor of the State of Idaho, do hereby proclaim the month of February to be STEM Matters Month

And encourage educators and leaders in the government, business, technology, and science communities to continue this STEM partnership to help Idaho students better analyze, reason, access technology and communicate solutions to the challenges of tomorrow, and to consider engagement in the Idaho STEM talent pipeline by choosing a STEM career needed in Idaho.

Advanced Research Agency Funds Two INL Net-Zero Research Projects

The U.S. Department of Energy’s Advanced Research Projects Agency-Energy (ARPA-E) has awarded more than \$5.8 million to Idaho National Laboratory to support research that boosts domestic supplies of the critical elements needed to meet the nation’s clean energy goals.

The money comes through two ARPA-E programs. The first, Mining Innovations for Negative Emissions Resource Recovery, or MINER, is for developing commercially scalable technologies to increase domestic production of rare earth elements and critical minerals such as copper, nickel, lithium and cobalt. The second, Converting UNF Radioisotopes into Energy, or CURIE, sponsors projects led by universities, private companies and national laboratories that develop new reprocessing technologies for extracting and recycling valuable actinides from used nuclear fuel.



Wencheng Jin

Through MINER, ARPA-E has awarded \$3.1 million to an INL project led by Wencheng Jin. The project will develop a disruptive technology called electric-hydraulic fracturing to break up underground rock deposits, extract critical minerals and sequester carbon dioxide. Weakening rock before mining reduces water consumption and requires less crushing, grinding and tailings.

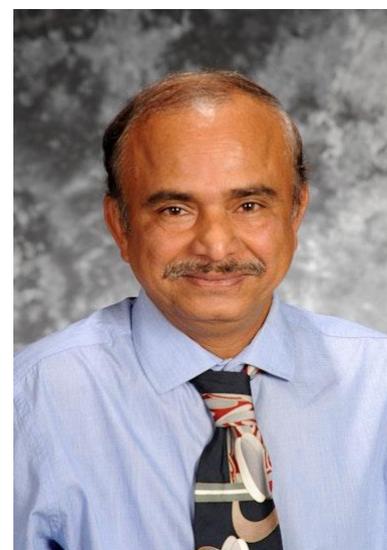
Under CURIE, INL is slated to receive nearly \$2.7 million for work focused on using electricity to recycle nuclear fuel led by Prabhat Tripathy. Specifically, the lab will design, fabricate and test anode materials for electrochemically recovering radioactive elements from used nuclear fuel for use in advanced reactors. These

actinides — elements such as uranium, thorium and plutonium that release energy during radioactive decay — can be used to power the next generation of nuclear reactors.

MINER: Better Extraction through Electricity, Chemistry

MINER’s intent, according to ARPA-E’s funding announcement, is to develop technologies that will help achieve carbon-negative mining operations.

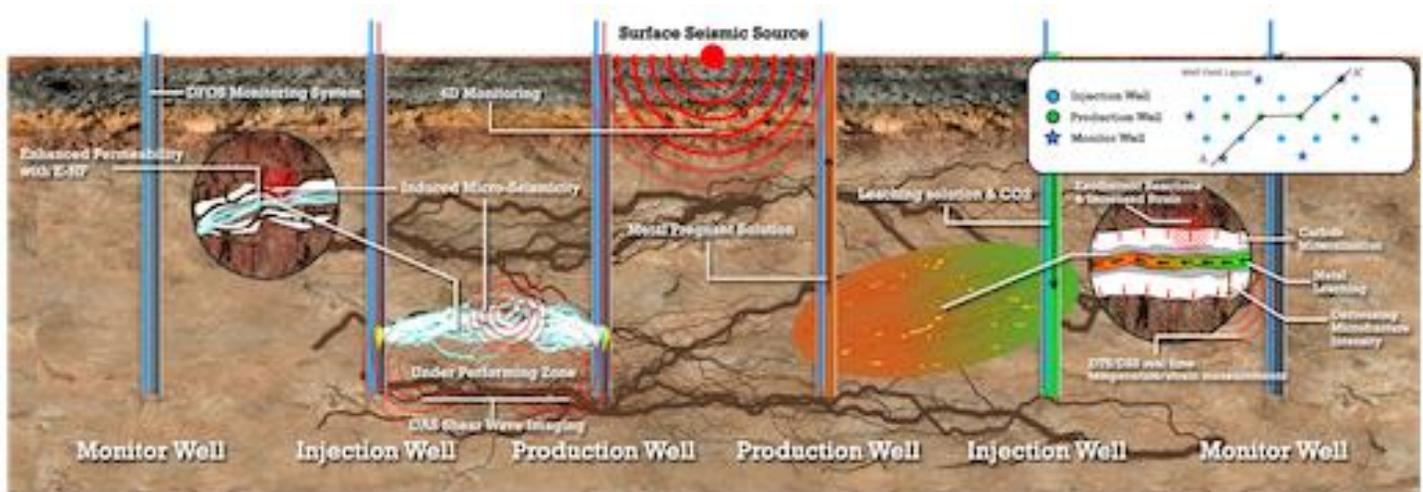
Certain ore deposits contain strategic minerals such as nickel, copper, cobalt and platinum, critical for energy transition. They also contain minerals such as olivine, a magnesium iron silicate that reacts with carbon dioxide. The biggest challenge to mine these minerals and isolate carbon dioxide is the lack of reactive surfaces. Using electrical current and fluids, Jin and his collaborators – Eden Geopower, Colorado School of Mines and Stony Brook University – aim to fracture ore deposits then inject enhanced metal leachate charged with carbon dioxide. While the leachate creates conditions for minerals to be extracted the carbon dioxide will be trapped on the surfaces of the fractured rock. Experimental and numerical simulations indicate this can increase permeability up to 500%, leading to recovery of up to 80% of the energy-relevant minerals and mineralizing up to 60% of the injected carbon dioxide — a vital carbon capture goal.



Prabhat Tripathy

“With carbon negative mining, energy used to extract the minerals is far less than what is used in open pit or underground mining,” Jin said.

Eden Geopower has performed a preliminary field test and Colorado School of Mines continues to develop a technology called distributed fiber-optic sensing, to monitor fracture processes and chemical reactions during operations. The first full-scale field tests will be done at the Sanford Underground Research Facility, a laboratory in South Dakota that houses dozens of experiments in geology, biology, engineering and physics.



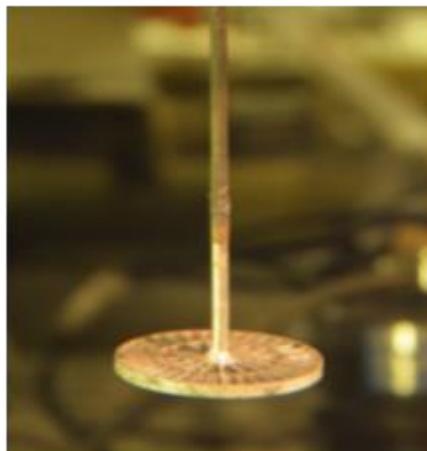
CURIE: Stronger, Less Expensive Anodes

Pyroprocessing uses electricity and chemicals to recover actinides like plutonium and uranium from used nuclear fuel. The anodes used in this process have traditionally been made from either platinum or graphite. In addition to being expensive, these materials degrade rapidly, contaminating the metallic product and increasing the carbon footprint. Researchers have long been looking for an anode that can maintain its structural integrity during pyroprocessing.

To reduce anode costs and improve performance, Tripathy and his research team aim to fabricate new anodes made from iridium and ruthenium and evaluate their performance for commercial use. Developing robust anode materials supports a transformative solution to treating used nuclear fuel without generating greenhouse gases, Tripathy said.

The work expands on research Tripathy has conducted at INL and Massachusetts Institute of Technology. Because iridium belongs to the same group of metals as platinum, Tripathy fabricated anodes and performed experiments at engineering scale using kilogram quantities of spent nuclear fuel oxides, rare earth metals and alloys commonly found in devices such as smartphones, laptops and electric vehicles. In his experiments, the monolithic iridium anodes experienced continuously extreme conditions for days at a time yet demonstrated service life nearly 10 times longer than platinum anodes under identical stress.

When iridium’s price nearly quadrupled around 2020, Tripathy turned his attention to ruthenium, a more affordable metal from the same family of elements. While he has tested monolithic ruthenium at bench scale for depleted uranium oxide and non-nuclear oxides, under CURIE these anodes are to be tested for actual spent fuels. Anodes made of alloys containing ruthenium and iridium and iridium/ruthenium-coated anodes will also be fabricated and tested. Outside of used nuclear fuel, Tripathy says the technology could be used to recover rare earth metals from e-wastes and remove toxic elements involved in environmental remediation work.



Supporting University, Industrial Research

In addition to these two projects, INL researchers can take part in four other ARPA-E/CURIE projects for two universities and two private companies. Here is what they involve:

- Self-powered Wireless Hybrid Density/Level Sensing with Differential Pressure Sensors for Safeguarding and Monitoring of Electrochemical Processing of Nuclear Spent Fuel — INL's Guoping Cao is working with Haifeng Zhang of the University of North Texas.
- Achieving 1% Isotopic Assay of Special Nuclear Materials in 2 Minutes with Microcalorimeter-Array Gamma-Ray Spectroscopy — INL's Ammon Williams is partnered with Daniel Becker of the University of Colorado.
- Closing the Cycle with NuCycle — INL's Ken Marsden is consulting with Vik Singh of Curio Solutions.
- Improved Volatile and Semi-volatile Radionuclide Off-Gas Management — INL's Amy Welty is working with Phillip Cox of Mainstream Engineering.

*by Paul Menser
INL Communications
January 26, 2023*

The optimist sees the glass half full.

The pessimist sees the glass half empty.

The chemist sees the glass completely full, half with liquid and half with air.



BSU Professor, Partners Aim to Advance the Future of Semiconductor Manufacturing

Earlier this year, the National Science Foundation invested over \$30 million in 21 projects, involving 100 institutions in 20 states through its Future Manufacturing program. Aligned to national priorities outlined by the White House in the new U.S. National Strategy for Advanced Manufacturing, this program aims to enable manufacturing capabilities that do not exist today. The new Advanced Manufacturing strategy outlines goals and objectives to advance microelectronics and semiconductor manufacturing, biomanufacturing, smart manufacturing, and also to develop innovative materials and processes for manufacturing.

David Estrada, associate professor of materials science and engineering, has partnered with the University of Washington, Eastern Washington University, the University of Pittsburgh and Micron Technology (Advisory Board) on a \$500,000 seed grant under the Future Manufacturing program to explore the feasibility of integrating two-dimensional materials with DNA nanotechnology as a new approach to manufacturing computer memory, a critical component in modern computing and data storage.

“One of the greatest challenges facing the information and communications technology ecosystem is the amount of energy required to process and store the tremendous amounts of data we produce,” Estrada said. “By some estimates, the world’s information and communications technology infrastructure will consume more energy than is produced by the global fleet of nuclear reactors.”

Estrada’s goal is to develop new materials and computing architectures that can address this global challenge at the single transistor level, which will have a broader impact on the information and communications technology ecosystem.

Turning to DNA for help

Currently, memory technologies are made from silicon wafers, which require expensive instruments to pattern. It is also increasingly difficult to shrink the size of the memory devices using this approach and the industry has invested heavily to push the limits of advanced semiconductor manufacturing to achieve features that are about two to three times larger than the diameter of DNA. Led by Haitao Liu, professor of chemistry at the University of Pittsburgh, the team aims to leverage DNA’s self-assembly properties and “two-dimensional” materials to overcome this manufacturing bottleneck.

These materials are a class that are one to three atoms thick and have exhibited outstanding electrical, thermal and optical properties. The team plans to leverage DNA’s size and self-assembly properties to create self-assembled nanometer-scale templates to pattern and modify two-dimensional materials in order to fabricate synaptic memory devices. The devices are critical to enable energy-efficient computing architectures that mimic the human brain.

The team will also develop atomistic models to understand the material and device behaviors, while developing education and workforce development activities, designed to highlight the integration of biology, chemistry, physics and engineering as a potential career path towards the future manufacturing of semiconductor devices.

Boise State News
January 27, 2023

BSU Receives Award for Open Researcher and Contributor Identifier Work

Boise State University received a 2022 ORCID Community Award for Institutional Achievement. Similar honors were also presented to other notable universities, such as Johns Hopkins, Stanford and Harvard Medical School.

ORCID stands for Open Researcher and Contributor Identifier. An ORCID iD is a free, unique 16-digit number assigned to anyone who participates in research, scholarship and innovation. It allows researchers to connect their professional information across various publications and platforms. Albertsons Library is being recognized for developing and managing an application to connect ORCID iDs with Boise State IDs.

“Boise State is innovating alongside much larger institutions with a fraction of the resources and staff,” said Bill English, head of library computing and information systems. The library is currently developing a way to share their ORCID application project nationally for the benefit of smaller academic libraries.

Boise State News
January 30, 2023



If you're not part of the solution, you're part of the precipitate.

Starting Small: Three Microgrid Projects Bring Clean Energy to Army in Kuwait

When U.S. military members are deployed in the Middle East, they often have limited access to sustainable energy sources. To help reduce carbon emissions from troops abroad, Idaho National Laboratory and the U.S. Department of Defense are developing three pilot demonstration projects that will establish clean energy and sustainability solutions for the U.S. Army Central Command in Kuwait. The projects are part of a program called Operational Energy.

The projects have significant environmental implications for Kuwait, which gets 99% of its power from fossil fuels. Operational Energy will diversify the area's energy economy with resilient and sustainable power sources. These efforts will also improve quality of life for the soldiers. In particular, troops will no longer eat and sleep in the same space as the diesel generators, grappling with the fumes and noise.

The Three Projects

The inaugural project focused on a microgrid solution to store energy and eliminate the need for costly and energy intensive solutions like diesel generators. "The first project successfully guided the first hybrid microgrid installation for the U.S. in Kuwait," said Bob Turk, one of the managers on this project. "We used advanced inverters, battery storage and specialized solar photovoltaic implementations" so the Central Command operation area in Kuwait can operate more sustainably.

More than 60% of this microgrid's operating power will be renewable, combining battery and solar energy. When the battery gets low, the local diesel generator (now integrated into the microgrid) will automatically supply the load and recharge the battery. This generator will supplement the microgrid's renewable power system only when needed. The microgrid also makes it possible to cut the number of spot generators serving two buildings next to the microgrid components. This will ultimately save DOD around 7,500 gallons of diesel fuel annually, and over \$65,000 per year in fuel, generator leasing, and operations and management costs for just this pilot project.



A solar microgrid installation in Kuwait.

The second installation successfully implemented a unique 40-kilowatt carport solar power system design. "This shows that a collaboration between solar inverters and diesel generation can be achieved while maintaining stable operations," said Turk. "This system eliminates the need to rely exclusively on diesel and proves that sustainable solutions can serve the same purpose."

A water reclaiming and recycling installation rounded out the three projects and was primarily focused on environmental sustainability. The team installed a system that collects shower water and sends it through a three-phase filtration system, as well as chlorine and ultraviolet sanitation. The filtered water is then used for flushing toilets. This allows the facility to use a portion of its water twice before discarding it, resulting in significant water

savings. It also reduces the Central Command area’s environmental impact because most of the water used is trucked in, with a high cost per gallon, both in dollars and carbon emissions.

Where Does INL Fit?

“INL has been with this project since its inception,” said Porter Hill, one of the Kuwait field implementation team members. “Our efforts began with basewide feasibility studies, thinking about different energy options, building efficiencies and power system possibilities that might work for the (Central Command) area.”

From the feasibility study, the team was able to lay out several options for program development concepts and field implementations. The INL team initially served as subject matter technical experts and in an advisory role. Then, in early 2022, some of the team members traveled to Kuwait to help conduct the pilot tests for each of the three installations.



The INL and US Army Central Command teams.

“We’ve tried to stay a little more engaged with this project to make sure the team out in Kuwait felt our support and understood our rationale behind major design decisions and best practices for moving forward,” said Kurt Myers, another INL manager on the project. “This is truly a first of a kind effort, and it’s been a privilege to be able to shepherd this project through both the challenges and triumphs.”

The data collected from these efforts will inform further microgrid research and development activities. It will inform aspects of novel, inverter-based microgrid system controls. It will also help the team adjust its control algorithm approaches and may be used for artificial intelligence applications in microgrid management

systems development, including the automation of changes to control settings depending on forecasts, use-cases and time of year.

“The research and development implications of this project are substantial,” Myers said. “When we work on projects like this, from base-wide feasibility to pilot scale implementation, we’re able to figure out the bugs and kinks with the design as we go along. Our efforts here will inform future microgrid implementations as we continue pushing toward net-zero solutions worldwide.”

*by Michelle Goff
INL Communications
January 31, 2023*

Did you hear about the man who got cooled to absolute zero?

He’s OK now...



Cybersecurity Scholarships Benefit U of I Students Locking in Positions with Federal Agencies

All 10 University of Idaho College of Engineering students in a federal cybersecurity scholarship program are headed to top jobs after graduating with more than \$900,000 in scholarships aimed at supporting one of Idaho's fastest-growing industry needs.

U of I tuition and degree-related financial support is provided through the National Science Foundation's (NSF) Cybercorps: Scholarship for Service Program (SFS).

Scholarships of \$70,000 for graduate students and \$40,000 for undergraduates are awarded annually through the SFS program. U of I has secured more than \$20 million in funding and graduated more than 110 students through the program since 2001. The most recent cohort, consisting of four women and six men, had a 100% job placement rate. Ninety-five percent of graduates in the past four years are working in cybersecurity.

"The SFS program is one important part of U of I's ongoing role in meeting Idaho's and the nation's critical need for cybersecurity professionals," said Terence Soule, professor and chair of U of I's Department of Computer Science. "U of I was one of the nation's first institutions to recognize this need, offering our first course in cybersecurity 30 years ago."

Upon graduation, students will go on to professional cybersecurity positions in government, including the U.S. Department of Defense.

U of I launched Idaho's [first cybersecurity bachelor's degree program](#) in 2020, adding to existing comprehensive [computer science degree programs emphasizing cyber defense](#). U of I was one of the first Northwest universities to start a [cybersecurity master's program](#) and is on track to launch its doctoral program. Students train alongside 15 nationally and internationally recognized U of I faculty with expertise in power engineering, information assurance, industrial control systems and transportation. Students are assigned to faculty-led research investigating cybersecurity and cyber defense issues. These positions require security clearance and maintaining student anonymity.

As one of the National Security Agency's first of seven National Centers of Academic Excellence in Cyber Defense, U of I has led advanced cybersecurity education and research for three decades. The designation assures students receive academic instruction to produce the qualified workforce that the nation needs.

The Idaho State Board of Education in 1999 approved U of I's Center for Secure and Dependable Systems (CSDS) as a research entity within U of I's College of Engineering. CSDS was also recently named academic support center lead for the newly launched Department of Defense University Consortium for Cybersecurity (UC2), representing community colleges and universities nationwide. Congressionally mandated by the 2020 National Defense Authorization Act, the UC2 exists to facilitate two-way communication between the U.S. Secretary of Defense and academia across the U.S. to expand opportunities for students and faculty, creating a fast track for jobs and security clearances in the federal government.

University of Idaho News
February 6, 2023

ISU Geologist Helping NASA Prepare for 2025 Crewed Moon Mission



An Idaho State University professor is helping to coach the next team of astronauts to visit the moon.

Currently, Shannon Kobs Nawotniak, associate professor of geosciences, is serving as a member of NASA's Joint EVA Test Team (JETT) 3. The JETT 3 Team is responsible for preparing the astronauts to conduct the experiments that are planned for the Artemis III mission through simulated missions on Earth. Planning to launch in 2025, Artemis III is slated to be the first crewed moon landing since the Apollo 17 mission in 1972.

"During the Apollo missions, astronauts were almost all test pilots. Only one geologist was ever sent to the moon, even though most of the research that was done is related to geology," said Kob Nawotniak. "The Artemis astronats will include geologists, biologists, and other scientists, and we are figuring out how to support them from Earth. There will be a lot riding on their shoulders, and they will need active help from Mission Control to do good science while they're up there."

The experience has also led to her working side-by-side with a former student, Angela Garcia. Garcia earned a master's degree in geology from Idaho State and now works for NASA as an exploration geoscientist, making tests like JETT 3 possible. Garcia works daily to integrate science into human spaceflight to prepare for Artemis missions that will explore the Moon.

“It was a true privilege to work alongside Shannon on the JETT 3 science team,” said Garcia. “As my former advisor, Shannon taught and exemplified how to foster healthy relationships with colleagues and how to be a leader and follower. These lessons have been vital in my career, and I am so thankful to have had a role model like Shannon cheering me on every step of the way.”

“It's incredibly exciting to be part of the team that's setting the stage for humans to return to the Moon,” Kobs Nawotniak said. “It's been doubly wonderful to work on this project because I get to work with Angela again and see how she's taken problems that we wrestled with when she was a graduate student at ISU and taken their solutions to a whole new level.”

The JETT 3 Team has been working with astronauts at sites around the nation to help better prepare the astronauts for their time on the lunar surface. Recently, Kobs Nawotniak spent time in Arizona helping with a [moonwalking test mission](#).

“We've been doing a lot of preparatory work on this for years here in Idaho, including at Craters of the Moon National Monument and Preserve, and I'm thrilled to see that work getting incorporated into the JETT 3 architecture and beyond,” Kobs Nawotniak said.

Kobs Nawotniak's work on JETT 3 marks the latest time she's worked [with NASA](#). Previously, she was the Deputy Principal Investigator for the Biologic Analog Science Associated with Lava Terrains project, Geology Co-Lead for Field Investigations to Enable Solar system Science and Exploration project, and a co-investigator on the Systematic Underwater Biogeochemical Science and Exploration Analog. She's also had a number of research projects funded by NASA grants.

“Space exploration has always been fascinating to me, but it never occurred to me growing up that I would someday actually be working with NASA to make it happen,” said Kobs Nawotniak. “Maybe someday I'll be cool enough for it to all seem normal, but I've been working with NASA for close to a decade now and I haven't gotten there yet.”

ISU News
February 7, 2023

The Periodic Table of the Elements

Legend:

- alkali metals
- alkali earth metals
- transition metals
- other metals
- other non-metals
- semiconductors
- halogens
- noble gases
- unknown type

I had to make these bad chemistry jokes because all the good ones Argon.

BYU-Idaho Seeks to Improve Courses through Unique Program



BYU-Idaho's core theme of "Quality" is as follows: "Provide a high-quality education that prepares students of diverse interests and abilities for lifelong learning and employment." The Creative Course Collaboration Lab has a unique way of doing that.

Brigham Young University-Idaho is known for offering courses that prepare students to succeed in the workforce. The university regularly reviews and revises course content to maintain a high standard of excellence in teaching and real-world learning. Central to these efforts is the Creative Course Collaboration Lab.

Better known as the C3 Lab, the Creative Course Collaboration Lab is a semester-long program run by BYU-Idaho's Learning Innovation and Technology Department with the intent of improving the student learning experience. The C3 Lab brings together a cross-curricular team of faculty, a curriculum designer, subject matter experts, and student voices to build better courses.

The process of revising a college course is a long one. Many factors must be taken into account, including how understandable the course material is, the time it takes to teach course concepts, and ensuring course accreditation. The idea behind such substantial revisions is that the course continues to improve even after the C3 Lab team has left.

"The idea of C3 is that we create this teaching team that continues to improve the course, even after C3 ends," said David Ashby, the director of the Learning Innovation and Technology Department. "So, we get a jumpstart on getting the course where we want it to be. We put it on a new trajectory."

The C3 team begins each course revision by determining how delicate the course is, meaning how much of the content can be adjusted and how much needs to stay standardized.

“We have to figure out whether this is a football or a baby,” said Jonathan Trujillo, a C3 Lab facilitator and adjunct faculty member. “If it’s a football, you can throw it around, you can play with it, you can get creative. If it’s a baby, you can’t throw it around. You can’t call it ugly.”

After determining the appropriate level of restructuring, the team works with faculty members, past and present students, focus groups, subject matter experts, librarians and more to determine the best actions going forward. The key question they aim to answer, according to Trujillo, is, “What do we want students to remember 10 years from now because they took this course?” With the end goal in mind, the C3 team works backwards to design course content that will support students throughout their careers.

Another important objective is to make courses easily navigable. The majority of students’ time and effort should go towards completing assignments, Trujillo explained, not figuring out how to submit them online. Submitting assignments online has been an especially difficult adjustment for freshmen as they learn how to navigate Canvas and other school-related websites. To remedy this hurdle, the C3 Lab team has put every General Education course through the Creative Course Collaboration Lab.

The same idea of ease-of-access applies to adjunct faculty. Trujillo compared it to a car that has so many nuances that the owner is the only one with the ability to drive it. BYU-Idaho has more than 1,800 subject matter experts who teach part-time at the university, he explained, and although they are professionals in their course content, they can sometimes have difficulty navigating courses that other faculty members have designed. The C3 Lab team aims to make every “car” easy to “drive.”

“Every course [should] be turn-key and ready for someone with content knowledge to be able to teach,” Trujillo said.

Three to six courses are typically put through the C3 Lab each semester, with more courses being fit into an expedited two-week summer program. The summer program sees the C3 team work with faculty all day, every day, for two weeks, rather than the two-hour-per-week lab sessions during the semester. There is also a self-paced online program currently under development that will provide more courses with access to C3 Lab resources. In the self-paced program, faculty with an interest in C3 will be able to improve their courses on their own whenever they have time.

As with every facet of BYU-Idaho, the C3 Lab is all about the student experience. Ashby said students are a part of the C3 Lab revision processes from start to finish.

“The student voice is really important,” he said. “We’ll either bring in focus groups, or we’ll survey students, or we’ll actually have students in the meetings, collaborating with the faculty on how to improve the course.” Ashby shared a recent example of a C3 Lab session where former students were interviewed about their experience with a course in educational psychology. Every student who had taken the course in the past six years, including students that had already graduated, were asked 25 questions about what they remembered from the course. The interviewees were also asked what they used in their respective areas of study from the course and whether they were using the knowledge from that course in their current professions.

The conclusions from the interviews were eye-opening for BYU-Idaho faculty.

“They concluded that students needed to see more examples of psychology principles being used in real life,” Ashby said.

The success of a C3 Lab treatment is determined by many things, but inevitably it’s all about the participating faculty’s engagement.

“We find that teachers that go through C3 become more collaborative, Ashby said. “They create better relationships with each other and they start to see better teaching strategies that are shared across multiple departments.”

Trujillo agreed, saying that faculty members will enjoy finding ways to make their classes better for both students and themselves if they work with other members of the C3 team, including other faculty members who might not be teaching anywhere near the same field as the course undergoing revision.

“One of the main goals of C3 is to build instructors who are collaborators,” Trujillo said. “They create an infrastructure where collaboration just happens. They build an attitude of collaboration.”

With course improvement, the BYU-Idaho experience for students also improves. Sometimes revisions to current courses means that entirely new courses are created.

Trujillo, who teaches GE SCI 110, Sustaining Human Life, said his course never existed before the C3 team looked at how general science concepts were being understood by students.

“It was a result of this program,” he said.

That course, developed through the C3 Lab, was pivotal in the life of Hannah Brown, a BYU-Idaho senior majoring in interdisciplinary studies. Brown plans on attending dental school upon graduation and she came to that decision because of Sustaining Human Life.

Previous to taking the course, Brown had changed her major several times, unsure of where she wanted to go in life. She had always had an interest in dentistry but did not believe she was capable of completing a science-based program.

“It helped me feel confident enough to be able to do a science-based major,” Brown said of Sustaining Human Life. “I realized that it was my forte.”

That’s the purpose of the C3 Lab: to give students the best possible learning experience and to prepare them for employment.

by Brogan Houston and Adam Jacobs

BYU-Idaho News and Notes

February 7, 2023

The name's Bond

Ionic Bond.

Taken, not shared.



How Old Was That Tree?



This slab was cut from one of the majestic American elm (*Ulmus americana*) trees that formerly lined the streets on and near The College of Idaho campus. Elm limbs often stretched across the streets forming “tunnels.”

The trees were planted around 1920. Dutch Elm Disease, which arrived in Caldwell in the late 1970s, is caused by a fungus accidentally introduced from Asia. (Dutch researchers identified the fungus, hence the name “Dutch.”) The fungus eventually kills the tree. By the mid-1980s, our formerly beautiful elms were dying and the College had to cut them down.

This tree grew along 20th Street on the west side of campus. Museum volunteer Mary Post persuaded one of the tree cutters to cut several cross-section slabs from the base of the tree for the Museum. Volunteer Robert Hays took one of the better slabs to his shop in Meridian to cleanup, preserve, and prepare for eventual display.

Did you know that you can use the number of tree rings to determine the age of the tree? Each year the tree lays down wider, larger, thin-walled cells in spring and thicker, smaller, darker cells in summer. The alternating light and dark bands create the rings. Because rings are wider in good years and narrower in dry, cold years, they can tell us much about the weather of specific years during the tree’s lifetime. Rings of long-lived trees (e.g., bristlecone pines) can give us information on climates several thousand years ago. The science of using tree rings for dating events, past climates, environmental changes, and archaeological artifacts is called dendrochronology.

This exhibit was possible thanks to Mary Post for saving the tree section; Robert Hays for preparing the slab; and Jan Boles, Dr. Steve Maughan, and Bill Clark for information on the elm trees on campus.

-Created by the Museum Exhibit Committee: Dr. Eric Yensen (Chair); William (Bill) Clark; Jan Summers Duffy; Dr. Patrick Fields

The College of Idaho
Orma J. Smith Museum of Natural History
Annual Report July 1, 2021 – June 30, 2022

The College of Idaho, Orma J. Smith Museum of Natural History, Annual Report Highlights



We have made significant progress in Entomology this past year. We received five research grants, the first of which allowed us to begin a research and curation project on local bee pollinators of specialty crops. Dr. Ron Bitner has spearheaded this project, with major help from Amy Dolan and Dr. Craig Baird. Skyler Burrows in Utah is helping with bee identifications. Several C of I students are assisting with the project. The project is based out of the newly remodeled Room B-14, adjacent to the main Museum. You are welcome to stop in to see the activity. Three grants were received to continue curation of the large SageSTEP collection donated to the Museum by Dr. Jim McIver (Curator of Entomology); he has also secured the grants to keep the curation moving along. Entomology volunteer, Angela Lints, has done most of the curation, with Dr. Al Gillogly helping out on beetles, and myself assisting on ants. In addition, I was able to secure a grant to allow us to purchase a top-grade research stereomicroscope with camera as well as the equipment to allow us to barcode specimens. We are also working on a major grant for Entomology, Aquatic Macroinvertebrates, and other areas, headed up by Dr. McIver as well as others and myself. Stay tuned for news of this grant. If the grant is received, it will propel the Museum into the next level. The College Grants Office has been extremely helpful with the various grants. The Museum continues to collaborate with the University of Idaho and our sister Museum at CICESE in Ensenada, Baja California, Mexico.

Good progress has also been made in the Research Library, with many new volumes being added to the collection. Major progress continues to be made in the Fish Collection, the Paleontology Collections, the Mollusk Collection, and several other areas of the Museum.

The Museum again hosted the Gipson Honor Students (two classes) during fall semester, putting the Museum to great use. The College Museum Club has assisted with this class as well as many other Museum activities.

William H. Clark, Director

The Treasure Valley Bee Survey (aka "Bitner Bee Grant") is in its second year and the progress is exciting. The goals of this project, funded by a USDA specialty crop grant, are to survey and identify native bee species in the Treasure Valley, train students and citizen scientists, and educate the public on the diversity and conservation of native bee species in Idaho. Dr. Ron Bitner and Amy Dolan are leading this project with help and support from Dr. Craig Baird, Dr. David Ward, Bill Clark, Mandy Slack, and other Museum volunteers.

Project highlights & updates:

- Thousands of bees were collected in 2021 using blue vane traps, pan traps, and nets. These samples are still being processed by student workers in the museum.
- Room B-14, next to the museum, has been renovated as a Bee Grant project room with LED lights, new paint, and electrical outlets. New cabinets, drawers, unit trays, and microscopes were ordered for the project; these resources will be available for other museum projects in the future.
- Two C of I students (Batu Getachew Olana and Kristen Clark) and one C of I graduate (Kaden Youssef) have been trained to sort, pin, and label bees.



(LtoR): Dr. Craig Baird, Dr. Dave Ward, Bill Clark, and Dr. Ron Bitner (Grant PI).

- Seventeen volunteers have enrolled in the Oregon State Master Melittologist program to be the first class of Idaho Bee Atlas volunteers! They are being trained to collect and prepare museum-quality bee specimens. The first field training for these enthusiastic volunteers was held in late June.

Special thanks to Tina Wilson, with Western Alliance Economic, who was a great help with the writing of the grant.

Jan Summers Duffy (below), our Archaeologist, curator, Egyptologist and consultant on the Tutankhamun Tomb Exhibit, recently coordinated with a museum in Paris, France (MUSÉUM NATIONAL D'HISTOIRE NATURELLE) to exhibit a copy of a Luther Douglas Sandpainting (pictured to the right). Permission was graciously given by the artist's daughter, Conda Douglas, who is glad for this international collaboration. This helps encourage our worldwide connections for international students as well as others.



Don Nelson of KIVI-TV news interviewed Jan on Idaho's petroglyphs.

Jan has been busy writing a Forward (Preface) for a book by a well-known UK author on one of the first female Pharaohs, Sobekneferu.

She also was interviewed by CRW Productions for the upcoming 100th Anniversary of the Tomb of King Tut, KV62!

Jan's Archaeology Month Exhibit 2022 included some of our unusual, rare Pre-Columbian Effigy Vessels, currently on exhibit for the rest of the year.



From the Field

In early June, Dr. Jim McIver conducted a survey on insects and spiders on lupine at Pike Creek, Harney County, Oregon (base of the Steens Mt. and between the mountain and Alvord Desert). This is a part of a 30+ year ecological project, and the specimens collected will be split between OSU and our Museum. Also present for the field work were Angela Lints, Kacey Broderick, Bill and Mary Clark.



(Photo by Courtney Loomis.)

Deer Flat National Wildlife Refuge, founded by President Teddy Roosevelt in 1909, is one of the oldest refuges in the National Wildlife Refuge System. It consists of the 9,000 acre Lake Lowell, located in Nampa, Idaho and approximately 1,600 acres of wetland, grassland, upland sage steppe and riparian forests surrounding the lake as well as 101 islands (an additional 800 acres) distributed along 113 miles of the nearby Snake River.

With a growing interest in understanding biological diversity, Deer Flat NWR held its first BioBlitz weekend in June of 2006 and invited the public to help document the plants and animals living on the refuge. Orma J. Smith Museum personnel became involved by generating the first list of insects found there and collecting a few representative samples which formed the nucleus of a Deer Flat insect reference collection. A partnership developed between the refuge and the Museum so that the Deer Flat NWR Insect/Arthropod Biodiversity Project

Reference Collection/Database expanded from an annual one-weekend-a-year BioBlitz survey to an ongoing study entailing approximately 15 insect sampling excursions every year.

The project is now entering its 17th year. The Deer Flat NWR Reference Collection currently consists of 3,021 individual specimens (primarily insects, but also including some related non-insect arthropods) representing 1,344 taxa, including 233 different families from 23 orders. Approximately 2,500 additional specimens from the Deer Flat surveys have been integrated into the main O.J. Smith entomology collection. Another 8,000 specimens that have been pinned and labeled are in the process of being identified and placed into the reference and main collections.

The specimens and database are valuable as museum holdings available to the scientific community for research purposes as well as to The College of Idaho faculty and students and the general public for viewing, learning, and research. The Deer Flat NWR Reference Collection has also been available and used outside the Museum for public outreach events showcasing the diversity of insect life found locally in southwestern Idaho. Many of the specimens have been photographed and placed on a Deer Flat-hosted iNaturalist website to give more exposure to the project and the Museum, thereby increasing the awareness of the research community to some of the Museum's entomological holdings.

Paul Castrovillo



The 2021 4J Count gang

On July 11, 2021 the 31st annual Boise Front 4th of July Butterfly Count, sponsored by the O.J. Smith Museum of Natural History, took place. This event (one of the longest running counts in the country) brought together 27 observers and butterfly experts, as well as folks new to the field, to survey the butterfly fauna in the Boise area from habitats as diverse as Military Reserve Park (elevation approximately 2,500 ft) to the summit of Mores Mountain (approx. 7,000 ft). During nine hours spent in the field, 999 individual butterflies were recorded representing 49 different species (nearly one third of Idaho's known butterfly residents). One of the biggest surprises was



The Hedgerow Hairstreak butterfly (and ants)

observing 78 Hedgerow Hairstreaks (*Satyrrium saepium*). This species has been found on about half of the previous counts, however, usually only in single digit quantities. All data was submitted to the North American Butterfly Association who archive and publish survey results from approximately 400 other counts across the US, Canada and Mexico.

Paul Castrovillo

In February there was a collection/research/camping trip to the Catavina area in Valle de los Cirios, Baja California, Mexico, by the Wards and Clarks. A few specific Coleoptera (beetle) collections were made, some pitfall traps were collected for later curation, and weather instruments were serviced as part of a long-term study.

Due to the efforts of Dr. Paul Castrovillo, the Museum recently acquired the Boise USDA insect collection, and it is especially rich in grasshopper specimens. The collection was assembled in the 1950s - 1960s, with species determinations made by experts of that time period. Dr. James Ryan is curating the grasshopper specimens.

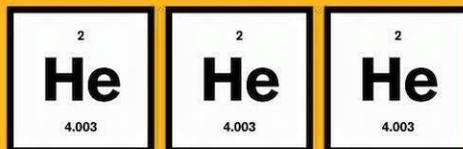


Approximately 200 identified species are in this collection. For perspective, the current Museum collection holds only 34 identified species of acridid grasshoppers, and a large number of unidentified grasshoppers. Some of the significance of this collection comes from economic importance: grasshoppers can breed to populations dense enough to damage and even destroy crops. In the 1950s - 1960s the destructive potential of this group of insects led to funding research on the species found in North America, and this donated collection resulted from those efforts. Its scientific value may increase over time with climate and agricultural practice changes.

The College of Idaho

Orma J. Smith Museum of Natural History

Annual Report July 1, 2021 – June 30, 2022



LAUGHING GAS



Watch February 7, 2023

Three Minute Thesis

2 p.m. Pacific / 3 p.m. Mountain

WATCH 3MT LIVE

We invite you to join us for the live stream of the 2023 Statewide Three Minute Thesis (3MT) Competition and learn about the cutting-edge research of Idaho students.

One state.

One scholar.

One slide.

One panel of judges.

Three minutes to give it all they've got!

Graduate students from the University of Idaho, Boise State University and Idaho State University will present their master's thesis or doctoral dissertation research in just three minutes and with only one slide. Twelve competitors will contend for first, second and third place, determined by judges at the final round. Finalists are also eligible to win a People's Choice award based on audience votes, so make sure to join us and vote for your favorite presentation!

This event (both online and in-person) is free and being live streamed from the College of Western Idaho in Nampa.

This event is presented by the University of Idaho's College of Graduate Studies. Learn more about Idaho's Statewide 3MT Competition at uidaho.edu/3mt-state.

The Three Minute Thesis (3MT®) is an academic research and communication competition developed by The University of Queensland, Australia. Visit threeminutethesis.org/ for more information.

WATCH 3MT LIVE



SCIENCE
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CYBERSECURITY
A LEADER'S PERSPECTIVE
FROM THE FIELD

with
Brian M. Gant, Ed.D.
Assistant Professor of Cybersecurity and
Program Coordinator-UG, John E. Simon School
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St. Louis County Library

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St. Louis

[REGISTER](#)

FREE and OPEN to ALL. Space is limited. **Advance registration required.** Junior Academy members and middle and high school students are welcome and encouraged to attend.

Featured Speaker:

Brian M. Gant, Ed.D., Assistant Professor of Cybersecurity and Program Coordinator-UG, John E. Simon School of Business, Maryville University

Dr. Gant is an Assistant Professor & Program Director for undergraduate cybersecurity at Maryville University. He discusses his various roles within the FBI and United States Secret Service, particularly how it correlates directly to cyber/physical security within higher education. He also discusses the current state of cybersecurity and his passion for youth access and opportunity in the cybersecurity realm.

A veteran of both the FBI and the Secret Service with more than 15 years of working knowledge in cybersecurity issues such as domestic and international terrorism, cyber and electronic crime, Gant covers a topic of interest to us all in today's hyperconnected online world.

Science in St. Louis is a public science seminar series partnership program of the The Academy of Science – St. Louis and the St. Louis County Library underwritten in part with support from Boeing and the Employees Community Fund of Boeing St. Louis, sponsoring the full array of Academy STEM Teens programming.



Planetarium: Roving Mars

February 10, 2023
7:00 PM - 8:30 PM

Whittenberger Planetarium

Symposium

Curiosity has been roving Mars for a decade and Perseverance for two years. They have provided answers to some of our questions about Mars and have captured stunning images of the Red Planet. Mars is in a great location for observing from Earth, too. Learn how to find Mars in the night sky this month and a few highlights of the work from these rovers. Please join us on Friday, February 10, at 7 p.m. Please arrive 15 minutes early. All shows are live.

The cost is \$3.00 for children ages 4-17 and \$6 for adults. Reservations should be purchased in advance at <https://www.collegeofidaho.edu/about/campus-facilities/planetarium>. Questions regarding the purchase of tickets should be directed to planetarium@collegeofidaho.edu or to Vanessa at 459-5507. This show is more suited for late elementary grades to adults.

The planetarium is located in Boone Science Building near Jewett Auditorium at the corner of 20th Ave. and Fillmore St. in Caldwell.

Timmy's teacher asks the class, "What is the chemical formula for water?"

Timmy pipes up and replies, "HIJKLMNO!!!"

Timmy's teacher asks, "Where did you get that from?"

Timmy replies, "Yesterday you said it was H to O!"

Newton, Pascal and Archimedes are playing hide and seek. Archimedes starts to count, Pascal hides in a bush, and Newton draws a square on the ground and steps into it. Archimedes finds Newton first, of course, but Newton replies, "Nope. One Newton on one square meter is equal to one Pascal."

A butterfly gets pulled over by the cops for speeding. He hands the cop his driver's license with a photo of a caterpillar on it. "Sorry, it's an old picture."

Smart Cities REU at UNLV

We are excited to announce the third year of our **Smart Cities REU (Research Experiences for Undergraduates) program** focusing on *intelligent transportation systems (ITS)*, *automated vehicles (AV)*, and *vehicle-to-everything (V2X) communication* at the University of Nevada, Las Vegas (UNLV). Applications are open now through February 12th, 2023 at our website:

<https://smartcities.sites.unlv.edu/>

We would appreciate your **sharing this information with your electrical and computer engineering and computer science undergraduates**. We look forward to receiving applications from a broad array of diverse backgrounds.

Here is a **summary** of the program's features:

- 10-week research program: **June 1 – Aug 4, 2023**.
- Participants receive a **\$6,000** stipend.
- Participants are **mentored by a UNLV faculty member** in the Electrical and Computer Engineering or Computer Science Department.
- Participants will **conduct research** to address the challenges of building intelligent, safe, and secure Smart Cities with a focus on mobility.
- Participants engage in **co-curricular activities** with their cohort such as workshops on writing academic papers and presenting research.

Logistics:

- Application deadline: **February 12th, 2023** (see the website: <https://smartcities.sites.unlv.edu/>).
- Notification: **March 3rd, 2023** (students will be notified whether they were accepted into the program).
- Program dates: **June 1 – Aug 4, 2023**.

We look forward to receiving your students' applications, and if you have any questions, feel free to contact us at: smartcities@unlv.edu. We appreciate your sharing this email broadly.

For More Information and to Apply

Visit the UNLV Smart Cities REU Website: <https://smartcities.sites.unlv.edu/>

How does a German
physicist drink beer?



With ein Stein

Opportunity for Early Career Professionals – NASA Planetary Science Summer School



January-February 2023

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- U.S. Citizens or legal permanent residents
- Foreign Nationals from non-designated countries (maximum of 2 admitted)
- Applicants from diverse backgrounds are particularly encouraged - we highly value diversity, equity, & inclusion.

Register now for
informational session
February 14 11:00 am ET

Apply by March 28, 2023

2023 Session dates:
#1 May 11 - August 4
#2 May 25 - August 18

NASA Science Mission Design Schools



In NASA Science Mission Design Schools, you will learn the development of a hypothesis-driven robotic space mission in a concurrent engineering environment. Get an in-depth, first-hand look at mission design, life cycle, costs, schedule & inherent trade-offs. To broaden your understanding, you are encouraged to take on science and engineering roles outside your normal area of expertise. With workload of a rigorous 3-credit graduate-level course, you will act as a science mission team during the first 10 weeks of preparatory webinars, then spend the culminating week mentored by JPL's Advance Project Design "Team X" to refine the mission concept design & present it to a mock NASA expert review board.

Other SMDS Opportunities



Heliophysics Mission Design School (expected in 2024)
Deadline early fall
Session runs January-April



Astrophysics Mission Design School (alternating years)
Deadline early fall
Session runs January-April

NASA Science Mission Design Schools are run by NASA's Jet Propulsion Laboratory, supported by JPL's Innovation Foundry and its legendary Team X. JPL is a federally-funded research and development center managed for NASA by Caltech.



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<https://www.researchgate.net/project/Planetary-Science-Summer-Seminar>



Please join us for the third presentation in our seminar series featuring faculty and alumni to celebrate the 20th anniversary of the founding of the College of Science. All presentations will be via Zoom. The Zoom meeting information will be sent to registered attendees.

The next seminar will be Wednesday, Feb. 22, 2023, from 4 to 5 p.m. PT.

Registration is required to participate.

[REGISTER HERE](#)

Advancing DNA Diagnostics: The Science and Applications of DNA-Targeting Invader Probes

Presenter: Professor Patrick J. Hrdlicka
Department of Chemistry, University of Idaho

For more than 30 years, scientists have been working to develop molecules that can target specific DNA sequences in cells and organisms as this could revolutionize how we regulate gene expression, detect diagnostically important targets, and edit disease-causing mutations. While significant progress has been made, existing methods only target a limited range of sequences, display promiscuous binding, and are challenging to deliver into cells.

Our lab has developed a new class of molecules that recognize genomic DNA sequences without exhibiting these limitations. We call these new molecules "Invader probes." They are synthetic DNA duplexes with unique arrangements of intercalator-functionalized nucleotides that act as molecular wedges which destabilize the Invader probe. In contrast, the two probe strands display exceptional affinity toward target DNA as the intercalator-functionalized nucleotides, in that case, act as molecular glue to stabilize probe-target duplexes. It is this stability difference that drives the recognition of genomic DNA.



In this presentation, I will elaborate on the principle behind the Invader probes, summarize our synthetic efforts, and highlight some exciting diagnostic applications of Invader probes.

Dr. Hrdlicka earned all his Chemistry degrees from the University of Southern Denmark (BSc 2000, MSc 2004, PhD 2006), working at the Nucleic Acid Center. He joined the University of Idaho Chemistry Department in 2006 and became a full professor by 2017. His group - which has been comprised of nearly twenty graduate students, thirty undergraduate researchers, and two postdocs - has published over 70 peer-reviewed articles in international journals and enjoyed financial support from the NIH EUREKA R01 program, the DoD/ONR (Department of Defense / Office of Naval Research), and the Idaho SBOE. Dr. Hrdlicka has received several awards from the

University of Idaho including the 2013 Excellence in Research and Creative Activity Award, the 2022 Donald Crawford Graduate Faculty Mentoring Award, and the 2022 College of Science Advisory Board Faculty Fellowship. He has served as a chair of UI's Faculty Senate, consulted for two US biotech companies, and acted as a subject matter expert in numerous patent lawsuits.

His research focuses on the intersection of organic chemistry, medicinal chemistry, and molecular biology, specifically on chemically modified oligonucleotides as therapeutics, diagnostics, and smart materials. Recently, his team has focused on developing novel methods for site-specific and sequence-unrestricted recognition of genomic DNA.

In his free time, Dr. Hrdlicka enjoys spending time with his family and friends, watching sci-fi and fantasy TV shows, following politics and financial news; playing competitive table tennis (ranked in the top 10 in the Pacific Northwest), and exploring new mushroom habitats in the Pacific Northwest.

For more information, contact the college at 208-885-6195 or email science@uidaho.edu.





NATIONAL ASSOCIATION OF ACADEMIES OF SCIENCE

Greetings Academy of Science leaders—

I want to invite you to one or both of our upcoming mentoring events for students in the 2023 [American Junior Academy of Science](#). The two events are below.

We'd like representation from as many states and disciplines as possible. If you have an hour or two, I hope you'll consider joining us to talk to students and share your own story & career path. No preparation necessary! Thank you.

1. **Meet the Scientists** is a two-part virtual event. It's hosted by our friends at the [National Academy of Sciences](#). [Meet the Scientists virtual mentoring Invitation](#) –

Feb 16

9:30 am-10:40 ET

3:30-4:40 ET

Scientists [RSVP here](#)

Please specify morning, afternoon, or both.



2. **Breakfast with Scientists** is in Washington DC - if you're nearby, or in town for the AAAS Annual meeting, please join us. We're looking for high-level graduate students and professional scientists in all disciplines.

[Breakfast with Scientists Invitation - March 4, Washington DC](#)

Scientists [RSVP here](#)

[More about the American Junior Academy of Science](#)

Thank you!

Amanda Fuller, NAAS President



Call for Nominations: Sigma Xi Fellows

Nominations Deadline: February 21, 2023

It is our honor to announce a call for nominations for the 2023 cohort of Sigma Xi Fellows. The prestigious Fellows honor will recognize members for their distinguished service to the Society and exceptional contributions to the following areas of the scientific

enterprise:

- Research and Development
- Outreach
- Teaching and Curricular Innovation
- Mentorship
- Science Advocacy
- Leadership



Nominees must be full members of the Society who have maintained active membership for the last 10 years, of life members. [See the full nomination criteria and process.](#)

Please contact [membership services](#) if you have questions about the eligibility of your nominees. We look forward to receiving your nomination.

[Submit a Nomination](#)

ISGC Review Committee Signup

We would like to extend an invitation to join one or more of Idaho Space Grant Consortium's grant review committees for our current open solicitations, which include ISGC Fellowships, Higher Education Grants, K-12/ Informal Education grants, and Idaho-based Internships. As a committee member, you will play a crucial role in determining the outcome of the grant applications and have the opportunity to learn more about the grant evaluation process. This will provide valuable insight into the grant evaluation process, should you choose to apply in the future.

Please only sign up to review grants you have not applied for, and if you are available for the review process in March through mid-April.

To sign up, fill out the brief form linked [here](#). It should only take a few minutes to complete, but we ask that you fill it out by February 22nd.

Please feel free to pass this opportunity along to colleagues that would benefit the committee search.

Rosalie Mullane
Program Specialist
NASA Idaho Space Grant Consortium & Idaho NASA EPSCoR
www.idahospacegrant.org & www.idahonasaepscor.org
@NASAISGC

ISTPF Call for Fellows

The Idaho Science and Technology Policy Fellowship (ISTPF), a nonpartisan program, is thrilled to announce the fourth call for ISTPF fellows. This is an opportunity for outstanding scientists, social scientists and engineers to learn firsthand about policymaking while using their knowledge and skills to address pressing challenges facing Idaho. Fellows support decision makers in Idaho, serving in yearlong assignments in state agencies or the legislature. Portfolios include topics such as water, energy, fire, public health, economic development and more.

A doctoral level science or social science degree (e.g., PhD, ScD, MD, DDS, DVM) or a master's in engineering and three years of work experience is required. ISTPF fellows are provided with compensation, benefits, orientation, professional development, mentorship, a travel allowance and administrative support.

For more information about the ISTPF and how you can apply, please visit the ISTPF [website](#) and [application](#), and follow us on Twitter [@ScienceIdaho](#). If you have questions about the ISTPF, then please contact us at istpf@uidaho.edu.

An online information session will be held February 23, 1:00-2:00 PM MST.

Applications are due by Sunday, March 26, 2023, and the fellowship year begins in late August 2023.

The ISTPF is a collaborative effort among Boise State University, Idaho State University and University of Idaho, and is led by the McClure Center for Public Policy Research.

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63rd Symposium and Annual Meeting

Boosting the Signal-to-Noise Ratio in Communicating Scientific Research

April 21-22, 2023
Idaho College of Osteopathic Medicine
Meridian, Idaho

Call for Abstracts

IASE invites abstract submissions for posters and papers to be presented at the 2023 Symposium. While submissions related to the main theme stated above are strongly encouraged, submissions on any science or engineering topic of interest to citizens of Idaho are encouraged – from students, educators, postdocs, senior researchers, policymakers, and others.

Poster Sessions

Posters **must be** 4 feet wide by 3 feet high. *This is a strict requirement!* A presenting author is required for each poster submission, and that person is expected to be present during the entire poster session to discuss results and answer questions.

Please view the video <https://www.youtube.com/watch?v=SYk29tnxASs> before you begin creating your poster.

Oral Paper Presentations

Oral presentations will each be from 15 to 20 minutes in length, *including time for questions*. The first author of each paper must make the presentation.

General

Those wishing to present (either posters or papers) at the symposium should complete the attached Abstract Submission Form and email the form and your abstract to submit@Idaho.Academy by Friday, March 24, 2023, at 5:00 pm. Notice of acceptance or rejection will be given by March 31. The symposium schedule will be finalized by April 7, and posted on the website at <http://IASE.website>. Complete and final copies of the abstracts of all accepted posters and papers must be emailed to submit@Idaho.Academy by Wednesday, April 12, 2023, at 5:00 pm. The abstract file must be in DOC or DOCX format, and named with the presenting author's last name, an underscore, and then first name. For example, a paper written by John Smith should have a file named smith_john.doc or smith_john.docx. The abstracts will be published in the open-source *Journal of the Idaho Academy of Science and Engineering*. Complete copies of papers may also be submitted for review and possible future publication.

All presenters and attendees must officially register for the symposium. Please note that student presenters are given complimentary registration and a one-year trial student membership in IASE, but must still register online at the symposium website. Registration will open on February 20, 2023.

Questions? Send them to info@Idaho.Academy

2023 IASE Symposium
Abstract Instructions

No more than 250 words total for the title, author identification, and body combined. Use a 12 pt. Times Roman font. Email this completed form and your abstract to submit@Idaho.Academy or submit online at iase.website/symposium/submit. Your Abstract should not include diagrams or other illustrations. ***If your poster or paper is accepted, this abstract will be used in the symposium program, and must follow the format requirements and size limits described here. Failure to follow instructions will be considered grounds for rejection.***

Any Special Notes: _____

The **required** abstract format is shown below:

This sample abstract contains 188 words.

Sample Abstract

Primary Author, University of Somewhere
Secondary Author, Whatever State University

Lorem ipsum dolor sit amet, eu nam oratio bonorum, sapientem honestatis omittantur vim an. No essent facilisi consequuntur qui, ea ius brute delectus dissentiunt, alia essent latine quo ei. Esse habeo liber usu an, eam ne nisl accusata. Vel an saperet verterem quaerendum, vel eirmod ponderum et, ne vis volumus perfecto maluisset. In vel quodsi nominati. Populo facilisis vix at.

Te lorem inimicus vim, pri odio nihil fastidii ut. In nec brute aperiri commune, ex nobis consulatu deterruisset mea, putent persius at usu. Ea vim graeci minimum reprehendunt, mei fierent repudiare deseruisse ad. Dictas admodum vituperata no per, eu quo nibh probo. Ea commune evertitur has.

Ne esse vivendo gloriatur ius. Ea cum augue tacimates, eum clita soleat et, duo eu tollit electram. Ex virtute lucilius dissentiet duo. Ut vix audiam expetendis, pro at vidit omittantur mediocritatem, per dicant delicata in.

Cu putent aliquam mei, duo et tale vituperata intellegebat, nec vide nusquam eu. In oblique quaerendum duo, ad nec exerci eripuit. Eum tantas dictas antiopam ne. Saperet epicurei ea quo, ad dolorum epicuri intellegam vel.

2023 IASE Symposium
Abstract Submission Form

Title (no more than 15 words/200 characters): _____

Full Name of Primary/Presenting Author: _____

Primary Author's Affiliation, address, and contact information (telephone, email):

Co-authors – Name, Affiliation, and City-State address (no more than 5 please):

Preferred Session: (We will try to honor your preference, but the distribution of accepted papers may require topical rearrangements.)

- | | |
|---|---|
| <input type="checkbox"/> Biology | <input type="checkbox"/> Materials Science and Technology |
| <input type="checkbox"/> Biomolecular and Biomedical Science | <input type="checkbox"/> Microelectronics |
| <input type="checkbox"/> Chemical and Physical Science | <input type="checkbox"/> Nanotechnology |
| <input type="checkbox"/> Ecology | <input type="checkbox"/> Nuclear Science and Technology |
| <input type="checkbox"/> Ecological and Environmental Science | <input type="checkbox"/> Pedagogy |
| <input type="checkbox"/> General Science | <input type="checkbox"/> Pharmacology and Toxicology |
| <input type="checkbox"/> General Session | <input type="checkbox"/> Science Education |
| <input type="checkbox"/> Geotechnics and Geoscience | <input type="checkbox"/> Wastewater |

This is not an exhaustive list of acceptable subjects. Please provide at least three keywords to help us place your paper if accepted:

Presentation Preference (Please check one.): Oral Poster