



Established Program to
Stimulate Competitive Research

News & Notes

Providing leadership and coordination to broaden and diversify North Dakota's science, technology, engineering, and mathematics (STEM) workforce pathway and growing statewide STEM research and competitiveness at participating institutions of higher education.

September 2023

From the Executive Director

School has started, leaves are turning, and harvest is in full swing. Autumn has arrived in North Dakota.

Faculty, staff, and students participating in the NSF EPSCoR Track-1 “New Discoveries in the Advanced Interface of Computation, Engineering, and Science” (ND-ACES) project have had a whirlwind summer and early fall preparing for a site visit from the National Science Foundation. In the fourth year of every NSF Track-1 project, program officers from NSF along with subject matter experts review programs to assess the program and make recommendations.



On September 13 and 14, ND-ACES participants from all 10 participating institutions gathered in Fargo together to highlight the research, education, and outreach initiatives of the program for the site visit panelists. It was exciting to see to collaborations that have developed between researchers at primarily undergraduate institutions, Tribal Colleges and Universities, and research universities and how these collaborations are generating new opportunities for undergraduate and graduate students in the state from research experiences to support for student teachers in rural schools.

Jolynne

Cankdeska Cikana Community College receives \$900,000 from NASA for gait assist device research

Cankdeska Cikana Community College's (CCCC) *Research and Development of Extravehicular Activity Gait Assist Device* project, was chosen for funding by the NASA M-STAR program. CCCC will be collaborating with the University of North Dakota, a subawardee on the award, will be collaborating on a three-year endeavor to improve how astronauts walk on the moon.

North Dakota Established Program to Stimulate Competitive Research (ND EPSCoR) formulates, coordinates and sustains statewide research and outreach programs to support science and research among 10 (two research universities, one master's university, three primarily undergraduate universities, and four TCUs) higher education institutions in North Dakota including the current NSF EPSCoR RII Track-1, New Discoveries in Advanced Interface of Computation, Engineering, and Science.



CANKDESKA CIKANA
COMMUNITY COLLEGE
Spirit Lake Dakota Nation

STEM leaders from both CCCC and UND credit the relationships established as part of the ND-ACES project as the foundation for developing the grant proposal that was funded by NASA.

Participation in ND-ACES has facilitated relationship development across institutions of higher education across North Dakota. "As a result, the ND-ACES participants have gained a deep appreciation for the STEM acumen at TCU's and the potential that creates for TCUs collaboration," says Mike Parker, CCCC science instructor and principal investigator of the NASA project. "TCUs across the nation are often overlooked as research institutions but successes like the NASA grant are putting TCUs on the forefront of collaborative scientific research."



North Dakota's research universities and Tribal Colleges and Universities share the perspective they can complement each other and working together is a way to maximize their collective expertise, creativity, and resources.

“TCUs are valuable research partners for UND and critical to building research capacity across North Dakota and the region,” said John Mihelich, interim Vice President for Research and Economic Development at UND. “We are committed to continuing to enhance these partnerships. In addition to Candeska Cikana Community College, we partner with all TCUs in North Dakota, including Turtle Mountain Community College, Nueta Hidatsa Sahnish College, United Tribes Technical College and Sitting Bull College, as well as the Tribal Nations Research Group.

“Importantly, we recognize that our collective capacity and progress are rooted in relationships established while participating in ND EPSCoR programs and leading myriad others,” Mihelich said.

Sunday Academy

The Sunday Academy Program is a program designed to generate interest in science, technology, engineering, and math (STEM), among the American Indian students. Once a month during the academic year, middle- and high-school students are brought together on a Sunday. They are presented with practical day-to-day problems involving STEM in an informal and friendly atmosphere, requiring them to think, analyze and seek solutions.

Supported by the ND EPSCoR Nurturing American Tribal Undergraduate Research and Education (NATURE) program, six sessions are scheduled across four Tribal Community Colleges, commencing in September. This initiative offers a clear STEM career pathway for tribal youth, ensuring a comprehensive education experience at each location.

This year's Sunday Academy will cover

- Green chemistry
- Sugars are more than sweet
- Plant microbes
- Visual perception
- All sites Wind
- All sites DNA
- Electromagnetic train

- Bat ecology



News from around North Dakota

- The United Tribes Technical College hosted Tribal Leaders Summit September 5-7, 2023 at the Bismarck Event Center.
 - Researchers at NDSU, in collaboration with South Dakota State University, the South Dakota School of Mines and Technology and Sitting Bull College score a \$4 million grant from EPSCoR to develop microbial fertilizers for crop nutrient management in North Dakota and South Dakota. [Read more.](#)
 - Dr. Tomi Phillips, Ph.D., has accepted the president's position at Sitting Bull College and officially take the helm when current president Dr. Laurel Vermillion retires January 1, 2024. Vermillion has been SBC president since 2005. [Read More](#)
 - Di "Sandy" Sun is Ph.D. student in the UND Chemistry Department, and the Royal Society of Chemistry recently published his paper, "Streamlined synthesis of potential dual-emissive fluorescent silicon quantum dots (SiQDs) for cell imaging." [Read the paper.](#)
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STTAR partnership internship spotlight

During Summer 2023, the ND EPSCoR [STTAR \(Students in Technology Transfer and Research program\)](#) helped 12 North Dakota businesses finance internships for 26 college students pursuing STEM-related careers. STTAR internships provide students opportunities to apply their academic STEM training to address real-world science and technology-based problems at North Dakota businesses across North Dakota. Businesses anywhere in North Dakota may [apply to participate in the STTAR program](#).

Creedence Energy was among the businesses and talks about the 2023 interns and the benefits of STARR participation.



Tell us about Creedence Energy

Founded in 2014 by Kevin, Wyatt, and Malachi Black, Creedence Energy Services specializes in oilfield chemistry. Through a culture of innovation and collaboration, Creedence provides our energy partners with chemical solutions that generate value for their business. <https://www.creedence-energy.com/>

Who were Creedence's STTAR interns this summer?

- **Ahmed Abdelaal**, Petroleum Engineering, UND
- **Jalyn Derr**, Petroleum Engineering, transferred from Dakota College at Bottineau to UND this fall

How do STTAR interns benefit from working at Creedence?

Creedence internships are designed to provide our STTAR interns an opportunity to apply their academic skills in a real-world environment. Our students were encouraged to think outside of the box while building upon the fundamentals learned within the classroom. Our ultimate goal is to allow them to recognize the transition from classroom theory to field applications and understand how engineers fit in to the larger picture in our industry.

How does Creedence benefit from STTAR interns?

Both interns provided a fresh perspective to a number of different projects that we have been working on as well as owning their own projects from start to finish. When we bring our students on the team, we have them working with our engineers and chemists. When

Ahmed and Jalyn came on, they immediately jumped into every project we could bring to them. They took ownership of everything we could ask of them. In each project they were assigned, they collaborated and identified a variety of solutions that were able to be taken and implemented.

What did the STTAR interns do for Creedence?

They spent time in the field and the office. In the field, they were actively troubleshooting issues ranging from surface issues to downhole diagnostics. Ahmed and Jalyn each embraced the hybrid approach of hands-on evaluation coupled with lab analysis to identify solutions for our customers.

Has Creedence participated in STTAR before?

We participated in STTAR in 2019. We offered the intern a full-time position upon graduation. COVID then hit, and we rescinded our offer. Then COVID hit, and we rescinded the offer. We continue to stay in contact with that intern and would like to bring him aboard someday.



Jalyn Derr & Ahmed Abdelaal



Jalyn Derr



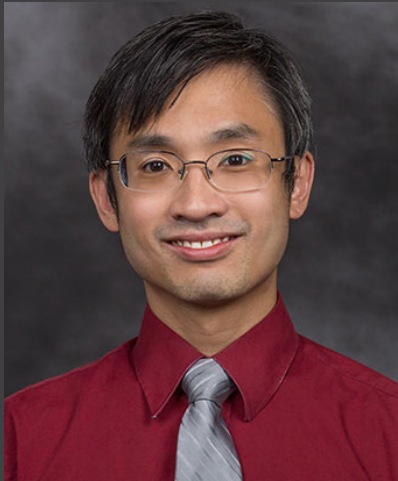
Ahmed Abdelaal

NASA Internship

NASA has extended their internship application deadline to October 20, 2023. NASA

internships allow college students of all majors the opportunity to complete a research project at any of the NASA centers. NASA internships are 10 weeks in the fall/spring semesters. [Learn More](#)

Meet the researcher



Yen Lee Loh, Ph.D.

Professor, Department of Physics and Astrophysics
University of North Dakota

What are your primary research and scholarly interests?

My training was in condensed matter physics, focusing on quantum many-body theory and critical phenomena, in the context of materials, devices, and ultracold atomic gases. Since coming to UND, I have also had a longstanding collaboration on systems biology with Dr. Manu.

How does this tie into the work you are doing with ND-ACES?

As part of the ND-ACES Computational Pillar, my group is applying machine learning methods to analyze biological data acquired by the Cellular Pillar, in order to interpret the data, reveal patterns, and test hypotheses. We are analyzing microscope images of cell cultures to determine how various types of cancer cells are affected by various factors, such as the presence of drugs or other cell species. Biomedical imaging involves a surprising amount of chemistry (dye molecule structure) and quantum physics (fluorescence spectra), so my background comes in handy for building mathematical models to interpret the data. Moreover, many concepts are transferable at a deeper level. In my primary research on strongly correlated systems, probability distributions and

quantum wave functions are high-dimensional objects, and different parts of a system behave in a highly coordinated way, leading to emergent phenomena where “the whole is more than the sum of the parts.” In ND-ACES, we are studying high-dimensional datasets, where crucial information is embedded in correlations between different parts of the system (the brightness of different pixels in an image, or expressions of different genes in a cell), and one must analyze the data in a holistic way to reveal those hidden patterns.

Where are you from and where did you pursue your education?

I grew up in Malaysia. I studied at the National University of Singapore for one year, and then from 1996-2005 I did my undergraduate and graduate education at Trinity College, Cambridge.

What excites you about ND-ACES?

Everywhere in the world, even in academia, there is so much of an “us-versus-them” mentality—the idea that we have to be in competition against other people. ND EPSCoR is refreshing in that we’re all working together towards common goals. I’m really enjoying working with Colin Combs (UND) and John Wilkinson (NDSU), because we come from such different fields and yet we share “the scientific method” as a common language, and the collaboration is likely to accomplish things that could not have been done otherwise. A lot of my previous work involved “doing theory,” but in ND-ACES, we are connecting theory and computation with experimental data—we are “doing science.” That’s a great opportunity, especially for students!

What motivates you?

It’s almost always true that there is a reason for everything in nature. Sometimes the reason may not be obvious, but as we make progress and deepen our understanding, things begin to make sense, like a jigsaw puzzle being solved. That’s always a great experience. Being part of a team with students, colleagues, and collaborators is the other big source of motivation.

If you could time travel, where would you go?

That’s a difficult one. I really haven’t thought about it. The world is full of misery, throughout human history and in the present. I also would not want to travel to the future to discover that humanity had been obliterated by nuclear weapons or climate change! I’d prefer to just stay in the present where I have family and friends. (Although a temporary visit to the past/future might be a fun vacation if one could do so without dying!)

If you could have coffee / tea with anyone, who would it be?

Someone to whom I could make a difference, such as a student who just needed a few words of reassurance, guidance, or inspiration.

What was your first job?

My first postdoctoral research position was probably my first real job. I have very little real-world experience—I haven't even operated a cash register.

What does your very best day include?

My wife makes every day my best day! (She told me to say that. But, it's true!)

What's your favorite quote?

As a faculty member I've always found this one amusing, whether or not it rings true: "Those who can, do; those who can't, teach!" (From a play by George Bernard Shaw.)

Funding opportunities

DHHS

[Cancer Tissue Engineering Collaborative: Enabling Biomimetic Tissue-Engineered Technologies for Cancer Research](#)

Basic Research in Cancer Health Disparities [R01](#), [R21](#)

[Innovative Research in Cancer Nanotechnology](#)

[Cancer Research Education Grants Program - Research Experiences](#)

DOD

[Defense Sciences Office \(DSO\) Office-wide BAA \(DARPA\)](#)

DHS

[Fiscal Year \(FY\) 2023 Tribal Cybersecurity Grant Program](#)

NSF

[Enabling Partnerships to Increase Innovation Capacity](#)

[Research on Innovative Technologies for Enhanced Learning](#)

[Ideas Lab: Personalized Engineering Learning](#)

ND EPSCoR wants to hear your news

Given the opportunity to communicate with both the public and internally within our own program, the ND EPSCoR team invites you to provide content that can be used in stories, social media, press releases, and ND EPSCoR News and Notes.

Send us your news, events, accomplishments and most importantly, your BRIGHT SPOTS!

[Submit a story>>](#)

Have questions, ideas, or suggestions for News and Notes?



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Acknowledgement

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