ND EPSCoR
Established Program to Stimulate Competitive Research

News & Notes

November 2021

A successful EAB meeting

Last month, the efforts of the 40 senior personnel from 10 campuses who make up the ND-ACES (New Discoveries in the Advanced Interface of Computation, Engineering, and Science) team, were presented to our external advisory board (EAB). This successful meeting of the EAB showcased and celebrated the exciting work happening around the state on this NSF RII Track-1 cooperative agreement.

ND-ACES supports the Center for Cellular Biointerfaces in Science and Engineering (CCBSE), which is co-led by NDSU University Distinguished Professor **Kalpana S. Katti**, Ph.D., F. AIMBE and UND Chester Fritz Distinguished Professor **Colin K. Combs**, Ph.D. The CCBSE features three pillars of scientific inquiry: Materials Design at Biointerfaces; Cellular Systems at Materials Interface; and Computation, Machine Learning, and Predictive Modeling.

The EAB meeting demonstrated the remarkable work and progress of each pillar. Now in year two, the Materials Design at Biointerfaces Pillar (co-led by **Sanku Mallik**, NDSU and **Julia Xiaojun Zhao**, UND) is progressively increasing CCBSE researcher knowledge and application in the area of biomaterial scaffolds relevant to tissue engineering, particularly in the area of design methodologies of biologically inspired materials for diverse 3D tissue architectures.

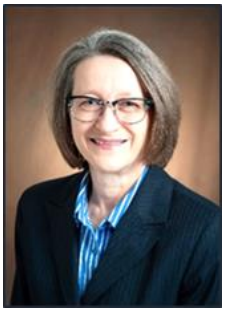
The Cellular Systems at Materials Interface Pillar (co-led by **Archana Dhasarathy**, UND and **John C. Wilkinson**, NDSU) is working to increase the capacity and expertise of the CCBSE researchers in basic and translational use of *in vivo*-like 3D cell cultures, which will ultimately help the CCBSE team partner with health care providers to serve as a resource for personalized medicine approaches to fighting cancer.

The Computation, Machine Learning, and Predictive Modeling Pillar (co-led by **Dinesh R. Katti**, NDSU and **Mark Hoffmann**, UND) is enhancing connected learning, knowledge, and application across multi-scale modeling, machine learning platforms, and experimental biomaterials and cellular data. This work should result in an evolutionary *in-silico* platform to predict tumor growth and increase the knowledge and understanding of 3D systems, leading to future therapeutic alternatives for cancer patients.

The goals of the CCBSE research efforts are heightened via the integrated broader impact efforts of the PROSPER (PROmoting Sustainable Partnerships in Education and Research) team, the broadening participation arm of ND-ACES. The PROSPER team is creating diverse and sustainable STEM education and professional development pathways and expanded bioscience partnerships and internships. PROSPER is also working to expand underserved and underrepresented participation, and inform the residents of North Dakota about these efforts.

The PROSPER Broadening Participation element supports American Indian students along the biosciences pathway. The Education and Workforce Development element supports faculty professional development; student training; and K-12 student bioscience, engineering, and computational exposure. The Partnerships and Collaborations element builds research infrastructure and strengthens research competitiveness across the state through industry partnerships and other collaborations. The Communication and Dissemination element keeps all stakeholders informed about the progress of the project, supports the harmonious interactions of all ND-ACES groups, assists research and programmatic participants in disseminating their work to legislative, scientific, and citizen stakeholders; and develops materials for different audiences.

After a successful EAB meeting, we reflect on the many collective achievements of all of the ND-ACES participants as we progress through year two of this cooperative agreement. I hope that you are, and will continue to be, well.



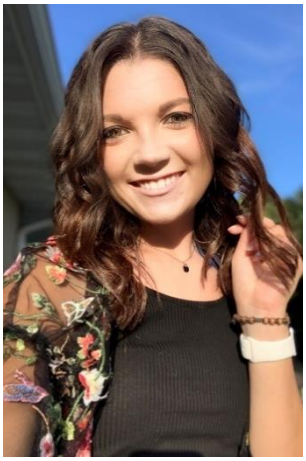
Regards,
Kelly A. Rusch, Ph.D., P.E., BCEE
ND EPSCoR Executive Director

ND-ACES Rural Student Teaching Experience

By **Ryan G. Summers** (UND), ND-ACES PROSPER Rural Student Teaching Experience Coordinator

The ND-ACES Rural Student Teaching Experience (RSTE) program provides unique learning experiences for teacher candidates. The goal of the RSTE program is to provide an exceptional learning experience in a rural school and community as the teacher candidates complete the requirements of their undergraduate programs. While participating in the RSTE program, teacher candidates also receive mentorship from PROSPER faculty.

Jadyn Callenius (NDSU, right), and **Lydia Odenbach** (UND, below), are the 2021 ND-ACES RSTE awardees and are engaging in their rural student teaching experience this semester. Callenius is teaching high school family and consumer sciences in Gwinner, ND and Odenbach is teaching second grade math in Watford City, ND.



Odenbach is student teaching at Fox Hills Elementary and created a STEM activity for National Johnny Appleseed Day. National Johnny Appleseed Day is celebrated annually on September 26. Odenbach incorporated the life and accomplishments of Johnny Appleseed as a unifying theme across multiple lessons in her second grade classroom. She introduced Johnny Appleseed as part of reading instruction in September and based on the ideas introduced in the books, students worked on a STEM design challenge each day for the rest of the week.

The goal of this challenge was for students to work collaboratively to build a device that could carry the largest number of apples. Odenbach scaffolded lessons that required students to first individually brainstorm ideas for the project and design a blueprint for their devices. Then, students working in groups critiqued their designs and worked on a consensus blueprint for the group. On the third day, the students built prototypes of their devices using classroom materials.

A second grade student at Fox Hills Elementary works on the Johnny Appleseed Day STEM activity.

Students were encouraged to follow the blueprints they had selected; no ideas or instructions were provided by Odenbach or her cooperating teacher. The next day students tested their designs by collecting and transporting paper apples around the perimeter of the classroom. Designs were judged on the number of apples they could carry (and they could not lose apples while moving). The two most successful devices competed, again, using real apples on Friday, October 1. The most successful device in this design challenge transported 14 real apples!

Odenbach is originally from Jamestown, ND. She is completing her B.S.Ed. Elementary Education degree with minors in Spanish and English Language Learning at the University of North Dakota, and she expects to complete the RSTE program and graduate next month.

We are excited to welcome **Jessica Edwards** (Mayville State, left) as a participant in the RSTE program for Spring 2022. She is currently completing her B.S.Ed. in Mathematics along with a minor in Special Education at Mayville State University. Her journey to becoming a middle level and high school teacher has been circuitous. Edwards credits her experiences as a math learner for motivating her choice to pursue teaching. It is also those experiences that are helping her to connect with students in the classroom. She says, "As a student who [was] not necessarily 'gifted' in mathematics, I have pinpointed several of the stumbling blocks and hurdles [my] students face when learning these concepts."

Edwards recognizes that mathematical understandings develop over time, and she wants to leverage her preparation in special education to support all learners in this process. As a teacher, she connects math ideas and the process of learning to everyday situations. To her credit, while pursuing her degree, Edwards has actively sought out opportunities to gain practical experience in the classroom. Over the past three years, she has been a math tutor, a paraprofessional educator, and a long-term substitute teacher (grades 1-6) for North Star Public School in Cando, ND.

We look forward to supporting Edwards in her ongoing professional learning as part of the RSTE program in 2022 and thank Callenius and Odenbach for their work within the RSTE program and congratulate them on their achievements in 2021.

Supporting the STEM pathway across the state

The ND EPSCoR State Office staff recently traveled to Turtle Mountain Community College (TMCC) and Cankdeska Cikana Community College (CCCC) with several ND-ACES researchers. During these travels, we met with administrators, faculty, staff, and students.

Austin Allard *(TMCC, left) visits with fellow ND-ACES Materials Design Pillar researcher* ***Binglin Sui*** *(UND, center) and Materials Design Pillar UND Lead* ***Julia Xiaojun Zhao*** *(UND, right).*

While visiting ND-ACES researcher Austin Allard at TMCC, we also learned more about the impact of the Nurturing American Tribal Undergraduate Research and Education (NATURE) program. A program which several TMCC faculty and staff members have been involved with for many years, including Allard himself.

Campus of Turtle Mountain Community College.

In addition to visiting with researchers, faculty, and staff, we toured the lab spaces and had the opportunity to learn more about research and outreach efforts on the campus.

Cankdeska Cikana Community College campus.

At Cankdeska Cikana Community College, we met with ND-ACES Materials Design Pillar student researcher **Nicholas Bittner** and learned about his work and research with advisors **Brent Voels** and **Michael Parker** (all CCCC) using 3D printers. We also met with campus administrators, STEM faculty, and staff. In addition to being an ND-ACES Materials Design researcher, Voels is also the new NATURE site coordinator for CCCC.

ND-ACES student researcher Nicholas Bittner (left) takes Julia Xiaojun Zhao (center) and Binglin Sui (right) on a tour of a lab at CCCC.

As we make our way through another semester, we reflect on the impact and the many collective achievements of all of the participants on the ND-ACES project and thank them for their hospitality during our 2021 campus visits.

NATURE program kicks off Sunday Academies

The NATURE Sunday Academy program for the 2021-2022 school year began last month. The Sunday Academy Program is designed to generate interest in science, technology, engineering, and math (STEM), among American Indian students. Once a month during the academic year, middle and high school students are brought together on a Sunday to explore practical day-to-day problems involving STEM in an informal and friendly atmosphere, requiring them to think, analyze, and seek solutions.

Sunday academy sessions are held at each of the participating tribal colleges. Professors travel to share their research across the state, and the sessions are hosted by the Tribal College/University (TCU) NATURE Coordinator at each site. Activities usually begin at 10 or 11:00 am and last up to four hours, including lunch. Cultural relevance and hands-on activities are emphasized in all topic areas.

Last month, **Alexander Parent** (NDSU) travelled to Turtle Mountain Community College to deliver his Counting Equilibrium activity.

“It's designed to teach about the principles of equilibrium and to allow a visualization of dynamic equilibrium,” said Parent. “So basically what's happening is, we set up students to move candies back and forth between cups and count how many candies are in each cup at each time points. They start with all of the candies in one cup and by moving the candies they reach eventually in equilibrium, where the same number of candies are moving in each direction at each time point.”

Parent has been involved with the NATURE Sunday Academy program for the past several years. “I just really enjoy getting to go out and see these young learners. It makes me really happy to be able to go out and visit the sites.”

Austin Allard is the TMCC site coordinator for NATURE and said that the students enjoyed this first Sunday Academy lesson. For information about NATURE Sunday Academy, contact ND EPSCoR or visit our NATURE Sunday Academy page.

ND EPSCoR State Office conducts K-12 STEM outreach

By **Makenzie Stockwell** (NDSU) and **Tia Lawrence** (NDSU), ND EPSCoR State Office Student Workers

The ND EPSCoR State Office recently participated in a STEM outreach project hosted by the Girl Scouts of North Dakota. The event was for troops of all ages, engaging learners from kindergarten through high school. The ND EPSCoR State Office booth featured a hands-on experiment that allowed participants to engineer their own toothpick bridges.

The ND EPSCoR State Office toothpick structure hands-on learning station.

Students used mini marshmallows, toothpicks, candy, and uncooked spaghetti noodles to construct their structures. Younger participants built shapes and compared which geometric figures are the strongest while secondary students experimented with bridge building and compared which structures are the sturdiest.

In order to test which structures are the most stable, we provided an earthquake simulation section. This simulation was created by taping down the structure to a piece of cardboard, then placing the taped down structure on top of marbles in a box which were rolled around to see if the building would stay put.

Outreach events and hands-on activities are important to have in our community, as they give children a new way to think about STEM and become interested in the real-world applications of classroom learning.

Participants build structures with a variety of materials at the Girl Scouts of North Dakota event.

This creative project encouraged young learners to think outside of the box while experimenting inside of one! If you would like to do this activity in your home or classroom, Subscribe to our YouTube channel and watch the accompanying STEM at Home video. This video and activity shopping list, as well as all of our STEM at Home activities, are available on our STEM at Home page. A special thank you to Shireen Alemadi, former ND EPSCoR State Office STEM Manager, for her effort in making this event possible.

The STEM at Home video series continues

The ND EPSCoR State Office is bringing fun STEM projects to families at home via our YouTube channel. STEM at Home features simple and exciting STEM projects for young students help to teach important critical thinking skills and potentially spark a lifetime interest in STEM.

Our full collection of STEM project videos and shopping lists is available here. Watch our newest videos in our STEM at Home series, linked below.

Get the full shopping list for the new Autumn Leaves activity here.

Get the full shopping list for the new Structure Building activity here.

Subscribe to our YouTube channel and visit our STEM activities page for shopping lists. You can also visit our STEM Education Portal and NATURE Sunday Academy pages for more activities and lesson plans that strengthen the STEM pathway for students across ND.

CIRCLES Alliance survey and interview opportunities

In October 2020, the ND EPSCoR State Office joined five other EPSCoR states (Idaho, Montana, New Mexico, South Dakota, and Wyoming) in a National Science Foundation funded collaborative research project that forms an Alliance to connect with tribal community members within those states to gain a better understanding of each community's definition and perspective of STEM (science, technology, engineering, and mathematics). Initially, Alliance members planned to visit each tribal community, but with the COVID pandemic continuing, the Alliance has decided to continue to make virtual connections.

Using a common set of questions across the six-state CIRCLES (Cultivating Indigenous Research Communities for Leadership in Education and STEM) Alliance, participants input is being gathered through virtual interviews over Zoom or through an online survey with tribal community stakeholders to gain their perspective on how indigenous based STEM education is currently being incorporated or might be incorporated in the future, to support student STEM learning. To participate in an interview or survey, you must be 18 years or older.

The ND EPSCoR State Office has created a link to a 90-second video that describes these efforts. The anonymous online survey is available at this link. Additionally, ND EPSCoR is conducting individual virtual interviews. If you would prefer to participate in an individual interview, please contact ND EPSCoR at ndepscor@ndus.edu, or call 701-231-8400.

This effort aims to foster better connections with tribal communities and support STEM educational programming. Working toward that goal, the ND EPSCoR State Office humbly requests your assistance in completing this survey or contacting us to set up a virtual interview. The CIRCLES Alliance believes this is a particularly poignant time to reflect on observations regarding indigenous based STEM education as the COVID pandemic has brought some new challenges into focus. Learn more about the North Dakota CIRCLES effort here.

Events and trainings

Visit the ND EPSCoR State Conference information page often, more details to come as the event approaches.

Responsible Conduct of Research (RCR)

RCR training is available upon request to augment initial campus or Collaborative Institutional Training Initiative (CITI) RCR trainings. Please contact ND EPSCoR to schedule.

Funding opportunities

Funding Opportunities come from three sources:

1. The National Science Foundation (NSF)-funded New Discoveries at the Advanced Interface of Computation, Engineering, and Science (ND-ACES) RII Track-1 cooperative agreement, which consists of two broad components: 1) Center for Cellular Biointerfaces in Science and Engineering (CCBSE), which consists of three research pillars: materials design, cellular systems, and computational approaches and 2) PROmoting Sustainable Partnerships in Education and Research (PROSPER), which consists of four connected project elements:

education and workforce development, broadening participation, partnerships and collaborations, and communication and dissemination.
2. ND EPSCoR State Office
3. EPSCoR and EPSCoR-like federal funding agencies, which include: Department of Energy (DOE), National Aeronautics and Space Administration (NASA), National Institutes of Health (NIH), NSF, U.S. Department of Agriculture (USDA), and Department of Defense (DoD).

NASA EPSCoR Pre-Proposals from ND Faculty – ISS CAN

In response to the NASA Notice of Funding Opportunity (NOFO) EPSCoR ISS Flight Opportunity Announcement Number: NNH22ZHA003C, the North Dakota NASA EPSCoR (Established Program to Stimulate Competitive Research) is soliciting pre-proposals from faculty at affiliate institutions specifically designed to promote and expand NASA research in North Dakota. Following preliminary proposal selection by ND NASA EPSCoR, the selected pre-proposal team will work directly with the ND NASA EPSCoR office to submit a full proposal to NASA via NSPIRES (NASA Solicitation and Proposal Integrated Review and Evaluation System).

Pre-proposals are due Noon, 11/17/2021.

The full RFP, online submission form, and budget sheet can be found in the RFP announcement on the ND NASA EPSCoR website.

ND EPSCoR State Office Request for Proposals STEM Equipment/Equipment Repair

The ND EPSCoR State Office's mission is to support efforts of participating institutions of higher education across the state that result in increased STEM faculty capacity and competitiveness; a stronger STEM pathway that produces our next-generation workforce, educators, and researchers; and an informed citizenry that values the STEM ecosystem and economy. Thus, the ND EPSCoR State Office is now accepting proposals to fund STEM activities at EPSCoR participating institutions: research universities (RUs; NDSU and UND), master's college/university (MCU; Minot State University), primarily undergraduate institutions (PUIs; Dickinson, Mayville, and Valley City State Universities), and the tribal colleges/universities (TCUs; Cankdeska Cikana Community College, Nueta Hidatsa Sahnish College, Sitting Bull College, Turtle Mountain Community College, and United Tribes Technical College). For more information, please see the Request for Proposals.

Due to ND EPSCoR State Office: Noon, December 9, 2021

NSF EPSCoR Research Infrastructure Improvement Program: Track-2 Focused EPSCoR Collaborations

The Established Program to Stimulate Competitive Research (EPSCoR) is designed to fulfill the mandate of the National Science Foundation (NSF) to promote scientific progress nationwide. A jurisdiction eligibility is based on a jurisdiction's recent five-year history of total funds awarded by NSF relative to the Foundation's total research budget for that same period. The current table of eligible jurisdictions is available on the NSF EPSCoR website (see RII eligibility).

Through this program, NSF establishes partnerships with government, higher education, and industry that are designed to effect sustainable improvements in a jurisdiction's research infrastructure, Research and Development (R&D) capacity, and hence, its R&D competitiveness. For more information, read the full solicitation. Please be aware that some campuses may have internal guidelines related to this RFP.

Letter of intent required – due December 20, 2021

Full proposal – due January 31, 2022

Track-1 ND-ACES: Doctoral STEM Teaching Assistantship NDSU/UND ONLY

Under ND-ACES, the Doctoral STEM Teaching Assistantship program is designed to: 1) increase NDSU/UND doctoral students' understanding of and experience in undergraduate STEM teaching and 2) provide course release time to the Tribal College/University (TCU), Primarily Undergraduate Institution (PUI), and Master's College/University (MCU) faculty/instructors/CCBSE researchers so that they are able to spend additional time conducting their research. The Doctoral STEM Teaching Assistantship Program is a semester-long teaching placement (during Spring 2022 or Fall 2022) that will take place at a CCBSE-participating TCU, PUI, or MCU. Under the direction of the faculty/instructor/CCBSE researcher on those campuses, doctoral students will teach one course determined collaboratively between the doctoral student, the TCU/PUI/MCU faculty/instructor, and the institution. For more information, see the Request for Applications. Please be aware of the following application deadline:

- Fall 2022 Award Dates: August 1 – December 15, 2022 / Application Due: February 28, 2022

Track-1 ND-ACES: Early Career Faculty Support

Funds are available as part of the NSF EPSCoR RII Track-1 New Discoveries in the Advanced Interface of Computation, Engineering, and Science (ND-ACES) cooperative agreement to support participating early

career faculty (ECF) from any of the 10 ND-ACES institutions. Funds can be used for additional graduate students and domestic travel to assist in fast tracking research and outreach efforts within the ND-ACES Center for Cellular Biointerfaces in Science and Engineering (CCBSE) and/or PROmoting Sustainable Partnerships in Education and Research (PROSPER).

- Applications for ND-ACES-related graduate students and travel will be accepted from ND-ACES assistant professor participants at North Dakota State University (NDSU) and the University of North Dakota (UND).
- Applications for ND-ACES-related travel will be accepted from ND-ACES faculty/instructor participants at Cankdeska Cikana Community College (CCCC), Dickinson State University (DSU), Mayville State University (MaSU), Minot State University (MiSU), Nueta Hidatsa Sahnish College (NHSC), Sitting Bull College (SBC), Turtle Mountain Community College (TMCC), and Valley City State University (VCSU) who participate in the ND-ACES ECF mentoring program.

Track-1 ND-ACES: Distributed Research Experience for Undergraduates (dREU)

This ND-ACES program gives undergraduate students – from the nine participating CCBSE campuses the opportunity to work in the CCBSE alongside NSF Track-1 faculty researchers on their cutting-edge research projects. For more information, see the Request for Applications. Please be aware of the following application deadline:

- Spring and Spring/Summer 2022 Application Deadline: Noon, December 1, 2021

Track-1 ND-ACES: Undergraduate Research Assistantship (URA)

This program gives current junior and senior undergraduate students pursuing a B.S. STEM degree at a four-year institution (or a two-year institution granting B.S. STEM degrees) an opportunity to perform research within the National Science Foundation (NSF)-funded New Discoveries in the Advanced Interface of Computation, Engineering, and Science (ND-ACES) Center for Cellular Biointerfaces in Science and Engineering (CCBSE). For more information please see the Request for Applications. Please be aware of the following application deadline:

- Noon, December 1, 2021

Department of Defense EPSCoR Capacity Building

The DEPSCoR Capacity Building competition objectives are to jumpstart capability development in the State/Territory through increased human, technical, and management resource and to achieve excellence in a DoD-relevant research area through funding to support equipment, education, research, and other relevant activities.

Grants awarded under this program are intended to support the strategic objectives of IHEs (either individually or in partnership with others) in DEPSCoR States/Territories to achieve basic research excellence in areas of high relevance to the DoD. Proposals will vary depending on technical field and geographic region. View the grant opportunity details here. Slides from Summer 2021 info sessions are available here.

- Due February 22, 2022

Department of Defense EPSCoR Research Collaborations

The DEPSCoR competition intends to encourage collaborations on basic research projects of interest to the Department. The program is structured to form a 2-person team between 1) a researcher who has never served as a principal investigator (PI) on a prior DoD-funded award and 2) an investigator who will provide mentorship and has served as a PI on a DoD-funded research award actively between 1 October 2014 and 30 September 2021. View the grant opportunity details here. Slides from Summer 2021 info sessions are available here.

- Due February 22, 2022

Department of Defense: DEPSCoR Regional DoD Day

The Department of Defense (DoD) has asked the University of South Dakota to host a regional DEPSCoR DoD Day, where DoD program managers will provide information about the DEPSCoR program and general information about working with the DoD. The regional DEPSCoR Day will be held in Spring of 2022 in Vermillion, SD. For more information, please see: DEPSCoR Regional DoD Day

NSF: EPSCoR Workshop Opportunities

EPSCoR is designed to fulfill NSF's mandate to promote scientific progress nationwide, and NSF EPSCoR continually welcomes proposals for workshops in Solicitation NSF 19-588. These workshops focus on multi-jurisdictional efforts of regional to national importance related to EPSCoR's goals and NSF's mission. For more information, please see the RFP: EPSCoR Workshop Opportunities

Acronyms

Participating Institutions:

- Master's College/University (MCU)
  - Minot State – Minot State University
- Primarily Undergraduate Institutions (PUIs)
  - DSU – Dickinson State University
  - Mayville State – Mayville State University
  - VCSU – Valley City State University
- Research Universities (RUs)
  - NDSU – North Dakota State University
  - UND – University of North Dakota
- Tribal Colleges/Universities (TCUs)
  - CCCC – Cankdeska Cikana Community College
  - NHSC – Nueta Hidatsa Sahnish College
  - SBC – Sitting Bull College
  - TMCC – Turtle Mountain Community College
  - UTTC – United Tribes Technical College

Funding:

- National Science Foundation (NSF) EPSCoR Research Infrastructure Improvement (RII) Track-1 Collaborative Agreements
  - ND-ACES – New Discoveries in the Advanced Interface of Computation, Engineering, and Science (NSF OIA #1946202)
- NSF Collaborative Research
  - CIRCLES Alliance - Cultivating Indigenous Research Communities for Leadership in Education and STEM Alliance (NSF OIA #2038196)
- ND EPSCoR State Office
  - STEM programing identified within the newsletter and state match funding for ND-ACES

Acknowledgement

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

Stay in touch

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