

Preparing for the future

The COVID-19 pandemic has us all attempting our usual roles and routines under the additional stress that accompanies the fear of uncertainty. Our personal and professional lives have been unsettled, and we are without a clear end or expectation of a return to normal. We are left with the challenge of preparing for an unpredictable fall.

This feels exhausting to us all because it is a challenge unlike anything we have faced before. The personal trials we encounter are a part of a larger, collective challenge facing society. There are lingering questions for faculty and staff at colleges and universities. How do we move the mission forward? How do we come together as faculty, staff, and students?

This crisis is different than past crises we have endured before in higher education, and it will leave lasting changes. This includes our ND EPSCoR funded researchers, students, and staff. Institutions across the state will have to work collaboratively and persistently to help students and researchers to continue their education and their contributions to the research community. Such efforts require global collaboration, cooperation, and empathy.

Our communities need research and education to continue to thrive. Collaboration between the colleges and universities across ND are now of magnified importance. Our collective efforts help us to focus on our missions and responsibilities to the citizens of the state. Keeping the mission central means that we will emerge resilient, focused, and out ahead.

We have seen successful collaboration for years within ND EPSCoR-funded research, especially through the Track-1 cooperative agreement. Individual researchers, spread across our state, contribute information and insight around a central mission: to broaden and diversify ND's science, technology, engineering, and mathematics (STEM) workforce

pathway from elementary through graduate school; support and grow statewide STEM research efforts and competitiveness at participating institutions of higher education; and convey the impact of STEM research, outreach, and workforce efforts to ND stakeholders.

There is not a clear road ahead, this stress calls upon us all not just to be more empathetic to each other, but to ourselves. Modeling a collaborative spirit is one way we can all prepare for the future before us and do our part to improve the well-being of ND citizens.

COVID-19 has already given us valuable lessons in empathy worth holding on to. We come together as faculty and staff with a new perspective on work and research with students. For faculty, staff, and students it means joining forces to protect those who have underlying health issues and supporting the caregivers in our community. Within our tight collaboration, everyone on the team is an equal partner.

As we look at the big picture, we have a greater awareness today that real leadership looks like support, empathy, and connectedness. It looks like being aware of the multifaceted impacts of the pandemic.

We carry forward these lessons in empathy as we complete another year of research and outreach. The impact of COVID-19 on our students, staff, and researchers is significant. For the future, the higher education community in ND is coming together in a supportive collaboration while staying apart.

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



ND-ACES CCBSE to be co-led by distinguished professors and friends

“I remember when the phone call came from NSF,” Professor **Kalpana Katti**, Ph.D., F. AIMBE (NDSU) recalled, thinking back to the moment she learned North Dakota’s new National Science Foundation (NSF) EPSCoR RII Track-1 award, ND-ACES, would be funded by NSF. “I was doing my chicken dance and shouting!” This was a result of an effort that was about ten years in the making.

Professor **Colin K. Combs**, Ph.D. (UND), had a more laidback reaction, remarking that the work was “kind of a natural evolution of things that we were already working on.” ND-ACES (New Discoveries in the Advanced Interface of Computation, Engineering, and Science) will support the Center for Cellular Biointerfaces in Science and Engineering (CCBSE) which Combs and Katti will co-lead. “The focus of the proposal is largely on cancer-related research,” he added.

Mechanics Based Computer Modeling of Cancer

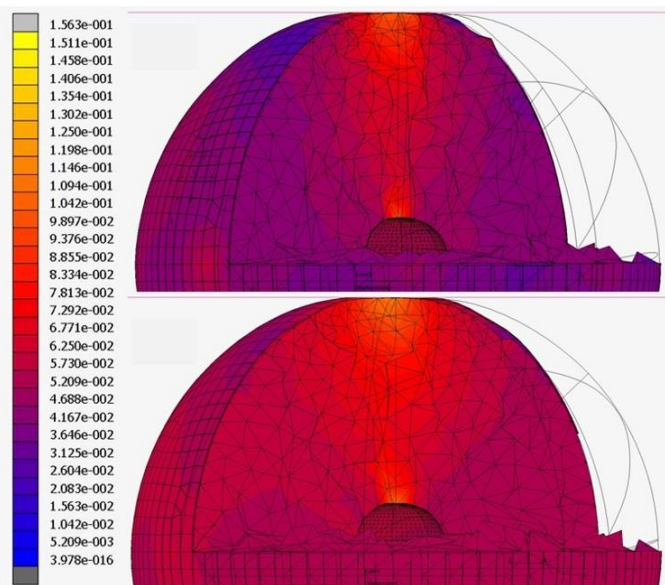


Image of mechanics-based computer modeling of cancer courtesy of Kalpana Katti, Ph.D., F. AIMBE.

The CCBSE builds on old and new endeavors. ND-ACES requires the multidisciplinary coordination of ten institutions and the transdisciplinary growth of expertise and research capacity across three research pillars: materials design at biointerfaces; cellular systems at materials interfaces; and computation, machine learning, and predictive modeling.

Each of the three CCBSE pillars will support the growth of bioscience research capacity and advanced understanding of the biochemistry and cell biology of cancer cells and tumors. More specifically, the research will focus on the metastasis of breast and prostate cancers to bone.

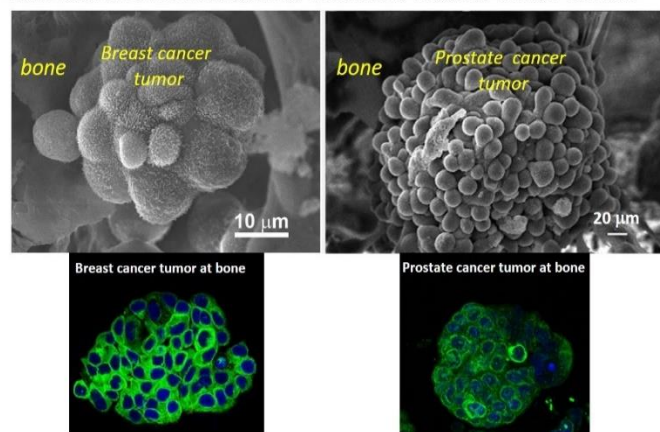
“Many times, when an individual has a tumor, it would be useful if you could immediately know what types of drugs would kill that tumor and keep it from growing and spreading throughout an individual’s body,” explained Combs. ND-ACES researchers will create the engineered materials, grow cancer cells, and create bone interfaces so the scientific community can truly understand the process of metastasis in a way that will eventually benefit cancer patients.

According to Katti, about one million people die each year of prostate or breast cancer and the majority of those deaths are caused by metastasis. “Anything we do to reduce those numbers is a victory,” she added.

The ND-ACES team will conduct research to define improved ways to grow three-dimensional cell cultures. The goal is to reduce the need for animal testing and to improve the relevance to human physiology. “What we’re trying to do is find a way to grow cancer cells in a dish that behave similar to the way they behave as a tumor in a human’s body,” described Combs.

The long-term impacts of the ND-ACES research could affect the lives of cancer patients and the physicians who treat them. Combs further explained, adding, “We can help with this concept of personalized medicine. In the ideal scenario, a patient’s tumor could be screened in an environment like these 3D cultures and that information could go back to a provider and say these are the characteristics of the tumor and these are the drugs that could kill it.”

Lab Created Bone Metastasized Breast and Prostate Cancer Tumors



Lab-created bone metastasized breast and prostate cancer tumors, image courtesy of Kalpana Katti, Ph.D., F. AIMBE.

“We’re focused on an important problem, that is, the interface between the engineered systems and the biological world,” said Katti, whose research career has been largely focused on the emerging field of tissue engineering while Combs is a biomedical researcher and has worked on cross-disciplinary projects in biomedical engineering. Combs is the UND Human Health Grand Challenge Champion and Katti leads the NDSU Grand Challenge program that supports the Center for Engineered Cancer Testbeds. The Grand Challenge support has led to the development of the cancer bone metastasis testbeds for both breast and prostate cancer.

Combs and Katti have worked together before. Collaborations between the two have led to a successful working relationship, and friendship, between the researchers. The research project ahead is complex, actively engaging ten institutions across North Dakota, but neither has doubts that the ND-ACES collaboration will be a successful one. “We have a good relationship, we always have very open communication and talked through priorities and strategies. Based upon our experience, we will be able to implement the ND-ACES vision and help things move forward,” said Combs.

The successful and long-term working relationships between them is just one small example of the relationships within the larger group of dedicated researchers and staff from across the state. ND-ACES fosters teamwork across the state, supporting not only research, but developing workforce and education pathways.



NDSU University Distinguished Professor Kalpana S. Katti, Ph.D., F. AIMBE (left) and UND Chester Fritz Distinguished Professor Colin K. Combs, Ph.D. (right) co-lead the CCBSE. The CCBSE will expand ND’s knowledge base and capacity about the growth of breast and prostate cancer cells that mimic primary and metastatic tumors.

Combs’ and Katti’s leadership will have a positive impact on the project’s intent to collaborate successfully among many institutions and disciplines over a large geographic area. Both researchers feel that the emphasis on communication is an important one.

“I can call him [Combs] anytime, absolutely anytime and I text him,” remarked Katti. During the proposal writing, the duo stayed in-touch constantly. “We were literally talking four times a day.”

“We wrote this proposal very specifically with the intent that it would be a highly interactive research effort,” said Combs.

During the proposal writing, the large transdisciplinary team of project leads already started to work well together Katti reflected. “Within the period of writing the proposal I’ve gotten to know everybody...I feel it’s personal and I know many of the scientists think it’s personal and I want to keep it that way.”

Combs concurs with the sentiment, “It’s a unique type of environment that we’re hoping to cultivate. That means we’re going to improve our collaborative relationships and, in some cases, develop collaborative relationships with investigators that are spread pretty far apart across the state.”

Both researchers’ exuberance for the possible outcomes of the work is matched only by their outlook on what students in ND will gain from the experience through ND-ACES. “There are so many different kinds of institutions involved, the students will have the opportunity to have many mechanisms to disseminate the research,” Katti added.

Both Combs and Katti are dedicated educators, doing their part at their respective universities to broaden and diversify ND’s science, technology, engineering, and mathematics (STEM) workforce pathway from elementary through graduate school.

“Students are going to be exposed to cell biology, molecular biology, genetics, computation, and synthetic chemistry. A student might only typically be exposed to one or two of those areas but by being part of the ND-ACES network, they are going to have a little bit of exposure to many, many things,” said Combs.

The number of institutions involved in ND-ACES and the collaborations between them are a strength that will enhance the experience for all involved.

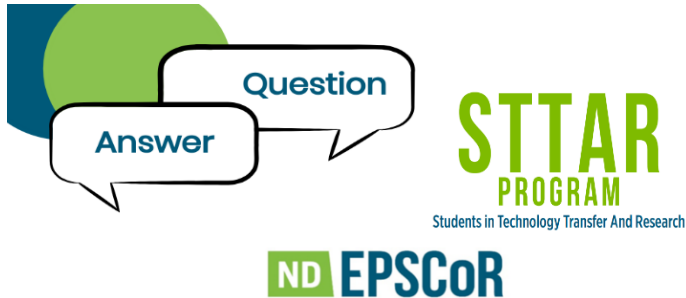
We’re going to provide pretty broad interdisciplinary training to lots of students, not just at UND and NDSU but across the state,” added Combs.

The ND-ACES award does not officially begin until July 1 but all of the team members are already preparing and collaborating, with Combs eager among them. “I’m looking forward to it. I’m hoping we can

make it a big success and partner across the universities and colleges around the state, improve our relationships with healthcare providers and biotechnology startups in the region, and work with some of our other large infrastructure building science programs in the state as well.”

“I think we have a very good team,” said Katti.

Get to know the 2020 STTAR participants



ND EPSCoR recently kicked off another season of STTAR (Students in Technology Transfer And Research) internships. We will be featuring a Q&A series from our participating companies, beginning this month with Melissa Klose, HR Director at **WCCO Belting**, located in Wahpeton, ND and Tara Steinberger, Director of Human Resources at **Interstate Engineering**, located in Jamestown, ND.



Q: Tell us about your company?

A: WCCO Belting is a 65-year-old, family-owned, and award-winning custom rubber product manufacturer for the agriculture, light industrial, construction, sand and gravel, packaging and recycling industries worldwide. The company is the value innovator in the global rubber belting industry, engineering custom products using specialized equipment, and proprietary processes. WCCO focuses on the technological advancement of each raw material and belt component to provide high value rubber product solutions. Its design and manufacturing expertise are effective in reducing the total cost of ownership of their customers' equipment.

Q: What are the benefits of having STTAR interns (to your company and the student)?

A: For our company, the intern program is critical to our talent pathway. The majority of our recently added engineering positions have been filled by students who participated in our intern program, and we've even created new full-time positions specific to the students' interest following graduation. Related to the work the intern will be doing, it's an additional resource to support our business development strategy and goals. For the student, they receive a high value learning experience as an employee of our company. They work on real projects that can have big impacts, and they are given a seat at the table in discussions involving their tasks and activities.

Q: During their internship what will the student be working on?

A: This intern will be finalizing a test machine that's ready for commission and work on drawing up a new idea for a brand-new testing apparatus. In addition, the intern will be researching a new industry, determining its application requirements, and working on a prototype. These projects will heavily influence how we market products to both new and existing customers worldwide.



Current STTAR intern Blake Higgins (NDSU) is working in WCCO's R&D Area on a new prototype design, photo courtesy of Melissa Klose.

Q: Have you partnered with the ND EPSCoR STTAR program before (if no, how did you hear about it)?

A: We began participating in the STTAR program in 2003.



Q: Tell us about your company?

A: Interstate Engineering provides consulting, engineering, land surveying, GIS/GPS, and planning services to municipal, county, state, and tribal governments in addition to private individuals and corporations. With headquarters in Jamestown, Interstate Engineering has nine main offices and three satellite offices in the states of North Dakota, Minnesota, Montana, and South Dakota. An employee-owned corporation in operation since 1976, Interstate Engineering employs more than 150 professionals.

Q: What are the benefits of having STTAR interns (to your company and the student)?

A: An internship provides the experience that helps students put their education into practice, develop the confidence to be future leaders in the workplace, and have the ability to be mentored by our experienced professionals. All of these benefits are a huge competitive advantage for these rising stars. As a company, we feel that we are investing in our future. By giving these upcoming professionals experience now, we are developing long term relationships with them. We also love hearing their fresh ideas!

Q: During their internship what will the students be working on?

A: They will be exposed to wide variety of experiences involving civil engineering which may include aspects of project observation, project management, and design.

Q: Have you partnered with the ND EPSCoR STTAR program before (if no, how did you hear about it)?

A: No, one of our proactive office managers did their research and found the program for us via the internet.

Congratulations to STTAR interns

By **Shireen Alemadi**, ND EPSCoR
STEM Manager (*right*)



Several companies around the state have hired interns as a part of the Students in Technology Transfer And Research (STTAR) program. The STTAR program provides juniors through graduate students, who are majoring in STEM disciplines, with opportunities to use their academic training and experiences to address science and technology-based problems faced by ND companies.

Congratulations to the following students and organizations for their commitment to STEM in ND:

- **Ahmed Elsharti** (UND) at **Airtonomy**, Grand Forks
- **Austin Snobl** (NDSCS) at **Interstate Engineering, Inc.**, Jamestown
- **Blake Higgins** (NDSU) at **WCCO Belting, Inc.**, Wahpeton
- **Bradley Traver** (UND) at **Airtonomy**, Grand Forks
- **Brook Anderson** (NDSU) at **ComDel Innovation**, Wahpeton
- **Chase Bader** (NDSU) at **Amity Technology, LLC**, Fargo
- **Connor Wander** (NDSU) at **CrossFire Technologies**, Fargo
- **Jacob Fandrich** (NDSU) at **Interstate Engineering, Inc.**, Jamestown
- **Marvin Qaqos** (NDSU) at **Interstate Engineering, Inc.**, Jamestown
- **Nicholas Feddersen** (NDSU) at **CrossFire Technologies**, Fargo
- **Pierce Kvien** (NDSU) at **ComDel Innovation**, Wahpeton
- **Ramtin Kardan** (UND) at **Airtonomy**, Grand Forks
- **Su Sampson** (NDSU) at **ComDel Innovation**, Wahpeton
- **William Huber** (NDSU) at **Amity Technology, LLC**, Fargo

Virtual NATURE Camps begin

By **Scott Hanson**, ND EPSCoR Tribal Colleges and Universities Liaison Manager and NATURE Coordinator (right)



ND EPSCoR staff, in a collaboration with tribal colleges and universities across ND, developed online camps for American Indian undergraduate students to engage in STEM enrichment during the COVID-19 pandemic.

We wanted to keep the students engaged with STEM during the summer even though we couldn't offer the usual camp. We are organizing the camp with the aid of associate camp coordinators at North Dakota State University (NDSU; Dr. Uwe Burghaus, associate professor, Chemistry and Biochemistry, NDSU) and University of North Dakota (UND; Tyson Jeannotte, Environmental Engineer, ND Dept. of Environmental Quality).

During the first two weeks in June, ND EPSCoR usually hosts its NATURE University Summer camp on the UND and NDSU campuses for American Indian TCU students. Typically, during this camp, participants tour the campuses and STEM labs, meet research university faculty, and conduct short research projects.

Due to COVID-19, ND EPSCoR cancelled the in-person camp; however, ND EPSCoR will offer an online camp option for TCU participants this summer which will include virtual lab tours, virtual meetings with UND and NDSU faculty, and online research opportunities.

During the virtual lab tours, each researcher will be able to talk to participants about his/her area of teaching and research and show photos and video of their research process. During the virtual meetings, faculty will have real-time discussions with students about STEM degree opportunities, research prospects, support programs on the NDSU and UND campuses, and STEM careers. The students will also be able to participate in one of two online research projects: mapping surface water resources in ND and looking for evidence of rivers on Mars.

The surface water mapping project is being offered by Dr. Taufique Mahmood, assistant professor of Geology and Geological Engineering at UND. Participants will learn how to remotely access UND workstations to use remote sensing technology and access data from free government websites.

The Mars river project is being offered by Dr. Trung Bao Le, assistant professor of Civil and Environmental

Engineering at NDSU. Participants will help map out a path for a Mars rover that will land on Mars in February 2021. They will learn how to do Matlab coding, analyze satellite imagery, and generate 3D topographical maps.

The undergraduate participants will be students from the five TCUs in ND: Cankdeska Cikana Community College, Nueta Hidatsa Sahnish College, Sitting Bull College, Turtle Mountain Community College, and United Tribes Technical College.

This virtual camp experience will continue to strengthen the STEM pathways for American Indian youth in North Dakota despite the need for social distancing.

Read more about the NATURE camps on the [ND EPSCoR NATURE page](#). Confirmed 2020 camp dates are listed below:



Sitting Bull College (SBC): June 22, 2020 – July 31, 2020

Turtle Mountain Community College (TMCC): June 22, 2020 – July 31, 2020

United Tribes Technical College (UTTC): June 22, 2020 – July 31, 2020



Cankdeska Cikana Community College (CCCC): June 15, 2020 – June 26, 2020

SBC: June 15, 2020 – June 26, 2020

TMCC: June 15, 2020 – July 24, 2020

UTTC: June 16, 2020 – June 21, 2020



NDSU Associate Camp Coordinator: Uwe Burghaus, associate professor, Chemistry and Biochemistry

UND Associate Camp Coordinator: Tyson Jeannotte, Environmental Engineer, ND Dept. of Environmental Quality

This camp runs simultaneously at CCCC, NHSC, SBC, TMCC and UTTC: June 15, 2020 – July 10, 2020

A special thank you to the NATURE Coordinators, who worked with ND EPSCoR to make these virtual camps possible:

- CCCC – Chris Dahlen, Registrar
- NHSC – Kerry Hartman, Academic Dean, Environmental Sciences Instructor, and INSPIRE-ND Center for Regional Climate Studies (CRCS) researcher and Ann Vallie, the Pre-Engineering Education Collaborative (PEEC) Director
- SBC – Mafany Ndiva Mongoh – Science Instructor and INSPIRE-ND Center for Sustainable Materials Science (CSMS) researcher
- TMCC – Austin Allard, Engineering Instructor and Pre-Engineering Education Collaborative (PEEC) Project Director
- UTTC – Mandy Guinn, Environmental Science & Research Chair and Instructor

NSF EPSCoR PI meeting highlights

By **Jean Ostrom-Blonigen**, ND EPSCoR Project Administrator (*right*)

ND EPSCoR provided an update to the Innovative and Strategic Program Initiatives for Research and Education-North Dakota (INSPIRE-ND) Track-1 project at the 2020 NSF EPSCoR PI Meeting, May 18-22.



Building on strategic NSF and ND investments made since ND EPSCoR began, INSPIRE-ND has over the past six years:

- developed two new research platforms through the Center for Regional Climate Studies (CRCS) and the Center for Sustainable Materials Science (CSMS)
- fostered critical research infrastructure, and integrated research, education and human resources with workforce development initiatives to strengthen the state's overall research competitiveness. The collective impact has been active involvement in research, outreach, education, and diversity activities throughout the state.

Awards and presentations

Professional Contributions

Eric Brevik, CRCS researcher and Professor of Geology and Soils at Dickinson State University, was awarded the 2020 [Professional Contributions Award from Dickinson State](#). Congratulations to Brevik!

Outstanding graduate

Karissa Bohn was named a [Dickinson State University \(DSU\) 2020 Outstanding Graduate](#). Bohn served as a research assistant within the CRCS and was an ND EPSCoR REU awardee. Congratulations!

Senior Spotlight

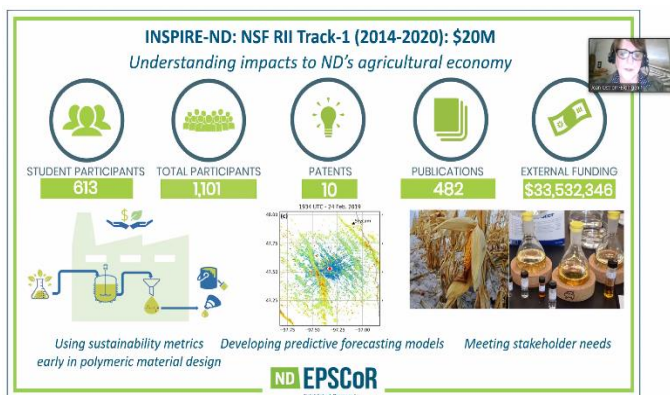
Erin Winterton was featured in the [Minot State University senior spotlight](#). Winterton participated in the CSMS research in Mikhail Bobylev's lab. Congratulations!

Funding opportunities

DEPSCoR Regional DoD Day

Congress recently re-established the Defense Established Program to Stimulate Competitive Research (DEPSCoR) Program. 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 as well as general information about working with the DoD. The regional DEPSCoR Day will be held **September 10, 2020**, in Vermillion, SD. For more information or to register for the event, please see:

[DEPSCoR Regional DoD Day](#)



Ostrom-Blonigen gives an update on INSPIRE-ND during the 2020 NSF EPSCoR PI Meeting held virtually this year.

DEPSCoR Funding Opportunity

The funding opportunity announcement for the FY20 DEPSCoR Competition is now available. DEPSCoR is a capacity building program designed to support the research capabilities at institutions of higher education to perform competitive basic research in science and engineering that is pertinent to the DoD mission and reflect national security priorities. The deadline for paper submissions is **September 21, 2020**. For more information, please see:

[DEPSCoR Funding Opportunity](#)

EPSCoR Workshop Opportunities

EPSCoR is designed to fulfill the mandate of NSF to promote scientific progress nationwide, and NSF EPSCoR 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](#)

Stay in touch

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