



REQUEST FOR APPLICATIONS

TRACK-1 ND-ACES: EMERGING AREAS/SEED AWARD PROPOSALS

Issued: June 7, 2021

Application Deadline: Noon, September 1, 2021

Purpose:

ND EPSCoR seeks to provide emerging areas seed awards of up to \$25,000 in direct costs to researchers from the NSF EPSCoR RII Track-1 New Discoveries in the Advanced Interface of Computation, Engineering, and Science (ND-ACES) participating institutions in areas of emerging high impact and transformative research related to the Center for Cellular Biointerfaces in Science and Engineering (CCBSE). Information on the CCBSE can be found on the ND EPSCoR website (*see below*).

Eligibility:

Applications must be made by a researcher from Cankdeska Cikana Community College (CCCC), Dickinson State University (DSC), Mayville State University (MaSU), Minot State University (MiSU), Nueta Hidatsa Sahnish College (NHSC), North Dakota State University (NDSU), Sitting Bull College (SBC), Turtle Mountain Community College (TMCC), University of North Dakota (UND), and Valley City State University (VCSU) who is not currently associated with the 2020-2025 ND-ACES cooperative agreement or who did not receive a 2021 ND-ACES emerging seed award.

Emerging Areas:

The ND-ACES team recognizes several areas of spin-off and emerging research (the seven areas are described below) that may expand the reach and capacity of ND-ACES and increase the opportunity for sustainability. Each year, any faculty (particularly early career, Master's College/University [MCU], Primarily Undergraduate Institution [PUI], or Tribal College/University [TCU]) are eligible to submit proposals focusing on high-risk, high-impact emerging areas or gaps in the current biosciences research that will also be linked to the broader impact activities through Promoting Sustainable Partnerships in Education and Research (PROSPER). Those receiving awards will be incorporated into CCBSE during the time of their award and be encouraged to participate in the programmatic efforts of PROSPER.

1. **Imaging Techniques for Cell Growth in Testbeds.** Protocols for high-resolution multichannel confocal imaging as well as 3D live cell and 3D cell culture imaging need to be advanced to provide the ability to quantify the spatial heterogeneity of the 3D cell cultures across the various scaffold materials. The equipment for doing these types of analyses is in place at both RUs. Techniques in machine learning, genetic algorithms, and other novel approaches will be encouraged, through seed awards, as additional component analyses for this form of image profiling.
2. **Inclusion of Additional Cell Types and Fluid Flow Conditions in Testbeds.** By increasing expertise and adding investigators, the comparison of cellular growth and behavior between normal and malignant cell types may expand beyond the areas targeted. As a result, seed awards will seek innovation in complexity and analysis of 3D co-culture paradigms under static and fluid flow conditions will be provided.
3. **Innovation Pilot Funding and Translational Seed Research that Fit the CCBSE Mission.** The intent of these seed awards is to continue building our regional capacity as an innovator in the use of 3D cultures that mimic normal and abnormal biology. Within CCBSE's scope, we will seek innovation in testbed design and materials, testbed fabrication methods, increased resolution assessment of cellular phenotype, 3D culture protocols and cell types, and improved predictive methods for using the *in vitro* generated data to model *in vivo* conditions. We will also seek innovations in translating research and technologies toward private sector adoption, by linking CCBSE research to specific end-use applications and potential private sector licenses with the support of a private sector company, with an identified need.
4. **New and Efficient Computational Techniques for Evaluation of Cancer Progression and Biology.** ND-ACES will provide seed awards for new machine learning/multiscale modeling methods to evaluate and improve the efficiency/reliability of computational efforts. These awards will allow computer scientists and other modelers to use the large volume of data generated by the CCBSE researchers to test and develop better predictive computational models that increase efficiency and improve accuracy of predictions.

5. **Multimedia Art Modules for Explaining CCBSE Science.** Art exhibits, videos, or visual elements that build upon the research visualization work of this project may attract a wide audience, thereby informing public perceptions of ND-ACES research. Seed awards will be provided for developing modules, videos, displays, etc. that are educational, informative, and geared toward the general public; particularly K-12. The products will be evaluated for use by ND EPSCoR in its outreach and communicating science efforts.
6. **New Biomaterials in Tissue Engineering and Advanced Manufacturing of Biomaterials.** While nanoclay-, synthetic-, and biopolymer-based scaffolds are the primary focus of CCBSE research, additional material systems as well as manufacturing methodologies for novel tissue engineering based scaffolds are of importance to the overall effort. New materials that include biobased polymers as well as novel 3D bioprinting methods, or innovative designs of various nanocarriers for specific delivery of stimuli to 3D cultures or tissue microenvironments will also be sought for emerging areas grants.
7. **Novel Biobased Specialty Crop Extracts for Anticancer Therapy Applications.** Using 3D cancer testbeds made from nanoclay and other bone mimetic scaffolds, ND-ACES will pursue the screening of various specialty crop-derived compounds for effectiveness in therapeutic applications and in reducing or eliminating cancer stemness. This translational area will target new links with ND's agricultural sector.

Primary evaluation criteria. (Priority will be given to early career faculty at NDSU/UND or MCU, PUI, or TCU from the participating institutions listed above).

Primary evaluation criteria from the CCBSE Leads will include potential for:

1. Linking of the ongoing ND-ACES CCBSE efforts through intellectual merit related to computational modeling to garner an improved interdisciplinary understanding of biological and engineered materials biointerfaces, expand expertise in novel cellular growth and analysis paradigms for mimicking the *in vivo* environment, and development or use of cyber-enabled discovery and innovation.
2. Enhancing broader impacts of the ND ND-ACES RII Track-1 project elements of PROSPER: education and workforce development; broadening participation, partnerships and collaborations, and communication and dissemination. (see ND EPSCoR website).
3. Submitting competitive research proposals to the NSF during the award or shortly thereafter.

Allowable expenses (the total of up to \$25K in expenditures is for direct costs. F&A expenses will be added to these NSF RII Track-1 dollars):

1. Faculty salary (up to ½ month of summer salary, but not to exceed \$5,000) plus related fringe benefits;
2. Student salary and related fringe benefits;
3. Research supplies (including minor equipment);
4. Core facility or recharge center fees;
5. Domestic travel up to \$2,000 (i.e. to collaborating institutions or field study sites, or for conference presentation).

Capitalized equipment, visiting scholars/researchers, and post docs are not allowed under this award.

Application Requirements:

Electronic submission: Submit items in the order as listed in the checklist below as ONE submission in a single PDF file to ndepscor@ndus.edu. In the subject line, please indicate: *Track-1: Emerging Areas Seed Award Application*.

Checklist of Requirements:

1. ND EPSCoR Cover page
<https://www.ndepscor.ndus.edu/fileadmin/ndus/ndepscor/SeedAwards/CovSheetNDACESEmergingandSeed2021.pdf>
2. Executive Summary - One-page limit.
3. Project Description: No more than four (4) double-spaced pages, font no smaller than 10. Required sections: 1) Introduction, 2) Proposed research, 3) Nature of collaborative fit between the ND-ACES CCBSE, 4) Incorporation of potential ties to ND-ACES PROSPER elements, and 5) Anticipated results.

4. NSF-style Two-page Biosketch.
5. NSF-style Current and Pending form.
6. Budget form is at:
<https://www.ndepscor.ndus.edu/fileadmin/ndus/ndepscor/SeedAwards/2020NDSUStandardBudgetFormFederal.xlsx>
7. Budget justifications with a clear alignment to the budget form. *Those submitting proposals without a budget justification will be asked to provide one.*
8. A tentative list of specific federal programs to which proposals may be submitted as a result of this support.

Award Announcements and Additional Information:

Awards will be announced on or about September 15, 2021. The effective award dates are from September 15, 2021 – June 30, 2022 after which time all remaining funds may be recovered. Funds are expected to be available on September 15, 2021 and throughout the entire award period. Awards are contingent upon second year funding from the National Science Foundation and the State of North Dakota.

Please direct questions to:

- Kalpana Katti (CCBSE Lead at NDSU) – Kalpana.katti@ndsu.edu
- Colin Combs (CCBSE Lead at UND) – Colin.combs@und.edu

For information about:

- ND EPSCoR's NSF RII Track-1 ND-ACES cooperative agreement, please visit the [ND-ACES webpage](#).