In FY 2022, North Dakota State University (NDSU) achieved significant milestones in research, with expenditures climbing to $164 million—a $11 million increase from the previous year. This growth secured NDSU an R1 classification as a "Doctoral University - Very High Research Activity" from the Carnegie Classification of Institutions of Higher Education, ranking it among the top 146 institutions nationwide.

NDSU’s research efforts span various disciplines, focusing on areas such as food, energy, and water security; cybersecurity; life sciences; entrepreneurship and innovation; and materials. This year marked substantial foundational developments in these critical areas.

Among the key infrastructure accomplishments was the completion of Sugihara Hall, a $51 million state-of-the-art facility serving the departments of chemistry and biochemistry, and earth, environmental, and geospatial sciences. Additionally, construction began on the Peltier Complex, a new facility dedicated to agricultural product research. This complex is set to advance research in fields like food science, meat science, muscle biology, food safety, nutrition, and the development of new agricultural products, further solidifying NDSU’s leadership in research.
Furthermore, FY 2022 saw the laying of foundational initiatives with profound implications for future discoveries and commercialization across the state and beyond. The NIH Center of Biomedical Research Excellence for Diagnostic and Therapeutic Strategies in Pancreatic Cancer secured Phase 2 funding to continue developing early detection methods and treatment protocols for pancreatic cancer.

NDSU researchers also received a $6 million award from the National Science Foundation to develop an AI-enabled sustainable energy infrastructure network. This new AI research center will address challenges like disruptions in the nation’s energy grid.

Additionally, NDSU’s plant sciences department initiated a $1.2 million project to increase the protein content in peas, catering to the booming industry around alternative protein sources. The North Dakota Agricultural Experiment Station also had a fruitful year, testing various crop varietals and releasing new, more nutritious and resilient varieties of durum wheat and soybeans.

Overall, NDSU’s research community is well-positioned to continue making significant contributions to science and technology.

Colleen Fitzgerald, PhD
NDSU Vice President for Research and Creative Activity
## RCA Budget

**Operating: Campus Support and Programs**

- Equipment Match/Repair/Purchases: 274,154
- Faculty Cohort Programs: 1,448
- Faculty Fellows: 21,621
- Misc. Campus Support: 49,060
- Proposal Assistance/Workshops: 34,400

**Research Core Operations**

- EML: 145,858
- MERC and R2 Operating: 14,045
- UAS Operating: 3,368
- CBF Technician Partial Salary: 21,589
- Research Support Services: 34,797
- Travel Awards: 7,976
- Undergraduate Res Symp and Resources: 1,868

**Total Campus Support**: 610,184

**Operating: RCA Business Units**: 83,847

- Salary Budget: RCA: 2,310,481
- Salary Budget: EML: 146,652

**Total Budget**: 3,151,164
Innovation and Economic Development

Composed of the Business Development Unit and Licensing, this group aims to maximize the opportunities for industry-sponsored research and licensing of intellectual property through streamlined intellectual property discussions during negotiation of sponsored research agreements and continuity for research sponsors interested in licensing technologies developed at NDSU.

Invention disclosures

- 1 horticulture
- 4 plant
- 24 technology
- 79 Confidentiality/Nondisclosure agreements
- 98 Material/Data Use agreements
- 86 new subawards

US Issued Patents:

- Highly Functional Epoxidized Resins and Coatings
- Eco-Friendly Materials and Methods for Renewable and Sustainable Applications in Material Chemistry
- Acetoacetylated and (Meth)Acrylated Lignin and Thermosets Therefrom
- Integrated Dielectrophoretic and Surface Plasmonic Apparatus and Methods for Improvement in the Detection of Biological Molecules

Foreign Issued Patents:

- Selective Laser-Assisted Transfer of Discrete Components
- Novel Non-Isocyanate Siloxane-Modified Glycidyl Carbamylate Resins and Coatings Containing Them
- Bio-Based Thermosets
Research Integrity and Compliance

Research Integrity supports Institutional Review Board (IRB), Institutional Animal Care and Use (IACUC), Institutional Biosafety Committee (IBC) operations; oversees financial conflicts of interest reviews; provides veterinary animal care and consultation; and subject matter expertise on promoting research integrity and compliance with federal regulations.
Sponsored Programs

The Sponsored Programs Administration (SPA) office is the central administrative support office under the Vice President for Research and Creative Activity unit. The office encourages and supports university faculty and staff in their pursuit of external funding to conduct research or other scholarly activity, with an emphasis on administrative functions that advance a culture of compliance with applicable regulations. SPA provides budget review and institutional signature for all external proposal submissions, manages electronic application submission processes, and negotiates awards received from external sources for sponsored program activities on behalf of the university. The office also assists in non-financial post award administration matters.

<table>
<thead>
<tr>
<th>External Awards</th>
<th>FY2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total External Awards</td>
<td>$107,486,670</td>
</tr>
<tr>
<td>Hatch/McIntire-Stennis Funds</td>
<td>$3,318,175</td>
</tr>
<tr>
<td>Extension Service Smith-Lever Formula Funds</td>
<td>$4,107,098</td>
</tr>
<tr>
<td>Student Financial Aid</td>
<td>$9,994,423</td>
</tr>
<tr>
<td>Total Federal Formula Funds</td>
<td>$17,419,696</td>
</tr>
<tr>
<td>Grand Total</td>
<td>$124,906,366</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>College/Unit*</th>
<th>Proposals Processed through Sponsored Programs Administration</th>
<th>Total Dollars Requested from External Funding Sources</th>
<th>Total Dollars Awarded from External Funding Sources**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture Experiment Station &amp; Extension Service</td>
<td>463</td>
<td>$99,315,202</td>
<td>$30,451,875</td>
</tr>
<tr>
<td>Agriculture, Food Systems &amp; Natural Resources</td>
<td>74</td>
<td>$4,776,713</td>
<td>$1,039,141</td>
</tr>
<tr>
<td>Arts, Humanities &amp; Social Sciences</td>
<td>37</td>
<td>$1,785,928</td>
<td>$1,860,975</td>
</tr>
<tr>
<td>Business</td>
<td>7</td>
<td>$190,522</td>
<td>$36,348</td>
</tr>
<tr>
<td>Engineering</td>
<td>135</td>
<td>$57,478,656</td>
<td>$13,259,055</td>
</tr>
<tr>
<td>Graduate School</td>
<td>1</td>
<td>$220,436</td>
<td>$408,682</td>
</tr>
<tr>
<td>Health Professions</td>
<td>106</td>
<td>$48,433,902</td>
<td>$15,794,236</td>
</tr>
<tr>
<td>Human Sciences &amp; Education</td>
<td>37</td>
<td>$6,037,747</td>
<td>$1,912,912</td>
</tr>
<tr>
<td>Information Technology</td>
<td>1</td>
<td>$207,584</td>
<td>$0</td>
</tr>
<tr>
<td>Miscellaneous Offices</td>
<td>38</td>
<td>$10,512,661</td>
<td>$19,371,452</td>
</tr>
<tr>
<td>Science &amp; Mathematics</td>
<td>83</td>
<td>$46,823,016</td>
<td>$15,063,121</td>
</tr>
<tr>
<td>Upper Great Plains Transportation Institute</td>
<td>64</td>
<td>$8,550,034</td>
<td>$8,288,873</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1,046</td>
<td>$284,342,401</td>
<td>$107,486,670</td>
</tr>
</tbody>
</table>
Research and Faculty Development

The mission of the Research and Faculty Development unit is to enhance NDSU’s ability to compete for external funding by providing resources, training, and assistance related to developing successful research programs. Activities of the research development office include announcing funding opportunities, managing the SPIN database subscription and offering training and support for users of the system, developing and coordinating grant writing workshops and professional development opportunities for faculty, managing internal funding programs such as travel awards and research support services, support for broader impacts, and developing proposal writing resources and tools.

FY22 Programming

- NSF Proposal Development Program (7 sessions, 13 participants in cohort)
- NSF CAREER Proposal Development Program (7 sessions, 11 participants in cohort)
- New Faculty Program (9 sessions, 32 participants)
- USDA Program Director Panel (41 NDSU participants; 62 total participants from 9 institutions)
- Workshop: Write Winning Grant Proposals (57 participants)
- Workshops: NEH / Funding in AHSS (41 participants)
- Workshops: NSF and Social Science / Convergence Research (36 participants)
- Research Symposium on Mental Health (co-hosted with President’s Council for Campus Well-being; 70 participants)
FY22 RCA Awards

- Research Support Services Awards: $12,988 was awarded to 13 faculty.
- Research Development Travel and Conference Support Awards: $27,387.19 was awarded to 28 faculty to support participation at conferences.
- Proposal Support: $71,373 was awarded to support development and review of 22 proposals.

FY22 Undergrad Research

- Initiated collaborative effort with the Graduate Student Council and Gamma Sigma Delta to launch NDSU Student Research Day. The inaugural event scheduled took place April 19, 2022. RCA hosted NDSU EXPLORE at Student Research Day, with 43 undergraduate student participants.
- The RCA Office funded registration for 8 students to present at the 2022 National Conference on Undergraduate Research virtual conference in April 2022, and funded registration for 2 faculty members.
- RCA Faculty Fellow Ying Huang managed the INBRE summer undergraduate biomedical research program, with 18 student participants from around the state.

<table>
<thead>
<tr>
<th>Program</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF Proposal Development Program [7 sessions]</td>
<td>13</td>
</tr>
<tr>
<td>NSF CAREER Proposal Development Program [7 sessions]</td>
<td>11</td>
</tr>
<tr>
<td>New Faculty Program [9 sessions]</td>
<td>32</td>
</tr>
<tr>
<td>Panel: USDA Program Directors</td>
<td>41 NDSU participants</td>
</tr>
<tr>
<td></td>
<td>62 total participants from 9 institutions</td>
</tr>
<tr>
<td>Workshop: Write Winning Grant Proposals</td>
<td>57</td>
</tr>
<tr>
<td>Workshops: NEH / Funding in the Arts &amp; Humanities</td>
<td>41</td>
</tr>
<tr>
<td>Workshops: NSF and the Social Sciences / Convergence Research</td>
<td>36</td>
</tr>
<tr>
<td>Research Symposium on Mental Health</td>
<td>70</td>
</tr>
<tr>
<td>co-hosted with President’s Council for Campus Well-being</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>College</th>
<th>RSS</th>
<th>Travel</th>
<th>Proposals</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFSNR</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>AHSS</td>
<td>2</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>BUS</td>
<td>2</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>ENG</td>
<td>5</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>HP</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSE</td>
<td>3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>SM</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
NDSU Research in the News

- NDSU education professor lands contract with US Air Force
- NDSU researchers awarded NIH grant to study how socioeconomics and perceived control can affect dementia-related diseases
- NDSU receives $2.9 million NSF award to help post-baccalaureate students get involved with research
- NDSU pancreatic cancer research center receives phase 2 funding from NIH
- NDSU researcher awarded R15 grant to measure muscle function in older adults
- NDSU researcher Barney Geddes receives prestigious FFAR New Innovator Award
- NSDU geosciences researchers add two new state-of-the-art analytical instruments
- NDSU receives $6 million research infrastructure award to develop an AI-enabled sustainable energy infrastructure network
- NDSU Researchers Included in Rankings of World’s Top Cited Scientists
- NDSU researcher receives award to study how countries control online access to information
- Center for Bioplastics and Biocomposites Receives NSF Grant Phase II Funding
- John Creese collaborates with Wisconsin Anishinaabe tribe on archeological project and field school
Faculty Publications

2022

RECLAIMING MIGRANT MOTHERHOOD: IDENTITY, BELONGING, AND DISPLACEMENT IN A GLOBAL CONTEXT
   Editor/Author  Maria D Lombard
   Publisher      Rowman & Littlefield

CHOCOLATE: A CULTURAL ENCYCLOPEDIA.
   Editor/Author  COLLINS, ROSS F
   Publisher      ABC-CLIO

THRESHOLD CONCEPTS IN WOMEN’S AND GENDER STUDIES: WAYS OF SEEING, THINKING, AND KNOWING.
   Editor/Author  LAUNIUS, CHRISTIE
   Publisher      ROUTLEDGE

RECENT ADVANCES IN OPERATIONS MANAGEMENT APPLICATIONS: SELECT PROCEEDINGS OF CIMS 2020
   Editor/Author  ANISH SACHDEVA
   Publisher      SPRINGER

MATERIALITY AND WRITING STUDIES: ALIGNING LABOR, SCHOLARSHIP, AND TEACHING.
   Editor/Author  HASSEL, HOLLY
   Publisher      NATL COUN TEACHERS OF ENG

TEACHING AND LEARNING FOR SOCIAL JUSTICE AND EQUITY IN HIGHER EDUCATION: VIRTUAL SETTINGS
   Editor/Author  LAURA PARSON
   Publisher      PALGRAVE MACMILLAN
Faculty Publications

2021

MECHANICAL HARVEST OF FRESH MARKET APPLES: PROGRESS OVER THE PAST DECADES.
Editor/Author  ZHANG, ZHAO
Publisher  SPRINGER

EMERALD HANDBOOK OF GROUP AND TEAM COMMUNICATION RESEARCH
Editor/Author  MICHAEL ROBINSON
Publisher  SPRINGER

TEACHING AND LEARNING FOR SOCIAL JUSTICE AND EQUITY IN HIGHER EDUCATION: CO-CURRICULAR ENVIRONMENTS
Editor/Author  LAURA PARSON
Publisher  PALGRAVE MACMILLAN

HANDBOOK OF EMBODIED PSYCHOLOGY: THINKING, FEELING, AND ACTING
Editor/Author  MICHAEL ROBINSON
Publisher  SPRINGER

POLICING: THE ESSENTIALS.
Editor/Author  ARCHBOLD, CAROL,
Publisher  SAGE PUBLICATIONS

HYDRAULIC AND CIVIL ENGINEERING TECHNOLOGY VI
Editor/Author  M. YANG
Publisher  IOS PRESS

TRANSFORMATIONS: CHANGE WORK ACROSS WRITING PROGRAMS, PEDAGOGIES, AND PRACTICES
Editor/Author  HOLLY HASSEL
Publisher  UTAH STATE UNIV PRESS
Mukund Sibi, University Distinguished Professor of chemistry and biochemistry, and Colleen Fitzgerald, vice president for Research and Creative Activity, have been named fellows by the American Association for the Advancement of Science.

Sibi was honored for “pioneering work in enantioselective radical reactions and asymmetric synthesis and building biomedical research infrastructure through effective leadership and mentoring.”

He joined the NDSU faculty in 1987 and has built an international reputation in synthetic organic chemistry – radical chemistry in particular. He developed the first catalytic method for carrying out enantioselective radical reactions.

Fitzgerald was recognized for “outstanding contributions to the field of linguistics, with a focus on language documentation, language revitalization and empowering Indigenous communities through collaborative work.”

Fitzgerald came to NDSU as the vice president for research and creative activity on Oct. 1, 2021, from Texas A&M University – Corpus Christi, where she was associate vice president for research. Prior to that, she was on the faculty at the University of Texas at Arlington from 2008 to 2019, and for the last four years of that period, she served as program officer for the Documenting Endangered Languages Program, a joint funding initiative between the National Science Foundation and the National Endowment for the Humanities.

Both are members of a 2021 cadre of 564 scientists, engineers and innovators from the around the world who will receive the lifetime honor.