North Dakota EPSCoR

NSF EPSCoR Conference

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www.ndsu.nodak.edu/epscor

ND EPSCoR's Five Year Strategic Plan Goals:

- Enhance research infrastructure via strategic investments in areas critical to North Dakota's economic future
- Expand cyber-enable communication and education, discovery & innovation
- Provide enhancements to increase faculty capacity & competitiveness
- Broaden the STEM pipeline
- Continue to build university-private sector partnerships

Overview

- Research initiatives: SUNRISE (renewable energy); FLexEM (flexible electronics)
- A series of programs to improve hiring and retention of outstanding faculty and chairs
- Programs to increase faculty competitiveness: workshops on grant writing and project management, competitions for grants using an external merit review process, travel awards to conferences, visits to agency Program Directors
- Funds for collaborative projects of national and international scope
- Enhancement of cyberinfrastructure in the North Dakota University System
- A comprehensive set of programs designed to broaden participation of North Dakotans, particularly Native Americans, in science, technology, engineering, and mathematics (STEM) activities and careers
- Programs to continue generating strong partnerships with the private sector

1. Enhance Research Infrastructure

- SUNRISE (heterogeneous catalysis for fuels & chemical feedstocks)
  - Novel F-T catalysts
  - Nanoscale supports
  - Theoretical/computational electronic structure
- FlexEM (printed routes to electronic materials)
  - Improved barrier materials
  - Conjugated organic polymers
  - Liquid silanes

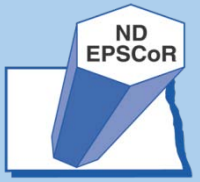
2. Provide Competitive Enhancements

- To lay the foundation for future endeavors, we support a competitive seed grant program which looks to invest in specific areas of growth for the EPSCoR program. In year 1, we have supported four collaborative seed awards.
  - Thermodynamic measurements in high speed flows (Ames, UND MechEng / Suzen, NDSU Mech Eng)
  - Accurate breast phantom based on tissue measurements (Sauter, UND Surgery / Noghanian, UND Elec Eng)
  - Hybrid wireless network coverage (Zhang, NDSU Comp Sci / Jiang, China)
  - Mobile friendly web browsing (Kong, NDSU Comp Sci / Zhang, Texas)
- Graduate and undergraduate research assistantships

ND EPSCoR

New Faculty Start-Ups

- ***Ji*** conversion of cellulosic, hemi-cellulosic, and lignin biomass into fuels and chemicals.
- ***Benson*** sustainable coal utilization.
- ***Chu*** novel synthetic methods and the construction of nano-architectures, e.g. covalently bonded nanotubes.
- ***Delhommelle*** simulation methods for molecular mechanisms of self-assembly and transport at the nanoscale.
- ***Du*** kinetics and mechanism of nitride coupling, a reverse reaction possible in the nitrogen fixation pathway.
- ***Hightower*** highly oxidizing LMCT excited states for multi-photon artificial photosynthetic devices.
- ***Fazel-Rezai*** biomedical signal and image processing, brain signal characterization for human seizure detection.
- ***Noghanian*** three-dimensional high resolution ultra-wide band microwave imaging system.
- ***Martin*** ethnography in Native American Indian communities.
- ***Tyree*** Native cultural preservation in the face of water conflicts.
- ***Putkonen*** geological processes of the Earth's surface and geomorphology.
- ***Yarbrough*** 2009 Red River Flood Response activities.
- ***Biga*** molecular and hormonal regulation of muscle growth and metabolism in vertebrates.
- ***Greenlee*** respiratory physiology of insects at the molecular, cellular and whole organism level.
- ***Travers*** climate change on regional plant phenologies, including gene flow between Canola crops and related weed species.
- ***Liu*** nucleic acid biosensor device, based on gold nanoparticle probes. Two provisional patents filed.
- ***Zhao*** decarboxylative conjugate additions for economic and environmentally benign alternative to transmetalation.
- ***Kim*** composite materials for infrastructure rehabilitation.
- ***Fan*** wind power grid integration to improve system stability and power delivery.
- ***Srinivasan*** desynchronized circuit states, automatic checking of pipelines, and verification of synchronous elastic processors.
- ***Law*** MMPs and nanometer-sized nanofiber precursors.
- **Gordon** roles of elevated pain tolerance amongst individuals with eating disorders.
- ***Routledge*** creative terror assessments.



3. Expand Cyber Infrastructure

- Critical to the interactions between researchers at all institutions in North Dakota is the investment in the cyberinfrastructure. Enhancements to the network connections and the deployment of 10 Gbps connections between buildings are helping us build a more collaborative virtual community.

- We partner with the Northern Tier Network Consortium (NTNC) to provide connectivity with the nation's backbone high speed Internet2.

- We facilitated a partnership between the tribal colleges, the IT departments of the two research universities, and the State of North Dakota IT department to assess the cyberinfrastructure needs of the tribal colleges.

4. Broaden STEM pipeline

- Highly effective targeted efforts that broaden participation and strengthen state-wide collaborations that link the major research universities and the Tribal Colleges. One significant outcome is the continued growth of the NATURE program which gives students a STEM experience that encourages them to pursue advanced degrees in STEM.
  - Educational summer camps
  - Sunday academies
  - Mentored research
- Women in Science and Engineering (WISE)
  - Supplemental funding for equipment and additional students
  - 4 awards made in first year

5. University-Private Sector Partnerships

- Three workforce development programs:
  - Technology Transfer and Research (STTAR)
  - The Plus Experience (TPE)
  - Entrepreneurial Scholarship Program (ESP)

- Year 1 - total of 65 students and 31 companies in these programs, providing students internship opportunities and helping transfer technology from university to private-sector.

- Product Design Center (PDC) bridges gap between basic discovery and commercialization.

Outreach and Communication

- We continue to reach out to the broader community and tell the success stories of EPSCoR RII supported activities. Our faculty, students and staff are engaged in meetings at a state-wide, national and international level. In addition to our scientific discoveries, faculty are sharing our experience in programs including NATURE.
  - Travel funding for students and faculty
  - Radio programs
  - Coffee shop science cafes
  - Annual state conferences

Evaluation and Assessment

- Hired outside evaluator (Dr. Rose Shaw)
- Metrics formulated and progress with respect to those being analyzed.
  - Research production
  - Research portfolio quality
  - Faculty development
  - S&T workforce development
  - Critical mass of researchers
  - Research collaboration and networking
- Rigorous assessment and evaluation have documented progress in our first year.

Value Added

- EPSCoR RII funding key to leveraging other support including
  - CAREER awards
  - Tribal Colleges and Universities program (TCUP)
  - Plant Genome Research program (PGRP)
  - REU

Sustainability

- Key element in our successful partnership with the strategic leadership of the State of North Dakota.
- ND EPSCoR is a line item in the University System budget.
- Our partnership produced a cash commitment of ~$30M from 1986-2008 for investment in research infrastructure. The 2009-11 biennium allocation increased by 25% percent to just over $7M.

Major Achievements

From 1986 – 2008, North Dakota invested $32.5M in ND EPSCoR:
Cash return > $246,000,000 in merit based awards for ND EPSCoR PIs

From 2001 – 2005 total academic research expenditures increased 77.4%;
4th in nation in percentage change, according to SSTI

From 1986 – 2005, ND's share of NSF research funds increased 160%,
2nd in nation in percentage change

North Dakota ranks 7th in nation for University R&D/$1000 of GSP

ND EPSCoR, through its New Faculty Startup Program recruited 140 new faculty researchers to ND

ND has 26 NSF CAREER Awardees, 24 recruited and supported by ND EPSCoR

Experimental Program to Stimulate Competitive Research

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