

2010 Pre-Engineering Education Collaboration Award Winners

Collaborative Research: OLC/SDSU/SDSMT Pre-Engineering Education Collaborative
Award#: **1037797** Current Year Award Amount: **\$165,000** Cumulative Award Amount: **\$165,000**
Estimated Total Award Amount: **\$825,000**
Original Start Date: **Sep 01, 2010** Projected Duration: **60 Months**
PI: **Hrncir** Institution: **SD Sch of Mines and Tech** State: **South Dakota** District: **00**

Collaborative Research: OLC/SDSU/SDSMT Pre-Engineering Education Collaborative
Award#: **1037708** Current Year Award Amount: **\$165,000** Cumulative Award Amount: **\$165,000**
Estimated Total Award Amount: **\$825,000**
Original Start Date: **Sep 01, 2010** Projected Duration: **60 Months**
PI: **Berdanier** Institution: **South Dakota State Univ** State: **South Dakota** District: **00**

Collaborative Research: OLC/SDSU/SDSMT Pre-Engineering Education Collaborative
Award#: **1037661** Current Year Award Amount: **\$499,999** Cumulative Award Amount: **\$499,999**
Estimated Total Award Amount: **\$1,249,997**
Original Start Date: **Sep 01, 2010** Projected Duration: **60 Months**
PI: **Giraud** Institution: **Oglala Lakota College** State: **South Dakota** District: **00**

Collaborative Research: OLC/SDSU/SDSMT Pre-Engineering Education Collaborative
ABSTRACT

Oglala Lakota College (OLC) proposes to extend and enhance its capability to deliver the first two years of a Bachelor of Science degree program in engineering. This capability will be developed through a Pre-Engineering Education Collaborative (PEEC) established with the College of Engineering at the South Dakota State University (SDSU) and the South Dakota School of Mines and Technology (SDSMT), and is referred to as the OLC/SDSU/SDSMT PEEC (OSSPEEC). The project will establish collaborative offerings of gateway and bottleneck courses that occur in the first two years of engineering curricula coupled with on-reservation hands-on laboratory and service learning experiences on the PRR that will increase Native American student retention in pre-engineering and engineering programs across South Dakota. A major result of this project will be the establishment of a complete two-year pre-engineering curriculum at OLC, which will enable our students to enter any four-year undergraduate engineering program at the junior level. Further, this project will make an additional unique or radical step in the transformation of classical engineering education at the state colleges participating in the collaboration.

We propose to collaborate to develop and offer the courses required for an integrated two-year pre-engineering program at OLC and to increase the success of OLC transfer and other Native American students at SDSU and SDSMT through shared research, internship experiences, and community building in the third and fourth years of an engineering program. The project will be unique in the United States in that during the collaborative process of building OLCs pre-engineering capacity, OLCs faculty and students will be helping to transform the concept of the first two years of the engineering curriculum at SDSU and SDSMT. This will occur through the integration of project based service learning and undergraduate research projects on the Pine Ridge Reservation, which will involve professors and cohorts of students from SDSU and SDSMT. Also, these projects will cultivate closer ties among our institutions and OST Tribal Agencies through collaborative summer research and internship opportunities on the Pine Ridge Reservation that will lead to the development of future collaborative NSF research proposals.

Collaborative Research: CMN PEEC Project: Providing for the Education of American Indian Engineers

Award#: **1037626** Current Year Award Amount: **\$164,617** Cumulative Award Amount: **\$164,617**
Estimated Total Award Amount: **\$823,900**

Original Start Date: **Sep 15, 2010** Projected Duration: **60 Months**

PI: **Kunz** Institution: **U of Wisconsin Platteville** State: **Wisconsin** District: **03**

Collaborative Research: CMN PEEC Project: Providing for the Education of American Indian Engineers

Award#: **1037597** Current Year Award Amount: **\$165,000** Cumulative Award Amount: **\$165,000**
Estimated Total Award Amount: **\$825,000**

Original Start Date: **Sep 15, 2010** Projected Duration: **60 Months**

PI: **Romero** Institution: **U of Wisconsin Madison** State: **Wisconsin** District: **02**

Collaborative Research: CMN PEEC Project: Providing for the Education of American Indian Engineers

Award#: **1037595** Current Year Award Amount: **\$250,000** Cumulative Award Amount: **\$250,000**
Estimated Total Award Amount: **\$1,250,000**

Original Start Date: **Sep 15, 2010** Projected Duration: **60 Months**

PI: **Morris** Institution: **College of the Menominee N** State: **Wisconsin** District: **08**

Collaborative Research: CMN PEEC Project: Providing for the Education of American Indian Engineers **ABSTRACT**

College of Menominee Nation (CMN), together with the University of Wisconsin Madison and the University of Wisconsin Platteville, is applying to the National Science Foundation's Science, Tribal Colleges and Universities Program (TCUP) Pre-engineering Education Collaborative grant

to strengthen CMN's capacity to establish CMN as an Associate Degree granting engineering program of distinction.

The CMN PEEC: Providing for the Education of American Indian Engineers collaborative project proposes the following objectives:

- To build CMN's capacity and infrastructure to sustain a Pre-engineering Associate Degree Program.
- To implement a Pre-engineering program of distinction.
- By September 2015, to graduate at least twenty students from CMN's pre-engineering program and transition into U.W. Madison's and U.W. Platteville's engineering programs.

Project Intellectual Merit: This project recognizes and embraces diversity and the role Tribal Colleges play in coordinating demonstrative research on increasing the participation of underrepresented minorities in STEM fields. Tribal Colleges are key contributors to the body of knowledge on American Indians. Project research, data, and outcomes focused in the ultimate outcomes of increasing the number of and performance of American Indian students in engineering, leading to increased numbers of American Indians in engineering careers, will provide key nationally recognized research. This collaboration will develop, apply and assess evidence-based practices shown to increase the participation of underrepresented minority students in science and engineering. Furthermore, the partnership between CMN and its UW partners is tailored to establish robust connections between institutions that will serve as a model for the engineering community in general and other minority-serving institutions as we assess, document and disseminate the success of this process.

Project Broader Impact: This project will build upon the research of previous STEM activities, continuing the investigation of essential research in discovering and understanding how Tribal Colleges and the unique strategies they implement promote education in minority students. The project further advances the research of American Indian undergraduate education in engineering and contributes to the global body of knowledge in underrepresented minority engineering education. The short term outcome of this effort will be to increase the knowledge, understanding and interest in engineering among students in rural populations, with emphasis on the American Indian population of Northern Wisconsin. The long term outcome will be an increase in the participation of American Indian students graduating with degrees in engineering. This will ensure that the voices, perspectives and talents of a population that is so underrepresented in engineering have an opportunity to contribute to the development of the engineering profession.

Hawaii's Pre-Engineering Education Collaboration (PEEC)

Award#: **1037827** Current Year Award Amount: **\$999,961** Cumulative Award Amount: **\$999,961**

Estimated Total Award Amount: **\$4,999,805**

Original Start Date: **Sep 01, 2010** Projected Duration: **60 Months**

PI: **Pagotto** Institution: **U of Hawaii** State: **Hawaii** District: **01**

Hawaii's Pre-Engineering Education Collaboration (PEEC) **ABSTRACT**

Kapiolani Community College, University of Hawaii (UH) System proposes to develop 'Hawaii's Pre-engineering Education Collaborative' (PEEC) that will support 155 Native Hawaiian (NH) students (females, males, and students with disabilities) pursuing and completing baccalaureate degrees at the UH Manoa College of Engineering (UHMCOE). Since 2006, the UHMCOE has accepted a total of 117 transfer students from the four participating community colleges and UH Maui College (UH MC): Kapiolani (50), Leeward (51), Honolulu and Windward (4 each), UH MC (8).

Goal 1: A Quality Pre-Engineering Core Curriculum: that prepares NH students for success in progressively higher level courses in their Engineering education, effectively integrating Calculus, and that is available online in every semester during the project and beyond.

Goal 2: A Community of Practice in Engineering: connecting NH students, mentors, and undergraduate researchers with nurturing advising, structured cohort experiences, quality curriculum, faculty/researchers, and community partners, through funded positions for students, increased engagement with engineering issues and industries, and online communication strategies.

Activities

- 1) Faculty leaders in PEEC will review pre-engineering course success rates for NH students, and improve existing and new courses by integrating technology, service, peer mentoring, research, and internship opportunities, preparing NH students for Engineering degree completion and careers in Hawaii.
- 2) Develop one new course Engineering 100, Introduction to Engineering, and one existing course, Physics 272, General Physics 2, for online delivery.
- 3) Integrate key concepts from 'Introduction to Engineering Design' (ME 213), and student projects from 'Junior/Senior Engineering Design' (ME 481-482), into successive NH Summer Engineering Experiences (SEE).

- 4) Develop three SEE that anchor NH cohorts for successful transfer, degree completion, and careers.
- 5) Increase and strengthen recruitment and engagement (service, peer mentoring, undergraduate research, renewable energy and sustainability projects) opportunities for NH students.
- 6) Increase NH student engagement with each other and key stakeholders: NH scientists, community experts, UH researchers, local industry, and federal, state, and county government partners.

Outcomes

- 1) 170 NH students complete 6 week Summer Engineering Experiences at KCC, UH MC, and UHMCOE.
- 2) 50 students complete the ASNS degree in Physical Sciences at KCC.
- 3) 155 students complete all of a shared 39-credit pre-engineering core curriculum and transfer.
- 4) 124 NH students complete UHMCOE Bachelor of Science degree (80% completion rate).
- 5) Improved Pre-engineering core curriculum available online to all ten UH campuses and beyond.
- 6) Hawaii's PEEC curriculum, support and engagement strategies disseminated statewide and nationally.
- 7) Hawaii's PEEC partnerships for sustainability established, program expanded to all UH campuses.

Collaborative Research (PEEC: 2+2+2+Infinity: Pipeline for Tribal Pre-Engineering to Society
Award#: **1038186** Current Year Award Amount: **\$197,888** Cumulative Award Amount: **\$197,888**
Estimated Total Award Amount: **\$957,768**

Original Start Date: **Sep 01, 2010** Projected Duration: **60 Months**

PI: **Hall** Institution: **Turtle Mountain Cmty Col State: North Dakota** District: **00**

PEEC: 2+2+2+Infinity: Pipeline for Tribal Pre-Engineering to Society (PTiPS)

Award#: **1038127** Current Year Award Amount: **\$198,715** Cumulative Award Amount: **\$198,715**
Estimated Total Award Amount: **\$998,534**

Original Start Date: **Sep 01, 2010** Projected Duration: **60 Months**

PI: **Baker-Big Back** Institution: **Fort Berthold Community Co State: North Dakota** District: **00**

Collaborative Research: PEEC: 2+2+2+Infinity: Pipeline for Tribal Pre-Engineering to Society (PTiPS)

Award#: **1038080** Current Year Award Amount: **\$165,000** Cumulative Award Amount: **\$165,000**
Estimated Total Award Amount: **\$824,995**

Original Start Date: **Sep 01, 2010** Projected Duration: **60 Months**

PI: **Pieri** Institution: **North Dakota State U Fargo State: North Dakota** District: **00**

Collaborative Research: PEEC: 2+2+2+Infinity: Pipeline for Tribal Pre-Engineering to Society (PTiPS)

Award#: **1038079** Current Year Award Amount: **\$196,984** Cumulative Award Amount: **\$196,984**

Estimated Total Award Amount: **\$989,702**

Original Start Date: **Sep 01, 2010** Projected Duration: **60 Months**

PI: **Halvorson** Institution: **Sitting Bull College** State: **North Dakota** District: **00**

Collaborative Research PEEC: 2+2+2+Infinity: Pipeline for Tribal Pre-Engineering to Society

Award#: **1038067** Current Year Award Amount: **\$199,050** Cumulative Award Amount: **\$199,050**

Estimated Total Award Amount: **\$997,427**

Original Start Date: **Sep 01, 2010** Projected Duration: **60 Months**

PI: **McDonald** Institution: **Cankdeska Cikana Community** State: **North Dakota** District: **00**

Collaborative Research (PEEC: 2+2+2+Infinity: Pipeline for Tribal Pre-Engineering to Society

ABSTRACT

This collaboration among TCUP colleges Cankdeska Cikana Community College Community College, CCCC, Ft. Berthold Community College, FBCC, Turtle Mountain Community College, TMCC, and Sitting Bull College, SBC, and North Dakota State University, NDSU, is the culmination of more than 11 years of active engagement in STEM education on the reservation, including a year-long academic sabbatical at TMCC by an engineering professor. It supports a tribal college vision of expanded life-choices for reservation residents that could provide more technical competency for tribal decision-making, infrastructure improvement and the opportunity for personal and tribal advancement without loss of cultural heritage. For NDSU the benefits would include expanded participation of culturally diverse students, shared fulfillment of the 1862/1994 land grant mission, improved faculty-student communication and interaction and expansion of the talent pool entering STEM professions. The heart of the proposal is the interaction of tribal high school, tribal college, mainstream University and engineering profession stakeholders to facilitate the recruitment, education and support of tribal students to acquire and hone the skills that will allow them to enter the engineering profession or contribute in some other fashion to their communities and the nation. The proposal will accomplish this vision by impacting students through interactions with faculty/staff, curriculum and supporting functions/agencies. All of this will be accomplished in a culturally supportive fashion.