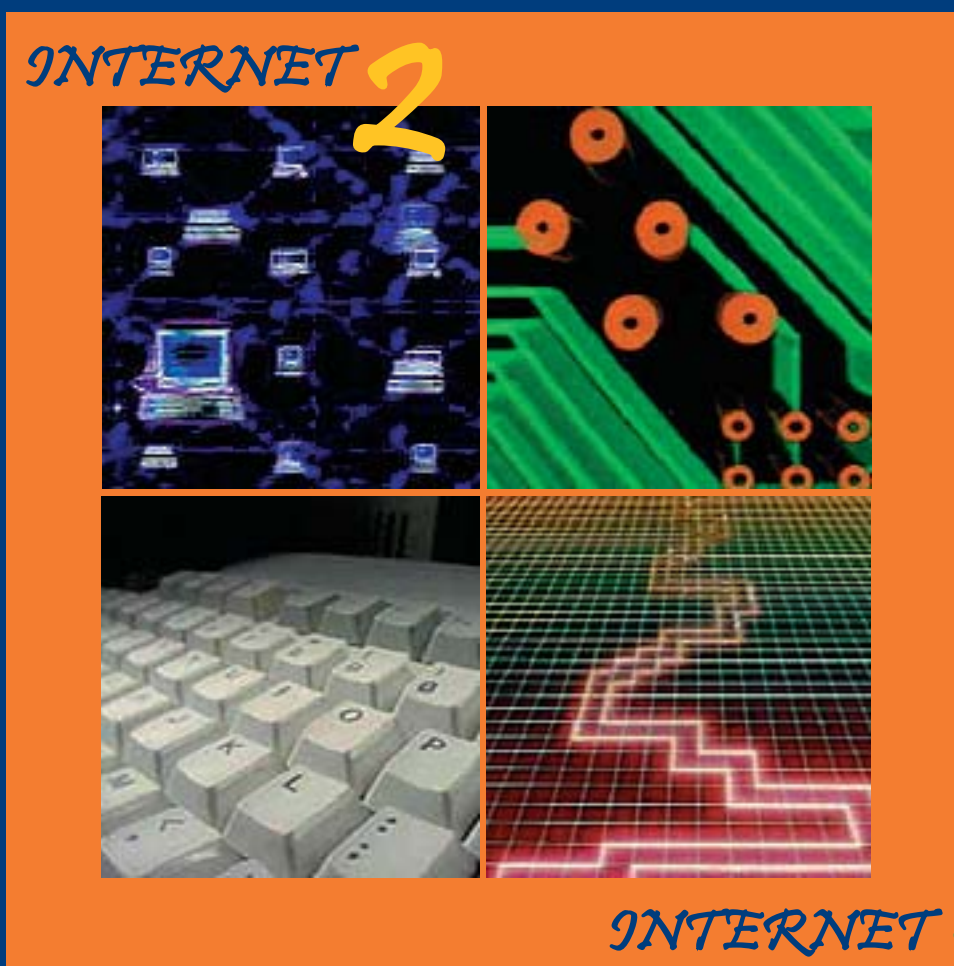


QUARTERLY

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY

FALL 1998



SDSM&T Jumps on the Internet Fast Lane

Story on page 8

A PUBLICATION OF SDSM&T

Perspectives



The South Dakota School of Mines and Technology entered our 119th year continuing our commitment of excellence established more than a century ago. Those traditions continue both in and out of the classroom. Included within our traditions is a commitment to providing our students with an excellent education at an affordable price. This fall the University was recognized by Barrons, a leading resource for higher education information, as one of 300 'Best Buys' in higher education from across the nation. This coveted recognition is also reinforced by an increase in the number of new students choosing to join the Tech family this fall.

Tech is committed to enhancing teaching and learning through the integration of advanced technologies. Our traditions of excellence in teaching were recently given a boost through a project funded by Governor Janklow. The South Dakota School of Mines and Technology was honored to be selected to participate in the Governor's Faculty Awards for Teaching with Technology program.

During the past summer eight of our faculty and forty-nine other faculty from across the state were selected to participate in the program. The Tech projects resulted in a wide range of resources for our current students as well as students and teachers in the K-12 systems across our state. The High Priority Connection Network has made it possible for these resources to be accessed through the South Dakota Education Network via the Internet.

Although the projects officially involved only eight of our faculty, support was provided for the projects from across the campus. Today these faculty are not only providing new learning experiences for their students, they are also serving to teach and inspire their fellow faculty to utilize new technologies.

These are just a few examples of the many projects being implemented on campus to apply current technologies to provide our students with the competitive educational edge Tech students have expected and experienced for nearly 12 decades.

Sincerely,

Richard J. Gowen
President

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY QUARTERLY

Fall 1998

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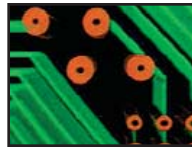
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CAMPUS

Profile

The South Dakota School of Mines and Technology, founded in 1885, has been a national leader in preparing world-class engineers and scientists. Our graduates design, construct, and operate modern technology to meet complex challenges such as global warming, health care delivery, energy resource development, mineral extraction and processing, environment quality, futuristic transportation, and national defense. Our alumni are held in the highest regard by their fellow leaders in industry, consulting, government, health and education.

Tech has diversified to meet the needs of engineering and science throughout the world. South Dakota Tech's intellectual environment was shaped a century ago by the ingenuity and rugged individualism of pioneers in science and technology. Tech's present day pioneers provide inspiration and remain on the cutting edge in the fields of engineering and the sciences.

ACADEMIC PROGRAM: SDSM&T is a state-assisted university providing graduate and undergraduate degrees in science, engineering, and interdisciplinary studies.

BACHELOR OF SCIENCE DEGREES

Chemical Engineering	Industrial Engineering
Chemistry	Interdisciplinary Science
Civil Engineering	Mathematics
Computer Engineering	Mechanical Engineering
Computer Science	Metallurgical Engineering
Electrical Engineering	Mining Engineering
Geological Engineering	Physics
Geology	

MASTER OF SCIENCE DEGREES

Atmospheric Sciences	Materials Engineering and Sciences
Chemical Engineering	Mechanical Engineering
Civil Engineering	Paleontology
Computer Science	Technology Management
Electrical Engineering	
Geology and Geological Engineering	

DOCTORATE OF PHILOSOPHY DEGREES

Atmospheric, Environmental and Water Resources
Geology and Geological Engineering
Materials Engineering and Sciences

ENROLLMENT: The University has a diverse enrollment of approximately 2,200 students from nearly 30 states and 20 countries. Our 13 departments offer 30 degree programs in engineering and science disciplines at the baccalaureate, masters, and doctoral levels. Students enter the university with the highest ACT composite in the state and more than half graduating within the top 25 % of their high school.

COSTS AND FEES: Annual undergraduate costs for tuition, fees, room and board total less than \$8,000 per year for residents of South Dakota, Alaska, Colorado, Hawaii, Idaho, Minnesota, Montana, Nevada, New Mexico, North Dakota, Oregon, Utah, and Wyoming. Annual total costs for all other undergraduates is less than \$11,000 per year.

RESEARCH: High quality research is conducted in departments and in our research institutes.

FACULTY: There are approximately 100 faculty with degrees from more than 150 institutions, eighty five percent of which have earned doctoral degrees.

Jurassic

Dinosaurs reign over

About 150 million years ago—70 million years before the Black Hills were even formed—huge Jurassic-era creatures roamed the area now known as the northern Black Hills and ruled over the region's first mammals. SDSM&T paleontologists are unearthing fossils of Jurassic dinosaurs and primitive mammals at an important scientific site near Sundance, Wyoming. Unlike the mechanical versions found on movie screens, these Jurassic dinosaur skeletons are the real things!

For the past several summers, officials of the SDSM&T Museum of Geology have been excavating the Jurassic bone bed that was unearthed as a result of the

Interstate highway being built. SDSM&T graduate student John Foster (MS Paleo '93) discovered the site in 1991 after parking along I-90 to check out a rock outcrop of the Morrison Formation. It took him only a few minutes to realize that the highway had cut through a site that contained many fossils.

Under a cooperative partnership agreement with the State of Wyoming, SDSM&T paleontologists are conducting the field excavation along Interstate I-90 west of Sundance. Dr. James Martin, SDSM&T Curator of Vertebrate Paleontology and Professor of Geology, has directed the field excavations. Over the years hundreds of students and volunteers from across the nation have participated in these field digs.

"This site represents a unique and significant paleontological find for several reasons," says Dr. Martin. "The area has produced an amazing abundance of specimens in a small area—a diversity of relatively little-known dinosaurs from the Black Hills and rare Jurassic mammals. It's the most significant dinosaur site in the Black Hills," states Dr. Martin. "The diversity is unparalleled."

The site represents a prehistoric streambed where flooding events deposited dinosaurs and mammals approximately 150 million years ago. Through their excavations at this site, SDSM&T paleontologists have recovered some very well articulated skeletons of *Allosaurus* and *Camarasaurus*. In the world of zoology, articulated means having joints or movable segments between bones still in life position.

Excavation during the summer of 1997 focused on recovering the skeleton of *Camarasaurus*, a huge herbivorous dinosaur from the Late Jurassic period known for its "fishing pole" neck. These dinosaurs foraged for plants in the same region where buffalo would eventually roam many millions of years later. Describing the *Camarasaurus* site as "extremely significant and rare," Dr. Martin

states there are few other sites of this magnitude in North America.

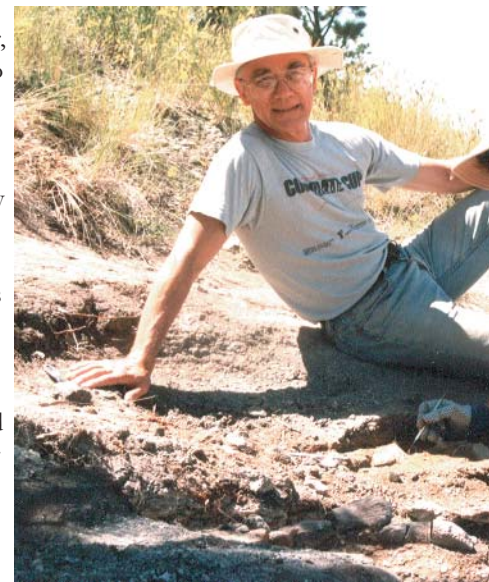
Camarasaurus was a gigantic beast that stood 50 feet high and measured 50 feet long. However, compared to the rest of the body, this dinosaur had an extremely tiny head that was only 1-1½ feet in diameter. The weight of the unearthed pelvic portion illustrates the size of this Jurassic creature. The fossilized pelvic portion of *Camarasaurus*, which SDSM&T paleontologists carefully removed and transported to their curation lab on campus, weighed over six tons!

Darrin Pagnac, a graduate student in paleontology at SDSM&T, has concentrated his research on this *Camarasaurus* specimen. "Darrin's research is a review of species of *Camarasaurus* based upon the structure of the forelimb. From the research a better understanding of these dinosaur species will result," says Dr. Martin.

This past summer SDSM&T's field digs focused on excavating adult and juvenile *Allosaurus* fossils located at this site. *Allosaurus*, which means strange lizard, was a flesh-eating dinosaur from the Jurassic Age. Allosaurs were approximately 36 feet long and walked semi-upright on their hind legs. The teeth of *Allosaurus* are somewhat knife-like in contrast to the rounder teeth in the younger carnivore, *Tyrannosaurus rex*.

In conjunction with excavating the adult *Allosaurus*, SDSM&T paleontologists also focused on recovering the bones of a baby allosaur. Because the bones of smaller animals tend to be more easily broken and scattered, Dr. Martin states that finding a juvenile *Allosaurus* specimen is especially rare.

In addition to the *Camarasaurus* and *Allosaurus* specimens, other fossils found at this site include *Apatosaurus* (or *Brontosaurus*), *Barosaurus*, *Diplodocus*, *Stegosaurus*, two types of turtles, two types of fish, freshwater clams, and vegetation. However, the fossils of three types of primitive mammals—some very



Jim and Kathy Heaslip of Baton Rouge, Louisiana, the Jurassic-era paleontology field dig site under the di

Bone Bed

primitive mammals

tiny, shrew-like creatures—that have been discovered here are especially significant. SDSM&T paleontologists have unearthed the jaw of a very primitive mammal unlike any that has been previously found.

"Mammals are one of the most important creatures from the site," says Dr. Martin. "They are exceedingly rare at this time." He adds that the shrew-like insectivores and other mammals found at the site became extinct and are not the ancestors of any creature that lives currently.

"The fossil site is fascinating because it is from an era in which mammals were just developing the toolbox of traits that enabled them to coexist with dinosaurs and eventually replace dinosaurs," explains Dr. Martin. "While dinosaurs dominated the landscape, these little mammals were underfoot but preparing to one day dominate."

This site provides an important window into what the prehistoric ecosystem was like during the Jurassic era. What caused this paleontological piece of Jurassic life to be preserved? Dr. Martin believes a catastrophic flood created this Jurassic bone bed by depositing the animal remains into a pool that was quickly covered. With the right set of conditions occurring after the catastrophe, the bones were preserved in the ancient riverbed until being exposed by highway crews building Interstate 90.

Field excavation is slow, tedious work that combines the patience of Job with the joy of unearthing fossils that are millions of years old. The field dig crews carefully chip away at the sandstone with dental picks, trowels and paintbrushes to recover

Story Photos by Julie Smoragiewicz



work on excavating the allosaur fossils discovered at direction of SDSM&T.

the embedded bones. The location and identification of the fossils are recorded in the well-documented field notes that accompany every scientific excavation.

Once exposed, the bones are encased in a plaster jacket for protection while being transported back to SDSM&T's curation lab for further research and preservation. Some fossils from this site will eventually be placed on display at the Crook County Museum in Sundance.

Jim and Kathy Heaslip of Baton Rouge, Louisiana, were among the volunteers who traveled to South Dakota this summer to take



Paleontology graduate student Darrin Pagnac (Stephen, MN) carefully removes rock and soil from fossils found at the Jurassic site.

part in SDSM&T's field digs. Scraping away dirt with a dental pick, they worked on recovering the foot bones of a baby *Allosaurus*. "You know how it feels when a fish hits?" asks Jim Heaslip while describing his field dig experience. "You know it's a bone."

After the summer field dig sessions are completed, SDSM&T officials cover the entire site with dirt to protect it during the winter months. The following summer, the excavation crew digs out the site by hand because using any large earth-moving equipment on the site would crush the ancient bones underneath.

SDSM&T Museum of Geology officials hope that excavation at this important paleontological site will continue in the years ahead. During the month of July, SDSM&T offers two field dig sessions at this Jurassic site, each two weeks in length. The public can participate on a limited, space available basis in these or any of the numerous other field digs offered each summer. The option of taking the field digs for academic credit also is available. Information about participating in a future field dig can be obtained by contacting Dr. Philip Bjork, Director, SDSM&T Museum of Geology, at 1-800-544-8162, ext. 2467 or via email: pjbjork@msmailgw.sdsmt.edu.

As they carry on their scientific work at this site, SDSM&T paleontologists continue to piece together prehistoric clues that shed light on what Jurassic life was like. They are not only recovering fossils that predate the Black Hills, but are also making important contributions to a better understanding of prehistoric life, extinction and the future of our own species. ✂

Wired, Wrapped, & Ready

Faculty deliver
cutting-edge technological instruction

From high-tech 3-D glasses to an interactive CD-Rom about Black Hills geology, SDSM&T faculty members are integrating computer-based technologies into their teaching. These techno-charged professors at SDSM&T are at the forefront of delivering cutting-edge instruction in their disciplines.

Eight SDSM&T faculty members spent a productive summer utilizing funds from Governor Janklow's Faculty Awards for Teaching with Technology Program to prepare excellent course resources that will be available to all students. The South Dakota Education Network (www.bpcnet.org/SDEdNet) links these resources to allow teaching and learning to be available in the classrooms of elementary and secondary schools, technical institutes and higher education.

Governor Janklow established the special competitive grant program earlier this year to provide innovative faculty members from South Dakota's six public universities with the resources to redesign courses integrating applications of computer-based technology into their disciplines. Of the fifty-seven award recipients, eight were SDSM&T faculty members whose project grants totaled nearly \$180,000 and whose academic subjects ranged from science and engineering disciplines to sociology and English.

In his project entitled *Blending Technologies for a Data-Driven Introductory Statistics Course*, **Dr. Roger Johnson**, Associate Professor

of Mathematics, redesigned SDSM&T's introductory statistics course. He supplemented PC-based technologies with the use of the TI-83 statistical graphing calculator

and two associated data-collection devices, the Calculator-Based Ranger (CBR), and the Calculator-Based Laboratory (CBL).

The CBR records time, distance, velocity, and acceleration on a moving object. The CBL probes can measure temperature, light intensity, current, voltage, force, magnetic field, EKG, pressure, pH, heart rate, respiration, and other kinds of data. By gathering and analyzing real data in class through CBR and CBL lab activities, students can better appreciate the data collection process and how to deal with measurement variability.

"I can envision several uses of these materials by students in

"As a former teacher, I can appreciate the total commitment from the faculty members who did this," said Lt. Governor Carole Hillard. "I am pleased to see technology being applied in a wide range of disciplines in the sciences, history, English, and sociology, as well as geology and chemistry."

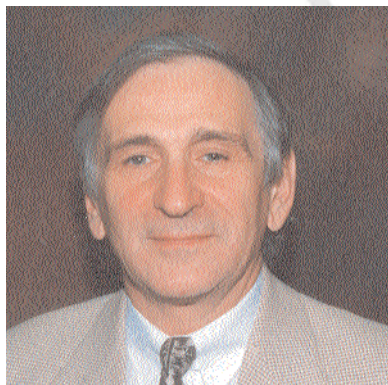


Story Photos by Darrell Sawyer

*Dr. Robert Corey
Assistant Professor of Physics*



*Dr. Sidney Goss
Professor of Sociology*



*Dr. Zbigniew Hladysz
Chair and Professor of Mining Engineering*



*Dr. Stanley Howard
Chair and Professor of
Metallurgical Engineering*



*Dr. Roger Johnson
Associate Professor of Mathematics*

my high school statistics and math classes," said Marie Ritten, statistics and calculus teacher at Rapid City Stevens High School.

Dr. Brad Morgan, Professor of English, utilized the award for his *English 101* project to redesign the freshman English course to adapt to the World Wide Web. With distance education students accessing from home, the restructured course helps to deliver class materials and promote student writing. In addition to developing their own Web pages on the HPCNet and posting writing assignments for peer critiques, students will build an electronic portfolio to which they can continually add materials.

"Students in my advanced technical course are developing a multi-assignment HPCNet-based business package to gain experience in writing in a Web environment," said Dr. Morgan.

Dr. Larry Stetler, Assistant Professor of Geological Engineering, utilized his award to develop an interactive, multimedia CD-Rom entitled *The Geology and Natural Science of the Black Hills*. This product was designed for junior and senior high school earth science courses as a supplement to the regular science curriculum. Arranged in five modules with several subjects, the material

remendous effort and
displayed their projects,"
eased to see technology
including music, art,
logy, mathematics, physics

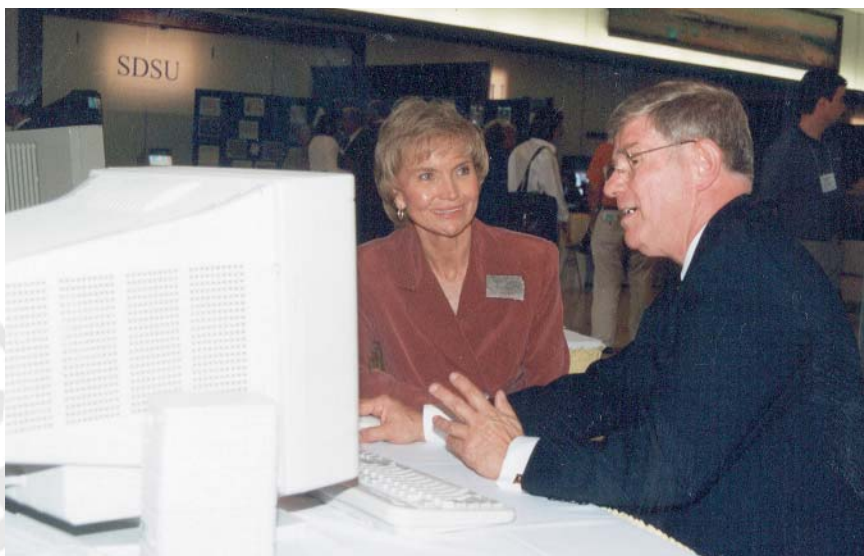
includes text, video clips, photos and audio.

"For students of all levels, this project can be adapted for use as a method of teaching geology and science related to the Black Hills," explained Dr. Stetler.

As a result of his award, **Dr. William Roggenthen**, Professor of Geological Engineering, developed the *Modular Delivery of Geophysical Techniques*. Building the main module around ground-penetrating radar

(GPR) and a subsidiary module on seismic techniques, he constructed training and teaching units to complement his geophysics instruction.

Dr. Robert Corey, Assistant Professor of Physics, utilized his award to develop *Prep-Physics I*, a multi-use instructional software package that can be used for remedial or introductory physics. The project is HPCNet (High Priority Connection Network) based, which will allow students across South Dakota access and will prepare them for placement exams as they move through the self-paced program.



Dr. Richard J. Gowen, SDSM&T President, demonstrates the South Dakota Education Network (SDEdNet) to Lt. Governor Carole Hillard during the Governor Janklow's Faculty Awards for Teaching With Technology demonstration program.

Through his project entitled *Sociology: Live and Connected*, **Dr. Sidney Goss**, Professor of Sociology, restructured the Introduction to Sociology course. As a result, the course is now more accessible to distant learners, allowing them and on-campus students access to a wide range of course-related material directly from the Web. With the click of a mouse, South Dakota's students are instantly linked to students around the world currently enrolled in the same course. Providing South Dakota's high school seniors with the opportunity to receive dual credit, the course also is directly accessible through SDSM&T's Educational and Distance Technology Services (EDTS).

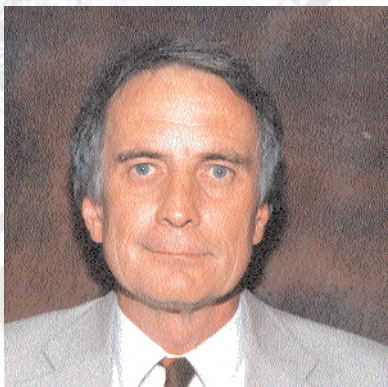
Dr. Stanley Howard, Chair and Professor of Metallurgical Engineering, designed *Thermodynamics On-Line*, an interactive software package to help engineering students learn the fundamental principles of thermodynamics. This resource could be used by both high school students and teachers in Advanced Placement physics and chemistry courses.

Dr. Zbigniew Hladysz, Chair and Professor of Mining Engineering, used his award to develop and implement cutting-edge, three-dimensional computerized visualization. His project was named *Virtual Earth*. Dr. Hladysz developed a sequence of visual case studies that can be used to teach science and

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*Dr. Bradford Morgan
Professor of English*



*Dr. William Roggenthen
Professor of Geological Engineering*



*Dr. Larry Stetler
Assistant Professor of
Geological Engineering*

From MINES TO MONGOLIA and Down Under

Civil engineering professor's expertise spans the globe

The reputation of Dr. Venkataswamy Ramakrishnan, SDSM&T Distinguished Professor of Civil & Environmental Engineering, extends far beyond the campus and the borders of South Dakota. Universities around the world—from Mongolia to China to Australia—invited him to present technical workshops in their countries this past summer and share his knowledge about high performance concrete. Dr. Rama, as he is affectionately known, conducted pioneering research work at SDSM&T in high performance concrete and is one of the top international experts in that field.

Under Dr. Rama's leadership, the first international workshop on concrete was presented in Mongolia—the ancient realm of Genghis Khan, whose empire was the largest in world history. At the height of his rule, Genghis Khan occupied more land than either Alexander the Great or the British Empire!

With funding support from the National Science Foundation (NSF), Dr. Rama organized and conducted the "U.S.-Mongolia Joint Workshop on High Performance Concrete for Construction and/or Rehabilitation of Transportation Structures." The three-day workshop was held at Mongolian Technical University in Ulaanbaatar, Mongolia, during the first week of July, 1998.

As principal investigator for the NSF grant, Dr. Rama selected the leading U.S. experts in concrete to comprise the ten-member U.S. team visiting Mongolia. Participants included George Hoff, former president of the American Concrete Institute, and Dave Huft, Research Engineer, South Dakota Department of Transportation, as well as officials from the Federal Highway Administration, Rutgers University, University of Maryland, University of Illinois, and the University of New Hampshire. Workshop participation by Mongolians was restricted to high-level officials, including a Member of Parliament, the Ministry of Infrastructure, highway department chiefs, and a few selected civil engineering department faculty.

The workshop focused on cooperative research projects that could be undertaken to assist Mongolia in the repair, renovation and rehabilitation of its deteriorating transportation infrastructure. The very best roads in the nation are asphalt and have little or no drainage.

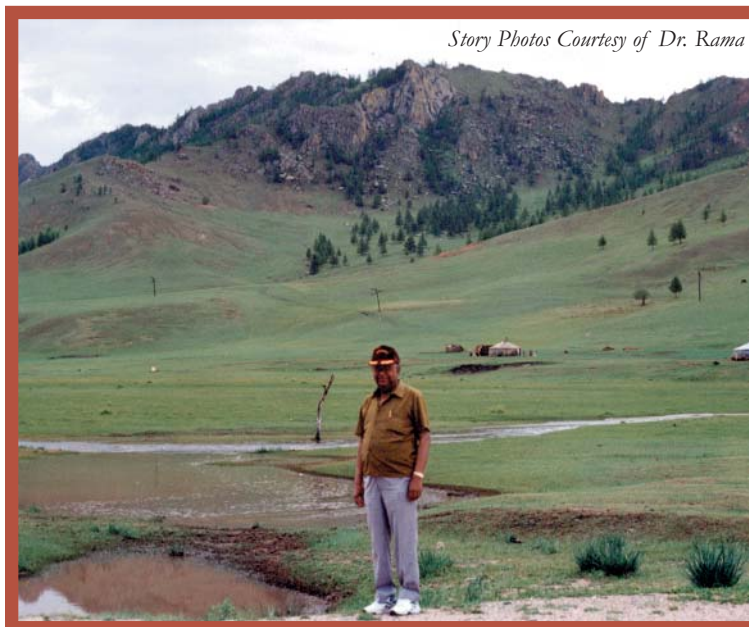
Following a lengthy period of Soviet domination, Mongolia is making a transition to a western-style economy. Although such economic changes are often difficult, Mongolia has certain advantages such as a well-educated population, substantial natural resources and proximity to the large Asian market.

After following Russian bridge-building standards for many years, Mongolia adopted the use of U.S. bridge specifications two years ago. Recognizing the poor condition of their current road and bridge system, Mongolian officials are very interested in developing a good transportation infrastructure. Currently, no highway connects Ulaanbaatar, the largest city and capital of a nation. The landlocked country on the northern plain of central Asia has a population of 2.3 million people, half of whom are under twenty years of age. As many people live in Ulaanbaatar as the entire state of South Dakota!

Dr. Rama was very impressed with the Mongolian participants' knowledge and their desire to learn how to improve Mongolian roads and bridges using pre-stressed concrete. "Of the five international workshops I have presented, none had as many questions and as good discussion as this one," stated Dr. Rama. "This was the way a workshop should be."

Although they are located on opposite sides of the globe and have strikingly different transportation systems, Mongolia and South Dakota share many similar topographical features. Ulaanbaatar is located in a mountainous region of Mongolia, which also has large areas of grassland with few trees, similar to the western South Dakota plains. This area of Mongolia also has hills that reminded Dr. Rama of the Black Hills of South Dakota.

Mongolian officials extended gracious hospitality to the U.S. delegation. In addition to touring laboratories and construction sites, Dr. Rama and his colleagues visited the Mongolian National Games, attended a concert in the National Theater, and were guests of honor at a traditional Mongolian reception. Touring the region, they received a firsthand look at a ger, a traditional felt tent in which the nomadic people live, moving from place to



Story Photos Courtesy of Dr. Rama

The scenery in Mongolia reminded Dr. Rama of the Black Hills.

place on the Mongolian grasslands as the grass is depleted. The circular structure, which can be warm in the arctic cold and cool in the summer heat, can collapse small enough to be transported by one animal and can be set up again in only a few hours.

The workshop in Mongolia is an extension of the ties previously established between SDSM&T and Mongolian Technical University (MTU). Although MTU's student population of 6,500 is nearly three times the size of SDSM&T's enrollment, the two institutions have a similar focus that emphasizes technology, science, engineering and mathematics. During a visit to Rapid City in February of 1997, Dr. D. Badarch, Rector at MTU, jointly signed a Memorandum of Understanding with Dr. Richard Gowen, President of SDSM&T, that set forth plans to develop collaborative technical research projects.

The goal of fostering an exchange of students and scholars between the two institutions is already bearing fruit. For the first time, two students from Mongolia are currently studying at SDSM&T. Burmaa Ayurzana is majoring in computer science, and Davabat Mangal is studying mining engineering.

"We are planning to organize cooperative research as a follow up to the workshop," says Dr. Rama. "The National Science Foundation is very supportive of cooperative research." NSF officials who were instrumental in supporting the project include Dr. William Y.B. Chang, Program Manager, Division of International Programs, National Science Foundation, and Dr. Ken P. Chong, Program Manager, Structural Systems and Construction Processes, who reviewed the proposal for the workshop.

Mongolia's neighbor to the south and east, the People's Republic of China, also hosted Dr. Rama this summer at a seminar he conducted at Tsinghua University in Beijing, the top engineering university in China. Recognizing Dr. Rama's prominence in the civil engineering profession, Chinese officials provided some of their faculty and top students with the opportunity to hear firsthand from Dr. Rama about his research in high performance concrete.

Following the workshop in Beijing, Dr. Rama was invited to present a seminar on fiber-reinforced concrete to China's largest engineering consulting firm. Chinese officials chartered an airplane and flew Dr. Rama to the site of where the world's largest concrete dam is being constructed.

China is very interested in utilizing fiber-reinforced concrete wherever possible.

This past summer was the third time that Dr. Rama made technical presentations in China. The president of the Kummimg Institute of Technology and the Ministry of Education of the People's Republic of China first invited him to

Dr. Rama stands in front of a ger in Mongolia.



visit twelve years ago, during a period when few Americans were allowed to visit China. He spent a month giving a total of thirteen lectures on his concrete research at Kummimg Institute of Technology, Shanghai Research Institute, and the Research Institute of Building Materials in Beijing.

Two years later in 1989, the summer of Tiannamen Square, the Chinese Ministry of Construction invited Dr. Rama back to discuss his research activities. He helped the faculty at the Harbin University Architectural and Civil Engineering Institute with starting new research that would be useful in developing new materials and structures designed to be more resistant to earthquakes. He also gave two seminars at the China Building Materials Academy. At that time, with the help of a \$10 million loan from the World Bank, China was building the world's second largest shake table to be used for earthquake research.

In addition to Dr. Rama's reputation extending from North America to Asia, officials "down under" also recognize him as one

of the world's foremost experts on high performance concrete. Curtin University of Technology in Perth, Western Australia, selected Dr. Rama as its 1998 C.Y. O'Connor Fellow. He is only the



Dr. Rama (right) and the School of Civil Engineering's Professor B Vijay Rangan meet with Vice-Chancellor Professor Lance Twomey from Curtin University of Technology (seated).

fourth person in the world to be awarded this prestigious honor. The \$10,000 fellowship funds visits to Curtin University by eminent engineers and scientists who can contribute to the development of science and engineering in Western Australia. Previous recipients include individuals from Denmark, Great Britain, and the former president of the American Concrete Institute.

The fellowship was established in honor of the first Engineer-in-Chief of the Colony of Western Australia and one of the most eminent civil engineers in Australian history. O'Connor not only built the Perth Harbor in the late 19th century, but also



Dr. Rama and Dr. Badarch, President of the Mongolian Technical University, discuss issues related to the conference.

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SDSM&T is joining the next generation Internet that will leave non-participants in the cyberspace dust! The new, high speed connection will move SDSM&T into the fast lane of the information superhighway. The change in network speed is akin to switching from a moped to a turbo-charged race car on the Interstate highway!

The National Science Foundation (NSF) recently selected SDSM&T as one of the approximately 150 research universities around the nation to be connected to Internet 2. South Dakota Tech joins a very prestigious group. These 150 universities with Internet 2 connections represent only 4% of the approximately 3,600 higher education institutions in the United States.

SDSM&T will soon be connected to this new high speed, high-capacity fiber-

"Internet 2 is at the forefront of developing applications that will push the technology network forward to support them."

The current Internet, which began as a research tool, does not have the "bandwidth" or capacity to transmit the huge amounts of data and graphics that many faculty and research scientists need. Much like a traffic jam on the freeway, today's Internet often gets bogged down in handling millions of daily electronic transmissions.

This congestion stems from the explosive growth in using the Internet for everything from e-mail and electronic commerce to surfing the World Wide Web and playing video games. According to a recent survey by Nielsen Media Research and Communications, more than 1/3 of U.S. adults (70.5 million) now use the

Cabletron, Cisco, FORE Systems, IBM, Lucent, MCI, Newbridge Networks, Qwest, Nortel and Starburst Communications.

Just as today's existing Internet stemmed from investments in federal and academic research networks of the 1980s, the development of Internet 2 by universities, in collaboration with industry and government, will result in a new generation of Internet applications and commercial uses that will benefit all society. Internet 2 will not replace the current Internet but rather is a parallel network.

In addition to a dramatic increase in speed from the current Internet, another important advantage of Internet 2 to researchers and higher education is that Internet 2 allows for data transmissions to be sorted and prioritized. Bandwidth can be reserved on the Internet 2 network, which can then make possible "real-time"

optic network. This high speed connection means that scientists at SDSM&T will have the capacity to transmit large amounts of research data and also have "real-time" video interactions with their colleagues located elsewhere in the nation. The connection to Internet 2 provides SDSM&T with a capacity approximately 30 times greater than the current network for sending information electronically.

"This enhanced connectivity will allow us to communicate and share equipment and resources in new ways," says Katherine "Kata" McCarville, SDSM&T Director of Instructional Technology Services.

Internet—an increase of 340% in the past three years!

Internet 2 is a partnership among higher education, industry and government that is developing advanced technology and Internet applications to meet the research needs and education missions of higher education. Participants in Internet 2 are members of the University Corporation for Advanced Internet Development, which provides leadership and direction for advanced networking development within the U.S. university community. Corporate partners include 3Com, Advanced Network & Services, AT&T, Bay Networks,

applications, including video presentations and medical imaging.

Access to this high speed high-capacity network, will enable researchers to collaborate with their scientific colleagues in other geographic locations and share large amounts of data, including three-dimensional graphics. Applications are currently being developed to provide the capability to operate complex equipment, including high-tech imaging devices, from remote sites. This advanced research and education network offers tremendous potential to be applied in a myriad of ways—virtual laboratories, digital libraries (with real-time sound and video), telemedicine in rural medically underserved areas, and distance education.

Connectivity to this heavy duty computer networking infrastructure has very important economic development ramifications for attracting more high-tech businesses to South Dakota. Future SDSM&T graduates will have experience in utilizing the applications of the new technologies. Faculty members will be accessible for consulting work that involves these advanced data transmissions, which can in turn drive the demand for networking infrastructure into the commercialization phase.

INTERNET 2

As new applications for scientific research, telemedicine, and education are developed, a ripple effect will occur, leading to increased private sector demand for high speed connections. Regular Internet service providers experienced a similar ripple effect the past few years. This can drive the private sector need for advanced networking services to a point where the high speed, broader bandwidth will eventually become the common denominator for commercial connectivity.

SDSM&T's connection to this next generation Internet network offers tremendous potential for expanding and enhancing distance education programs in South Dakota. The higher education institutions in South Dakota will have greater opportunities to share faculty expertise and also offer students access to courses otherwise not available to them.

INTERNET 2

developing applications that require or take advantage of high speed high-capacity network connectivity. The new national network for education and research that is being put in place to support these

In addition to NSF funds underwriting the cost of the intercampus connections to the new high speed electronic network, SDSM&T is providing an equivalent match to its share of the NSF grant. SDSM&T's

This can result in enhanced academic opportunities and greater collaboration within the South Dakota higher education system.

Funding from the National Science Foundation (NSF) has been instrumental in the effort to connect SDSM&T to high bandwidth networks. An NSF EPSCoR (Experimental Program to Stimulate Competitive Research) grant provided \$1.4 million for the Great Plains Networking Consortium to build a high bandwidth pipeline connecting universities in the six Great Plains states from North Dakota to Arkansas. SDSM&T, along with South Dakota State University (SDSU) and the University of South Dakota (USD), are members of the Great Plains Networking Consortium. Through the grant, a "drop point" was provided in each of the six states to connect to the network pipeline. The EROS Data Center serves as the drop point in South Dakota.

"The Great Plains Network will play a key role in leveling the playing field for the scientists in this region," stated Royce Engstrom, EPSCoR project director. "Our researchers will have access to the same computing resources as scientists in the rest of the country."

The Internet 2 program is focused on


applications is being deployed in two modes—the very high performance Backbone Network Service (vBNS) and Abilene networks.

The DakotaLink project, which NSF also approved for funding, will connect the EPSCoR universities in North and South Dakota (SDSM&T, SDSU, USD, UND and NDSU) through the EROS Data Center and eventually have access to both the vBNS and Abilene. This high capacity network allows scientists and engineers to collect and share vast amounts of data, collaborate better across large distances, and run complex equipment remotely.

The NSF grant will provide SDSM&T, SDSU and USD with DS-3 fiber optic connections to the high speed computer-networking infrastructure. A DS-3 pipe connection can handle 328 mbps, which is equivalent to 328,000,000 bits per second. This means SDSM&T researchers and students now will be able to send and receive data more than 200 times faster than the 1,540,000 bits per second capability of the current T-1 connection! In comparison to the average modem of a home computer operating from 28,800 to 56,600 bits per second, the speed of the new DS-3 connection will be 6,000 to 11,000 times greater!

matching funds are being used to improve the access of researchers, professors and students to the network. These efforts include acquiring faster routers, as well as installing fiber-optic cable within and between campus buildings.

The connection to Internet 2 will transform higher education in South Dakota by reaching new markets and fostering collaboration between research institutions that are geographically scattered. A few examples of current SDSM&T research activities that will immediately benefit from this new capability to quickly transmit large amounts of data include the Upper Missouri River Basin project, three-dimensional depictions of virtual mines, and weather models used by the Institute of Atmospheric Sciences.

SDSM&T's connection to Internet 2 will open the electronic floodgates for the university. The high performance networks linking powerful computers and vast databases will usher in a new age of scientific exploration as students and faculty enter the fast lane on the information superhighway. Overcoming geographic barriers, the new high speed network will zap SDSM&T to the forefront of leading-edge research on the next generation Internet. 

Oyate Consortium

Collaboration with tribal colleges continues



Story Photos Courtesy of Mark Peacock

Dr. Bruce Berdanier, Assistant Professor of Civil and Environmental Engineering, demonstrates stream gauging tests on the Moreau River to Oyate Summer Institute students.

SDSM&T's collaboration with tribal colleges reached a new level of partnership this past summer.

Through an innovative cooperative agreement with the Oyate Consortium, faculty members from SDSM&T, Oglala Lakota College and Cheyenne River Community College co-taught environmental science courses this summer. This joint effort is a continuation of SDSM&T's commitment to serving as a partner and resource to tribal colleges in developing pre-engineering curricula and environmental science courses of study.

The Oyate Consortium, in which Oglala Lakota College (OLC) is the lead institution, is a partnership among the tribal colleges in South Dakota designed to share resources and enhance the educational opportunities for tribal college students. Other members of the Oyate Consortium include Cheyenne River Community College, Sinte Gleska University, Sisseton-Wahpeton College and Sitting Bull College.

Thirty-six students from tribal colleges and SDSM&T enrolled in the Oyate Consortium Summer Institute courses. These courses were intense, two-week immersion experiences that focused on various environmental topics. The courses offered were Environmental Engineering-Water Quality, Environmental Hydrology, Lakota Culture and Environment, Principles of Ecology, and Principles of Forestry.

Faculty members who participated in the Summer Institutes included Dr. Bruce Berdanier, SDSM&T Assistant Professor of Civil & Environmental Engineering; Kail Bowman, OLC Biological Sciences Instructor; Dr. Scott Kenner, SDSM&T Associate Professor of Civil & Environmental Engineering; Mark Peacock, Alliance for Minority Participation (AMP) Project Director, Cheyenne River Community College; Dr. Andrew Rogerson, former SDSM&T Associate Professor of Biology; and Dr. Mitch Stone, OLC Academic Coordinator and SDSM&T Assistant Professor of History. Kail Bowman, who was site coordinator for the Summer Institutes, lived in the SDSM&T dormitories with the students and also

provided tutorial services.

Classroom teaching and hands-on laboratory experiences were provided on the SDSM&T campus. Some of the workshops also included in-the-field instruction off campus. Students in Dr. Bruce Berdanier's Environmental Engineering-Water Quality course studied stream gauging on the Moreau River and toured water treatment plants on the Cheyenne River Reservation. Under the guidance of Dr. Berdanier, the students learned how to develop a cross-section for conducting stream gauging tests.

Faculty involved with the Summer Institute courses stated that the students did extremely well, worked hard and were highly motivated during the intense, total immersion workshop experiences. Each two-week course involved a total of forty-five classroom hours, earning students who completed the workshop three credit hours.

Some of the students continue to participate in undergraduate research with SDSM&T faculty members. For example, Bob Whipple, an SDSM&T civil engineering major from Porcupine with Lakota and Navaho ancestry, spent the summer assisting Dr. Berdanier on a water quality survey of the Rapid Creek Watershed through Rapid City. They are currently working together to develop a research program for a nitrogen mass balance through the Rapid City Wastewater Treatment Plant.

Hayes Haas, who is completing the requirements for an Associate of Arts degree in math and science from Oglala Lakota College, participated in the Summer Institutes. Having finished OLC's pre-

engineering curriculum, Haas is moving into the civil engineering program at SDSM&T. He also has been hired part-time by the U.S. Geological Survey (USGS) and will be working on a monitoring program for ground water wells on the Pine Ridge Reservation.

The National Science Foundation and the All Nations Alliance for Minority Participation (ANAMP) funded the Summer Institute collaborative course offerings. Dr. Mitch Stone and SDSM&T alumnus Stacy Phelps (ME '96), OLC Special Projects Coordinator, worked with SDSM&T officials in organizing the workshops. NSF, ANAMP, and the American Indian Science & Technology Education Consortium (AISTEC) are helping to create a network of activities and funding sources that support the learning of minority students in math, science and engineering.

"From both a student performance and a tribal collaboration perspective, the courses were a successful experience," stated Dr. Francine Campone, SDSM&T Associate Dean of Students. "We hope that additional Summer Institutes will be offered in the future on a regular basis."

In addition to the Summer Institutes, the Oyate Consortium has done several other projects to enhance math, science and engineering curricula at tribal colleges in South Dakota. These include the development of distance learning infrastructure, as well as articulation agreements that foster interaction and transfer of credits between tribal colleges and SDSM&T.

"The cooperation given by SDSM&T to members of the Oyate Consortium has been outstanding," noted Dr. Stone. "This collaboration has broadened the benefits

[continued on page 21](#)

Oyate participants who received hands-on laboratory experience include (l to r) Luke Peterson, Angel Lee, Delaine Peterson, and Mark Peacock, Alliance for Minority Participation (AMP) Project Director, Cheyenne River Community College.





-apauling to a New Level of Excellence

Corporate Gift will Benefit Students and Faculty

Caterpillar Inc.'s recent announcement of a major gift to SDSM&T provides positive proof that South Dakota benefits from the SDSM&T alumni who work for Fortune 500 corporations and other companies across the nation. Maintaining close ties to SDSM&T and the state after they graduate, many alumni often utilize their corporate positions to leverage resources to support higher education in South Dakota.

Caterpillar officials recently visited the SDSM&T campus to announce a gift of \$225,000 to the university. SDSM&T alumnus Jim Green (ME '74), Caterpillar's Director of Power Sources - R&D, and Maryann Morrison, Caterpillar's Manager of Corporate Support Programs, presented a check to Dr. Richard Gowen, President of SDSM&T.

The nearly quarter-million dollar gift, payable over three years, will be directed toward two areas of significant need. Two-thirds of the contribution (\$150,000) will be utilized for a new student laboratory that will bring SDSM&T's multi-disciplinary team projects to a new level of excellence. The laboratory, to be called the Caterpillar Student Excellence Center, will greatly enhance the availability and quality of work space for student projects such as SDSM&T's solar car, concrete canoe, Mini-Baja, Mini-Indy and the many senior design projects.

The remaining \$75,000 will fund a three-year continuation of the Caterpillar Excellence Award that will provide \$10,000 annually for student scholarships, \$10,000 for curriculum development and \$5,000 for faculty support. For many years Caterpillar has provided five scholarships of \$2,000 each to two ME, one Met and two EE majors. Current

Caterpillar Scholars include Tom Fennell (ME, Rapid City); Ardell Ochsner (Met, Kaylor); Julie Richter (EE, Colman); Taunya Riley (EE, Rapid City); and Tracey Schmidt (ME, Rapid City).

Caterpillar's most recent gift represents a total scholarship commitment of \$30,000 over the next three years. Caterpillar officials recognize the value of providing scholarship support to some of SDSM&T's

outstanding students. These scholarship recipients also serve as a nucleus of talented hiring prospects from which Caterpillar can recruit. One of last year's recipients, Joshua Goddard (ME '97) was hired as a test engineer in Caterpillar's Technical Center.

Caterpillar's support for curriculum development will continue to be used primarily for laboratory upgrades. Caterpillar's past support was utilized by the Mechanical and Metallurgical Engineering Departments as matching funds to leverage resources to purchase new high-tech equipment. One example was the collaborative purchase of a video data-projection microscope that allows groups of students to view materials in class and save the images for analysis and technical presentations.

The annual \$5,000 faculty support will help SDSM&T faculty members stay current with industry trends and applications of new technologies. Participation in industry conferences and technical forums assists faculty members in keeping abreast of new developments outside academia and then transferring that knowledge to their students.

Caterpillar and SDSM&T have enjoyed a mutually beneficial relationship for more than fifty years. Excluding retirees, 58 SDSM&T alumni are presently employed by Caterpillar. These employees are graduates of SDSM&T's mechanical, electrical, metallurgical, civil and chemical engineering departments, as well as mathematics and computer science.

"SDSM&T's graduates are second to none," stated Jim Green. "Caterpillar has long recognized the quality of engineers educated at SDSM&T. This gift is viewed as an investment by Caterpillar to

assist the institution in continuing its tradition of producing prominent engineers."

This gift's timely arrival will allow for construction of the center to coincide with the \$3.75 million renovation of the Civil/Mechanical Engineering Building, approved by the State Legislature in March, 1998. "The Caterpillar Student Excellence Center space will be incorporated into the overall renovation project," said Dr. Richard Gowen. "The laboratory will maximize our abilities to provide



Story Photo by Darrell Sawyer

Caterpillar, Inc. displayed some of its heavy-duty equipment during the recent check presentation on the SDSM&T campus. Pictured l to r: Brad Johnson, SDSM&T Foundation; Jim Green, Caterpillar's Director of Power Sources - R&D; Dr. Richard J. Gowen, SDSM&T President; Maryann Morrison, Manager of Corporate Support Programs for Caterpillar Inc.; and Rod Pappel, SDSM&T Foundation.

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page 21**

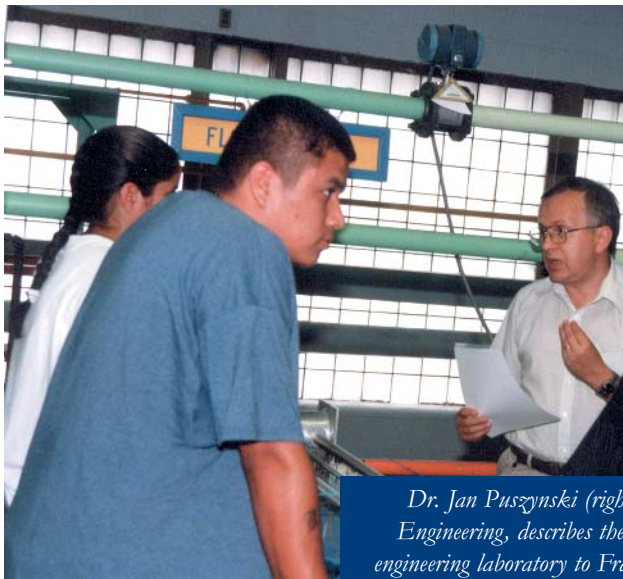


Photo by Darrell Sawyer

Dr. Jan Puszynski (right), Professor of Chemical Engineering, describes the equipment in the chemical engineering laboratory to Francis Running Bear (front) of Pine Ridge and Misty Mousseaux (back) of Porcupine. Twelve Native American students completed the week-long Engineering Bridge program designed to encourage Native American students to pursue engineering careers.

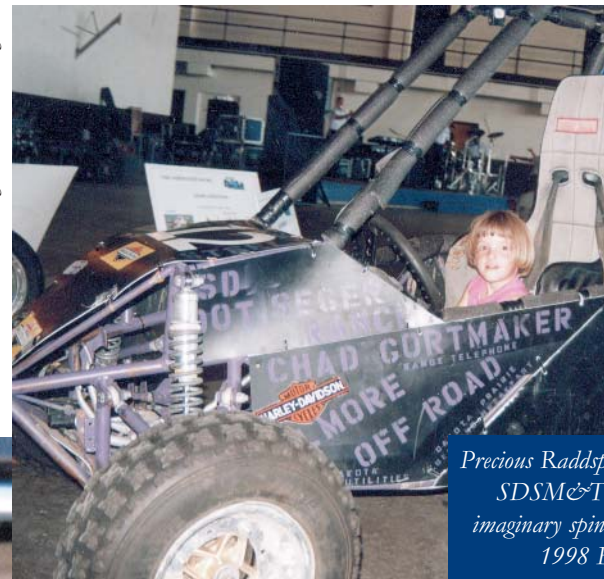


Photo by Darrell Sawyer

Precious Raddys
SDSM&T
imaginary spin
1998

SDSM&T REACHING OUT

Extending far beyond the campus boundaries with their outreach efforts, SDSM&T faculty, staff and students participate in a wide variety of programs. These activities provide important educational and cultural links to not only K-12 education, but also the community as a whole.



Photo by Julie Smoragiewicz

A group of Oregon teachers traveled to South Dakota to take part in SDSM&T Museum of Geology Field Digs. Pictured above at the Flint Hill site are: (kneeling l to r) Jamie Hawkins, Pat Ward, Mike Hodge, Linda Kebr and Thomas Dyer. (standing l to r) are Jim Kochenderfer, Doug Matheson, David Myers, and Dr. James Martin, SDSM&T Curator of Vertebrate Paleontology.

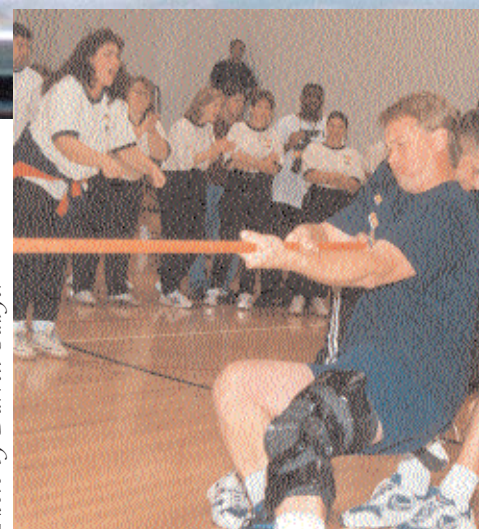


Photo by Darrell Sawyer

P-U-L-L-L-L-L-L! SDSM&T's tug-of-war team competes in the YMCA Corporate Cup. The team included Chan Kramer, Mike Mueller, Scott Redd, R



Driver of Rapid City takes the Mini-Baja vehicle for an parade around the racetrack at the Ellsworth Air Show.

Photo by Julie Smoragiewicz



SDSM&T hosted a Citizens Social Security Forum sponsored by Americans Discuss Social Security with support from The Pew Charitable Trusts. Approximately 150 area participants attended.

Photo by Darrell Sawyer



SDSM&T presented Newt Gingrich, Speaker of the U.S. House of Representatives, a reproduction of a mosasaur jaw during his recent visit to Rapid City. Pictured l to r: Dr. James Martin, SDSM&T Curator of Vertebrate Paleontology; Walt Dennison, Museum of Geology volunteer; Congressmen John Thune; and Julie Smoragiewicz, Director of SDSM&T University & Public Relations.

Photo by Darrell Sawyer



Members pulled their way to victory in the 1998... Les Colombe, Rebecca Cronin, Holly Hall, Randy... Rachel Schofield, and Therese Zadnik.

Photo by Darrell Sawyer



Lucas Hall, left, and Nicole and Wade Outka, all of New Underwood, look for fossil casts in the simulated fossil dig at the Ice Age exhibits. SDSM&T co-sponsored the month-long event that was held at the Rushmore Mall.

Making a Difference With LRC

Photo by Darrell Sawyer

The SDSM&T family and the Rapid City community are more than a collection of individuals, but rather the sum of the interactions among them. The active participation by SDSM&T faculty and staff in the Leadership Rapid City (LRC) program provides compelling proof of the university's active involvement in community service and civic organizations.

Sponsored by the Rapid City Area Chamber of Commerce, Leadership Rapid City is a ten-week program designed to develop the leadership potential of local residents in order to provide Rapid City with quality civic and community leaders. The program is completely staffed by volunteers including the organizers and special speakers involved in developing the curriculum and conducting the class sessions.

Each year approximately thirty individuals from the community are accepted on a competitive basis to participate in the LRC program. Since the program's inception in 1982, SDSM&T faculty or staff members have been a part of every LRC class except two.

The institution not only encourages involvement by faculty and staff in the program, but also has hosted several LRC classes. In addition, several of SDSM&T's LRC alumni participated this fall as presenters or facilitators for the 1998 LRC "Environment and Education" session held on the SDSM&T campus.

These on-campus sessions enhance the LRC class participants' awareness of the wide range of academic, economic development, cultural and athletic activities that SDSM&T offers to



Susan Watton (LRC '97) takes driving lessons from Dr. Dan Dolan, Professor of Mechanical Engineering and Director of Academic Programs of CAMP, before taking the SDSM&T Mini-Indy car for a spin.

students and members of the community. SDSM&T has provided LRC classes with special tours of the Museum of Geology, paleontology curation lab, fossil repository, Center for Advanced Manufacturing and Production (CAMP), the Devereaux Library, high-tech equipment in the mechanical and civil engineering laboratories, and various other facilities on campus. SDSM&T's student teams—concrete canoe, Mini-Baja, Mini-Indy and solar car—also have displayed their vehicles and made presentations during these LRC sessions on campus.

The Leadership Rapid City alumni from SDSM&T remain very active in the Rapid City community. From the Allied Arts Fund Drive to the Zonta Club, the civic involvement by the university's LRC graduates runs the gamut of hundreds of organizations, service clubs and community activities. Many are involved with so many

activities that it is difficult to compute the total amount of time they spend in volunteer community service. However, a survey of the twenty current LRC alumni at SDSM&T indicated that on average they each spent approximately 138 hours in volunteer community service activities during the last year. That represents a combined total of 2,760 hours or 115 days—nearly 1/3 of an entire year!

SDSM&T's involvement in the Leadership Rapid City program is mutually beneficial. "LRC is a great way to get our talented people off the campus and into the community," says Dr. Sid Goss, Professor of Sociology and a graduate of the first LRC class in 1982.

SDSM&T participants during the next five years of the LRC program included Dr. James Munro ('83), Professor of Chemical Engineering; Dr. Philip R. Bjork ('85), Professor of Geology and Anthropology, Director and Paleontologist, Museum of Geology; Linda B. Allen ('87), South Dakota Space Grant Consortium Outreach Coordinator; Dr. Alfred Boysen ('86), Professor of English; Dr. Karen Whitehead ('86), Vice President for Academic Affairs; and Dr. James Feiszli ('87), Professor and Director of Music.

The 1989 Leadership Rapid City class included three SDSM&T faculty members whose academic disciplines ranged from civil and electrical engineering to English—Dr. Wendell Hovey, Chair and Professor of Civil & Environmental Engineering; Dr. Josephine Lee, Associate Professor of English; and Dr. Larry Simonson, Chair of Electrical & Computer Engineering and Professor of Electrical Engineering. "LRC provided an excellent

opportunity to network with people who are active in the community," states Dr. Simonson ('89). "This allowed me to more effectively associate with people to organize such events as the Mount Rushmore Trail 100-Mile Endurance Run."

From 1990 through 1995 every LRC class included at least one SDSM&T faculty or staff member, with two in the 1994 class. SDSM&T representatives during this period were Dr. Kathy Antonen ('90), Associate Professor of English; Sara McCulloh ('91), former director of SKILL program who is now studying at Princeton Theological Seminary; L. Rod Pappel ('92), SDSM&T Foundation President; Dr. Judy Sneller ('93), Associate Professor of English; Dr. Francine Campone ('94), Associate Dean of Students; Dr. David Dixon ('94), Associate Professor of Chemical Engineering; and Julie Smoragiewicz ('95), Director of University & Public Relations, who serves as chair of the LRC Selection Committee.

Citing LRC's personal and professional connections, Dr. Kathy Antonen ('90), considers Leadership Rapid City to be a worthwhile investment of time and resources. "It is good for the community to get to know the Tech faculty, to be aware of the expertise and personalities available, and maybe erase some of the stereotypes of a technical campus," she says.

Her LRC colleagues in the Department of Humanities agree. "I found LRC most helpful and would participate again in a heartbeat," says Dr. Judy Sneller ('93).

Dr. Francine Campone ('94) echoes similar views. "I think it's vital that the university be solidly rooted in the community and serve as a resource beyond its academic mission. SDSM&T's participation in LRC benefits the community by extending the individual connections and networking, making people with

specialized expertise available to benefit the community in a broad spectrum of activities."

The 1996 LRC class contained four SDSM&T officials—Brad Johnson, Foundation Development Officer; Dr. Scott Kenner, Associate Professor of Civil & Environmental Engineering; Del McDonald, former director of SDSM&T's High Plains Center for Technology; and Tim Vottero, Alumni Association Director and Foundation Development Officer.

"SDSM&T has grown up with the city," states Brad Johnson ('96) in describing the mutually beneficial relationship between the university and LRC. "Current and future leaders need to understand and appreciate SDSM&T's impact as a major economic, cultural and social component of Rapid City."

"SDSM&T's participation complements our mission of education, development and outreach both within the campus and to the broader community," adds fellow LRC alumnus Tim Vottero ('96). "Hopefully, LRC participants will gain an appreciation of our institution and its available resources and feel welcome to interact and use them when needed."

Lori Litzen ('97), former Industrial Assistance Coordinator who now works for the South Dakota Department of Transportation, and Darrell Sawyer ('97), Public Information Manager, graduated from last year's LRC class. The current 1998 LRC class includes two SDSM&T representatives—Dr. Antonette (Toni) Logar, Associate Professor of Mathematics & Computer Science, and Rachel Schofield, Publications Manager. They already see the benefits of LRC participation.


"It is always good to get people in the community working with people from SDSM&T," states Dr. Logar. "We need each other and the more friendships we forge, the better we will work together. For example, I already have commitments from people in my

class to help with entrepreneurship lectures for our computer science seniors. In return, I have been asked to help small business officials evaluate high-tech proposals they receive. I've also expressed an interest in helping with more high-tech economic recruiting."

Applications for LRC are available through the Rapid City Area Chamber of Commerce. Traditionally, June 30th has been the deadline to submit applications and letters of recommendation to the Chamber.

"Each year the selection committee makes every effort to select a quality class with members representing the many diverse facets of our community," states Linda Rabe (LRC '93), Vice President of the Rapid City Area Chamber of Commerce, who also is Chamber Contact for the LRC Board. "Participating in LRC is a great way to better understand our community and develop skills that can then be utilized through civic involvement. I would encourage any Rapid City area resident to consider applying for a future LRC class."

Although certainly not all faculty and staff who volunteer in Rapid City area organizations have participated in LRC, it still serves as an excellent launching vehicle for community involvement.

By getting off the campus and into the community, SDSM&T faculty and staff volunteer thousands of community service hours each year to hundreds of civic organizations. The university's active involvement in Leadership Rapid City definitely dispels the notion of SDSM&T being "the monastery on the hill" as some in the community once believed. The synergy between LRC and SDSM&T produces win-win partnerships for all involved. Contact the Rapid City Area Chamber of Commerce at 605-343-1744 for more information. 

Pictured right: Lana Thom, SDSM&T Foundation; Dr. Paul Gries, Professor Emeritus of Geology and Geological Engineering; and Chad Gortmaker (ME '97) enjoy the camaraderie of climbing and whitewashing M-Hill.

Pictured far right: Jed Brich (CE, Ogallala, NE) sports the grubby look for M-Day.



Story Photos by Darrell Sawyer

SDSM&T

is steeped in traditions that transmit the campus culture from one generation of students to the next. One such tradition, and one of the oldest, involves the institution's ties to M-Hill. When SDSM&T students recently climbed M-Hill and whitewashed the "M" as part of their 1998 M-Week homecoming celebration, they carried on a tradition that spans more than eight decades.

As countless freshmen have done in years gone by, this year's SDSM&T freshman students continued the time-honored practice of marching from campus to a picnic at the base of M-Hill along Omaha Street in west Rapid City. Following the picnic, the students climbed M-Hill, whitewashed the "M" with a slide down the concrete slabs, and then placed the plaque listing the names of the 1998-99 seniors.


The M-Hill tradition dates back to October, 1912, when a large "M" was constructed on Cowboy Hill, located on the west side of Rapid City. According to *SDSM&T Centennial: An Illustrated History 1885-1995*, the idea of an "M" dated back several years prior to 1912 when several students and faculty proposed placing a large letter in a prominent spot to help advertise the school. Although erecting an electric sign was one of the possibilities considered, the decision was made to have the students construct an "M" because it would lessen the cost and would be a valuable learning experience for the students.

School of Mines President Dr. C.C. O'Harra gave the students a holiday on October 8, 1912, to build the huge "M" on land owned by prominent local businessman Tom Sweeney, who had given his consent to the project. Approximately 75 students and teachers brought their picks, shovels, and other tools to Cowboy Hill that day. Two teams of horses with plows and wagons were used to loosen and remove the soil. After using more than 100 wagon loads of rock to fill in the area, the students then whitewashed the newly constructed "M".

The citizens of Rapid City showed a great interest in the project. The *Black Hills Journal*, forerunner to the *Rapid City Journal*, reported that people used spy glasses, opera glasses and binoculars to watch the students' activities on the hill.

Measuring 112 by 67 feet, the "M" was hailed as the largest letter in the state and could be seen from twelve miles away. For the next several years, "M Day" consisted of pulling the weeds between the stones and whitewashing the letter. In 1922, the stones were replaced with concrete. That year a slab of concrete 160 feet square replaced a similar area of stone. In following years additional slabs of concrete were added.

"Everybody should climb M-Hill at least once in their life," stated Professor John "Duff" Erickson (MinE '55), who recently retired as director of the SDSM&T Alumni Association. Dr. Paul Gries, Professor Emeritus of Geology and Geological Engineering, may hold the record for M-Hill climbs. He first climbed M-Hill in 1938 and has journeyed to the top a total of 58 times!

Climbing M-Hill and whitewashing the "M" again this year resulted in loads of fun and some unique sliding experiences not found on many other campuses. Over the years, the M-Hill tradition has generated special memories that last a lifetime and bond the South Dakota Tech family tighter together. 



Carrying on the

Campus culture sp



The traditions of whitewashing the "M" and mud volleyball still continue today.



Photo courtesy of SDSM&T archives



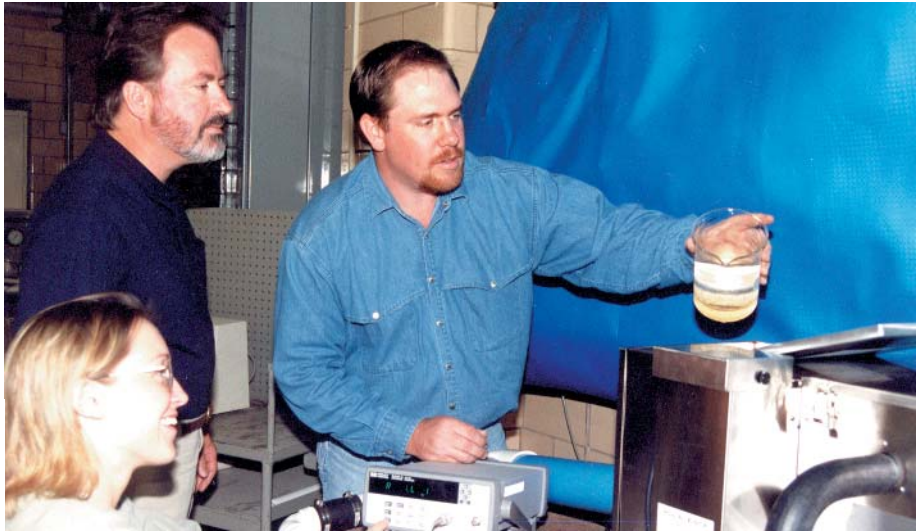
Students carry whitewash up M-Hill in 1919.

M-Hill Traditions

ans eight decades

Separating Oil From Water

Chenoa Jensen (ME Sr., Newell), Dr. Mike Langerman, Chair and Professor of Mechanical Engineering, and Casey Allen (ME '94), Integrated Manufacturing Specialist, test the efficiency of an oil-water separator.



Many South Dakota companies are increasingly recognizing the opportunities for economic development partnerships with SDSM&T. McTighe Industries, Inc. is one such South Dakota company. McTighe officials are tapping the university's technical expertise to conduct tests of certain environmental protection equipment.

Based in Mitchell, McTighe Industries fabricates and markets oil-water separator systems to businesses all over the United States. In addition, the company is actively engaged in several international markets, including Chile, Guam, Israel, Mexico and Venezuela.

When McTighe officials wanted to test the efficiency of an experimental oil-water separation system, they turned to SDSM&T's Center for Advanced Manufacturing and Production (CAMP) for assistance. An exciting new program at SDSM&T, CAMP focuses on interdisciplinary research and enterprise teams that can provide manufacturing technology assistance to private industry and help companies solve design problems.

Under the direction of Dr. Michael Langerman, SDSM&T Chair and Professor of Mechanical Engineering, the research for the McTighe-CAMP project is being conducted by Casey Allen (ME '94), SDSM&T Integrated Manufacturing Specialist, and Chenoa Jensen, senior mechanical major from Newell. Dr. Srinvasa Iyer, Professor of Civil & Environmental Engineering and Director of Industry Programs for CAMP, serves as administrator of this project and provided the support for ensuring that the right connections for the company were made between the faculty and the students.

Analyzing the efficiency of various oil-water separators has very important environmental ramifications. These systems extract solids and oil from wastewater before entering the drain, thus playing a vital role in controlling water pollution. Many applications exist for oil-water separators. For example, the food service industry can obtain a more efficient means of reducing the amount of solids, fats, and oils that go down the drain. These separator systems not only help curtail the pollutant level of wastewater, but also can result in lower maintenance costs and a reduced need for grease traps.

As public awareness increases about the importance of protecting water quality, so does the need for an increasingly efficient means of removing the fats and oils from wastewater

before entering the drain. In addition to the food service industry, other uses for oil-water separators include drains at car washes, runways at airports, and the run-off from parking lots before being discharged into storm sewers. The systems can be sized to accommodate virtually all types of pollutant discharges from petroleum and non-petroleum industries.

"Optimizing the design of oil water separators will require in-depth modeling capability, heretofore not possible with the simplified design theories currently in use," states Dr. Langerman. "Our students have taken on a project that requires application of state-of-the-art analysis tools and have done so in an atmosphere of teamwork and interdisciplinary cooperation among departments on campus. We feel their education is enhanced and, at the same time, we are aiding economic development in the state of South Dakota."

The research being conducted on campus through CAMP for McTighe Industries benefits both the company and SDSM&T students. CAMP provides an opportunity for students to get involved with projects that provide real-world work experience, as well as a focus on building teamwork and leadership abilities. In addition, students develop verbal and written communication skills through their interaction with the company for whom they are conducting the research.

"This project has personally provided me with an opportunity to work with flow visualization and get some hands-on experience in fluid dynamics," said Chenoa Jensen, who is one of the select group of 21 SDSM&T students to be accepted into the CAMP curriculum.

As an undergraduate student a few years ago, Casey Allen, who is pursuing a Master of Science degree in mechanical engineering, gained experience in testing oil-water separators for McTighe Industries. For his senior design project, Allen was a member of a student team that tested the efficiency of larger separators for McTighe that had capacities of 5,000 and 10,000 gallons.

In addition to utilizing SDSM&T's research capabilities and high-tech laboratory equipment, McTighe also recruits SDSM&T students for internships and full-time positions after graduation. Senior Lance Roberts (civil engineering, Sidney, NE) worked as an intern this past summer for McTighe. Handling customer service responsibilities, Roberts answered technical and engineering

Story Photo by Darrell Sawyer

continued on page 23

PERSONNEL

Changes

WELCOME:

Douglas J. Bandy, Library Clerk, Devereaux Library (9/15/98)

Brenda L. Brown, Secretary, Graduate Education/Sponsored Programs (10/5/98)

Sandra Carlson, Communications Coordinator, SDSM&T Foundation (8/25/98)

Dr. Roger Dendinger, Assistant Professor, Social Sciences (8/16/98)

Heather Finlayson, Instructor, Chem/ChemE (9/1/98)

Dr. Lonnie Ludeman, Associate Professor, Electrical & Computer Engineering (8/16/98)

Jenny Mathison, EMS Admissions Counselor (8/25/98)

Ty McGuire, Assistant FB Coach/Ath. Equip. Mgr, Intercol. Ath. (9/1/98)

MaryAngela Milne, Child Care Coordinator, Little Miner's Clubhouse (8/3/98)

Dr. Jeffery McGough, Assistant Professor, Math & Computer Science (8/16/98)

Dr. Timour Paltashev, Assistant Professor, Electrical & Computer Engineering (8/16/98)

Debra Richards, Secretary, Math & Computer Science (8/13/98)

Floyd Sperlich, Custodial Worker, Physical Plant (8/18/98)

Dr. Kerri Vierling, Assistant Professor, Chem/Chem E (9/1/98)

Michelle Youngblood, Child Care Worker, Little Miner's Clubhouse (9/1/98)

Robin White, Admin. Asst. II, Grad. Ed. & Sponsored Prog. (9/28/98)

Therese Zadnik, Admin. Asst. I, Enrollment Mgt. Services (7/27/98)

CHANGES IN POSITIONS:

Donna Kliche, who previously was Research Scientist I for the Institute of Atmospheric Sciences, has been hired as the PRIME Program Coordinator in Math & Computer Science. (8/31/98)

Pat Kung, who previously served as secretary in Math & Computer Science Dept., was named Computer Support Supervisor in ITS. (7/22/98)

Val Napier, who previously was Administrative Asst. II for Graduate Education & Sponsored Programs, accepted a position as Planned Giving Coordinator for the SDSM&T Foundation. (8/25/98)

Cassie Thayer, who previously was secretary for EPSCOR in Graduate Education & Sponsored Programs, accepted a position as Accounting Asst., Business & Administration. (9/14/98)

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The Hardrockers are not a run-of-the-mill football team. The quarterbacks can solve quadratic equations. The tight ends are engineers. The front line can focus on both first downs and physics.

More than 87% of the students on this year's SDSM&T Hardrocker football roster are science or engineering majors! On the field, they tackle their football opponents in the South Dakota Iowa Conference (SDIC). Off the field, they tackle calculus, chemistry, computer science and other tough subjects.

Of the forty-eight players who have declared a major, approximately one-half are either civil or mechanical engineering majors. SDSM&T's other gridiron athletes are pursuing majors that include chemical, electrical, geological, industrial, and metallurgical engineering, as well as chemistry, computer science, and a pre-med course of study. Three players are pursuing a Bachelor of Science degree in Interdisciplinary Sciences (IS). Strongly science-based with a requirement that at least one-third of the courses be in math and science, the IS degree provides students with the opportunity to enroll in a wide variety of courses that include the humanities, fine arts and social sciences. Seven players on the roster have not yet declared a major.

"It is easier to coach engineering students," says Head Coach Ron Richards in describing his interest in coaching teams at technical universities such as SDSM&T. "They have no problem learning the technical aspects of the game of football. There is not a lot of conflict between strong academics and football."


Ron Richards assumed the helm as head coach of SDSM&T's football team last spring. For the past thirteen years he was offensive coordinator for Montana Tech in Butte, MT. Shane Stephen serves as defensive coordinator for the Hardrockers. Other assistant coaches include Dick James, linebackers; "Bear" Jones, offensive backs and video coordinator; Ty McGuire, offensive assistant; Richard Murrell, receivers; and Luke Steinmetz, defensive line.

With only nine returning upperclassmen, the 1998 Hardrockers are a young football team. The thirty-one freshmen comprise more than half the team roster. Approximately 83% of the players are freshmen or sophomores. Because the team is so young, Coach Richards describes the Hardrockers as being in a rebuilding mode as they strive for excellence in building a solid football team.

SDSM&T recruits from a somewhat narrower pool of football talent than many other universities. Some high school football players are not a good match for SDSM&T's science and engineering focus and its challenging academic standards. Despite this challenge, SDSM&T officials are still able to recruit quality athletes who reflect the ideal of the college athlete whose primary goal is to obtain a good education.

One of Richards' most difficult recruiting jobs is finding players who can both handle the university's academic challenges and also can fit into positions that the team needs. "We first look at their academic record, their grades and their ACT scores," he said. "Then we start to look at whether they fit into a position that the team needs."

Since the school first began fielding a football team in the late 1890's, the South Dakota Tech Hardrockers have sent hundreds of engineers into the end zone to score touchdowns over the years. When their gridiron games are finished and they are ready to graduate, many of these SDSM&T football

players will trade their helmets for hard hats and laptop computers and help build the highways and high tech industries of our nation. 

TECH


Engineers in the Endzone

outstanding hands-on educational opportunities. The Caterpillar Center will permit the institution to focus efforts on multi-disciplined student team projects that will better prepare our graduates to compete in the job market."

The Caterpillar Student Excellence Center will provide an area with adequate space to fully realize the learning benefits of team-oriented projects like the Solar Car, Mini-Indy Car, Concrete Canoe, Mini-Baja vehicle and other senior design projects. These projects are learning opportunities that simulate situations in the workplace. The new laboratory will offer a setting that will enable integrated student groups to work together to address and solve real-world problems. In addition to enhancing students' engineering expertise, this environment will stimulate the development of teamwork, leadership, and communication skills that are in high demand by industry.

"It is wonderful to coordinate win-win situations for the institution and our corporate sponsors," said Brad Johnson, SDSM&T Foundation Development Officer. "Caterpillar's support helps us to provide outstanding educational opportunities, which in turn make our graduates better prepared to work for companies like Caterpillar."

Caterpillar is one of the numerous corporations that have partnered with SDSM&T in recent years to provide scholarships and resources to enhance academic experiences. Companies and individuals interested in learning more about establishing similar partnerships should contact the SDSM&T Foundation at (605)-394-2436 or toll-free, 800-211-7591.

With the support of corporate partners like Caterpillar, SDSM&T can continue to provide students with a top-quality education that utilizes leading-edge technology. Upon graduation, SDSM&T students stand ready to make a smooth and productive transition from the campus to the business world. 


Oyate Consortium

continued from page 10

available to our Native American students, which will in turn benefit the entire tribe. The ability to protect the land-base is one of the most pressing issues across the reservations."

"One of the exciting impacts that I see coming out of the Summer Institutes is the growth of the Environmental Science and Technology programs at the tribal colleges," commented Dr. Berdanier. "What began as simple concepts two years ago for SDSM&T to help in developing curriculum has already taken on its own life and direction. For instance, Mark Peacock at CRCC has successfully acquired a \$100,000

grant from the David and Lucille Packard Foundation to fund additional field sampling and analysis equipment, as well as several multi-day workshops involving undergraduates, high school students and high school educators. I really think that we are just beginning to see the impact that these programs can have."

Serving as a resource to the Oyate Consortium in its self-development process, SDSM&T's collaboration with the Summer Institutes takes tremendous strides forward in helping to incorporate Lakota culture into a pre-engineering and environmental science curriculum. SDSM&T continues to strengthen its circle of partnerships with tribal colleges as they all work together toward realizing the vision of increasing the number of Native American engineers and scientists. 

CAMPUS BRIEFINGS AND RESEARCH NOTES

Dr. Alfred Boysen, Prof. of English, has been named the 1998 South Dakota Professor of the Year by The Carnegie Foundation for the Advancement of Teaching and the Council for Advancement and Support of Education (CASE). The award recognizes extraordinary dedication to teaching, commitment to students and innovative teaching methods.

SDSM&T physics major **Robert B. Anderson III** of Pierpont has been named a 1998 Barry M. Goldwater Scholar. He is one of three 1998 Goldwater Scholars attending South Dakota universities to receive the \$7,500 scholarship.



"Old Maids' and Wily 'Widders': The Humor of Ruth McEnery Stuart" by **Dr. Judy Sneller**, Assoc. Prof. of English, was recently published in New Directions in American Humor.

Four papers of a research group in the Electrical and Computer Engineering Department were selected to be published and presented in the 7th NASA Symposium on VLSI Design at Albuquerque, NM. The authors include: 1) **Nasar Ameen**, Graduate Teaching Assistant, **Mabbubur Choudry**, Research Graduate Assistant (CAMP), and **Dr. Nobill Park**, Asst. Prof. of Elect. & Comp. Engineering; "Configurable and Scalable Memory Modules for FPGA Based ATM Switches" (Speaker: **Mabbubur Choudry**); 2) **Shiberdra K. Roy**, Graduate Teaching Assistant, and **Dr. Nobill Park**; "Testing and Diagnosis of Faults of Switch Block Matrices in FPGAs" (Speaker: **Shiberdra K. Roy**); 3) **Vinaya K. Bondada**, Research Graduate Assistant (CAMP), **Satyranarayana Parimi**, Graduate Teaching Assistant, and **Dr. Nobill Park**; "Yield Enhancement by Spare Cutting in Redundant RAMs" (Speaker: **Vinaya Bondada**); and 4) **Saisure Ganesamoorthi**, Graduate Teaching Assistant, and **Dr. Nobill Park**; "A Test Algorithm for SRAM" (Speaker: **Saisure Ganesamoorthi**).

Dr. Sanjeev Khanna, Asst. Prof. of Mech. Engineering and ASME Faculty Advisor; **Julie Clapero** (ME, Wabasha MN), ASME Student President; **Thomas Batbo** (ME, Sioux Falls), Secy.; **Roy Reiss** (ME, Java), Treas.; and **Gregory Stayer** (ME, Rapid City), Student Rep.; attended the recent ASME Student Leadership Conference in Omaha, NE. **Thomas Batbo** was a member of the team that won the impromptu bridge building contest.

Dr. Kenneth Han, Dean of the College of Materials Science & Engineering and Distinguished Prof. of Met. Engineering, received the Regents Award for Excellence in Research by an Established Investigator at the State EPSCoR meeting. **Dr. Han** was also recently named the first recipient of the Douglas W. Fuerstenau Professorship at SDSM&T.

Dr. Srinivasa Iyer, Prof. of Civil & Environmental Engineering, taught a two-day course on "Advanced

Fiber Reinforced Plastic (FRP) Composites for Infrastructure Applications" at the University of New South Wales in Sydney, Australia, this summer.

Dr. Christopher Jenkins, Prof. of Mech. Engineering, was invited to participate in the Symposium on Deployable Structures held Sept. 7-9 at Cambridge University, England. He delivered a lecture entitled "Computational Issues in Modeling Wrinkling during Parachute Deployment," co-authored with **Xinxiang Liu**, Ph.D. student in Materials Science & Engineering, and **Dr. Willi Schur** of NASA.

Dr. M. R. Hansen, Assoc. Prof. of Civil Engineering, recently presented two papers at the International Conference on High Performance High Strength Concrete (HPHSC) held at Curtin University of Technology, Perth, Western Australia. The papers were based on research work sponsored by the South Dakota Department of Transportation and the Material Recovery Facility (MRF) in Rapid City. Co-authors for the papers were **Brenda Flottmeyer** (MS CE '98) and **Michelle Nielsen** (MS CE '98).

The article "Exploring Zipf's Law", by **Linda Alexander** (BS Math 98), **Dr. Roger Johnson**, Assoc. Prof. of Mathematics, and **Dr. John Weiss**, Assoc. Prof. of Computer Science, has been accepted for publication in Teaching Mathematics and Its Applications.

Dr. Robb Winter, R.L. Sandvig Prof. of Chemical Engineering, organized and ran the first year of an NSF Research Experience for Undergraduates Site and the All Nations Alliance for Minority Participation undergraduate research program on the SDSM&T campus. With a strong emphasis on attracting women and Native Americans, the program offered ten undergraduate students the opportunity to explore science and engineering research. This year's mentors were **Dr. Sookie Bang**, Assoc. Prof. of Biology; **Dr. Bruce Berdaniel**, Asst. Prof. of Civil & Env. Engineering; **Dr. William Cross**, Research Scientist III; **Dr. Steven McDowell**, Chair of Chemistry & Chem. Engineering and Assoc. Prof. of Chemistry; **Dr. David Dixon**, Assoc. Prof. of Chemical Engineering; **Dr. Andrew Rogerson**, Former Assoc. Prof. of Biology, and **Dr. Robb Winter**. The 5-year National Science Foundation grant awarded to **Dr. Winter** totals \$333,476.

Dr. Jan Puszynski, Prof. of Chemical Engineering, presented the paper "Chemically-Assisted Combustion Synthesis of Silicon Carbide from Elemental Powders" at the 100th Annual Ceramic Meeting. His paper will be published in the proceedings of the Symposium on Innovative Processing and Synthesis of Ceramics, Glasses and Composites. **Dr. Puszynski** also presented seminars at Catholic University, Leuven, Belgium and Academy of Mining and Metallurgy in Cracow, Poland. **Drs. David J. Dixon**, Assoc. Prof. of Chemical Engineering, and **Jan A. Puszynski**, Prof. of Chemical

Engineering, attended the Annual Meeting of American Society of Engineering Education (ASEE). Both professors co-chaired two different conference sessions.

The ABET Engineering Accreditation Commission recently presented **Dr. E. Ashworth**, Prof. of Mining Engineering, with a certificate of appreciation for her five years of service on the commission representing the Society for Mining, Metallurgical and Exploration (SME).

Charles L. Colombe, Telecommunications Technology Specialist, Instructional Technology Services, received the "Most Improved Award" from Skyline Toastmasters for 1997-1998.

Dr. Robb Winter, R.L. Sandvig Prof. of Chemical Engineering, chaired the Mechanics/Materials Science Linkage Through Experimentation I session at the Society for Experimental Mechanics Spring Conference in Houston, TX. He also presented the paper entitled "Interphase Mechanical Properties in an Epoxy-Glass Fiber Composites as Measured by Interfacial Force Microscopy", co-authored by J.E. Houston of Sandia National Laboratories. **Dr. Winter** also chaired the Engineering Division at the Council on Undergraduate Research's (CUR) annual Councilors Meeting.

Dr. James Feiszli, Prof. of Humanities and Dir. of Music, was the guest of the Swedish Choral Federation at the recent concerts in Stockholm honoring Swedish choral conductor Eric Ericsson. He also spent two days in Belgium assisting Jean-Claude Wilkens developing web pages for the International Center for Choral Music (ICCM). **Dr. Feiszli** also has been contracted to be a clinician for the Fifth World Symposium on Choral Music in Rotterdam in July, 1999 and for the ACDA Southwest Division Convention in 2000.

SDSM&T's Institute of Industrial Engineers (IIE) Student Chapter and the Students Against Drinking and Driving (SADD) group recently received the South Dakota Board of Regents Awards for Academic Excellence and Organization Leadership respectively. Board of Regents President James O. Hansen presented the awards to **Paula Holmes** (IE, Hot Springs), past IIE president; **Tanya Harrod** (IE, Edgemont), current IIE president; and **Dawn Recker** (Chem, Gillette), SADD chapter president. **Dr. Carter Kerk**, Asst. Prof. of Industrial Engineering, is IIE chapter advisor and **Jolie McCoy**, Dir. of University Counseling, serves as SADD advisor.

Jade Kizer (EE, Rapid City) and **Robert Hofmeister** (EE, Rapid City) received the General Emmett Paige Scholarship and the General John A. Wickham Scholarship respectively from the Armed Forces Communications Electronics Association (AFCEA). SDSM&T, Texas A&M, and the Citadel are the only universities to have two AFCEA scholarship recipients this year. In the literature class taught by **Dr. Kathy Antonen**, Assoc. Prof. of English, the comments made by **Carol Peterson** (IS, Rapid City) comparing Mark McGwire to

Beowulf were included as part of the USA TODAY front page story (9/28/98) about McGwire hitting 70 home runs! "Baseball was getting a bad rap with the players' strike and McGwire changed that by making people happy again. Beowulf did the same by making it right when he slayed Grendel, who was ravaging the Kingdom, Peterson said."

Grad. Ed. & Sponsored Programs and the SD Space Grant Consortium participated in the 25th Anniversary of the EROS Data Center.

Carrie Torkelson (Math, Papillion, NE) and **Chuck Cox** (Me, Yankton) were elected 1998 M-Week queen and king.

Traditions of Excellence Award recipients are **Sheila Lien**, Accountant, Grad. Ed. & Sponsored Programs, (July); **Sandra Meier**, Secretary, Bus. & Admin./Debit Card & Cashiering, (August) and **Rosemary Robertson**, Custodial Worker, Physical Plant (September).



Dr. John Helsdon, Prof. of Atmos. Sciences, Institute of Atmos. Sciences, has been awarded \$120,000 from the NSF for his research, entitled "3D Cloud-Scale Model and Satellite Study of the Transport and Evolution of Lightning-Produced Nitrogen Oxides."

Dr. Jon Kellar, Assoc. Prof. of Met. Engineering, received \$100,000 from the NSF for the Presidential Faculty Fellowship.

NASA has awarded **Dr. Francine Campone**, Assoc. Dean of Students, \$100,000 in additional funds for the Scientific Knowledge for Indian Learning and Leadership (SKILL) NASA Honors Summer Program.

Dr. Sookie Bang, Assoc. Prof. of Biology, and **Dr. Venkataswamy Ramakrishnan**, Distinguished Prof. of Civil & Environmental Engineering, were awarded \$70,000 from the NSF for their research project entitled "Application of a Microbial Immobilization Technique in Remediation of Concrete Cracks."

Dr. James Martin, Prof. of Geology and Museum of Geology/Curator of Vertebrate Paleontology, received \$60,000 from the U.S. Army Corps of Engineers for "Survey of Missouri River."

Dr. Patrick Zimmerman, Dir. of Institute of Atmos. Sciences, received \$37,664 from the University Corporation for Atmospheric Research (UCAR) for his project, "Collaboration with NCAR Scientists."

Dr. Sherry Farwell, Dean of Grad. Ed. & Sponsored Programs, received \$25,000 from the University of North Dakota for "A Public Access Resource Center (PARC) Empowering the General Public to Use EOSDIS-Implementation Phase."

Drs. Sanjeev Khanna, Asst. Prof. of Mech. Engineering, and **Gregory Buck**, Asst. Prof. of Mech. Engineering; **Daniel Dolan**, Prof. of Mech. Engineering and Director of Academic Programs of CAMP, and **Christopher Jenkins**, Prof. of Mech. Engineering, received \$24,593 from the NSF for their research entitled, "Introduction of Optics and Fiber Optics into the Undergraduate Engineering Experimentation Experience."

Dr. Jon Kellar, Assoc. Prof. of Met. Engineering, and **Dr. Robb Winter**, R.L. Sandvig Prof. of Chemical Engineering, were awarded \$22,000 by NASA for a research project entitled "In-situ Near Infra-red Cure Monitoring and Surface Analysis of Polymer Composites." **Dr. Winter**, also was awarded \$50,000 from the U.S. Department of Energy for "Investigation of the Interphase Region in Polymer Matrix - Glass Fiber Reinforced Composites Using the Interfacial Force Microscope."

Dr. Gordon Bell, Haslem Post-doctoral Fellow in Paleontology, Museum of Geology, received \$15,000 from the U.S. Dept. of Interior-Bureau of Reclamation for "Keyhole Reservoir Fossil Resource Inventory" (\$7,500) and "Shadehill Reservoir Fossil Resource Inventory" (\$7,500). Dr. Bell also received \$5,000 from the U.S. Dept. of Interior-Bureau of Reclamation for "MNI-WICONI Water Project: Red Shirt Sector."

Dr. Christopher Jenkins, Prof. of Mech. Engineering, was awarded an additional \$20,000 in funds from the Jet Propulsion Laboratory for his project, "Shape Control of an Inflatable Thin Circular Disk-continue Phase B."

Dr. Mark Hjelmfelt, Chair and Prof. of Atmos. Sciences, Institute of Atmos. Sciences, and **L. Ron Johnson**, Assoc. Prof. of Meteorology, received \$8,000 additional funds from the University Corporation for Atmospheric Research (UCAR) for "Investigation of Mesoscale Convective Systems over the Northern Great Plains & Mid-Mississippi Valley."

Drs. Christopher Jenkins, Prof. of Mech. Engineering, and **Robb M. Winter**, R.L. Sandvig Prof. of Chemical Engineering, of SDSM&T and Douglas S. Cairns, MSU Dept. of Mech. and Industrial Engineering, are working on an NSF-funded project entitled "Vibration/Creep Interaction Effects on the Long-Term Durability of Polymers and Polymer Matrix Composites."

The South Dakota Tech family mourned the loss of **Clinton Johnson** (IE, Ipswich), **Erin Grubn** (ME '94, Watertown) and **Marcia Leclair** (ChemE, Eagle Butte), who all died in recent automobile accidents.

questions from U.S. and international clients about potential uses of the separators for specific applications, as well as what size of separation system he would recommend for a certain project.

"I liked working with the people and also the experience I gained from being in the real world," stated Lance Roberts. "The school did a good job in preparing me."

Senior mechanical engineering major Paul Oien of Kadoka also worked an intern for McTighe this summer. Both the company and the students benefit from these internships. Oien obtained hands-on, real world experience in drawing blueprints while providing some needed services for the company.

McTighe officials recognize that their company benefits from hiring SDSM&T students for internships, cooperative education, and in some cases permanent, full-time employees. "McTighe Industries has provided me with additional opportunities to expand my knowledge and technical expertise gained from SDSM&T," says Scott Reisenauer (ME '94) who recently accepted a job offer from the company. "Working with the students and professors from SDSM&T has been a very beneficial partnership."

"The students are great!" said Kris Graham, President, McTighe Industries. "They did a fantastic job, which goes to show that they have received excellent training. Their technical training easily transferred to our industrial application."

SDSM&T's testing of the experimental unit for McTighe offers potential economic development opportunities. The company, which manufactures some of its products in South Dakota, could decide to enter another niche of the oil-water separator market and add additional items to its product line.

The experience of McTighe Industries demonstrates that companies can indeed succeed in doing international business and be located in South Dakota, thus taking advantage of the state's friendly business climate of low taxes, low crime rate, and good schools. With the help of SDSM&T's technical engineering expertise and its top-quality students, companies can do business all over the world while providing good-paying jobs at home in South Dakota. ✂

Mines to Mongolia

continued from page 7

constructed the 450-mile Perth to Kalgoorlie water pipeline, which was the longest of its kind in the world.

In conjunction with his fellowship, Dr. Rama organized the "International Conference on High Performance High Strength Concrete" sponsored by Curtin University's School of Civil Engineering. Like the workshop in Mongolia, the conference Dr. Rama organized in Perth was the first such international concrete forum ever held at Curtin University, which has an enrollment of approximately 25,000 students. Despite the large enrollment, admission to the institution's School of Civil Engineering is extremely competitive. Of the approximately 500 applicants each year, only forty students are accepted.

Delivering the keynote address for the forum, Dr. Rama described his research on the performance and strength characteristics of fiber-reinforced, light-weight concrete. In addition, he presented a series of lectures describing his research sponsored by the National Science Foundation that focused on the novel idea of using bacteria to repair cracks in concrete.

Dr. Rama's receipt of the C.Y. O'Connor Fellowship may lead to cooperative research projects between SDSM&T and Curtin University. Further ties between SDSM&T and universities in Australia may be established in the not too distant future. Dr. Rama has already been invited to come back next year and present workshops in Melbourne.

Dr. Rama's international prominence in the civil engineering profession spans three continents and continues to grow. It's a long journey from the campus in Rapid City to universities in Asia and Australia. Through the highly respected research activities of this professor and concrete expert, Dr. Rama is making connections that link South Dakota to the exotic lands of Mongolia and China and civil engineers "down under".



Wired, Wrapped, & Ready

continued from page 5

engineering principles through application examples that involve the interactive participation of students. A common ground linking all disciplines, the "virtual earth" can be used to visualize a particular scientific or engineering problem that will make it easier for students of all levels to 'learn by doing' and develop better skills in understanding new knowledge.



Dr. Zbigniew Hladysz, Chair and Professor of Mining Engineering, provides Dakota State University President Jerry Tunheim with a 3-D Virtual Reality experience while Dr. Bradford Morgan, Professor of English, shows Dr. Donald Dablin, University of South Dakota Vice President for Academic Affairs, how to use the high-tech stereoscopic glasses.

Students in Dr. Hladysz's classes at SDSM&T now have the advantage of interacting with the virtual world by using crystallized stereoscopic glasses to see 3-D images. These glasses are not ordinary goggles—they are the same type of advanced technology glasses used by National Aeronautics and Space Administration (NASA) officials to control their robot on Mars!

This advanced technology is a powerful research tool for which the private sector has already found commercial applications—Boeing Corporation for designing its 777 jumbo jet and Ford Motor Company for designing new automobiles. Major pharmaceutical companies utilize 3-D depictions of complex molecular structures to conduct their latest DNA research.

"The applications of this technology are infinite," says Dr. Hladysz enthusiastically. "They can be used in any engineering or

science field, and others as well—even history! My dream is that we will someday have a virtual reality laboratory on campus that can break down the barriers between disciplines and stimulate a whole new way of learning."

SDSM&T's eight faculty projects provide access to a range of educational technologies to support both classroom and individualized education. These projects demonstrate a range of approaches that can be used to strengthen both K-12 and university education.

The fifty-seven award recipients from

South Dakota's six public universities demonstrated their technology projects on the SDSM&T campus during the October meeting of the Board of Regents. Lieutenant Governor Carole Hillard, who represented Governor Janklow at the program, described the projects as practical applications of technology in teaching.

"As a former teacher, I can appreciate the tremendous effort and commitment from the faculty members who displayed their projects," said Lt. Governor Hillard. "I am pleased to see technology being applied in a wide range of disciplines

including music, art, history, English, and sociology, as well as geology, mathematics, physics and chemistry."

"The members of our faculty and staff who have worked together to accomplish these projects are available to assist others in using the technologies and techniques in their disciplines," said SDSM&T President Dr. Richard Gowen. "SDSM&T has developed the High Priority Connection Network (HPCNet) that combines the access of the Internet with the power of an advanced database to provide a rich network for education and business."

As the use of computers and software keeps mushrooming, SDSM&T's faculty members continue to adapt new technologies into their instructional methods. By doing so, they help prepare today's students with the skills needed for tomorrow's technology-based world. Working with their K-12 colleagues in education, SDSM&T's professors are



You Are Invited . . . Calendar of Events

NOVEMBER

SUNDAY, NOVEMBER 1

Final Day of Tech Family Weekend

TUESDAY, NOVEMBER 3

12:30pm-4:30pm

CAAP Testing
Election Day
United Campus Ministry Forum -
Internet: Attraction/Distraction

WEDNESDAY, NOVEMBER 4

8am-12pm CAAP Testing

THURSDAY, NOVEMBER 5

8am-12pm CAAP Testing

Jane Elliot Lecture

FRIDAY, NOVEMBER 6

7pm Home Volleyball Game against
Dakota State University

SATURDAY, NOVEMBER 7

1pm Home Volleyball Game against
Huron University

1pm Football Game at Dakota Wesleyan
University
SDIC Cross Country Championship at
Sioux Falls

MONDAY - MONDAY, NOVEMBER 9 - 16

Early Registration Week

TUESDAY, NOVEMBER 10, 1998

United Campus Ministry Forum -
Global Warming: How Much & When?

WEDNESDAY, NOVEMBER 11

Veteran's Day Holiday

FRIDAY, NOVEMBER 13

7:30pm Home Men's Basketball Game against
Chadron State

TUESDAY, NOVEMBER 17

Men's & Women's Basketball Games at
Dickinson State University
United Campus Ministry Forum -
The Millennium Bug - How Bad is the
Byte?

WEDNESDAY, NOVEMBER 18

Tonic Sol Fa - TONITE

FRIDAY, NOVEMBER 20

7:30pm Home Men's Basketball Game against
Jamestown

SATURDAY, NOVEMBER 21

SDIC Cross Country Championship at
Kenosha, WI

FRIDAY & SATURDAY, NOVEMBER 20 & 21

Women's Basketball Game at Montana
State Havre Tournament

TUESDAY, NOVEMBER 24

United Campus Ministry Forum -
Thesis: A Civilized Culture Requires a
Measure of Intolerance

7:00pm Home Women's Basketball Game against
Chadron State

Men's Basketball Game at
Chadron State

THURSDAY, NOVEMBER 26

Thanksgiving Holiday

FRIDAY, NOVEMBER 27

No classes due to Thanksgiving Holiday

FRIDAY & SATURDAY, NOVEMBER 27 & 28

Home Men's Basketball Game in
Hardrock Classic
Women's Basketball Game at
Black Hills State University Tournament

DECEMBER

TUESDAY, DECEMBER 1

United Campus Ministry Forum -
Women & Mysticism in the Medieval
Christian Church

WEDNESDAY, DECEMBER 2

5:30pm & Home Men's and Women's Basketball
7:30pm Games against Dickinson State

SATURDAY, DECEMBER 5

Men's Basketball Game at
South State University
Women's Basketball Game at
University of Mary

SUNDAY, DECEMBER 6

7pm Christmas Concert in Lead

TUESDAY, DECEMBER 8

United Campus Ministry Forum -
Foreign Students - Expected & Shattered
Expectations
Women's Basketball Game at
Chadron State

THURSDAY, DECEMBER 10

Men's Basketball Game at
Jamestown

FRIDAY, DECEMBER 11

Men's Basketball Game at
Valley City State

SATURDAY & SUNDAY, DECEMBER 12 & 13

8pm 16th Annual Christmas Concert;
Cathedral

WEDNESDAY - TUESDAY, DECEMBER 16 - 22

Final Exams

FRIDAY, DECEMBER 18

Women's Basketball Game at
Point Loma, CA

SATURDAY, DECEMBER 19

10am Commencement
Women's Basketball Game at
Christian Heritage, CA

FRIDAY, DECEMBER 25

Christmas Holiday

SUNDAY & MONDAY, DECEMBER 27 & 28

5 & 7pm Home Women's Basketball Game in
US Bank Classic

TUESDAY & WEDNESDAY, DECEMBER 29 & 30

Men's Basketball Game at
Black Hills State University,
Perkins Classic

JANUARY

FRIDAY, JANUARY 1

New Years Day Holiday
7:30pm Home Men's Basketball Game against
Colorado Christian

SUNDAY, JANUARY 3

3pm Home Men's Basketball Game against
University of Regina
5pm Home Women's Basketball Game against
Colorado School of Mines

MONDAY & TUESDAY, JANUARY 4 & 5

New Student Orientation

THURSDAY, JANUARY 7

First day of classes for Spring Semester

FRIDAY, JANUARY 8

Men's & Women's Basketball Games at
University of Sioux Falls

SATURDAY, JANUARY 9

Men's & Women's Basketball Games at
Dordt College

FRIDAY, JANUARY 15

6 & 8pm Home Men's & Women's Basketball
Games against Huron University

SATURDAY, JANUARY 16

6 & 8pm Home Men's & Women's Basketball
Games against Dakota State University

MONDAY, JANUARY 18

Martin Luther King, Jr. Holiday

FRIDAY, JANUARY 22

Men's & Women's Basketball Games at
Mount Marty College

SATURDAY, JANUARY 23

Men's & Women's Basketball Games at
Dakota Wesleyan University

WEDNESDAY, JANUARY 27

6 & 8pm Home Men's & Women's Basketball
Games against Black Hills State
University

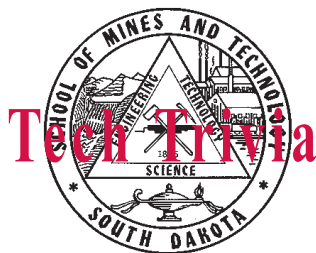
*For information on these events contact University and Public
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Did you know...

- President Calvin Coolidge toured the Museum of Geology when he visited the School of Mines in September, 1927.
- "Operation Evergreen" resulted in more than 1,500 trees being planted on campus in the early 1980's.
- The first M-Day queen was selected forty years ago in 1958.
- School of Mines President Dr. Cleophus O'Harra gave the main address at the

dedication ceremony of George Washington's face on Mount Rushmore on July 4, 1930.

- SDSM&T's tennis team won the SDIC championship in 1973.
- In 1889, Dr. Valentine McGillicuddy, Dean of the School of Mines, sent four live buffalo to the Smithsonian Institution's National Museum in Washington, DC.

(Source: *Centennial: An Illustrated History 1885-1995*, by Ruth Anne Stymiest)



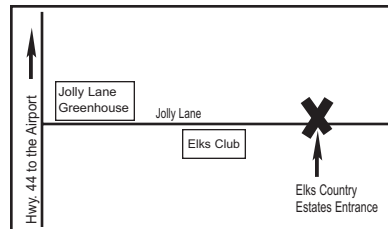
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