

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY QUARTERLY

SUMMER 1999



Spots, Stripes,
and Tail Feathers

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Perspectives



Dear Friends,

Since the days of the Dakota Territory, the South Dakota School of Mines and Technology has responded to the technology needs of the people we serve. The fire assays of gold mining 100 years ago have been replaced by programs in the major areas of engineering and the sciences that have established our proud tradition of educational excellence. Through the innovative programs of Governor Janklow, the schools, universities, and cities of South Dakota are being linked through the telecommunications technologies of today on

a scale unparalleled across the world. The activities of the university community this summer provide interesting examples of how the university continues to respond to these new technological opportunities.

In addition to our regular summer course and program offerings, we are hosting workshops and courses to prepare teachers to use technology to improve K-12 education. The network administrators of South Dakota's school districts are participating in a month-long institute to prepare them to install and operate the computer servers needed to link school classrooms to the Internet. The High Priority Connection Network is developing software to help parents use the Internet to review the grades and other activities of their children in the K-12 classrooms of South Dakota. Such software will soon be used to enhance the learning of individual students so they may develop to the fullest of their potential.

Enhancing K-12 learning in mathematics, the sciences, and English has become a special objective for our university. The experiences gained through the Scientific Knowledge for Indian Learning and Leadership (SKILL) program to prepare Native American high school students to succeed in engineering and science college studies have helped to identify new ways to enhance critical thinking skills. The NASA Honors Program and Model Institute for Excellence Program offered in partnership with the Ogalala Lakota College have brought 120 Native American students to the campus with studies in mathematics and sciences.

This summer, 11 of our faculty received Governor's funding to create courses to be taught over the Internet this fall. The Advanced Placement Institute brought 20 high school English teachers from three states to campus to learn new ways that they can improve the success of their teaching activities.

The reconstruction of the Civil-Mechanical Engineering Building is a visible reminder of the impact of changes in technology on the expectations of our graduates. When finished in the summer of 2000, the new building will provide laboratories and classrooms to prepare the leaders who will continue the proud tradition of improving the quality of life for all through changes in technology.

Sincerely,

Richard J. Gowen, President

SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY QUARTERLY

Summer 1999

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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	
Civil Engineering	Mechanical Engineering
Computer Science	Paleontology
Electrical Engineering	Technology Management
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.

PRODUCING FUTURE INDUSTRY LEADERS

*Center of
Excellence
provides pipeline
to student talent*

By Tom Domek

Imagine a team of engineers taking little more than an idea, conceptualizing it, modeling it through a sophisticated computer-aided-design program, fabricating the design on the shop floor, then completing a patent disclosure that leads to a feasible and highly marketable product, all at or below budget.

What would you call this team? A fiction? Dr. Dan Dolan, Professor of Mechanical Engineering, wouldn't. He would call them "low-cost leaders who can integrate proven technology to produce useable products for the market place." In a nutshell, Dolan says, "that's what good engineering teams do."

Dolan is the academic director of CAMP, otherwise known as the Center of Excellence for Advanced Manufacturing and Production. Dolan is joined at CAMP by Industrial Director Dr. Srinivasa Iyer, Professor of Civil and Environmental Engineering, and Executive Director Dr. Michael Batchelder, Professor of Electrical and Computer Engineering.

Teamwork, the triad will tell you, is the hallmark of CAMP. The program at SDSM&T prepares students for the realities of today's competitive workplace. CAMP utilizes the skills of Tech students who conduct interdisciplinary research and form enterprise teams. Oftentimes, these teams help private companies solve

design and manufacturing challenges. At other times, the teams compete nationally with other tech-heavy colleges. In addition,

students usually earn academic credit.

Keeping all of this in mind, is the program successful? Judge for yourself from the following projects.

- Durability testing of an air suspension system for Legend, a Watertown, SD, company. Tech students put the newly conceived invention through 1.5 million cycles, proving its staying power. The air suspension product is an after-market part that fits Harley Davidson's soft-tail "hog."

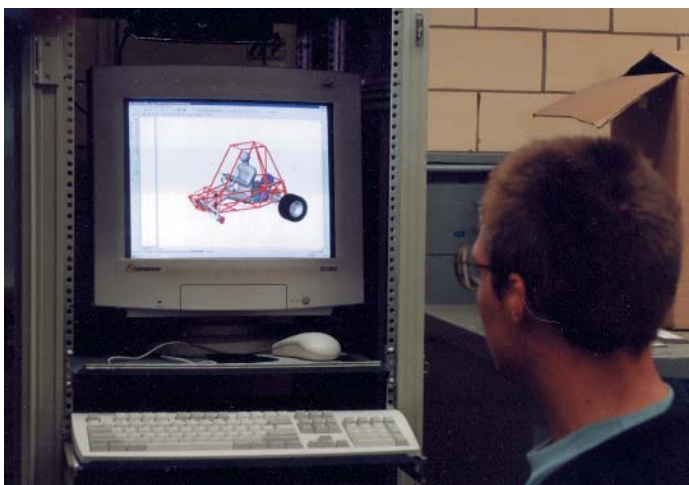
- Prototype development of a new dental device. Students developed a product for dental offices that may prove beneficial to the environment. The device is awaiting patent determination, so details can't yet be released. Its marketability looks very promising.

- Practical use of a computer-aided-design (CAD) program that enhances students' abilities to conceive, design, and create projects and products of all kinds. The CAD program allows students to model engineering designs on a computer screen. Students can view their designs from all angles in 3-D; can model for precise measurement specifications; and can conduct comprehensive system analysis entirely within the computer model. Such modeling significantly reduces trial-and-error engineering on the shop floor.

- Continued improvements in the design and practical application of highly visible projects that compete with other universities at national events. These projects include the concrete canoe, and vehicle projects: the Sunrayce solar car, Mini-Baja and Mini-Indy. For



Logo courtesy of C-CAMP



Photos by Tom Domek



From computer to the real thing - CAMP provides Tech students with the necessary tools to design vehicles such as the Mini-Baja. Above, left: Arlin Sandbulte (ME, Sherman) brings an image of this year's Mini-Baja design up on a computer using a CAD program. Above, right: Matt Helde (ME, Rapid City) works on getting the Mini-Baja ready for competition.

example, this year's solar car is utilizing Geographical Position System (GPS) technology, which can pinpoint the exact geographic location of the car in its competitive race between Washington, D.C., and Orlando. The GPS technology will help the driver optimize the capture of the solar rays within the car's solar cells, thereby improving the efficiency in propelling the vehicle over long distances.

- Development of a robotic snow blower that uses off-the-shelf technology. Caterpillar Corporation of Peoria, Illinois, is currently examining the new technology, which may provide additional design opportunities in mowing, harvesting, and fertilizing even large sections of land.

"CAMP students and faculty carry a passion for engineering," Dolan says. "We're working with the tools that make engineering and producing products fun!"

Two years ago, the South Dakota Board of Regents approved CAMP as Tech's "Center for Excellence." Each state university in South Dakota has at least one such center. As a Center of Excellence, CAMP receives state monies provided through the Board of Regents Reinvestment through Efficiencies Program. Pooled with grants monies and donations, CAMP's budget now tops out around \$250,000 per year.

CAMP's three directors are supported by secretary Rita Sabe and Integrated Manufacturing Specialist Casey Allen. In one way or another, all five people provide guidance to students from a wide horizon of disciplines: electrical, mechanical, civil, chemical, metallurgical, and industrial engineering, as well as computer sciences.

Such an approach, says Iyer, is a model for other universities. "In CAMP, our students are exposed to everyday, real-world problems they have to solve. To achieve success, CAMP faculty help develop student leaders, and these leaders in turn assist the younger CAMP students."

Batchelder echoes Iyer. "Leadership development, provided in a multi-disciplinary environment, establishes hands-on teaching in a creative atmosphere."

But providing students with a hands-on creative atmosphere, Batchelder says, does



Tech student, William Kroll, (ME, Corbett OR), works on a part for the solar motion car.

come with a price. "CAMP students are given a level of independence, which means they'll sometimes make mistakes. If we see them make a mistake, we'll tell them about it right away, but we don't micro-manage. Students often learn more from their missteps than from getting it right the first time. With independence comes consequences," Batchelder says, "but also

self-discovery."

Nearly every project incorporates interdisciplinary talents. The Mini-Baja and Mini-Indy cars, for instance, include students from civil, electrical, industrial, mechanical and metallurgical engineering as well as computer science disciplines. Civil and mechanical engineering students work on the concrete canoe. The solar car incorporates students from numerous disciplines as well.

"Industry doesn't care about your major," Batchelder explains. "Basically, they just want teams that can work together and get the job done."

To be selected for CAMP, students must be first-year juniors maintaining a 3.0 grade point average. "Essentially, this is an honors program for design and multi-disciplinary products development," Dolan

says. "CAMP helps fulfill the educational mission of SDSM&T while providing students and companies a direct link in producing practical, market-ready products."

CAMP students also learn to be "low-cost leaders," Dolan says. "We want to make the absolute best use of what we have in terms of dollars. We want to continually consider the bottom line, from product design to full project implementation."

To illustrate, Dolan compares some of the Tech's competitive projects, like the Mini-Baja or Mini-Indy cars with their counterparts from other schools. "While some big—and I mean big—universities put a tremendous amount of dollars into their project cars, we cap our costs. We come in with a budget significantly lower than most schools. We're an underdog, but we like that position. That helps us develop 'low-cost leaders.'"

And CAMP students are competitive. "Last year, in a field of some 50 or 60 mini-bajas from across the country," Dolan says, "we finished in the top ten overall. We even got a first place finish in the presentation category." Other projects, such as the concrete canoe and the solar-motion car, have earned first-place awards as well.

"Lots of bells and whistles," Dolan says, "simply don't make a team competitive." "Reliability is a big part of competition and we do good solid engineering at CAMP.

That's what industry is searching for—talented, and competitive engineering teams that keep an eye on the bottom line."

Originally, CAMP's directors hoped to have 15 students per year enrolled in the program. In just two years, enrollment has climbed to last semester's 42!

Quite an achievement, you might think, for a two-year-old program at a relatively small school. But Iyer isn't surprised: "The School of Mines is unique," he says. "Its small size is actually a strength, allowing us to move fast and to change with the advance of technology and the educational landscape. The students we attract are so talented, just fantastic. They're practical and have a strong work ethic. We're doing well at CAMP."



Spots, Stripes, and Tail Feathers

It's all in the math!

By Kari Larese

The most remarkable animals in the world are unique, beautiful and colorful. Peacocks, zebras, and leopards are unmistakable, but what makes them so? It is not their ferocious or gentle demeanor, their immense size, or peculiar walk. We notice these animals because of their pattern, or distinguishable coat.

A peacock wears striking blue and turquoise colors with beautifully patterned tail feathers. Zebras are marked by black stripes covering their entire body, and leopards wear many spots of different sizes and shapes. How do these animals get their complicated patterns? More importantly, how does the leopard get its spots? Dr. Jeff McGough, Assistant Professor of Mathematics at the South Dakota School of Mines & Technology (SDSM&T), has been involved in basic research to determine this question.

Mathematics is more than addition and subtraction. It has many useful applications that have been utilized for centuries. Coupled with biology, chemistry or physics, mathematics can be applied to solve coat patterns in animals, model highly reactive fuels, research epidemiology, or help understand electrical conduction around the heart.

It was during the mid to late '80's that McGough was introduced to pattern formation and in 1993 he became involved with a research group looking at coat patterns in animals. He had just received his Ph.D. in Mathematics

from the University of Utah (UU) and was awarded a postdoctoral fellowship in Scientific Computing. McGough worked in the Center of Scientific Computing at

fundamental question: How does the information contained on a genome, the genetic material of an organism, get translated to the adult? This involves

converting the abstract model into large systems of algebraic equations which can then be solved by the computer.

The first step would be to model the chemical reactions into an equation model. To do this you would look at the chemical's concentration at every point in the reactor and find approximating equations. The second step comes when these equations (which number in the hundreds of thousands) are solved and the computer simulation is then

presented as a graph. We understand images much better than raw numbers, so it is important to represent the results back into the original form, the third step. In this case it is an animal coat pattern.

"In creating a model you try to capture the essence of a problem with not too many details," said McGough. "By focusing on the essential part, you are able to make the approximation small enough to fit on a computer, but detailed enough to capture what you want to study. I take equations and solve them on a computer to provide feedback for the chemist, a virtual lab."

An example would be walking. If you were trying to discover how walking occurs researchers would not need to model hair, eyes, or arms, rather just the essential elements it takes one to walk such as legs, feet, and hips.

Mathematics can be applied to many areas of

Photo courtesy of Dr. Tomi Logar



the University of Utah.

"A group was working on computational biology trying to discover what is behind coat patterns in animals," said McGough. "They needed someone with skills in numerical analysis, partial differential equations, and computing. As a result I would do computer simulations of chemical reactions. I essentially set up a virtual lab," he added.

"I got involved because my Ph.D. work involved similar work. The director wanted someone with this background and asked me to apply."

McGough was in search of a

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observing population models in biology. Several different populations in a specific geographic area can be looked at and can focus on predator/prey or competing animal relationships. Ecological models can observe changes in birth/death rates. An example of this is fish

the sciences and engineering. Rocket fuels, chemical reactions, and fluid dynamics can all be modeled using mathematical equations. McGough was involved in research modeling highly reactive fuels. A chemical model using solid rocket fuel was created in an effort to find out how fuel shape affects its temperature. The research was trying to determine up to what point could fuel be heated before it explodes.

Equations can also be effective looking at epidemiology, the study of disease, when combined with biology. Researchers are able to study population groups in an effort to reduce the number of people getting sick. They can discover the optimum strategy for destroying a virus. "Researchers can manipulate how a disease runs through a population by changing the immunization approach," said McGough. "By studying the groups infected, recovered, and susceptible, researchers can achieve better overall population health."

By modeling a disease mathematicians can aid in reducing the incidence, or determine what the best age to immunize would be. This has been done with rubella. Researchers have been able to study how the disease propagates and when it is at its most vulnerable point. STD's and AIDS have also been modeled with equations to get an estimate of their occurrence and patterns.

Another area mathematics is useful is

hatcheries. Using mathematical equation models, researchers have determined how to most effectively fish a certain region.

Physiological models have been created in an effort to understand electrical conduction around the heart. Using what we know about electrical properties of a single cell, models have been developed to simulate the electrical activity of the heart. This has lead to a greater understanding of when things go very wrong, like what is seen with heart attacks.

You have just seen four ways mathematical applications can be used to solve very imminent problems. Can you begin to imagine all of the other useful applications math has? By running computer simulations with mathematical equations researchers have a very good tool in understanding how a system works.

"Once we understand, for example, how a certain set of chemicals react, we can use the computer to model the long term dynamics," said McGough. "This can then replace a lab experiment."

One area of focus McGough is personally interested in is animal testing. In the far-off future animal testing can be decreased with the assistance of computer simulations. In the near future mathematical simulations can replace a lab experiment, but not animals themselves. "Animal testing is not done to understand chemistry but to understand parts of a very complicated system, the living organism with its thousands of chemicals, many which are not well understood," said McGough. "If models become robust enough, then down the road we think that we can start to replace these tests with accurate models."


Addition and subtraction is just the beginning. As each day passes, researchers and mathematicians are discovering new areas to apply mathematics. The colors on a peacocks tail, number of stripes on a zebras back, or size of the spots on a leopard's coat are just three ways math has evolved to aid researchers in their studies. There is an immeasurable number of mathematical applications waiting for someone to grasp at, and many at Tech plan to take hold. 



Photo courtesy of Bear Country, U.S.A.

Growing up as a kid in Rapid City, Pierre, San Diego, Seattle, or even High Point, there is one universal element all kids wish for... a playground. Not just any playground, but their own playground. One that they are able to design and are able to find the best toys, the most exciting climbing equipment, and the largest jungle gym. A playground where they could live their wildest and most spine tingling adventures. They could be pirates, astronauts, famous basketball stars, or have fun playing house.

It is one such dream that a group of kids living in the Lakota Homes neighborhood of Rapid City got to bring to life. Shirley Hobbs, a community volunteer, took it as her responsibility to bring a playground to their neighborhood.

"The children in the neighborhood needed a safe place to play," said Hobbs. "I decided to get the community involved in order to create a fun and safe playground for the kids."

Two years ago Shirley called Dr. Marion R. Hansen, Associate Professor of Civil and Environmental Engineering at South Dakota School of Mines and Technology (SDSM&T) in an effort to solicit the help

of the SDSM&T Student Chapter of the American Society of Civil Engineers (ASCE). "Shirley called me up out of the blue and asked for our help," said Hansen. "She had heard that the ASCE student

one's imagination. Students at SDSM&T together with Shirley Hobbs and children from the Lakota Homes neighborhood got together to create the design.

Shirley Hobbs initiated the idea to

"It became our job to figure out what to do, where to put things, and what type of materials to use," said Deborah Paulson (IS, Rapid City) member of ASCE Student Chapter. "Once we collaborated with the kids we created a model of the playground on the computer using CAD (Computer Aided Design) software and then built a small scale model out of wood," she added.

chapter gets involved in community activities and was hoping that we could help, and we did," he added.

The American Society of Civil Engineers (ASCE) Student Chapter at SDSM&T had never participated in a project like this previously. Some of the students had assisted in putting together the playground at Little Miner's Clubhouse (LMC) but there was one key difference in the two, the playground at LMC was prefabricated making it a cinch to put together. The idea behind the Lakota Homes playground was developed out of

design the playground after hearing about two similar situations in Hot Springs and Sturgis. In both communities a playground was built with assistance from community members, organizations, and city funding. As a result, Tech students, Lakota Homes' children, and Shirley Hobbs made three trips to visit the playgrounds. They visited Hot Springs twice and Sturgis once.

"We visited the other sites to see the type of construction and theme each was modeled after," said Hansen. "We also wanted to talk to people about how they organized it as well."



Photos by Kari Larese



sloped bridge made out of conveyor belts.

Tech students were involved in the initial phase of

how to make it wheelchair accessible—the finished playground is approximately 60%-70% accessible.

"Most of our time was spent on the

"The children in the neighborhood needed a safe place to play," said community volunteer, Shirley Hobbs.

"I decided to get the community involved in order to create a fun and safe playground for the kids.

constructing the playground. They went out to the site and surveyed the land to make sure they built on the best location. The site chosen was 50 feet x 70 feet. They spent many hours on the telephone with the City Engineer making sure they were following building code specifications, and getting information about insurance coverage for the playground equipment. ASCE

phone," said Paulson. "None of us had ever done this before and we needed to be positive that we were following the right steps and adhering to city guidelines for building it," she added.

The playground was constructed through \$20,000 they received in city funding along with a few donations from United Building Center, Black Hills Materials, and West River Electric Association. Shirley Hobbs was the driving force to get it done," said Hansen. "She deserves most of the credit." Hobbs initiated the idea for the playground, solicited volunteers to help design it, sought for and received city funding, and

After their visits to the other playgrounds everyone sat down and brainstormed to gather ideas for the design. The children from the Lakota Homes neighborhood drew pictures depicting their 'perfect' playground, many of which included large swimming pools (unfortunately that was not possible). It was the job of Shirley Hobbs and students from SDSM&T to make their pictures become a reality. "The engineering students had to take the kids' ideas from the pictures and work it into something practical and feasible," said Hansen.

Students also helped decide which materials were most effective for the jungle gym ensuring a safe play area, and worked on

"It became our job to figure out what to do, where to put things, and what type of materials to use," said Deborah Paulson (IS, Rapid City) member of ASCE Student Chapter. "Once we collaborated with the kids we created a model of the playground on the computer using CAD (Computer Aided Design) software and then built a small scale model out of wood," she added.

The theme for the playground chosen by students in the Lakota Homes neighborhood was "Adventure Land." The design includes a walk through archway, series of maze walkways, rope swing, crawling space, tire swing, suspended bridge, cargo net created out of tires, and a



Lakota Homes children proudly show off their playground. Pictured l to r: Krystal Rencountre, Junior Dubray, and Lisa Andrews.

Tech students design a place for play



ROTC commissioning ceremony was held at Mt. Rushmore Memorial for spring graduates. Pictured l to r: Lieutenant Colonel Richard Murrell; Tech Students, Eric Hall and Garland Krabbenhoft; and Black Hills State University student, Stacey Trezona.

five hours a week in advanced military training, and six hours a week in physical training. As time progressed, students and faculty alike grew to appreciate the military presence on campus and grasped the necessity for thorough military training.

Despite becoming a part of the campus community, the AST only lasted ten months but the appreciation for the Army continued. In 1950 a

The Army Reserve Officer Training Corps (ROTC) at the South Dakota School of Mines and Technology (SDSM&T) has a proud history combining military officer training with the development of the mind. Cadets adhere to demanding physical training while working towards an undergraduate or graduate degree in the science and engineering fields.

"The confidence this school gives you academically coupled with ROTC training gives me the knowledge and confidence that I can compete," said senior cadet Garland Krabbenhoft (ME, Rapid City.)

As a cadet in the Army Reserve Officer Training Corps students receive a commissioning as a 2nd Lieutenant in the U.S. Army in addition to their undergraduate or masters degree. Cadets must take courses in military history, military law, basic tactics, map reading, and marksmanship.

"The Military Science curriculum provides leadership training and experience demanded by both corporations and the Army," said Major Randy Kramer. "The ROTC program is designed to provide an understanding of the fundamental concepts and principles of military art and science."

The Reserve Officer Training Corps was created out of the National Defense Act of 1916 in an effort to increase interest in collegiate military training. The Mount Rushmore Battalion at SDSM&T was established in 1950 and since its creation the unit has provided commissioned officers in the Vietnam Conflict, Desert Shield/Desert Storm, and many peacekeeping operations around the world.

Military training at SDSM&T first appeared on campus in 1918 with training detachments. Faculty at the time expressed a desire to aid in the war effort and offered the school's facilities for service. The Students' Army Training Corps (SATC) was formed and authorized at SDSM&T later that same year.

With the increase in students on campus came a favorable swing in academics. Engineering took a strong foothold at SDSM&T and once the war was over, temporary barracks were removed, the mess hall was revamped, and new construction was on the way. It wasn't until 1943 and the second World War did the military make another presence on the Tech campus.

The Army specialized Training Program (AST) was formed and Service Command Unit 4766 arrived on August 14, 1943 with 275 trainees. Men were to spend 24 hours a week in the classroom,

ROTC at Tech

By Kari Larese

Reserve Officer Training Corps unit was established at the South Dakota School of Mines & Technology and today is an active participant in campus life.

"The program at Tech is designed to develop leadership, managerial potential and a basic understanding of associated professional knowledge," said Kramer. "We try to develop a strong sense of personal integrity, honor and individual responsibility in each cadet that goes through the program, and develop an appreciation of the requirements for national security."

Unlike many ROTC battalions that train once a month, Tech's Mount Rushmore Battalion undergoes training once a week. Cadets learn land navigation, risk assessment, leadership skills, first-aid training, water safety, rappelling, self-defense, field training, physical fitness training, and retiring the colors for the school in the evening. In addition to the weekly training, cadets also attend summer training programs.

Camp Challenge is designed for students who are not yet active in the ROTC program. It is an introduction to the Army for students to experience first-hand what being a cadet is all about. Those interested in attending Camp Challenge and joining the ROTC program must have two years of college left to complete. It would be suitable for students about to enter their junior year, or for graduate students working towards their master's degree. Students attending Camp Challenge are not required to join ROTC. It is an opportunity for each student to determine if it is appropriate for them and if they can handle the challenge, and responsibility placed upon them.

"Camp Challenge is a summer internship program for students who are not yet in the Army but are considering the ROTC program," said Kramer. "Students from all over the United States are grouped together in platoons of 40 people and experience various weapons systems, land navigation, first-aid, a confidence course, rappelling, basic survival techniques, as well as leadership training."

At the end of the 5-week camp, students must decide if they want to become a cadet in their school's ROTC program. Students with a 2.5 Grade Point Average or higher may be offered a

scholarship to support their ROTC training. For those who choose to enter the program, once they have graduated they will have three options: Active Duty, Army Reserves, or Army National Guard.

A second camp all cadets must attend is the Advanced Camp. It is for individuals with one year of ROTC remaining before they are commissioned as an officer. Generally cadets attend the summer before their senior year. Advanced Camp is a five-week course held at Ft. Lewis, Washington. It is a final assessment for cadets before they are commissioned into the Army.

"It is perhaps the single most defining moment of their time spent in ROTC," said Colonel Rich Murrell. "It truly tests their mettle while honing their leadership skills they learned on campus."

Cadets are given more responsibility in leadership positions and more intense training to prepare them for their role as an officer in the Army. They are scored individually in training that involves

to get an outside view of his leadership ability and put into practice everything he has learned at Tech.

"I felt a lot of anxiety about going and was nervous about having to lead other cadets that I did not know," said Krabbenhoft. "There is no better way to test that than going to Advanced Camp," he added.

"There is no other program you can get on campus that teaches you how to build teams, encourage people, and develop leadership like ROTC has taught me."

Eight cadets will be attending Advanced Camp this summer, six from Tech and two from Black Hills State University. Tech students attending include Jason Ballard (IS, Box Elder); Jeremy Bryan (IS, Platte); Tyler Ehlers (ME, Letcher); Jeffrey Krueger (IS, Rapid City); and LeAnn Gunn (CHEM, Shadehill). Of the eight attending Advanced Camp, four will go on to Cadet Troop Leader Training, one will have a three-week internship with an active

Preparing leaders for half of a century

leadership reaction courses, marksmanship, wilderness survival, first aid, and many other areas. During the 1998 Advanced Camp, the ROTC cadets from Tech were deemed the best in their brigade which included cadets from Colorado, Iowa, Kansas, Minnesota, Nebraska, North Dakota, South Dakota, and Wyoming.

Army unit, and one will be attending the Northern Warfare Training Course in Alaska. Three sophomores will also attend professional development training this summer. Two will be attending Airborne School at Ft. Bragg, North Carolina, and the third will be going to Air Assault School at Schofield Barracks, Hawaii. Kim Lucero (IENG, Alamosa CO) is scheduled to attend Camp Challenge.

The Reserve Officer Training Program at Tech has a long and proud history behind it stemming from 1918 and the first training detachments, through the introduction of ROTC onto the Tech campus in 1950, and to the present with a strong training and leadership program preparing cadets for a career as an Army officer. Military Science courses coupled with degrees in engineering and science equip cadets with knowledge and leadership skills preparing them for a move into active duty service, or into a professional career while serving in the Army Reserves or Army National Guard.

On May 8 three cadets from the Mount Rushmore Battalion were commissioned at Mount Rushmore. Two were Tech students and one was a student at Black Hills State University. The two from Tech were Garland Krabbenhoft and Eric Hall (CSC, Rapid City). Krabbenhoft will go into active duty service in the Army as an Engineer Officer, and Hall will go into active duty service in the Army as a Signal Corps Officer.



Photo by Kari Larose

ROTC students and instructors (pictured l to r), front row: Master Sergeant James Herron, Thad Thome, Chris Ebler, LeAnn Gunn, Kris Keller, Karen Tallent, Jason Ballard and John Akins; middle row: April Romig, Jon Vaughn, Tyler Feblers, Paul Conradt, Mark Muirhead, Matthew Fechter, Byron Bultsma, and Jeff Krueger; back row: Travis O'Connor, David Meberg, Lieutenant Colonel Richard Murrell, Shawn Steele, Aaron Tabbert, and Captain Scott Redd.

"We finished so well last year because we have one of the best training programs in the region," said Kramer. "Our folks get a lot of opportunities to lead and perform due to our once-a-week training and it pays off. Cadets who returned from last year's camp said they were much more prepared than others at camp because of the training they received on-campus. The more opportunities they get, the better off they will be," Kramer added.

Before Cadet Garland Krabbenhoft left for Advanced Camp he said he was excited but nervous. It was going to give him a chance



Photo courtesy of SDSM&T Alumni Office

Members of the Army Specialized Training Program on campus in 1943.

Freshmen Receive a Helping Hand

Peer advisors and faculty mentors ease the transition to Tech



Above: Junior Mike Hall (CE, Black Hawk), left, reviews course descriptions with junior Rob Hofmeister (EE, Rapid City).

Right: Barb Dolan, Coordinator of Student Academic Support and Development (left), and Chuck Colombe, Coordinator of Student Academic Development (right), pose for a photo in the campus quad.



By Tom Domek

Despite who we are, or what we know, sometimes we all need a little help. Two programs administered by the Office of Academic Services are helping to temper the cultural shock many first-time students and non-traditional students experience while pursuing degrees on campus.

The Peer Advisor Program and Mentoring Program are engineered to reduce the stresses students feel, both on and off campus, and serve to develop the student's ability to make solid, fundamental decisions, whether in their academic or personal lives.

For the most part, each program operates independently; however, the programs are complimentary, reinforcing the overall objective of each—the ultimate success of Tech students.

THE PEER ADVISOR PROGRAM

Chuck Colombe, Coordinator of Student Academic Development, sits in his office in the Mineral Industries Building, searching for words to describe the Peer Advisor Program.

"Our program matches upper-level classmen—peer advisors—

"Peer advisors help other students maneuver through the complexities of academic life. They voluntarily assist other students in everything from campus orientation, to course registration, to providing information on financial aid and scholarships, student organizations, activities, and placement tests and co-op programs."

-Chuck Colombe

with often younger students, and students needing assistance, including freshmen, who may have difficulty adjusting to the rigors of campus life," Colombe says. "Peer advisors assist faculty advisors in reaching out to each student in a particular department. They provide a very important service."

The program is a simple approach to a complicated problem: recruit upper classmen to work directly with other students who

may not understand academic policies and concerns about financial aid. "Peer advisors help other students maneuver through the complexities of academic life. They voluntarily assist other students in everything from campus orientation, to course registration, to providing information on financial aid and scholarships, student organizations, activities, and

placement tests and co-op programs."

Begun in the early 1990s, the program enlists about 30 peer advisors each year, typically with one or two advisors from each

academic department. Says Colombe, "We have some top-notch, really outstanding peer advisors who do a great job representing not only their department, but the whole institution at large.

"Freshmen and even upper classmen often relate more closely to someone their own age and within their same major. That student-to-student contact is important. We need to recognize that."

Story Photos by Tom Domek



Dr. Kathy Antonen, Associate Professor in Humanities and an SDSM&T mentor, provides assistance to Darwin Goodsell (Rapid City), a student enrolled in Interdisciplinary Sciences at Tech.

THE MENTORING PROGRAM

Barbara Dolan, Coordinator of Academic Support and Development, joins Colombe in the Academic Services office to talk about the Mentoring Program.

"A mentor," Dolan says, "is the term we use at SDSM&T for the faculty advisor to our first-time freshmen." Mentors are, however, much more than academic advisors, she adds.

"The reason the Mentoring Program was started was to change the culture of advising. We expect mentors to try to create an emotional bond with freshmen. Studies have shown that if an incoming student bonds with somebody on campus—like a faculty or staff member—the student is more likely to adjust to campus life and return the following year."

Unlike peer advisors, who are strictly students, mentors are faculty cadre. Each year, approximately 10 mentors from Tech's four colleges reduce their teaching and research load by one-quarter, replacing it with the responsibilities of mentoring freshmen.

Mentors commit 10 hours per week to mentoring, trying to build a personal relationship with those freshmen in their charge.

"The first year of college is a huge hurdle for many students. Mentors help them build study skills and sort through the realities of the careers they may enter," Dolan says.

"We know that most of the students who come here have the ability to succeed. We know that, because we wouldn't admit them to Tech if they didn't have the ability. With the Mentoring Program, we're trying to catch the at-risk freshmen before they get

into trouble, whether emotionally, intellectually or financially."

In 1997, mentors began teaching a new non-credit, non-fee, freshmen-only course called Interdisciplinary Sciences 090: University Mentoring. Mentors cover topics crucial to a student's success, such as time management, study skills, learning styles versus teaching styles, and policies and procedures that affect their college career.

The real key to the program, however, is probably the interpersonal relationships mentors and freshmen develop with each other. "Mentors, along with peer advisors, organize pizza parties and other activities that help freshmen adjust to campus life," Dolan says. "We're committed to our freshmen. We're trying to help them get through those first-year blues."

PROGRAMS PAY DIVIDENDS


Not only are freshmen and other students assisted, the two programs also benefit mentors and peer advisors, according to Dolan and Colombe.

"Some of the faculty have always been mentors," Dolan says, "but this program frees up their time to focus specifically on the contributions they've made as mentors."

"Our peer advisors grow too, through the Peer Advisor Program," Colombe adds. "Peer advisors begin to see the how's and why's of academic and financial policies and procedures. They learn how to deal with people." This,

Colombe says, helps the peer advisors learn how to become good managers, people-

persons if you will, who always seem to be in short supply in the work force.

Finally, if trends suggest anything, recent year-to-year retention appears to be up. "Attitudes are changing at Tech," says Colombe. "Everyone is trying to create a culture where students are respected and valued. From faculty, to staff, to the students themselves, we're trying to make SDSM&T the school of choice, not only because of its high academic standards, but also because students will be assisted in having a productive and happy experience. That's the type of culture all our students should expect." 

"Mentors, along with peer advisors, organize pizza parties and other activities that help freshmen adjust to campus life," Barb Dolan says. "We're committed to our freshmen. We're trying to help them get through those first-year blues."



Photo by Kari Larese

Hanna Mortimer has fun experimenting at the School of Mines display during the recent Kids Fair held at the Rushmore Plaza Civic Center.

SDSM&T REACHING OUT

Faculty, students and staff at SDSM&T lend a hand in educational and cultural activities throughout the region. These outreach efforts will forever unite Tech with K-12 education and the community as a whole.

The first annual SDSM&T Dinosaur Dash was a great success, as community members participated in the 5K Run/Walk to help celebrate the Museum of Geology's 100th anniversary of the first field dig and to kick off summer events at the Children's Science Center.



Photo by Kari Larese

Sergio Lima (left) and Helio Dasilva (right), National American University students, represented Brazil at the Multi Cultural Expo held on the SDSM&T campus.

SDSM&T hosted a Technology for Teaching and Learning (TTL) program for approximately 175 participants. The program, initiated by Governor Bill Janklow, taught representatives from each South Dakota school district how to maintain a network server.



Photo by Kari Larese



Photo by Kari Larese

Photo by Tom Donek



Over 900 fourth grade students raided the Tech campus to participate in the 1999 Water Festival. Schools from Box Elder, Black Hawk, Custer, Hermosa, Piedmont, Rapid City, and Sturgis participated in a wide variety of hands-on activities, including stream gauging in Rapid Cree, backyard conservation, oil spill cleanup, water filtration, water chemistry, weather radar, wetlands, and many more.



Photos by Kari Larese



A sneak peek was recently held at the Children's Science Center to provide the community with an opportunity to see the work in progress. Above (l to r): Rapid City Major Jim Shaw; Julie Smoragiewicz, SDSM&T University and Public Relations Director; and Dr. Richard Gowen, SDSM&T President, pose for a photo in front of the monstrous T-Rex! Right: Rapid City students, Brandon Freed and Laura Nelson, dig for fossils in the simulated fossil dig exhibit at the Center.

DIGGING DEEPLY INTO PALEO

By Tom Domek

the Pacific Northwest and is rivaled on the West Coast only by the better-known Rancho la Brea Tar Pits in the Los Angeles area."

The late Pleistocene, he adds, tethers back to the last great ice age, or about

Wayne Harrold with a fossil horse leg he discovered. Wayne and his wife Bess, both in their eighties have joined Martin nearly every year at Fossil Lake. They also have donated over 10,000 well documented fossils to the Museum of Geology from other sites in the Northwest.

Spring sun and slicing wind stir the shifting sand dunes at Fossil Lake, Oregon. Tiny islands of sage brush and grease wood cling to the tawny soils. On this mostly flat, thinly vegetated stretch of ancient lake bed, students and paleontologists from the South Dakota School of Mines and Technology (SDSM&T) slowly advance on hands and knees, searching for Pleistocene fossils.

Their painstaking efforts aren't new. They are, in fact, following in the footsteps of two famous early American paleontologists, Edward Cope and Thomas Condon, who originally worked the area in the 1870's.

Now each year since 1989, Dr. Jim Martin, curator of vertebrate paleontology at SDSM&T's Museum of Geology, has led a team of professional, student, and amateur paleontologists in a detailed field research and reconnaissance project at Fossil Lake.

"Fossil Lake," Martin explains, "is truly significant. It is the most important late Pleistocene site in

Dr. Mark Gabel, paleobotanist and colleague from Black Hills State University, examines a site where he found the first ostracods, one-celled creatures, from Fossil Lake.



30,000 years. Among the Pleistocene fossils unearthed at Fossil Lake are saber-toothed cats,

giant sloths, camels, dire wolves, mammoths, and numerous horses. In addition, vast numbers of rodent, bird, and water-related fossils, such as snails and fish, have surfaced.

"The great part about this site is that the wind exposes the fossils," Martin says. "The fossils are literally blown out and exposed on an annual basis. Fossil Lake offers, for instance, one of the most prolific sites in the world for the discovery and collection of fossilized birds."

Up to 90 percent of the avian fossils found at Fossil Lake are associated with water: ducks, grebes, geese—even flamingos, and pelicans. Nearby "wave-cut benches" carved tens of thousands of years ago occur above the lake bed, suggesting a time when Fossil Lake may have been 200 feet deep. These benches led early paleontologists to speculate that prehistoric fauna fell through the ice, only to drown and later fossilize in the lake sediments.

This "deep-lake theory" remains one of the intriguing questions of Fossil Lake. According to Martin, if the ancient lake was at one time deep, it didn't remain that way for long. He notes the preponderance of shorebirds and shallow-water fossils as indicative of a more ephemeral or shallow-water system.

Martin thinks that great floods of water produced by rapidly melting glaciers may have gushed over the Fossil Lake area, concentrating many mammals into the Fossil Lake site. Other animals, he thinks, may have gotten stuck in watering holes, where they died and later fossilized.

Thousands of years later, some of the fossils were exposed by migration of sand dunes including rodents, like prairie dogs and pocket gophers. The finding of prairie dog skeletons, according to Martin, is unusual, and represents the most westerly occurrence yet verified. Generally



One of the few landmarks in the desert at Fossil Lake.



considered a Great Plains species, Martin wonders how prairie dogs established themselves so close to the West Coast, and wonders why they became extinct in what appears to have been a favorable habitat that still exists.

Cayse Lillesve, a Kasson, Minnesota native and 2000 graduate in geology from SDSM&T, is studying another rodent, the pocket gopher, as part of her senior project. The thrust of her project is to verify earlier research as to the number of species of pocket gophers represented at Fossil Lake. "There has been a discrepancy as to the number of pocket gopher species that lived at Fossil Lake," Lillesve says. "We're trying to eliminate a question that has pestered scientists since the 1930s."

A 1999 geology graduate, Joann Labs (Long Island, NY), studied a fossilized bird skeleton as part of her senior project. Labs described the osteology of the specimen found in 1977 by Martin. Using modern grouse specimens, Labs determined definitively that *Centrocercus urophasianus*, or the sage grouse, existed—as it does now—thousands of years ago at Fossil Lake. This species requires a dry habitat as do other species such as the spade-foot toad and prairie dog found at the site. These occurrences argue against permanence of a deep lake.


This verification by Labs, as well as other findings, possibly raises the most intriguing question of all for Fossil Lake. How has climate affected the over all environment of Fossil Lake over the Ice Age? That answer may lie in the volcanic ash deposited in the stratigraphic layers of Fossil Lake soils.

"Volcanic ash can be dated," Martin explains, "and therefore for the first time at Fossil Lake, we can get a very tight sense of time associated with our fossil collections. This may be the only place in the Pacific Northwest

where we can link significant numbers of fossilized vertebrates to ash dates. That dating can reveal the timing of climatic changes and their environmental effects on vertebrates."

Martin believes the research SDSM&T paleontologists and students do now will answer questions of climatic change over the last 30,000 years. Those answers, he adds, will be valuable not only to paleontologists, but to other scientists and researchers, too, such as biologists, meteorologists, and land managers.

Finally, Martin imagines perhaps the most provocative finding of all for paleontology, the discovery of a spear pointed artifact embedded into the fossilized bone of some Pleistocene mammal. Such a discovery would link Paleo-man with the hunting of Fossil Lake mammals at an earlier time than generally accepted.

"In 1977," Martin says, "a juvenile camel skeleton was found at Fossil Lake. Associated with the fossil was a spear point. It appeared to some that it might have pierced the camel, but it wasn't embedded in bone. We are now in the process of dating the stratigraphic layer from which that camel was found." Smiling, Martin concludes, "Yes, we still do dream of finding the extinct mammal with the spear point embedded between its eyes." 



Crawling among sagebrush in search of tiny fossils.

Taking Courses At Tech Has Just Gotten Easier

Have you ever thought about going back to school, fine tuning your professional knowledge in a targeted field, or getting a jump on college while still in high school? If so, the South Dakota School of Mines & Technology has something for you! Beginning in the Fall, 1999, SDSM&T will be offering courses to take over the internet.

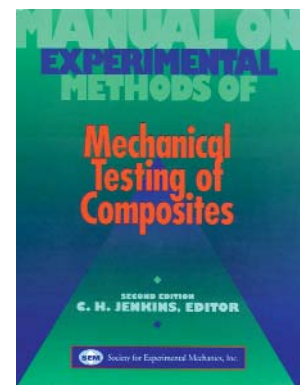
If it is the flexibility you need, convenience of taking classes at home, or the ability to work at your own pace, then internet courses at Tech are for you!

For information on internet courses offered this Fall, contact Academic and Enrollment Management Services at 605-394-2400.



PUBLICATIONS

Dr. Christopher Jenkins, Professor of Mechanical Engineering, edited a book entitled *Manual On Experimental Methods of Mechanical Testing of Composites*, Second Edition, recently published by The Fairmont Press.



GENEROUS ALUM REINVESTS IN TECH STUDENTS

\$45,000 annual scholarship award established

By Sandra Carlson, Edited By Kari Larese

1999 marks the inaugural year of the Richardson Outstanding Scholarship Program at the South Dakota School of Mines & Technology (SDSM&T). The program, implemented by Frank and Marilyn Richardson, will award each of nine SDSM&T students \$5,000 scholarships annually.

Under the terms of the program, the most outstanding sophomore, junior, and senior from SDSM&T's College of Earth Systems, College of Materials Science and Engineering, and College of Systems Engineering will be selected

annually beginning with the 1999-2000 academic year. The nine recipients are selected based on grade point average and other considerations.

Frank Richardson, a Wood SD native, graduated from SDSM&T in 1955 with a degree in Geological Engineering. He met and married Marilyn and the couple have two children, Stacey and Scott. Richardson worked for Shell Oil Company for more than thirty years, retiring as the company's President and CEO in the summer of 1993.

Since Richardson's retirement from Shell, Frank and Marilyn have remained active volunteers within the community. The two also remain active with SDSM&T, currently serving as National Co-Chairs in the institution's first-ever capital campaign.

"The Mines provided me a fundamentally sound education that served me well throughout my professional career," said Frank Richardson. "Marilyn

and I think it only fitting to provide future generations assistance in pursuing their educational goals at Mines," he added.

"Frank and Marilyn Richardson have demonstrated their support and commitment to this institution, this state, and our nation many times over," stated

sophomore Student Association Senator during the 1999-2000 academic year. He is also a member of the SDSM&T football team. Patrick Deering is a member of the SDSM&T Cross-Country and Track Teams and belongs to the Phi Eta Sigma freshman honor society. He is a member of Triangle

Fraternity and will be a junior Student Association Senator during the 1999-2000 academic year. Jennifer Waggoner has been awarded several scholarships and grants, and is active in Phi Eta Sigma National Honor Society, Alpha Delta Pi Sorority and the Drama Club. As a senior thesis topic, Jennifer will focus on using GIS methods to study volcanic

Photos courtesy of SDSM&T Foundation & Frank & Marilyn Richardson.



Seth Brakke



Deborah Morgan



Derek Rebsom



Gretchen Kvanvig



Abran Kean



Patrick Deering



Frank & Marilyn Richardson



Brenda Manley



Jennifer Waggoner



Jayme Zimprich

Dr. Richard Gowen, SDSM&T President.

"This latest gift provides a wonderful opportunity to recognize the student excellence that exists on our campus. The establishment of the Richardson Outstanding Scholars Program will forever link the incredible success story of a young man from South Dakota rising to the position of CEO of one of the world's largest companies due in part to the education received at the South Dakota School of Mines and Technology."

Gowen added, "It is wonderful to see alumni like Frank personally commit to ensure that future generations are provided the same opportunities."

The Richardson Scholars for 1999-2000 from the College of Earth Systems are sophomore Seth Brakke (CEE, Lyman), junior Patrick Deering (CEE, Brandon), and senior Jennifer Waggoner (Geol, Decatur TX). Brakke is a member of Delta Sigma Phi fraternity and will be a

resurfacing and impact craters on Venus from data gathered by the Magellan spacecraft.

The Richardson Scholars from the College of Materials Science and Engineering are sophomore Deborah Morgan (CHEM, Black Hawk), junior Derek Rebsom (MET, Dickinson ND), and senior Gretchen Kvanvig (ChE, Hettinger ND). Morgan is involved in many community organizations, and has been a volunteer for Black Hills Workshop, South Dakota Special Olympics, and Camp Hope. She is currently Home Manager for BH Workshop. Derek Rebsom is an active member of the Minerals, Metals, & Minerals/Materials Information Society International student chapter and has been on the SDSM&T Dean's list, and was a winner of the Metallurgy Faculty/Alumni Scholarship. In addition to a full time class load, Derek works 45 hours per week at

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In 1987, when Dr. Jon Kellar, Associate Professor of Materials and Metallurgical Engineering, was a student at the University of Utah, he watched with genuine excitement as Dr. Calvin Quate from Stanford University demonstrated a revolutionary advance in the use of microscope technology (microscopy).

Quate's microscope, referred to as an "atomic-force" or "nano-level" microscope, represented a profound technological advance that earned Quate a Nobel Prize in Physics.

"It was incredible," says Kellar. "With the atomic-force microscope, Professor Quate showed that he could literally isolate an atom and produce a high-resolution image of it."

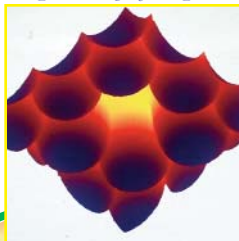
Now, some 14 years later, Quate's microscope has hit Tech with atomic force. Kellar and his assistants, graduate student Rajneesh Kumar (MES, Bakaro Steel City, India) and junior Travis Downing (ME, Apple Valley, CA) are teaching others what the atomic-force microscope is, and what its applications mean to scientists, researchers and industrialists from a whole host of disciplines.

An atomic-force microscope can view objects at the "nano-level," equivalent to a 1×10^{-9} magnification—or roughly the thickness of a human hair sliced 100,000 times. So powerful is the magnification that even the surface of an atom can be isolated, scanned, and its mechanical properties produced as an image on a computer screen! Measurements at the nano-level are measured in mere microns and below.

The images are simply astounding, exposing the very micro-frontiers of science to an audience far beyond the earlier theorists who could only imagine the mechanical properties of infinitesimally small objects. Now, college students, industrial and technological manufacturers, and biochemists can easily see the properties that play a role in such applications as DNA splicing or silicon-chip manufacturing.

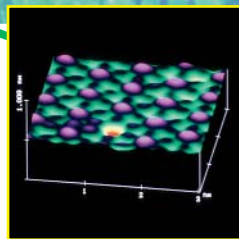
The images, color-enhanced with computer technology, are not optically correct, according to Kumar. That is, they aren't what the naked eye would detect as

Images courtesy of Digital Instruments



NEW MICROSCOPE HITS TECH WITH ATOMIC FORCE

By Tom Domek



seen through the typical optical microscope. Instead, these images portray mechanical properties, such as the "interphase" (or point of contact), between two substances, for example, fibers and epoxy.

Such imaging allows manufacturers to

Photo by Tom Domek



Graduate student Rajneesh Kumar demonstrates the operation of SDSM&T atomic microscope.

determine the relative strengths of their products, including the bonding of materials used in metals, polymers and ceramics. In addition, such imaging allows manufacturers of computer technology to "ensure defect-free semi-conductors and computer materials, such as hard disks," said Kellar. Furthermore, biochemists can enhance their abilities to splice DNA molecules, ultimately altering and improving the genetic composition of life itself.

With a value of a quarter-million dollars, Tech's microscope is secured in a lab in the Mineral Industries Building, and only Kellar and his student assistants currently train others to use the sensitive equipment.

The microscope is so sensitive, in fact, that even the slightest vibrations can hamper its ability to produce high-resolution images. The frequency of overhead lights, of radio transmissions, of air flow in the lab, of somebody walking one floor above in the building, or of a train rumbling in the distance can disrupt the microscope's hyper-sensitive hardware. For that reason, the microscope is operated mostly at night.

The instrumentation inside the microscope is quite sophisticated. The microscope uses "a very small cantilever to gently contact or tap an object's surface," Keller explains. "From the interactions between this very sharp cantilever and the sample's surface, researchers obtain very high resolution images of the sample's topography."

To convert the physical interactions between cantilever and surface to electronic images, lasers are used. "A laser is projected through the silicon-nitrate tip of the cantilever," says Kumar, "and that laser is reflected from the cantilever to a detector in the microscope. The detector then converts the reflection into electrical signals, and the variations of those signals are converted into images viewed from a computer screen."

Tech students enrolled in Metallurgy (MET) 231 laboratory use the atomic-force microscope to deepen their understanding of polymers, semi-conductors, and high-performance ceramics. Kellar says that when Tech

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So close you can almost taste the championship. Four more points and the Lady Hardrockers would have been face to face with the 1999 NAIA Division II championship game. Instead they came home with their second appearance in the women's Final Four tournament in two years. Tech battled four long quarters against Shawnee State (OH) losing 59-63 in the Division II semi-final game.

"The last thing I heard upon leaving the national headquarters from two

which is what makes this feat by these SDSM&T women so exciting. The group of women who have advanced to the final four the past two seasons, and who have participated in the NAIA tournament five out of the past six seasons have been led by their heart.

"The heart determines success," said Felderman. "Tech is known for academics. These girls did not come here to play basketball, but get an education which shows that the success over the past few seasons comes from quality people."

Jami Barraclough will enter her senior year at Tech with her name atop the Lady Hardrockers all-time individual record list in most points in a game, 42 vs Briar Cliff; most free throws made and attempted in a season, 174-266; most free throws attempted and made in a season, game, and career; and most points scored in a season, 675.

Elaine Foy, a senior Chemistry major from Helena, Montana, is on the all-time individual record list with most assists in a career with 492, and Ann Konechne, a senior Industrial Engineering major from Kimball, is atop the all-time individual record list with most 3-point baskets made and attempted in a career, game and season.

The 98-99 Lady Hardrockers were led by four seniors, Elaine Foy; Ann Konechne; Erin Caikowski (IS, Loveland CO); and Kelli McCabe (ME, Filer ID). The season started off well until a major

hurdle needed to be overcome. Defensive standout and 'gel' of the team, Erin Caikowski, tore her knee out ending her playing career. Instead of dwelling on her injury, Erin focused on the team and became a coach. She had been there, played in three NAIA tournaments and knew what was required to win. "Erin gave what she had in a new direction," said Felderman. After graduation, Erin, an NAIA Academic All-American, will be headed for physical therapy school.

Told by many that she was too small to play college basketball, 5'2" Elaine Foy proved them all wrong. Four years of acting as ball handler and orchestrator on the floor, Elaine literally guided the team. "She was a complete package as a point guard, dribbler, 3-point shooter, feed the post, and excellent defender," said Felderman. Elaine has been 2nd or 3rd



Photos courtesy of SDSM&T Athletics.

Jami Barraclough shoots from the line at an NALA Division II game.

opposing coaches was, you played a great game," said Coach Barb Felderman. "The saddest, they said, was we clearly were the better team last night—we should have been in that championship game tonight."

After coming off a record-setting season in 1997-1998 with 28 wins, Tech lost just one senior to graduation and started the 1998-1999 season with a #1 NAIA Division II preseason rating. The Lady Hardrockers closed out the 98-99 season with a 25-9 record. They lost to Mount Mary 68-72 in the South Dakota-Iowa Conference (SDIC) yet due to an excellent record of 22-8 they advanced on to the NAIA tournament where they made it all the way to the final four. Tech defeated Bethany, Kansas 86-71; St. Ambrose 68-58; and Ozarks 69-62. Jami Barraclough, a junior Interdisciplinary Sciences major from Spearfish, was high scorer in all three games with 23, 22 and 18 points.

Tech is not known for its athletics,



1998-1999 Lady Hardrockers (pictured l to r), front row: Elaine Foy, Jesse Big Crow, Amy Wilson, Ann Konechne, Heather Anderson, Krystal Kubas, and Lisa Konechne; back row: Coach Lori Coble, Jami Barraclough, Kelli McCabe, Jennifer DeGroot, Marissa Richards, Erin Caikowski, Jaime Rathjen, and Coach Barb Felderman.

team All-Conference for three years. At this year's NAIA tournament Elaine received the Hustle Award.

The versatile Ann Konechne has played every position on the court. Coming out of high school in Kimball, SD, she was not highly recruited. "It was

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Lady Hardrockers Tip-off to New Heights in

RESEARCH NOTES



Dr. Maribeth Price, Assistant Professor of Geology and Geological Engineering, has been awarded \$300,000 from the National Aeronautics

and Space Administration for her project entitled "Application of Remote Sensing to Forest Resource Inventory and Habitat Modeling." Dr. Price will be working with Black Hills National Forest to help update their forest database.

Dr. Sherry Farwell, Dean of Graduate Education & Sponsored Programs, was awarded \$212,500 in additional funds by the National Aeronautics and Space Administration for his proposal entitled "National Space Grant College and Fellowship Program."

Dr. Pat Zimmerman, Director and Professor of Atmospheric Sciences, has been awarded \$118,800 from the University of North Dakota for his project entitled "Development of Remote Sensing Links to Water Vapor Flux Measurements."

Dr. Mark Hjelmfelt, Chairman and Professor of the Institute of Atmospheric Science, has been awarded \$115,200 by the National Science Foundation for his project entitled "Mesoscale Boundary Layer Structures Observed During the Lake-Induced convection Experiment (Lake-Ice)."



Dr. Francine Campone, Dean of Students, has been awarded \$75,537 from Salish Kootenai College for her proposal entitled "ANAMP Bridge Program."

Dr. Paul Smith, Professor Emeritus of the Institute of Atmospheric Sciences, has been awarded \$66,600 in additional funds from the National Science Foundation for his project entitled "Armored T-28 Aircraft Facility for Research Requiring Storm Penetrations."

Dr. Chris Jenkins, Professor of Mechanical Engineering, has been awarded \$30,000 in additional funds from Jet Propulsion Laboratory for his project entitled "Investigate the Effort of Thermal Loading on Membrane/Inflatable Structural Dynamics." Dr. Jenkins has also

received \$66,282 from the U.S. Army Research Office for his project entitled "Improved Composite Structure Using a Scanning Infrared Radiometer."

Dr. Scott Kenner, Associate Professor of Civil and Environmental Engineering, and **Dr. Bruce Berdanier**, Assistant Professor of Civil and Environmental Engineering, were awarded \$29,000 by Royal River Technologies for their project entitled "Methodology for wellhead Protection, Upper Sioux Tribe."

Dr. Gregory Buck, Assistant Professor of Mechanical Engineering, has been awarded \$25,000 by the Air Force Office of Scientific Research for his project entitled "Acoustic Disturbance Source Modeling and Development for Hypersonic Receptivity Research."

Dr. V. Ramakrishnan, Distinguished Professor of Civil & Environmental Engineering, has been awarded \$15,000 from the South Dakota Department of Transportation for his project entitled "The Determination of Permeability, Density, and Bond Strength of Non-Metallic Fiber Reinforced Concrete in Bridge Deck Overlay Applications."

Dr. Stuart Kellogg, Associate Professor & Program Director of Industrial Engineering, was awarded \$10,000 by Texas Engineering Experiment Station for his proposal entitled "Affiliate Campus Travel Subgrant: Foundation Coalition."

Dr. Sookie Bang, Associate Professor of Chemistry & Chemical Engineering, and **Dr. V. Ramakrishnan**, Distinguished Professor of Civil & Environmental Engineering, have been awarded \$10,000 in additional funds from the National Science Foundation for their project entitled "Application of a Microbial Immobilization Technique in Remediation of Concrete Cracks."

Dr. Bruce Berdanier, Assistant Professor of Civil and Environmental Engineering, was awarded \$6,800 by West Dakota Water Development District, and \$6,800 by the City of Rapid City for his project entitled "GPS/GIS for On-Site Treatment Systems."

PERSONNEL

Changes

WELCOME:

Geraldine Becenti, Child Care Worker, Little Miner's Clubhouse (4/15/99)

Phyllis K. Dahlberg, Custodial Worker, Residence Life (4/2/99)

Teresa M. Heinbaugh, Secretary, SKILL (4/5/99)

Jim L. Hennen, Western Satellite Coordinator, Civil & Environmental Engineering (5/3/99)

Kari Larese, Public Information Manager, University and Public Relations (6/1/99)

Annette (Toni) Moore, Library Clerk, Devereaux Library (5/10/99)

Brian Steinberg, Asst. Dir. Residence Life for Programs & March/Dake Hall Dir. (6/14/99)

Maureen (Reeny) Wilson, Asst. Dir. Residence Life for Services & Connolly Hall Dir. (6/1/99)

FAREWELL:

Douglas Bandy, Library Clerk, Devereaux Library (3/12/99)

Tiffany Burrer (3/11/99), **Susan Nell** (5/21/99), **Halona Weaver** (3/10/99),

Child Care Workers, Little Miner's Clubhouse

Marvin Espeland, Western Satellite Coordinator, Civil & Environmental Engineering, retired 3/31/99 (8 yrs.)

Kathryn Fryberger, Research Scientist I, Institute of Atmospheric Sciences (4/13/99)

Les Muir, Building Maintenance Specialist, Physical Plant, retired 3/15/99 (12 yrs.)

Nohpill Park, Asst. Prof., Electrical & Computer Engineering (5/14/99)

Dana Pederson, Intramurals Dir./VB Instructor, Athletics (5/15/99)

Rosemary Robertson, Custodial Worker, Physical Plant (4/30/99)

Dale Rognlie, Prof., Mathematics & Computer Science retired 5/15/99 (30 yrs.)

Larry Schuh, Art Instructor, Humanities (5/15/99)

Mary Shields, Financial Aid Asst., Academic & Enrollment Services (5/6/99)

Donnalyn Snider, Secretary, SKILL (3/5/99)

Henry Waldman, Instructor, Mathematics & Computer Science retired 5/15/99 (15 yrs.)

Robin White, Adm. Asst. II, Graduate Education & Sponsored Programs (4/30/99)

Therese Zadnik, Adm. Asst. I, Academic & Enrollment Services (4/30/99)

CHANGE IN POSITION:

Cece Sharum has moved from Connolly to Palmerton Hall and is now the Palmerton Hall Dir. as well as Asst. Dir. Residence Life for Physical Environment.

DEPARTMENT CHANGE:

Dr. Ken Han will step down as Dean of the College of Materials Science and Engineering Department effective June 30, 1999. After serving as Dean for five years, Dr. Han now plans to devote his time to teaching and new developments in his research.

Looking Back, Looking Ahead

A Conversation with Professor Emeritus Dr. John Paul Gries

By Tom Domek

If accomplishments at the School of Mines and Technology were mountains, his would rise to among the highest in the Black Hills. Still, it's "the little things" he says, that give him the most satisfaction.

Professor Emeritus John Paul Gries—Paul to his friends—has devoted a life's work to the success of the South Dakota School of Mines and Technology (SDSM&T). Beginning in 1936, when he first joined the school as an instructor of geology, through today, as one of its most honored professors, Gries has put his heart into his work.

"The things I've enjoyed the most may seem real insignificant," Gries says. As an example, he says, "I'm very proud of the fact that I've found drinkable water for ranchers who maybe hauled water for years. And I'm satisfied to see some of my students blossom and make something of themselves."

Such sentiments aren't surprising from a man who first and foremost sees himself as a geologist, next as an educator. "Least of all," Gries says, "I see myself as an administrator."

But often as not, those most capable, even those who would shy from such assignments, find themselves "conscripted" into those administrative roles so necessary for the growth and success of a university. Such was the case with Dr. Gries.

For 14 years, Gries happily had gone about his work, applying his geologic knowledge to studies in and around the Black Hills and teaching his students the fundamentals of the geological sciences. But in 1950, under the administration of SDSM&T President Warren E. Wilson (1948-1953), Gries was asked to lead the development of graduate studies at the school. So, he began administrative duties without so much as a raise in pay or a decrease in his research and teaching loads.

"Helping to set up the graduate division was probably the most challenging task I ever encountered at the School of Mines," he says. "It was pretty much an uphill fight. Some departments had no need, they felt, for Ph.D. programs and all the extra coursework such programs

require. We had to bring some of those departments along kicking and screaming."

"But I really believed in the division of graduate studies," Gries adds. "It was a labor of love." Nevertheless, it wasn't until 1966, 16 years later that Gries was finally given the position of Dean of Graduate Studies. That long lapse in recognition, more than anything else, shows just how contentious the division's creation was at the time. It also shows, however, just how much heart Professor Gries has had.

From 1966 until his retirement in 1976, Gries served as dean of the graduate division. While administrative duties cornered a good deal of his attention, he also devoted time to research.

In the early '50s, he acted as the principal investigator for a study that produced a two-volume inventory of old mines in the Black Hills. The *Black Hills' Minerals Atlas* identified basic geologic data, location and ore types found at historic mines. The atlas remains a standard reference for Black Hills geology—a starting point for the layman to find out about old mining claims.

Then, in the late '60s, Gries helped write *Ore Deposits in Rocks of Paleozoic and Tertiary Age of the Northern Black Hills, South Dakota*, a study with maps that sought to determine if any significant ore deposits had been missed by earlier mining efforts.

"For the most part, the answer arrived at in the study was 'no,'" Gries says. "The old miners and geologists had pretty much found all the good sites. That still holds true today. There aren't any really new significant discoveries. We've learned some new techniques to get the ore out at less expense, but the ore deposits have all pretty much been discovered."

"Early miners knew what they were up to," Gries adds. "They looked at everything. They knew that certain stains in the rock meant this or that quartz veins meant something else. It was good common sense that they had."


In 1976, Gries retired "on paper," though you wouldn't know it for the work he's done since. In 1996, Mountain Press Publishing Company of Missoula, Montana, published his *Roadside Geology of*

South Dakota, an important work that Gries humbly says simply "fills a niche."

And, of course, all along there's been the public-individuals who've come to the professor emeritus for advice, for direction, for the last word on the geology of the region.

If he had not been a geologist and teacher, Gries says, he might have gone into archeology. His first job, in fact, was as a consultant to a group trying to identify fossils found in some ancient ruins in Egypt.

"There were holes in these fossilized shells," Gries explains, "and these folks were wondering why the ancient Egyptians had drilled holes in them. But people hadn't done that at all," he adds, chuckling at that distant memory. "A certain kind of snail found on the sea floor would cut through the shell and suck out the meat. Guess that shows you how you need more than one science working together to get to the truth."

In that quest for truth at the School of Mines, Dr. John Paul Gries found his pot of gold. 





Above: Dr. Paul Gries and Dr. Jim Martin talk near the J.P. Gries Plaza on the campus commons. A fossilized cycad can be seen in the lower right of the photo.

Left: Dr. J.P. "Paul" Gries examines a drilling sample brought to him by Mike Alexander, a Hill City driller.


Richardson Scholars

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Nash Finch. Gretchen Kvanig is a member of the American Institute of Chemical Engineers and Society of Women Engineers. She served on the SDSM&T Residence Hall Council in 1996-97 and was a foreign exchange student to Samara, Russia in 1995. She has won many scholarships including Dow Chemical Outstanding Junior Award, John V. N. Dorr Trust Scholarship, Dow Chemical Scholarship, and Joe Marion Scholarship.

The Richardson Scholars from the College of Systems Engineering are sophomore Abran Kean (CENG, Pierre), junior Brenda Manley (MATH, Hawesville KY), and senior Jayme Zimprich (IE, Hayti). In his first year at SDSM&T, Kean was elected President of the freshman class. He has served on the Student Association Finance Committee, has maintained a position on the campus radio station (KTEQ), was selected as Chairman of the Major Events Committee for TONITE (Tech's Outrageous New Initiative For Total Entertainment), and is a member of the Triangle Fraternity. While going to school full-time Brenda Manley holds down two jobs, one at Meiners Animal Clinic and one in the PRIME tutoring center on campus. She has previously been awarded the Guy March Scholarship and the Daniel E. Lipke Science Scholarship. Brenda has also received the Science Achievement Award for the past two years. Jayme Zimprich has spent the past two summers working with AlliedSignal Inc. as an associate engineer and team leader promoting lean manufacturing technologies. She is actively involved with the student chapter of Institute of Industrial Engineers and was a winner of the Leslie E. Boyd Award for outstanding technical communications.

The Richardson Scholarship Program awards students for their academic excellence while supporting continued academic achievement. "The scholarship will encourage me to do better in school," said Manley. "It gives me a reason to keep trying and not give up," she added.

Academic excellence at Tech has been part of the school's history since the beginning, and with the support of Frank and Marilyn Richardson, the tradition will continue well into the future. 

Microscope


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students enter their professions, they will make increasing use of atomic-force microscopy. "The atomic-force microscope has become a fairly standard research tool for conducting cutting-edge research," he added.

"Virtually all science and engineering disciplines have found uses for the atomic-force microscope. The number of atomic-force microscopes now sold number in the thousands. There is a new field of development called nano-fabrication. Basically, the atomic-force microscope will allow us to build machines at very small scales. Most likely, the first developments of this technology will be in bio-engineering and in the computer industry."

Along with Kellar and his associates, Tech has the National Science Foundation (NSF) to thank for its new microscope. Kellar, assisted by eight other Tech faculty, secured the microscope with a grant from the NSF, purchasing it from Digital Industries of Santa Barbara, California.

Kellar's associates include Professors Dr. Chris Jenkins and Dr. Lidvin Kjerengtroen (Mechanical Engineering); Dr. Kenneth Han (Materials Science and Engineering); Dr. Robert Corey (Physics); Dr. Dave Dixon, Dr. Dan Heglund, and Dr. Robb Winter (Chemistry and Chemical Engineering); and Dr. Ed Duke (Mining Engineering).

And Kellar, it would seem, is in full stride in his own career. Just this year, he was given the "Presidential Award for Outstanding Professor" at SDSM&T. This distinction comes on the heels of his prestigious selection as an NFS "Presidential Faculty Fellow" in 1994. 



Dr. Kellar receives his "Presidential Award for Outstanding Professor" from Dr. Richard Gowen, SDSM&T President.

CAMPUS BRIEFINGS

Dr. Roger Johnson, Assoc. Prof. of Math & Computer Science, presented the paper "Exploring Zipf's Law" at the April 30 - May 1 meeting of the Rocky Mountain Section Meeting of the Mathematical Association of America. Collaborating with Johnson on the paper, which was published by the British Journal *Teaching Mathematics and Its Applications*, were **Dr. John Weiss**, Assoc. Prof. of Math & Computer Science, and **Linda Alexander** (MATH '98) - now a mathematics instructor at Oglala Lakota College.

Dr. Jon Kellar, Assoc. Prof. of Metallurgical Engineering, gave a presentation entitled "Vibrational Spectroscopic and Nanomechanical analysis of Interphases in Polymer Matrix Composites," at the University of Idaho, Department of Metallurgical & Mining Engineering.

Eight Career Service employees received pins recognizing 10, 15, and 25 years of service to the state of South Dakota at the April 22 Career Service Meeting. Recipients recognized for 10 years of service included **Pam Fenner**, Geology & Geological Engineering; **Lawrence Beagle**, Physical Plant; **Richard Wold**, Chemistry & Chemical Engineering; **Dean Awe**, Tech Print Center; and **Deanna Edwards**, Dean of Students. **Dale Nickels**, Mining Engineering, was recognized for 15 years of service; **Donna Neal**, Devereaux Library, was recognized for 20 years of service; and **Marilyn Denison**, Physical Plant, was recognized for 25 years of service to the state.

On March 16, **Bonnie Cecil**, Activities Planner for Surbeck Student Center, received the annual Outstanding Student Service Award for recognition of her service for 1999.



Dr. Jan A. Puszynski, Prof. of Chemical Engineering, attended the 101st meeting of the American Ceramic Society in Indianapolis, Indiana April 25-28, 1999. At the meeting Dr. Puszynski presented two papers.

Dr. Brian T. Hemmelman, Instructor of Electrical & Computer Engineering, served as one of the senior level engineering and sciences judges for the 1999 National

American Indian Science and Engineering Society (AISES) Science Fair held in Albuquerque, New Mexico. He was also invited to give a special seminar to the Physics and Chemistry departments of Eastern New Mexico University in Portales, NM entitled "the Simulation and Fabrication of magnetic Quantum Structures." Dr. Hemmelman also met with Tech alumni working at Intel and their managers to discuss what current theoretical, experimental, and design skills should be included in Tech's curriculum to prepare graduates for work in the areas of digital VLSI design and testing.



Dr. Michael Day, Assoc. Prof. of English, was recently recognized for his leadership and dedication to the National Council of Teachers of English

Assembly on Computers in English. Day was awarded a plaque commemorating his service at the ribbon cutting ceremony for the new Technology Center at the Conference on College Composition and Communication in Atlanta, March 25.

Dr. Arden Davis, Prof. of Geology & Geological Engineering, has been selected as the FY2000 recipient of the Mickelson Professorship. The Mickelson Professorship, which was fully funded in 1998, is to be used to assist the Geology & Geological Engineering Programs by supporting and attracting distinguished faculty members.

The newly elected Career Service Council members are: **Jeanette Nilson** (Chair); **Diane Fraser** (Vice President); **Deb Tompkins** (Secretary and Jeans Day Chairman); **Steve Phelps** (Council Member and Board of Regents Advisory Council Member); and **Rebecca Cronin** (Council Member). The retiring Council Members thank those who have been so supportive and helpful and ask that everyone continue to do so. Retiring Council Members: **Toni Erickson**, **Dale Nickels**, and **Kathy Fischbach**.

Dr. Douglas MacTaggart, Research Scientist II, and **Dr. Sherry Farwell**, Dean of Graduate Education & Sponsored Programs, attended the National Small Business Innovation Research (SBIR) conference in Billings, Montana on May 16-19. They joined approximately 350 other

participants to learn about the expanded funding opportunities available to individuals interested in technology transfer and technological business development. Representatives from the various federal agencies (including National Science Foundation - NSF, National Aeronautics & Space Administration - NASA, Department of Defense - DoD, Department of Energy - DoE, etc.) with SBIR programs attended the conference to present an update on funding opportunities. The NSF-funded SD EPSCoR program sponsored the participation of individuals from South Dakota at this SBIR.

The Career Service Traditions of Excellence Award (TEA) winners for the months of March, April, and May were **Lori Hodgkin**, **Nan Halvorson** and **Wendy Boomer**, and **Jim Hartman**, respectively. Hodgkin works as an administrative assistant in Intercollegiate Athletics; Halvorson and Boomer are senior claims clerks in the Business and Administration office; and Hartman works in ITS's (Instructional Technology Services) Educational and Distance Learning Office as a systems programmer.

The South Dakota Tech family mourned the loss of **Dud King**, SDSM&T Athletic Director from 1971-1991; **Dan Cronin**, South Dakota Board of Regent; **Dr. Lee Luckhart**, Professor and former Chairman of Liberal Arts, and Dean of Humanities at Tech; alum **Cheryl Kaufman** (EE '70); and **Estella Helgeson**, former faculty member.

In appreciation of the loyalty and contributions of Tech's exempt employees, a reception was held on Wednesday, May 19. Those honored and their years of service included **Janet Taylor**, Coordinator of Library Operations, 26 years; **Sharon Reid**, Grant Services Manager, 25 years; **Jim Bailey**, Manager Instructional Services, 20 years; **Chuck Colombe**, Telecommunications Technician Specialist, 10 years; **Rob Houdek**, Director of Administrative Services, 10 years; **Mike Mueller**, Assistant Director of Physical Plant, 10 years; **Jaque Cranston**, Chemical Materials Manager, 5 years; **Dr. William Cross**, Research Scientist III, Metallurgical Engineering, 5 years; and **Donna Kliche**, PRIME Program Coordinator, 5 years.

Spotlight on Students

The Hardrock Institute of Industrial Engineers Chapter attended the 1999 Institute of Industrial Engineers (IIE) Midwest Student Conference hosted by Northern Illinois University, March 18-20. Attendees included **Brian Goertz** (IENG, Freeman); **James Heidrich** (IENG, Sturgis); **Everett Hix** (IENG, Rapid City); **Julie Netterberg** (IENG, Rapid City); **Holly Nolan** (IENG, Lynch NE); and Faculty Advisor **Dr. Carter Kerk**, Assistant Professor of Industrial Engineering. James Heidrich participated in the paper presentation with a paper entitled, "Reengineering the Workplace." The students also participated in plant tours, engineering college tours, panel discussions, a corporate fair, and the chapter development meeting. Other chapters participating represented the Milwaukee School of Engineering, Marquette, Purdue, Purdue-Calumet, Iowa State, Wisconsin, Illinois, Illinois-Chicago, and Minnesota-Duluth.

Jade Kizer (EE, Rapid City) has been selected to receive a \$10,000 Tau Beta Pi Fellowship for next year. He plans to attend Stanford in the Fall. Tau Beta Pi has also awarded a \$2,000 Nagel Scholarship to **Christopher Ahlers** (CENG, Pierre).

The 1999 Homecoming Candidates are **Anthony Shearer** (CEE, Hot Springs); **Brian Goertz** (IENG, Freeman); **Ryan Wood** (ME, Hulett WY); **Pete Ridl** (ME, Dickinson ND); **Brian Gregg** (MINE, Springfield VA); **Jami Barraclough** (IS, Spearfish); **Amy Williams** (SPEC, Rapid City); **Amy Landreth** (CEE, Chadron NE); **Jessica Gould** (CEE, Rapid City); and **Kristin Hensley** (CEE, Toston MT).

SDSM&T's Mini-Baja team placed in the top ten in five out of the seven events at the Mini-Baja Western Competition April 15-17. They took 4th in Hill Climb; 6th in Safety and Design; 8th in Maneuverability; 9th in Sales presentation; 9th in Acceleration; 48th in Endurance; 42nd in cost; and 30th overall. Team members include **Arlin Sandbulte** (ME, Laverne MN); **Nathan Selchert** (ME, Jamestown ND); **Matt Helde** (ME, Rapid City); **Jeff**

Major (MET, Platteville CO); **Dan Lerew** (MET, Rapid City); **Jaaron Johnson** (ME, Rapid City); and **Don Wishard** (ME, Lantry). **Dr. Dan Dolan**, Prof. of Mechanical Engineering, is the faculty advisor.



A student team from Tech took first place in the Student Chapters Environmental Design Project Competition at the 1999 Rocky Mountain AIChE Regional Conference held March 25-27. The project was entitled "Decomposition of Sodium Cyanide." Team members include **Ryan Caldwell** (CHE, Sioux Falls); **Robert Cunningham** (CHE, Mitchell); **Brian Drey** (CHE, Herrick); **Timothy Gramith** (CHE, Norwood MN); **Jason Heirer** (CHE, Rapid City); **Jason Herr** (ENGR, Aberdeen); **Brooks Pettit** (CHE, Aberdeen); **Mike Stratton** (CHE, Brooklyn Park MN); and **Eric Swanberg** (CHE, Bloomington MN).

The first Mr. & Mrs. Tech were selected during the first annual Spring Fling Week the week of April 19-23. **Jeremy Holman** (CENG, Gresham) and **Jill Soldatke** (IS, Sioux Falls) were crowned the winners at the end of the competition.



SDSM&T won the Rocky Mountain Regional Concrete Canoe Competition held April 9-10 at the Colorado School of Mines. Tech's student team also brought home the traveling trophy. Team members include **Kristin Hensley** (CEE, Toston MT); **Shane Boyle** (CEE, Rapid City); **Mike Towey** (CEE, Rapid City); **Rhaub Walker** (CEE, Rapid City); **Jessica Gould** (CEE, Rapid City); **Crissy Shear** (CEE, Belle Fourche); **Emily Schaffer** (CEE,

Aberdeen); **Josh Sletten** (CEE, Irene); **Jed Brich** (CEE, Ogallala NE); **Ryan Koontz** (ME, Rapid City); **Heidi Anderson** (CEE, Rapid City); **Chris Baer** (CEE, Freeman); **Charlie Baker** (CEE, Rapid City); **Chris Blankenbaker** (CEE, Buffalo); **Mike Brown** (CEE, Rock Springs WY); **Jim Cokeley** (CEE, Scotland); **Casey Einrem** (CEE, Avon); **Julie Fanning** (CEE, Powell WY); **Justin Fejfar** (CEE, Custer); **Lou Fleming** (SPEC, Rapid City); **John Gerlach** (CEE, Rapid City); **Corey Lang** (CEE, Arvada CO); **Holly Lipp** (CEE, Sioux Falls); **Beau Obriegewitch** (CEE, Wibaux MT); **Deborah Paulsen** (IS, Rapid City); **Kevin Potts** (ENGR, St. Helena NE); **Kent Reimann** (CEE, Rapid City); **Jen Trenary** (CEE, Rock Springs WY); and **Joe Williams** (CEE, Rapid City).

Farrah Johnson, (MET, Rapid City) was awarded a National Science Foundation Graduate Research Fellowship. With the Research Fellowship comes \$15,000/year stipend up to 5 years, and \$10,500 paid tuition per year.

Kristi Mach (IS, Rapid City) was awarded a Scarborough Scholarship given by the South Dakota Board of Regents.



Tech's Human Powered Vehicle (HPV) Team took 7th place overall at the American Society of Mechanical Engineers 1999 HPV Competition the weekend of April 30-May 2. The team took 16th in the Design Competition; 4th in Combined Sprint - 5th in Men's Sprint & 5th in Women's Sprint; and 3rd in the Road Event. Team members include **Jeff Schroetlin** (ME, Butte NE); **Karen Carda** (ME, Hermosa); **Ryan Lindquist** (ME, Grand Forks ND); and **Angela Swendsen** (IS, Rapid City). **Dr. Chris Jenkins**, Prof. of Mechanical Engineering, and **Dr. Carter Kerk**, Asst. Prof. of Industrial Engineering, are the faculty advisors.

You Are Invited . . . Calendar of Events

For information on these events contact University and Public Relations at (605) 394-2554.

JULY

- SUNDAY, JULY 4**
Holiday
- MONDAY, JULY 5**
Holiday
- MONDAY, JULY 5 - FRIDAY, JULY 16**
Jurassic Dinosaurs & Mammals I field dig
- TUESDAY, JULY 6 - FRIDAY, JULY 30**
Technology for Teaching & Learning workshop
- SATURDAY, JULY 10**
10am-2pm Buffalo Bonanza, Children's Science Center
- MONDAY, JULY 12 - FRIDAY, JULY 23**
Monster Marine Reptile field dig
- SATURDAY, JULY 17**
6-9pm Gala Auction, Children's Science Center
- MONDAY, JULY 19 - FRIDAY, JULY 30**
Jurassic Dinosaurs & Mammals II field dig
Giant Pigs & Rhinos field dig
- MONDAY, JULY 26 - FRIDAY, AUGUST 6**
The Unwily Coyote Site field dig

AUGUST

- MONDAY, AUGUST 2 - MONDAY, AUGUST 16**
Marine Turtles, Mosasaurs & Plesiosaurs from the Late Cretaceous field dig
- THURSDAY, AUGUST 12 - SATURDAY, AUGUST 14**
SD Board of Regents Retreat, Spearfish
- MONDAY, AUGUST 16 - FRIDAY, AUGUST 27**
Marine Turtles, Mosasaurs & Plesiosaurs from the Late Cretaceous field dig
- FRIDAY, AUGUST 20**
Last day to register for fall classes
- SATURDAY, AUGUST 21**
10am-2pm Meet the SDSM&T Vehicle Teams, Children's Science Center
- MONDAY, AUGUST 23**
Faculty return to campus
- THURSDAY, AUGUST 26**
New student orientation begins
- FRIDAY, AUGUST 27**
8am-4pm New student registration
- FRIDAY, AUGUST 27 & SATURDAY, AUGUST 28**
Volleyball tournament at University of Bellevue, NE
- MONDAY, AUGUST 30**
Registration day
- 7-8pm TONITE entertainer, Taylor Mason
- TUESDAY, AUGUST 31**
Classes begin

SEPTEMBER

- SATURDAY, SEPTEMBER 4 & SUNDAY, SEPTEMBER 5**
Volleyball tournament at St. Ambrose, IA
- SATURDAY, SEPTEMBER 4**
Football at Colorado School of Mines
- 10am Cross country alumni reunion run
- MONDAY, SEPTEMBER 6**
Labor Day holiday
- TUESDAY, SEPTEMBER 7**
7pm Home volleyball against Chadron State
- FRIDAY, SEPTEMBER 10 & SATURDAY, SEPTEMBER 11**
Black Hills State University Invitational volleyball tournament at Spearfish
- SATURDAY, SEPTEMBER 11**
10am SD Tech cross country Invitational
1pm Home football against Concordia University
Noon Soccer at Sioux Falls against South Dakota State University
5pm Soccer at Sioux Falls against University of Minnesota, Morris
- SUNDAY, SEPTEMBER 12**
Noon Soccer at Sioux Falls against Augustana College

MONDAY, SEPTEMBER 13

- Career Fair
- WEDNESDAY, SEPTEMBER 15 & THURSDAY, SEPTEMBER 16**
Black Hills Hydrology Conference
- FRIDAY, SEPTEMBER 17 & SATURDAY, SEPTEMBER 18**
St. Paul Invitational Volleyball Tournament against Bethel
- SATURDAY, SEPTEMBER 18**
Football at Dickinson State University
- TUESDAY, SEPTEMBER 21**
7pm Volleyball against National American University
- FRIDAY, SEPTEMBER 24**
Black Hills State cross country Invitational
- 7:30pm Volleyball at Huron University
- SATURDAY, SEPTEMBER 25**
11am Volleyball at Dakota State University
Football at Dakota State University
1pm Soccer against North Dakota State at Fargo
7pm Soccer against University of North Dakota at Fargo
- SUNDAY, SEPTEMBER 26**
M-Week begins
- 10am Soccer against Moorehead State University
- THURSDAY, SEPTEMBER 30 - SATURDAY, OCTOBER 2**
Life on the Great Plains Symposium

OCTOBER

- FRIDAY, OCTOBER 1**
Noon All school picnic & M-Hill climb
- FRIDAY, OCTOBER 1 & SATURDAY, OCTOBER 2**
SD Tech volleyball invitational
- SATURDAY, OCTOBER 2**
10am M-Day Parade
2pm Homecoming football game against Montana State University
University of Colorado cross country Invitational

Special thanks to: Elks Country Estates, Rapid City Area Economic Development Partnership, Rapid City Federal Credit Union, and Dale Russell. For more information on providing financial support for future issues of SDSM&T Quarterly, please call (605) 394-2554.

3,000 copies of this publication were printed @ a cost of \$1.50 each (printing costs only).

Lady Hardrockers

continued from page 20

their loss and our gain," said Felderman. Since setting foot on campus, she has worked on all aspects of her game. Through many extra hours working out in the gym, Ann moved up a tier each year from third team All-Conference to first team this year.

Post player Kelli McCabe came to Tech and became a standout volleyball player. After arriving, Kelli decided the Lady Hardrockers basketball team looked like fun, and came out her second year at Tech. Realizing what it was going to take to make a valuable contribution, Kelli went to work on her basketball skills. "Kelli's mobility, leaping ability and court awareness made her a valued asset to our success," said Felderman. Kelli leaves Tech as an Academic All-American.

A tradition at Tech has been formed in the women's basketball arena. Next year's team will have one senior, NAIA All-American Jami Barraclough, and two juniors, Marissa Richards, (CHEM, Butte MT) and Amy Wilson (CEE, Hamilton MT) to lead the team. The future lies in the next generation—the freshmen class.



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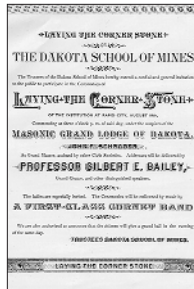




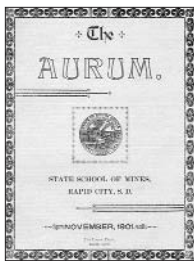
Teek Tricia

Did you know...

- The cornerstone of the first School of Mines building was dedicated April 19, 1885.



- In 1901, the first school magazine, *The Aurum*, was published.



- In 1934, the first alumni magazine, the *Hardrock*, was printed at Mines. The publication is still printed today!
- In 1950, the Civil/Mechanical Building was built. Currently, the building is under major construction as it is receiving a new face lift inside and out.



- In 1955, the High Plains Regional Science Fair began at SDSM&T. The fair is still held each year on campus.

7:40 a.m. Rush Hour



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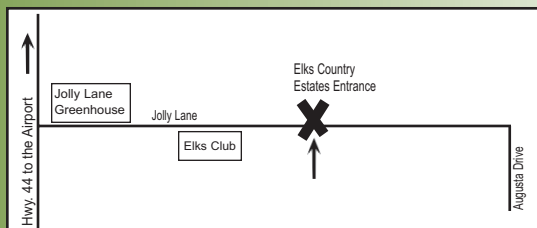
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