Executive Summary
of SDSM&T
Institutional Self-Study
2006
Context (See Chapters 1 for details.)

The South Dakota School of Mines & Technology (SDSM&T) is in Rapid City, which is the largest city in the western half of the state with a population of approximately 60,000. State per capita income is low ($17,562) and the state predominantly rural and thinly populated.

SDSM&T is one of six regents’ universities in the state and is governed externally by the South Dakota Board of Regents and internally by the President, Dr. Charles Ruch. SDSM&T specializes in undergraduate and graduate education in science and engineering and offers 16 Bachelor of Science programs, 10 Masters of Science programs, and four Doctor of Philosophy degree programs—all in science and engineering (RR219). Our sister institution, Black Hills State University (BHSU), is the university attended by most local high school graduates while SDSM&T has the reputation of being an academically challenging school.

Institutional energies and resources are focused on increasing external funding for research, offering a distinctively excellent undergraduate education, and becoming the University of Choice for engineering and science within South Dakota and among our peer group of specialized engineering and science universities.

As of fall 2005, we had 2313 students, of which 256 are graduate students. Females comprise 30.7% of the student population; 83.8% is Caucasian; 69% of all students fall between the age of 18 and 23; and 75% of all students attend the institution full time. Attending SDSM&T is not expensive (RR106). Demographic trends have resulted in enrollment declines, and much effort is currently being expended on improving retention, graduation rates, and overall enrollment management (RR289).

Our students are highly goal- and task-oriented and technologically skilled. They place high importance on values but have relatively few interactions with people from diverse and differing cultural and religious orientations. Ten percent of undergraduates participate in Intercollegiate Athletics, and many more would like to live on campus than we can currently accommodate.

Our six-year graduation rate as of 2004 was roughly 38% and far lower than we would like. Our students enter as freshman with an average ACT composite score of 24.3, and we have recently raised admission standards as part of a comprehensive plan to increase enrollment and to improve retention and graduation rates. Our placement rate for graduates, however, is high by any standards and averages between 90% and 95% each year.

We have 142 faculty members, 107 of whom are full-time / instructional, 25 of whom are adjunct, and 10 of whom are full time but have a mix of roles, including “researcher,” and “research / administrative,” with limited or no teaching duties. Terminal degrees are held by 86.5% of our faculty members, and tenure is held by 58.9%. The gender balance for all faculty campus wide has improved slightly and is roughly 19.7% female and 80.3% male (RR292). Faculty interests are represented by the Council on Higher Education (COHE) and the Faculty Senate http://www.mcs.sdsmt.edu/fac senate. Workload is perceived as high by all faculty members, and SDSM&T is more thinly staffed than comparable institutions. The curriculum of all regents’ institutions is
governed by the Board of Regents in a highly unified and centrally controlled manner, and this is particularly true of general education.

Two distinctive features of our curriculum are 1) a common freshman course (Professionalism in Science and Engineering, GES115) for engineering and science majors and 2) our Center of Excellence for Advanced Manufacturing and Production (CAMP) program and the enterprise teams it supports. In CAMP, students from all majors and all class levels elect to work on teamed engineering design projects and participate in competitions http://camp.sdsmt.edu.

Our research productivity has begun to achieve critical mass. Since 1996, external funding for research has quadrupled, from $3,210,173 to $11,922,155 in FY 2004. In the past four years alone we have established the Advanced Materials Processing and Joining Laboratory and the Additive Manufacture Laboratory (http://ampcenter.sdsmt.edu) to conduct leading-edge research on friction stir processing and composites, the Center for Accelerated Applications at the Nanoscale (http://www.hpcnet.org/caan) to conduct research on nanoparticles and associated nanosensors, and the Tech Development Laboratory facility to house research on composites, laser deposition, super lightweight materials, and polymers. This year, we created the Computational Mechanics Laboratory to support high-end computing activities.

Two new Ph.D. programs were created in 2004, one in atmospheric and environmental science and one in nanoscience and nanoengineering, and in 2005 we received approval for a biomedical engineering Ph.D. program.

Since 2001, SDSM&T has been closely involved in a statewide effort to have the former Homestake gold mine in Lead, SD converted to a Deep Underground Science and Engineering Laboratory (H-DUSEL) supported by the National Science Foundation and the Department of Energy. Creation of the lab is a goal of the Governor’s 2010 initiative. Creation of such a lab would have tremendous implications for research initiatives at SDSM&T.

Significant administrative changes have occurred in the last three years. In June 2003, Dr. Charles Ruch became the school’s 17th president and began a strategic planning process and initiated the institution’s second capital campaign. The position of Vice President for Research was created, a self-study conducted, and, in June 2005, we reorganized from a four-college structure to a two-college structure. The position of Associate Vice President for Academic Affairs was also created.

Over the last two years dramatic improvements have occurred in the degree to which SDSM&T is involved in regional economic development. The two most tangible symbols of this change are our involvement in the creation of a National Underground Laboratory and the 60,000 square-foot business incubator currently being built on campus (RR141).

**Significant Developments Since the 1996 Team Report**  (See chapter 2 for details.)

In 1997, the Center for Advanced Manufacturing and Production (CAMP) program was established and has since flourished. Approximately 200 students are involved each year...
in 10 multidisciplinary teams that participate in design and performance competitions on a local, regional, and national basis. All teams work on engineering projects in areas such as robotics, aircraft, concrete canoes, helicopters, racecars, off-road vehicles, and industrial design projects. The program excels in developing students’ teaming, design, and project management abilities.

We have closed one academic program over the last five years and have created several others. In 2002, the decision was made to phase out the Mining Engineering program and to replace it by a Mining Engineering and Management program which was begun in 2004. The Environmental Engineering B.S. degree program was created in 2000 and, in 2005, the College of Interdisciplinary Studies undertook to redesign their interdisciplinary science program in order to create four “specializations” clearly focused on science. In 1998 the M.S. programs in chemistry, physics, and metallurgy were combined into a Masters of Science in materials engineering and science. In 2005, the Atmospheric and Environmental Sciences (AEWR) Ph.D. program and a nanoscience and nanoengineering Ph.D. program were implemented and creation of a biomedical engineering Ph.D. program was approved. Distance education has remained a relatively minor aspect of our curriculum.

 Until this last year, we had a four-college structure, with one dean of interdisciplinary sciences and three deans of science and engineering. The structure enjoyed mixed success in its purpose of fostering interdisciplinary collaboration. On July 1, 2005, we changed to a two-college structure (RR223) and began a search process for two full-time deans.

Since 1996, we have employed the CAAP (Collegiate Assessment of Academic Proficiency) test as our general education assessment and participated in the creation of general education objectives and outcomes that are common to all of the regents’ institutions. Tremendous gains have been made in the area of academic assessment; in fact, it is fair to assert that the campus has developed a true culture of assessment over the last 10 years.

Over the last 10 years, the number of full-time state funded faculty members increased 3.7% while student headcount increased 4.33% (from 2218 to 2313). Faculty work loads have not lessened and, with increased emphasis on external funding, faculty members are increasingly concerned about balancing research and teaching obligations. Most faculty salaries remain below the average by discipline and rank as published annually by Oklahoma State University despite the raising of funding for salary enhancement and equalization through student fees and a Salary Enhancement Program begun in 1998 which resulted in average salary increases of 7% per year for three years.

In Student Affairs, numerous programs have been created and the Dean of Students position was elevated to Vice President for Student Affairs and Dean of Students. A Campus Community Prevention Coalition was formed in 2004 to address high risk behaviors, and grants have been recently funded for an alcohol prevention and suicide-intervention program. Student living and recreational facilities have been greatly enhanced through a major remodel of the Wellness center, the creation of an intramural sports program, a renovation of the Surbeck student center, and the building of a new dorm. A bold innovation initiated by Residence Life resulted in the creation of a freshman experiential program in which a cohort of students live together in the residence halls, take classes, study, and have orientation programs together in an effort to integrate
academic and co-curricular activities. The student profile has become slightly more female and diverse. Most notably, we have led the nation in the past two years in graduating Native American students with B.S. degrees in engineering. In 2005, SDSM&T awarded its first Ph.D. to a Native American.

Since 2001 federal appropriations to SDSM&T have totaled nearly $60 million through partnerships with the Army Research Laboratory (ARL) and the Air Force Research Laboratory (AFRL). The appropriations have been used primarily to enhance infrastructure for materials-related research and development and include laboratory construction, acquisition, and renovation. Our partnerships with other universities and industry and are focused on the transition and commercialization of new technologies. State funding has increased slightly every year since 1996; however, state funding focused on advancing economic development through research initiatives has recently increased under the governor’s 2010 Research Initiative.

Over the last 10 years, the cost of instruction per student FTE has risen by 57%, and resident undergraduate tuition and fees have increased by 73%. However, for the last eight years, we have earned a “Best Buy” designation (RR290). In 2005 a uniform out-of-state tuition of 150% of in-state tuition was established to make South Dakota more attractive to regional and international students.

A 2005 campus space audit and a new Master Plan have brought us up to date on facilities planning. 70% of our classrooms and lab areas are in excellent or good condition; however, significant lab improves still need to be made. Since 1996, major renovations have been done in the Civil/Mechanical building ($3,750,000) and the Devereaux Library ($881,000). Our electrical infrastructure has been upgraded ($767,795) and a central chiller project completed ($2,131,000). Planning has begun for replacement of the Chemistry Building. All significant changes in facilities are listed on pages 19 to 21 of the full text.

The networking environment (LAN and wireless enabled) has been greatly enhanced over the last four years, and we are piloting a tablet PC program for students planned for full implementation in fall 2006. In 1998, all regents’ institutions began centralizing student information through the implementation of Datatel’s Colleague software. This process was completed in 2005 under the STUDENT project, and a centralized HR/finance project was begun.

New academic relationships have been formalized with the Mongolian University of Science and Technology, with Gjøvik University College and Telemark University College in Norway, with Sri Ramakrishna Engineering College in Coimbatore, and with China Three Gorges University. SDSM&T continues to cultivate an array of linkages to area grade schools; however, we do not have any single office that coordinates the full range of involvements.

**Summary of institutional performance under Criterion One, Mission and Integrity** (See pages 47 to 66 for details.)

In June 2003, the Board of Regents published its system wide plan, “South Dakota Opportunities,” which recognized SDSM&T as the state’s technological university. We began discussions with its constituents to review and revise our mission documents and published Strategic Agenda and other documents that clearly express the University’s
mission and our commitments (RR122). In 2005, the second iteration of our Strategic Agenda was published (RR293) following considerable assessment of the prior year’s accomplishments and broad campus input (RR123).

We serve a fairly specific range of constituents and rely upon collaborations with other institutions to serve all the region’s higher education needs. Although our faculty is internationally diverse our undergraduate student body is not diverse. Our Multicultural Affairs Office and the Ivanhoe International Center work tirelessly to promote domestic diversity and global awareness by recruiting and working to retain international and under-represented American populations. And, in 2005, a globalization/global issues requirement was added to enhance students’ global awareness. We have made significant and successful efforts to increase Native American student numbers and began a Women in Science and Engineering program in 2005.

Our strategic planning process and the administration’s commitment to shared governance is reflected clearly in funding priorities and decisions. Strategic planning and self-study efforts over the last couple of years have done a great deal to make the Mission something that all members of the campus community understand, own and support. The artifacts of these efforts can be seen at http://www.hpcnet.org/PresidentCampusPlanning.

The campus relies on three major areas of governance: the administration; the Board of Regents; and the Faculty Senate. Within this governance, the institutional governance consists of the Executive Council, the University Cabinet, and the Faculty Senate. Many positive changes have been realized by our new president. All members of the campus have received the message that their involvement and input is much desired as we have assessed our institutional needs, our mission, our strategic initiatives, and collaborated to implement necessary changes.

**Summary of institutional performance under Criterion Two, Preparing for the Future (See pages 67 to 112 for details.)**

The last 10 years of SDSM&T have been shaped by changes in demographics and resources, changes in higher education, and changes in the workplace. State funding has remained relatively stable, if insufficient; however, the institution is slowly increasing external non-state support. In 2005, funding from state appropriations was 28% of actual revenues whereas funding from grants and contracts represented 38% of overall funding. A decreasing pipeline of high school graduates is reflected in recent enrollment declines. The figure of a 12% decline in high school graduates by 2010 is most often cited.

The major trends that influenced the institution over the past decade are 1) the need to collaborate, 2) the need to adopt more experiential learning pedagogies, 3) increasing demands for accountability, and 4) the changing needs of industry and employer expectations.

We have successfully met the need to increase technical research collaborations, many of which occurred naturally as a result of the progression of cutting-edge research in various fields. A very strong alumni base has fostered interactions with industry. Progress on inter-institutional collaborations has been adequate but not outstanding, and, on campus, we are still on the uphill portion of the journey to establish a fully integrated 1st-year experience. Infiltration of active-learning pedagogies is occurring but the degree of
success varies widely by program. Our seniors report engagement in the curriculum on par with engineering and science students nationwide, but our freshmen do not.

Assessment activities, always a part of the institutional culture, have become more organized in response to accreditation requirements and a sharpened focus on learning outcomes. The changing needs of industry have also prompted increased efforts to assess specific learning outcomes (such as teaming skills) that employers expect our graduates to have achieved. The increase in teamed projects and the success of student teams in various competitions indicate collaborative efforts have been successful. Evaluations of other “soft skills” are still developing.

Many of the forces of change that shaped our last 10 years continue to shape our present and future. Looking ahead, we see the following major trends: 1) demographic shifts, 2) funding shifts, 3) technological drivers and emerging disciplines, and 4) globalization.

The impact of continuing demographic declines is amplified for us since a majority of our students live within a 100-mile radius. Exacerbating the negative impact of dependence on regional recruiting is the decline in interest in math, science, and engineering among high school students nationwide. Our response has been to 1) expand our recruiting base, 2) refocus on our traditional strengths of science and engineering, and 3) to unambiguously set for ourselves the goal of becoming the institution of choice for science and engineering regionally. This second decision means concentrating our limited resources on our traditional programs and raising admission standards. The first and third choices involve revamping our approach to recruiting.

Our decision to become the institution of choice regionally for science and engineering has reopened the debate about the relative importance and roles of teaching versus research on campus. Faculty members are struggling with finding a way to balance the calls from the Board of Regents and governor to ramp up research as an engine of economic development with the necessity of maintaining our core strength of offering a high quality undergraduate education.

We have taken steps to improve recruitment and retention and have put special emphasis on attracting and retaining female students. Notable examples of retention efforts include work to increase student engagement through active learning, the creation of living and learning communities, improving our mentoring program, and the creation of an integrated first-year experience. Efforts to assess the learning and the needs of our freshmen and sophomores have been genuinely intense. We employ or are in the process of instituting the following assessments: the National Survey of Student Engagement (NSSE), the Student Satisfaction Inventory (SSI), the Collegiate Assessment of Academic Proficiency (CAAP), the Learning and Study Strategies Inventory (LASSI), and the Student Assessment of Learning Gains (SALG), and the Intercultural Development Inventory (IDI). These are merely the nationally standardized instruments we employ. Many additional assessments, including student focus groups and departmentally developed assessments, are trained on understanding the cognitive and psycho-social development of our students.

We are responding to funding declines through increased grants and contracts and alumni and corporate giving. Research funding has increased over the past four years from 18% to 29% of our operating budget, and our Foundation has entered into the initial phase of a second major capital campaign aimed at raising $50 million between 2005 and 2012.
As an institution dedicated to science and engineering, we are particularly impacted by the demands of ever increasing technological sophistication and the emergence of new disciplines. We have kept apace of technological change and have been quite successful in reformulating or creating academic programs.

Since 2001, SDSM&T has become keenly aware of the need to greatly improve the global view of our students. Through campus discussions, academic programming, changes in our general education requirements, and persistent leadership from the top, we have made considerable gain in this area despite the fundamentally non-diverse profile of our undergraduate population.

SDSM&T’s resource base support is sufficient and promises to improve over the next decade. Financial ratio analyses given on pages 76-78 of the full text show that the institution

- Could continue to function for over ten months using expendable reserves and without relying on additional net assets generated by operations (See primary reserve ratio).
- Has realized a return on net assets of between ~12% to 13% over the past four years (See return on net assets ratio)
- Is living within its means and has realized a small surplus three of the last four years (See net operating revenues ratio).
- Has sufficient expendable assets to satisfy all debt obligations (See viability ratio).
- Has a sufficiently low debt burden to allow for additional capital expenditures (See debt-burden ratio).

Total current assets increased from 2004 by $.6M, or 10%, to $6.3M as of June 30, 2005, due primarily to increased research activity and increased bond reserves for auxiliary operations. Total current liabilities declined from 2004 by $.5M, or 18%, to $2.1M as of June 30, 2005. Building and infrastructure projects completed in FY 2005 include the new residence hall construction, student union and library renovations, and electrical distribution and central cooling system upgrades.

Our continued financial stability depends upon 1) our ability to recruit and retain the highest quality students, faculty and staff; 2) on stable financial and political support from state government; 3) on cost and administrative efficiencies; and 4) on growth in federally and externally supported research.

In FY 2004-05, we increased resources expended for compensation and benefits by 6%, or $1.3M, to $22.6M in 2005. This increase is comprised of an annual compensation increase of 3% and the hiring of additional employees, primarily research scientists. The state’s economic outlook is solid, and we are making progress in obtaining grants and contracts. For example, since 1996 external funding for research has quadrupled, from $3,210,000 to $11,922,000 in FY2004. A Vice President of Research has recently joined SDSM&T with an expressed commitment to strategically increase research activity for campus.

We continually and effectively evaluate institutional performance through program review, external accreditation reviews of our engineering and chemistry programs,
program planning, peer-institution comparisons, consultations with academic and industrial advisory boards, and an array of indicators incorporated into the yearly review and update of our strategic initiatives document. We have also developed a well-defined strategic planning process for determining institutional priorities and directions, and all-campus planning sessions held three times a year contribute significantly to the campus-wide belief that everyone has a stake in effective camps planning. Additional significant efforts that have contributed to our ability to plan for the future include a Campus Master Plan, a campus-wide space-utilization assessment, and a comprehensive analysis of the University’s operations conducted by an alumni focus group.

Summary of Institutional Performance under Criterion Three: Student Learning and Effective Teaching (see pages 113 to 147 for details.)

In order to achieve our goal of being the regional institution of choice for science and engineering education we must continue to make progress on introducing active-learning pedagogies into the curriculum; widening the global orientation of our students; improving written and oral communication skills; and more fully exploiting the freshman and sophomore years as a critical time for students to achieve certain learning and developmental gains.

SDSM&T has made substantial progress in developing a culture of assessment and improvement at the program level. While virtually all programs now have well-defined assessment plans, like most universities, the campus continues to struggle with the development of integrated assessments of student learning that cut across departmental boundaries. Regardless, all 16 undergraduate B.S. programs and most graduate programs have articulated objectives, and outcomes and have well-developed assessment plans. Faculty and staff have designed and applied a variety of assessment tools and measurements, and both curricular and co-curricular programs have established effective mechanisms for utilizing assessment data. Most areas can point to data-based improvements, and we are proud of this achievement.

Faculty professional- and curriculum-development initiatives enjoy an unusually high level of funding at SDSM&T. Between 1999 and 2005, faculty development was funded through two $300,000 grants and annual institutional support of between $50,000 and $60,000 per year. From 1998 to 2004, a statewide competitive grant fund of about $1.5 million per year has been offered by the governor’s office to faculty members with the best ideas for course and curriculum development, with an emphasis on integrating technology into teaching and course redesign. Since 1998, SDSM&T faculty members have won 44 of these “Governor’s Awards,” and have brought an additional $1,025,632 to campus to support work on teaching and learning. Despite the conflicting pressures of teaching versus research, SDSM&T’s decision to refocus strongly on science and engineering has revitalized efforts to develop a scholarship of teaching in science and engineering education. Individual innovations and projects typically enjoy good support; however the institution’s published standards for teaching effectiveness do not dependably translate into a fair recognition of excellent (or poor) teaching through merit salary allocations, and teaching excellence needs to receive more administrative recognition overall.

Over the last decade, we have developed two campus-wide teaching and learning venues, one within the curriculum and the other in addition to the curriculum.
To respond to industry needs for engineers with advanced problem-solving and teaming skills, we created a freshman-level general science and engineering course (GES115) that is now required by all 10 of the engineering programs plus 2 of the science programs and serves roughly 360 students per year. A primary purpose of GES115 is to provide the knowledge base and foundational skills in math and science necessary for effective problem solving. The curriculum incorporates project-based learning, linked or integrated curricula, cooperative learning, and technology-enabled learning, and current research on the developmental needs of freshmen inform course pedagogy.

In 1997, SDSM&T established the Center for Applied Manufacturing and Production (CAMP). Students, faculty and industry partners developed a project-based learning approach to engineering and science education. The needs of industry are addressed through the use of multidisciplinary teams, electronic communications and a focus on manufacturing. All students are encouraged to join project teams to design and develop devices for outside industry, campus researchers, or for engineering competitions. There are presently 24 CAMP honor student members who must maintain a 3.0 GPA and serve as leaders of the CAMP activities. Approximately 175 additional students are involved in the CAMP projects. Students who wish to be heavily involved in the projects spend from 10 to 50 hours per week on them. Now in its seventh year, CAMP is thriving and respected on campus and in the community. It received the 2000 Boeing Outstanding Educator Award and the 2001 NSF Corporate and Foundation Alliance Award. Further, because of the developmental skills promoted within the program, the program is highly valued by corporations seeking to hire SDSM&T graduates.

A freshman mentoring program was also established in 1997 and has become an important part of the institutional culture. The goal of the mentoring program was to transition academic advising from an administrative function to one grounded in student developmental theory. In 2005, a formal for-credit linkage was made between the mentoring class (GES115M) and the freshman-level engineering and science course (GES115).

Our Student Affairs division has been the source of many innovative programs to help students transition to college life, form supportive social networks, make healthy life choices, and develop leadership skills. The Freshman Introduction to Real Success at Tech (FIRST) program supports 101 first-year students by combining community development activities and an adventure-based orientation to campus with academic support provided on the residence-hall floor these 101 students share. An expansion of FIRST to be called “FIRST Academic” is planned to create learning communities by having cohorts of students share select courses. The transition to college begins for students of SDSM&T and their parents during the spring and summer prior to fall term when a series of highly interactive orientation sessions are offered in conjunction with testing and registration.

For SDSM&T, under-represented groups means largely Native American and female students. We have a strong history of offering programming to attract and support Native Americans and have recently hired a full-time coordinator for our Multicultural Activities Office. Efforts to attract and retain female students do not have as strong a history; however, we have recently made a big gain in this area through the creation of our Women in Science and Engineering office and our Mentors & Mentees program. A significant number of our graduate students are international students, and our Ivanhoe International Center does a particularly good job of supporting them and working campus
wide to promote global and cultural awareness. Academically under-prepared students have also been the focus of a recently created support program. Our Freshman Summer Bridge program provides four weeks of instruction in college algebra and introductory chemistry courses (two courses that are highly correlated with academic success) combined with a supportive residential experience.

Like many small, state-supported schools, SDSM&T struggles to find the resources required for continual updating of equipment, and this is particularly critical for an institution focused on science and technology. A large Title III equipment grant has made a significant contribution to our efforts to strengthen student success through student data system enhancements and to strengthen academic programs through equipment upgrades. Maintaining fully updated instructional laboratories continues to be a challenge and success in this area is mixed. The updating of teaching technologies and the general campus information technology infrastructure, on the other hand, has been highly successful. Faculty computers are kept very up to date, and implementation of a tablet PC program is planned fall 2006 for all incoming freshman following pilot programs in AY 2005-06 subject to regents’ approval. Classroom presentation equipment is up to date, and a campus-wide wireless computing infrastructure was established in 2004.

**Summary of Institutional Performance under Criterion Four: Acquisition, Discovery, and Application of Knowledge** (See pages 149 to 181 for details.)

A lack of resources lessens the ability of most public universities to fully support all forms of research and intellectual inquiry among its students, faculty, and staff. The science, engineering, and technology focus of SDSM&T heightens our sense of constraint because the growing costs of working on the cutting edge of research and intellectual inquiry outpaces funding in nearly every area.

So while the drive to research, discover, and apply knowledge to new designs and applications rises to the level of fundamental instinct campus wide, our considerable accomplishments must be judged within the context of chronically limited resources. Also, as on most campuses, definitions of what constitutes scholarship vary. A strong movement exists on campus to fully develop a scholarship of teaching in the most rigorous sense of this phrase. Workload and resources are persistent challenges; however, they also make the many successes we can point to all the more notable.

Clearly, our library resources require attention if we are to achieve our goal of regional and national distinction. Funding shortfalls for library resources state wide have recently become a key concern of the Board of Regents. SDSM&T acted to allocate 3% of indirect costs directly to the Library budget, so that resources will grow as research grows, and we have made the Library a component of our capital campaign. Issues identified through our all-campus sessions are the upgrading the journal and book collections, enhancing availability of search engines, improving staffing, and giving faculty/staff greater input to the acquisition process and management of collections. The Library Committee is developing a strategic plan which will be presented it to the University Cabinet in spring 2006.

Support for research has recently been improving in some areas, and overall external funding for research has quadrupled since 1996. A Vice President for Research was hired with the specific charge of increasing our capacity for basic and applied research in
a strategic fashion. The governor elected in 2004 launched a “2010 Initiative” to increase research in the state university system as a means of stimulating economic development. We are confident in the ability of our faculty members to attract increased external funding; however, growing the level of external funding will necessitate development of internal structures for supporting grant-productive faculty members. The Research Affairs office is staffed by very dedicated personnel who are examining methods to streamline paperwork to decrease the time required to submit proposals. Nonetheless, the faculty has no formal mentoring system and very limited or no support for grant writing.

The picture for our undergraduates is better. It is common for our students to travel with faculty members to professional conferences and also to present conference papers. For them, research, scholarship, and applied design are fundamental components of the curriculum, and all students complete design or research projects in all B.S. degree programs. In addition, we have strong programs, such as our Center for Advanced Manufacturing and Production (CAMP), NSF-funded REUs (Research Experience for Undergraduates), geology field camps, and the yearly Design Fair that provide our students with engaging models for the life-long application of learning. Teaching and research labs, on the other hand, do not yet have an adequate and reliable base of funding for upgrades. To help address this issue, an increase in student fees over three years (from $23.30 to $50) was proposed in spring 2005 for all laboratory courses and the first year of the proposal received regents’ approval.

Research in the area of pedagogy is flourishing in a few areas of campus; however, we have a limited record of publications in this area in peer-reviewed journals. Work on assessment, new methods for addressing diversity, and study on cognitive development in students have been the focus of most publications and presentations in this area.

SDSM&T regularly reviews its general education program as part of a statewide system of general education; however, uniform general education policies create restrictions that prevent us from optimizing the impact of the program. Our General Education Assessment Committee (GEAC) and Engineering Assessment Committee (EAC) have successfully worked to diminish the impact of this separation between general education course work and course work in the majors. Notable work has been done, for instance, by our writing faculty and an interdisciplinary group focused on better aligning the math sequence with the needs of the engineering programs.

The creation of new academic programs and initiatives illustrates continual support of a broad-based education and the pursuit of knowledge. In the last seven years, we have created two new undergraduate programs, created a freshman engineering course, revised one of our largest undergraduate programs, made considerable progress on creating an integrated 1st-year experience, created two new Ph.D. programs, and have received regents’ approval for a third new Ph.D. program.

The learning essential for engineering and science students is a well established topic of concern and action. Seventy-five percent of our undergraduate programs are accredited by professional boards. The rigorous standards defined in the (a) through (k) outcomes of ABET’s EC2000 curriculum, have invested urgency into our efforts over the last six years to integrate the learning of so-called “soft skills” into the curriculum and co-curriculum. Student Affairs and Academic Affairs have worked aggressively to integrate efforts to enhance student learning in the areas of leadership, teaming, ethics, and an awareness of global issues. All eight engineering programs that underwent accreditation
review under the rigorous ABET standards in 2004 were found to have strong curricula and viable assessment processes. Learning outcomes we continue to work on achieving for all students include cross-cultural and global awareness; value-system development; and understanding the social implications of the science and engineering professions. Our desire to improve these outcomes is bound up with our efforts to increase the diversity of our still relatively homogenous undergraduate population.

Our considerable efforts to ensure student learning well beyond the content areas in science and engineering have not been driven solely by accreditation concerns. A vital and viable curriculum is essential for a school of our nature, and we rely heavily on regular input from our external academic and industrial advisory boards. Input from our campus-level academic advisory board (which meets twice yearly) supplements the input received through the 75% percent of our B.S. programs that have specialized advisory boards. Employers and alums are regularly surveyed and consulted on curricular matters. The collaborations with businesses and industry fostered though our internship and co-op program ensure a steady give and take between faculty members and external constituents who keep us apprised of the changing needs and expectations of the workplace.

**Summary of Institutional Performance under Criterion Five, Engagement and Service** (See pages 183 to 217 for details.)

SDSM&T does not alone serve the full range of constituents found in western South Dakota. We do this in concert with Black Hills State University (BHSU), National American University (NAU), Western Dakota Tech (WDT), and Oglala Lakota College (OLC).

SDSM&T is known as a center of research and development and is becoming a force in economic development. We also serve select aspects of the tourism industry. Our focus on science and engineering translates into a responsibility to focus on distinct regional needs in the areas of educational development and economic development.

We engage and serve our educational development constituents through activities and programs related to the advancement of engineering and science. We reach out to K – 12 teachers and their students involved in teaching and learning math and science; math and science teachers and students at junior, community and tribal colleges, and prospective students and their families. We have occasional or seasonal opportunities to serve organizations delivering educational programs or professional conferences, engineers and scientists desiring continuing education at the professional level, and individuals desiring to broaden their science and engineering educational backgrounds.

SDSM&T is in close proximity to the second largest and most diverse school district in South Dakota. Our nationally recognized faculty, our intimate campus, and a slowly growing excitement about science and technology among K-12 students makes us successful in attracting many high achieving local high school graduates. However, with important and notable exceptions (such as Engineers’ Week, teachers’ institutes, or the West River Math Contest), we do not market ourselves well in area schools. Our outreach lacks coordination and funding. Creation of a K-14 advisory board or a formal network of K-14 teachers, counselors and administrators is a project under consideration. On a brighter note, our efforts to learn from and serve the Native American population have been more systematic and increasingly well organized.
Our mission commits us to benefit the state, region and nation through collaborative efforts in economic development, and this we do well. Through programs, such as Small Business Innovation Research (SBIR), Tech Ventures, and Small Business Technology Transfer (STTR), and through unique capabilities in the areas of laser deposition, friction stir welding, and nanotechnology testing, we are quite successful in creating industrial collaborations.

Prior to 2003, the 40,000 square-foot business incubator now being built was destined for an off-campus location. Outreach by SDSM&T changed that, and the Black Hills Business Development Center (BHBDC) will now provide entrepreneurial training and technology-transfer assistance to campus and community members alike. Our Foundation-funded Tech Ventures Program helps to serve the needs of our entrepreneurial faculty members and was created in 2004 as a mechanism for the commercialization of ideas generated through research and development efforts on our campus. A recent (2004) revision of the regents’ IP policy expands the range of scholarly and artistic works for which faculty ownership is possible and establishes a distribution-of-income schedule that is within the top 5% of equitable IP profit sharing policies in the nation.

Pursuing economic development opportunities in multiple areas has, in the view of some, created a lack of focus and an inadequate concentration of resources. We are mindful of the need to serve our constituents by fostering economic opportunities in the areas of nanoscience and nanoengineering, materials science and engineering, atmospheric and environmental science, and geosciences and engineering without starving other emerging areas of research. A fifth focus area of biomedical engineering is opening up with the anticipated creation of a biomedical engineering Ph.D. program, and strategic hiring is underway in all focus areas.

*Details on the institutional response to the 1996 team report and a description of the self-study process can be found on pages 33 to 45 of the full text.*

*Organizational charts and a listing of all items found in the electronic resource room can be found in appendices A and F, respectively.*