

## CRITERION 2 - PROGRAM EDUCATIONAL OBJECTIVES

The terms and definitions used throughout this report are consistent with ABET publications and guidelines. Appendix F contains a glossary of important terms used throughout this self-study document.

### A. Mission statement

The Mission of SDSM&T is codified in state statutes (SD Codified Law Statute 13-60-61) and defined in SDBOR Policy 1:10:3. As articulated in state law, the mission is worded for lawmakers for policy purposes and does not speak clearly and effectively to the public at large. In fall 2013, the mission and vision were expressed as a single clear and aspirational statement. This statement is used for planning and is the effective mission of SDSM&T. It is found at <http://www.sdsmt.edu/About/Office-of-the-President/Vision-and-Mission/> and worded as follows:

*Our vision is for the South Dakota School of Mines and Technology to be recognized as an exceptional engineering and science university. Our mission is to prepare leaders in engineering and science, to advance knowledge and its application, and to serve the state of South Dakota, the region, and the nation.*

The goals of the Strategic Plan were established in fall 2012. Delay in full articulation and publication of the Strategic Plan was the result of then President Warton's untimely death followed by the Provost assuming for one year the dual role of Interim President and Provost.

The Executive Council revisited in 2013 the institutional values as articulated in 2011 through a campus-wide process. The value of "excellence" was added, and the values are published on the back cover of the Strategic Plan. The values of the institution are as follows: *Excellence, Respect, Integrity, Collaboration, and Service*. Between October 2013 and January 2014, the academic departments and center directors were asked to take the Strategic Plan goals articulated in 2012 and to create a 2-5 page summary of priorities, initiatives, and ideas for development. The summaries were universally shared, and an all-campus meeting that included key external stakeholders was held. Six overarching themes were discussed. The considerable feedback from this open planning session was studied and used to update and more fully flesh out the Strategic Plan goals and to ensure congruence between mission and program development. Table 2-1 shows the summary flyer of the Strategic Plan. More details and information on the Strategic Plan is available at <http://www.sdsmt.edu/About/Strategic-Plan/>.

The feasibility-study phase of a capital campaign was also executed in 2014. The president of the foundation and the president of the institution traveled to visit 45 major donors, partners, and alumni in 20 cities to get input on the strategic plan and issues of mutual concern. Input from these constituents was used to ensure congruence between mission, program development, and constituent needs. The *In Pursuit of Excellence: Mines Strategic Plan* was published in late spring 2014 and updated in fall 2015. The institution is managing to the six goals as articulated

Table 2-1 Mines Strategic Plan

<h1 style="text-align: center;">AN EVEN GREATER TEAM</h1> <h2 style="text-align: center;">MINES STRATEGIC PLAN</h2>					
GOAL ONE	GOAL TWO	GOAL THREE	GOAL FOUR	GOAL FIVE	GOAL SIX
Student Success	Research	Facilities	People	Administration	Development
<p>Prepare more undergraduate students for leadership in engineering and science.</p>	<p>Increase research to prepare science and engineering experts, advance knowledge, and catalyze economic development.</p>	<p>Redevelop and expand needed living, learning, and research spaces.</p>	<p>Recruit, develop and retain excellent faculty and staff.</p>	<p>Responsibly steward financial and physical resources.</p>	<p>Establish a robust culture of philanthropy to enable the university to sustain excellence.</p>
<p><b>LEAD:</b> PROVOST/ DEAN OF STUDENTS</p>	<p><b>LEAD:</b> VICE PRESIDENT FOR RESEARCH</p>	<p><b>LEAD:</b> DIRECTOR OF FACILITIES</p>	<p><b>LEAD:</b> VICE PRESIDENT OF HUMAN RESOURCES</p>	<p><b>LEAD:</b> VICE PRESIDENT FOR FINANCE</p>	<p><b>LEAD:</b> FOUNDATION PRESIDENT</p>
STRATEGY	STRATEGY	STRATEGY	STRATEGY	STRATEGY	STRATEGY
<p>Implement aggressive enrollment plan to increase the undergraduate student body to 3,000. (1-A)</p> <p>Strengthen advising, counseling, mentoring, and engagement to improve retention at every stage. (1-B)</p> <p>Enhance engaged and experiential learning in curricular and co-curricular programs, as well as co-ops and internships. (1-C)</p> <p>Advance student professional readiness through Mines Advantage. (1-D)</p> <p>Enhance recruitment, support, and mentoring for women, first-generation students, minorities, and international students. (1-E)</p> <p>Fully integrate athletics into the RMAC and strengthen access to educational opportunities for scholar-athletes. (1-F)</p>	<p>Develop sustainable funding for doctoral education sufficient to graduate 20 PhD students per year. (2-A)</p> <p>Further develop and implement a comprehensive doctoral recruitment plan. (2-B)</p> <p>Improve private sector sponsorship, including intellectual property and licensing practices, to significantly expand research and catalyze innovation. (2-C)</p> <p>Develop and implement targeted enrollment plan to expand professional Master's programs. (2-D)</p>	<p>Plan and secure sufficient housing on or near campus for all freshmen and sophomores. (3-A)</p> <p>Design and build an Energy Resources Center to support oil and gas research and teaching. (3-B)</p> <p>Design and build an Innovation Center for project based learning and competitive engineering program expansion. (3-C)</p> <p>Refurbish and rebuild Mining, Materials and Metallurgy Building to support research and teaching. (3-D)</p> <p>Restore and repurpose the Old Gym for teaching, performance, and faculty/staff space. (3-E)</p> <p>Restore and refurbish laboratories to meet the needs of Chemistry, Applied Biology, and Physics/EE/Nano. (3-F)</p> <p>Design and build expansion of Surbeck to accommodate expanded student dining and activity space. (3-G)</p>	<p>Increase faculty support through private funds to promote excellence and achieve greater salary equity. (4-A)</p> <p>Strengthen and expand professional development opportunities at all levels of the organization. (4-B)</p> <p>Review and optimize recruitment, performance evaluation, and recognition processes to promote excellence and align with strategic goals. (4-C)</p>	<p>Strengthen planning and budgeting practices to optimize fiscal management and tie budgets to the strategic plan. (5-A)</p> <p>Implement a systematic process for facility use, maintenance, and planning. (5-B)</p> <p>Review and improve business support services to enhance operations. (5-C)</p> <p>Develop and implement a systematic process for risk assessment and mitigation. (5-D)</p>	<p>Develop and implement a strategy for embedding a culture of giving in students, alumni, and friends of Mines. (6-A)</p> <p>Energize Mines fundraising and extend the culture of giving. (6-B)</p> <p>Engage alumni, corporations, community, and champions of STEM education in active partnerships. (6-C)</p>



in the 2014 Plan. SDSM&T follows an annual cycle to review, update, and refine the six goals of the Strategic Plan. Progress on the goals is reviewed twice annually. Additional information on the SDSM&T Foundation is available at <http://foundation.sdsmt.edu/>

The context of SDSM&T in the South Dakota Higher Education System helps ensure fidelity between institutional program array and mission. The institution has a clear role in the System as a demanding STEM-focused institution and members of the executive leadership team, including the president and all the vice presidents work through system-level advisory councils (e.g., The Council of Presidents and the Academic, Business, and Student Development councils). Governance of all institutions in the system by a sole Board of Regents and a broad spectrum of system-wide councils, committees, and task forces promote collaboration and reinforce the distinctive contributions and strengths of each university in the SD system.

The mission of the Department of Materials and Metallurgical Engineering appears in the catalog and on the web site at <http://www.sdsmt.edu/Academics/Departments/Materials-and-Metallurgical-Engineering/Accreditation---Assessment/>.

The Mission of the Department of Materials and Metallurgical Engineering is to

- Provide a quality program leading to the degree BS in Metallurgical Engineering
- Participate in multi-disciplinary programs leading to the MS and PhD degree programs in materials engineering and science
- Contribute to the expansion of knowledge in the area of materials and metallurgical engineering through scholarly activities
- Help local, regional, national and international materials and metallurgical industries through research and development activities

### **B. Program educational objectives**

The objectives of the BS in Metallurgical Engineering Degree program are to graduate students who can

1. Successfully apply metallurgical engineering principles in their employment
2. Meet societal needs through science and technology
3. Grow professionally and personally
4. Serve their profession and community

These objectives appear on the departmental bulletin board, on the departmental web page <http://www.hpcnet.org/ABETMetEngMissionObjectives>, in the 2010-2011 university catalog, and on selected departmental promotional literature.

Figure 2-1 shows an overall view of the university vision; the university and department, and program mission; and the program objectives.

### **C. Consistency of the program educational objectives with the mission of the institution**

The metallurgical engineering program objectives are derived from the institutional mission. Table 2-2 shows the relationships among the institutional and the metallurgical engineering program objectives.

**The SDSM&T Vision is for**

the South Dakota School of Mines & Technology to be recognized as an exceptional engineering and science university.

**The SDSM&T Mission is to**

prepare leaders in engineering and science

advance knowledge and its application;

serve the state of South Dakota, the region, and the nation.

**The Mission of the Department of Materials and Metallurgical Engineering is to**

Provide a quality program leading to the degree BS in Metallurgical Engineering

Participate in multi-disciplinary programs leading to the MS and PhD degree programs in materials engineering and science

Help local, regional, national and international materials and metallurgical industries through research and development activities

Contribute to the expansion of knowledge in the area of materials and metallurgical engineering through scholarly activities

**Program Educational Objectives**

**The objectives of the BS in Metallurgical Engineering degree program are to graduate students who can**

Successfully apply metallurgical engineering principles in their employment

Meet societal needs through science and technology

Grow professionally and personally

Serve their profession and community

Figure 2-1 Overview of Vision, Missions, and Objectives

Table 2-2 Alignment of the BS Metallurgical Engineering program objectives with SDSM&T institution’s objectives.

SDSM&T Mission BS MET ENG	Prepare Leaders in Engineering and Science	Advance Knowledge and Application	Serve the State of South Dakota, Region, and Nation
Apply Met Eng Principles			
Meet Societal Needs			
Grow Prof & Personally			
Serve Community & Profession			

**D. Program constituencies**

The program constituents are those who employ our graduates. These are

- Private industry
- Public agencies
- University graduate programs
- Self-employed entrepreneurial alumni

Constituent input is gained during the Materials and Metallurgical Engineering Advisory Board meetings and through input from alumni as they visit campus throughout the year. The Advisory Board includes alumni so they represent now-informed (former) student interests.

Undergraduate students in the BS Metallurgical Engineering program are considered a special constituency group in the area of providing direct feedback on the quality of the classroom and laboratory instruction for required and elective courses in the program. They do not have sufficient experience or knowledge to be considered a constituency group for evaluation and revision of PEOs. Each academic semester these students have opportunity to provide feedback into the program in the form of the student evaluations that are mandatory for every class taught every semester by Assistant and Associate Professors and once every three years for Full Professors. The university uses the IDEA Student Ratings of Instruction instruments. These data are collected and maintained by the Department Head and are discussed with individual faculty each semester the student ratings are completed. Student ratings constitute substantial portions of the individual faculty member’s promotion and tenure review process, as well as providing information on areas to adjust curriculum based on student expectations. Recent graduates, having gained some perspective, are highly valued as part of the program’s objectives and student outcomes review process.

### **E. Process for establishing program educational objectives**

The department has a long tradition of external evaluation dating to 1970. Periodic surveys of both alumni and their employers were routinely performed and acted on. The department was the source of the current campus student opinion surveys starting in 1971. The department was also the point of initiation for Industrial Advisory Boards (now called the Advisory Boards) beginning in 1972.

The design of the continuous improvement system began in 2000 and was followed by a staged collection of materials beginning in the 2001-2 academic year. During the subsequent two years, the system was continually refined and brought to full implementation. Although informal reviews and system refinements were occurring on a weekly basis throughout 2001-2003, the first comprehensive objective review involved all data collected up to the end of 2003. This initial “closing of the loops” occurred during the Spring Semester of 2004. During the period from 2001 to 2004 the entire department faculty has met once or twice a week during the academic year to create the continuous improvement system now in place. Departmental faculty members also attended ABET training sessions and numerous campus sessions on continuous improvement methodologies. With the substantial faculty retirements (Stone, Han, and Marquis) from 2005-2007, subsequent biannual Advisory Board reviews were renewed in 2007 with the newly contracted faculty (Medlin, West, and Cross). Subsequently, the board met in 2009, 2011, 2013, 2015, and again March 4, 2016 in review of the upcoming ABET review as well as planned implementation of new Student Educational Outcomes.

As departmental faculty members have retired and been replaced, new faculty members unfamiliar with the department’s continuous improvement system undergo extensive training. As of 2015, all program faculty members are well versed and directly involved in supporting and managing the continuous improvement system. All teaching faculty members in the metallurgical engineering program are actively engaged in periodic reviews of the program educational objectives. The program faculty members are asked to review the objectives each year for appropriateness and thoroughness. Reviews are also conducted by the Advisory Board which reflects our constituents.

The Program Objectives and the Student Educational Outcomes have been reviewed periodically by the Metallurgical Engineering Advisory Board. The board is comprised historically of representatives primarily from industry but occasionally there is governmental laboratory and outside university representation. The SDSM&T MES faculty members represent graduate program representation and recent program alumni are reflections of informed student opinion.

The composition of the 2013-2018 Advisory Board is as follows:

- Terry Rasmussen, Nucor, Board Chairman
- Dr. Ray Peterson, Aleris International, Past Board Chairman
- Ms. Wendy Craig, Gerdau Steel
- Ms. Jenifer Galvin, SDSM&T MS Candidate\*
- Mr. David Gildemeister, Alcoa
- Ms. Michelle Jensen, SDSM&T MS Candidate\*
- Mr. Andy Johnson, AdvTech-Consulting
- Mr. Wayne Douglas, Barrick
- Mr. Christopher Misterek, John Deere
- Ms. Lisa Schlink, Freeport-McMoRan
- Mr. Shawn Veurink, RPM and Associates
- Mr. John Walenta, Caterpillar Inc.
- Mr. Richard Wensel, Micron Technology

\* Recent Alumni

The department holds regular meetings with its Advisory Board to conduct a review of Program Objectives and the department’s success in achieving them. The review also includes a re-examination of the objectives to assure they are current and significant. Informational material presented to the board includes placement data, curriculum changes, continuous improvement assessment data, faculty professional activities, funding status, enrollment data, and laboratory and equipment status. The board members are selected to represent as many of the program’s constituents as possible.

The Advisory Board used to be provided surveys from employers and constituents but that has been replaced by populating the board with those who have first-hand knowledge of graduate performance through their employer positions. The board is asked to offer input on specific topics such as the currency of the program and the adequacy of education objectives. The board is encouraged to offer any constructive comments. The Advisory Board reviews are held approximately every two years. They also serve as the constituent focus group. The program faculty members consider and implement recommendations of the board. The review culminates with action statements that are posted on the program’s continuous improvement web site ([www.ABETMetEng.or/SD](http://www.ABETMetEng.or/SD)). Figure 2-2 shows the process to determine progress in meeting program outcomes.

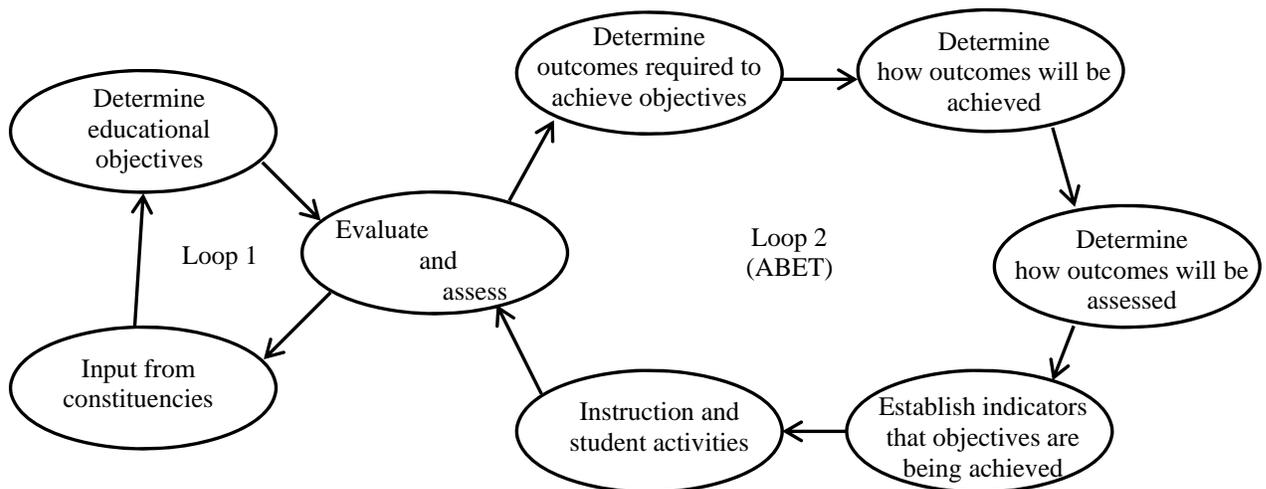


Figure 2-2 Continuous Improvement System (CIS) for the metallurgical engineering program

(intentionally blank)