SOUTH DAKOTA BOARD OF REGENTS

Academic and Student Affairs

AGENDA ITEM: 6 – A (2)
DATE: April 2-3, 2025

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SUBJECT

New Program Request – SDSMT – BS in Data Science and Engineering

CONTROLLING STATUTE, RULE, OR POLICY

BOR Policy 2.3.2 – New Programs, Program Modifications, and Inactivation/Termination

BACKGROUND / DISCUSSION

South Dakota School of Mines & Technology (SDSMT) requests authorization to offer a BS in Data Science and Engineering. The proposed program provides students with a comprehensive foundation in the core principles, tools, and techniques of data science. This interdisciplinary program is rooted in computer science, with supporting elements of statistics, mathematics, and domain-specific knowledge to equip students with the skills necessary to collect, analyze, and interpret large datasets. Graduates will be prepared to solve complex problems in a wide range of industries, including biology, environmental science, biomedical engineering, materials science, mining engineering, social science, and more.

The intent to plan has been approved by the Executive Director and was presented to the Board as an informational item at the December 2024 Board meeting.

IMPACT AND RECOMMENDATION

A summary of the program proposal has been included as Attachment I. Additional information on this proposal is available from the Board office by request.

ATTACHMENTS

Attachment I – New Program Request Summary: SDSMT – BS in Data Science and Engineering

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DRAFT MOTION 20250402_6-A(2):

I move to authorize SDSMT to offer a BS in Data Science and Engineering, as presented.

Full Proposal – BS Data Science and Engineering
South Dakota School of Mines and Technology

BOR Recommendation: The Board of Regents Academic Affairs and the Executive Director support the program request. This program will increase the number of SD graduates trained to work with large datasets increasingly common across multiple occupational sectors, including agriculture, finance, healthcare, and engineering.

Program Description:

Catalog Description: The Bachelor of Science in Data Science & Engineering program provides students with a comprehensive foundation in the core principles, tools, and techniques of data science. This interdisciplinary program is rooted in computer science, with supporting elements of statistics, mathematics, and domain-specific knowledge to equip students with the skills necessary to collect, analyze, and interpret large datasets. Graduates will be prepared to solve complex problems in a wide range of industries, including biology, environmental science, biomedical engineering, materials science, mining engineering, social science, and more.

Strategic Impact –

SDSMT Strategic Impact:

Data Science & Engineering is emerging as a core subject in science and engineering colleges nationwide. Industry and academia need these skills to address the challenges of this next century. Interdisciplinary computing, data science, and data engineering are explicit elements of the mission and strategic plan for South Dakota Mines (SDM). This new program is aligned with the institutional priorities.

The mission of SDM is to empower scientists and engineers to address global challenges, innovate to reach our creative potential and engage in partnerships to transform society. Data science and data engineering have become globally pervasive across nearly every sector of science and engineering. They have become essential elements in addressing global challenges ranging from food security and environmental science to novel materials discovery and global security. Housed within the newly formed Department of Electrical Engineering and Computer Science, this new program fits well within the current departmental degree offerings, as well as the entire institutional program array. As outlined above, the Data Science & Engineering degree program will be interdisciplinary, requiring domain-specific courses that span multiple fields across the SDM institutional program array. In addition, the proposed program is directly aligned with the institutional priorities as outlined by the following goals within the SDM strategic plan:

- Offering distinctive academic programs that are responsive to industry needs (Goal 1: Objective 1.1).
- Offering co-curricular programming that promotes creative thinking and innovative problem-solving (Goal 1: Objective 1.3)
- Increasing undergraduate student enrollment (Goal 4: Objective 4.1).

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BOR Strategic Impact:

The SD BOR strategic plan outlines five strategic goals, of which the proposed program is primarily aligned with Goals 3, 4, and 5. Specifically, Goal 3 focuses on academic excellence and

student success, as Data Scientists are in high demand, preparing SD students in this field will set them up for success upon graduation. Goal 4 is focused on workforce development, similarly, with Data Science skills being highly sought after, there are numerous employment opportunities both within and outside of South Dakota. Finally, Goal 5 is focused on the financial health can competitiveness of SD schools, Data Science is one of the fastest-growing fields across the country and one of the most lucrative career choices for students. The new B.S. degree in Data Science & Engineering will give SDM a competitive edge in undergraduate recruitment, and our academic excellence will help retain and graduate these students, preparing them for careers of the future.

Program Summary:

The classification of this program will be 30.7001 [Data Science, General]. This program is proposed to be offered beginning Fall 2025 on campus at SDM as well as online. It is eligible for ABET accreditation, which SDSMT will pursue as soon as possible.

Duplication and Competition:

While no exact duplicate programs exist, South Dakota State University (SDSU) currently offers a Data Science (BS) degree. Additionally, SDM offers a collaborative Ph.D. in Data Science and Engineering with the University of South Dakota (USD).

The Integrated Postsecondary Education Data System (IPEDS) for 2022-2023 reporting shows that South Dakota produced a total of **20 undergraduate** completers in related fields.

Regental Universities[1]:

University	Bachelor's Degrees Conferred in Related Fields	Total Number of Bachelor's Degrees Conferred at Each Institution
SDSU, BS Data Science	16	1824

Private SD Universities[2]:

University	Bachelor's Degrees Conferred in Related Fields	Total Number of Bachelor's Degrees Conferred At Each Institution
Augustana University, BS Data Science	3	381
University of Sioux Falls, BS Data Science	1	315

Total Sum of SD Findings:

[1] Integrated Postsecondary Education Data System (IPEDS) for 2022-2023

[2] Integrated Postsecondary Education Data System (IPEDS) for 2022-2023

University	Total Bachelor's Degrees in Related Fields Conferred in SD	Total Number of Bachelor's Degrees Conferred (All SD Universities Listed Above)
Total	20	2520

While a portion of the name of the degree is the same as the program offered at SDSU, 'Data Science' is a broad term that covers a variety of disciplines thus programs can be, and typically are, vastly different. The two biggest directions for Data Science programs tend to be (1) mathematics/statistics, or (2) computer science/machine learning. The B.S. in Data Science degree at SDSU is administered by the Department of Mathematics and Statistics and is designed with a curriculum focused on the mathematical and statistical aspects of data science. Additionally, the degree SDM is proposing incorporates data engineering, which is the development, building, and maintenance of systems that collect, store, and analyze raw data into useful information to support organizational needs and use cases.

The proposed B.S. in Data Science & Engineering at SDM will be administered within the Department of Electrical Engineering and Computer Science and require a large amount of computer science coursework, resulting in a much more targeted focus on the computational aspects of Data Science and Data Engineering (efficient algorithm implementation, Big Data, advanced computing concepts, cloud-based resources, etc.). The focus on computer science is needed to address the software engineering and data engineering skills required in the emerging discipline.

The proposed degree would complement the SDSU baccalaureate degree for those more interested in the computational aspects of Data Science & Engineering, as opposed to the statistical aspects.

Competitor University Peers[3]:

University	Total Bachelor's Degrees in Related Fields Conferred	Total Number of Bachelor's Degrees Conferred at Each Institution
Colorado State University, BS Data Science	15	5201
Illinois Institute of Technology, BS Artificial Intelligence	5	630
University of MN-Twin Cities, BS Data Science	12	7640

Workforce Outlook/State Need:

[3] IPEDS, 2022-2023

Data Science has permeated all aspects of science, engineering, agriculture, etc. According to the US Bureau of Labor Statistics5 and US Department of Labor - Career OneStop6, it is projected that between 2023 – 2033 the number of Data Science openings in the United States will go from 202,900 in 2023 to 276,000in 2033 (a 36% increase over a 10-year timeframe with just under 21,000 openings each year). In South Dakota, there is expected to be a 33% increase in openings over that same time period.

The data above were obtained in October 2024 and document almost 21,000 openings that will need to be filled across the country. In August 2024 those same sources (USDOL and USBLS) projected openings for the 10-year period at just over 17,000. Given the rapid expansion of the field and the need for educated and trained professionals to work as Data Scientists, in two short months, those projections have changed to document an additional 4,000 openings. The rapidly increasing projected openings clearly demonstrate the demand for graduates in the field and the existence of unfilled openings.

According to Glassdoor7, the salary range for Data Scientists is between $127k – 206k/year with a median starting salary of $160k/year. This information is supported by US Department of Labor data, which lists a median annual salary over $103,500.

During the creation of the Data Science & Engineering (Ph.D.) degree, Black Hills Energy expressed interest in Data Science skills below the Ph.D. level. Recently, Monument Health approached Mines with the idea of a Data Science & Engineering B.S. degree. These two organizations, both of which have a significant presence in the Rapid City community and region, demonstrate sufficient industry support to proceed to develop a BS degree.

5 USDoL Job Outlook: https://www.bls.gov/ooh/math/data-scientists.htm?src_trk=em663ccfe799c3b3.012538641904244899#tab-6

6 Career OneStop: https://www.careeronestop.org/Toolkit/StateAndLocal/ProjectedEmployment.aspx?soccode=152051&location=South%20Dakota&dataview=

7 https://www.glassdoor.com/Salaries/data-scientist-salary-SRCH_KO0,14.htm

Student Learning Outcomes:

Students will:

a. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.

b. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

c. Communicate effectively in a variety of professional contexts.

d. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

e. Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.

f. Apply theory, techniques, and tools throughout the data science lifecycle and employ the resulting knowledge to satisfy stakeholders' needs.

Projected Enrollment:

ESTIMATES	FISCAL YEARS*					
	1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year
Students new to the university	10	15	20	28	35	40
Students from other university programs	5	5	5	5	5	5
Students off-campus or distance continuing students		13	28	44	58	72
Total students in the program (fall)	**15**	**33**	**53**	**77**	**98**	**117**
Program credit hours (major Courses)**	150	313	623	984	1245	1523
Graduates				9	12	15

**Do not include current fiscal year.*

***This is the total number of credit hours generated by students in the program in the required or elective program courses. Use the same numbers in Appendix B – Budget.*

The B.S. in Data Science & Engineering program is expected to see steady growth in enrollment over the first six years of its launch, driven by increasing demand for data science professionals and the growing importance of data-driven decision-making across industries (as outlined above). Mines anticipates the initial launch year to attract 10 – 15 students. This is a conservative estimate to account for the time required for the program to gain visibility among prospective students, establish partnerships with industry, and build awareness within the high school pipeline. By year 2, Mines anticipates the enrollment to double to 15 – 20 new incoming freshmen. This growth will be supported by continuous recruitment efforts. By year three Mines projects the incoming freshman enrollment to be between 20 – 30 students as it is anticipated that students from previous cohorts will begin sharing their positive experiences with the program and have established internships and summer co-ops with data science-focused industries. By year 4 Mines will graduate its first cohort of data scientists and expect to maintain its annual incoming freshman enrollment of 20 – 30 students. Once the first cohort of students enters the job market, Mines projects more growth in incoming freshman enrollment to 30 – 40 students in year 5 and a goal of 40 or more new students enrolling by year 6.

Projected Revenue/Expenses:

FINANCIAL HEALTH SUMMARY	1st FY24	2nd FY25	3rd FY26	4th FY27	5th FY28	6th FY29
TUITION & FEE REVENUES	45,171	95,460	190,921	296,319	378,830	458,932
PROGRAM EXPENSES	3,620	3,620	104,089	104,089	215,907	215,907
NET (T&F REVENUES LESS PROGRAM EXPENSES)	**41,551**	**91,840**	**86,832**	**192,230**	**162,923**	**243,025**
OTHER SUPPORTING REVENUES	-	-	-	-	-	-
NET AFTER OTHER SUPPORTING REVENUES	**41,551**	**91,840**	**86,832**	**192,230**	**162,923**	**243,025**

The commitment of institutional resources to support one adjunct teaching one course each of the first two years, one full-time permanent lecturer faculty position starting in year three, and one full-time permanent tenure-track faculty position starting in year five are needed. The enrollment projections of this program will provide ample revenue to cover the expenses associated with those faculty positions. Additional short-term ongoing expenses in the form of start-up for the tenure-track faculty are needed and will come from grant funding the department has secured. Additional long-term ongoing expenses associated with marketing and promotion of the program are needed. Detailed figures regarding these one-time and ongoing expenses are documented on the Financial Health worksheet.

No new faculty lines will be needed until year three. At year three, as long as the program is achieving enrollment goals, there will be adequate student enrollment to support the first additional lecturer faculty line. Prior to year three, the new students to this program will be enrolling in existing courses, where there is typically room to absorb the students.

The introductory courses are required by several programs at the institution, so one adjunct teaching one course each of the first two years, is part of the budget model in case enrollment in those introductory courses exceeds the capacity of current faculty.