

**SOUTH DAKOTA BOARD OF REGENTS**

**Academic and Student Affairs**  
**Consent**

**AGENDA ITEM: 6 – C (1)**

**DATE: August 2-4, 2022**

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**SUBJECT**

**New Program Request – SDSMT – Minor in Business Management in Technology**

**CONTROLLING STATUTE, RULE, OR POLICY**

[BOR Policy 2:23](#) – Program and Curriculum Approval

**BACKGROUND / DISCUSSION**

South Dakota School of Mines & Technology (SDSMT) requests authorization to offer a minor in Business Management in Technology (BMiT). The proposed minor will be a collaborative program with Black Hills State University and is designed for students who wish to obtain skills and knowledge in business and management in the context of their engineering and science education. Business and industry challenges will require graduates to have a blend of skills in STEM and business. The BMiT minor is more specific than a general business minor, including required coursework that purposefully covers science and engineering topics.

**IMPACT AND RECOMMENDATION**

SDSMT plans to offer the minor in Business Management in Technology on campus at either SDSMT or BHSU, online, and at BHSU-Rapid City. Students will ultimately take courses from multiple locations and/or modalities, due to the collaborative nature of the program. SDSMT does not request new state resources, and no new courses will be required. SDSMT estimates 40 students enrolled and 30 graduates by the fourth year of the program.

Board office staff recommends approval.

**ATTACHMENTS**

Attachment I – New Program Request Form: SDSMT – Minor in Business Management in Technology

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**DRAFT MOTION 20220802\_6-C(1):**

I move to authorize SDSMT to offer a minor in Business Management in Technology, as presented.



## SOUTH DAKOTA BOARD OF REGENTS ACADEMIC AFFAIRS FORMS

### New Baccalaureate Degree Minor

<b>UNIVERSITY:</b>	<b>SDSM&amp;T</b>
<b>TITLE OF PROPOSED MINOR:</b>	<b>Business Management in Technology</b>
<b>DEGREE(S) IN WHICH MINOR MAY BE EARNED:</b>	<b>Engineering, Science, and Math Bachelor's Degrees (BS)</b>
<b>EXISTING RELATED MAJORS OR MINORS:</b>	<b>Business Management in Technology, BS</b>
<b>INTENDED DATE OF IMPLEMENTATION:</b>	<b>Fall 2022</b>
<b>PROPOSED CIP CODE:</b>	<b>52.0216</b>
<b>UNIVERSITY DEPARTMENT:</b>	<b>Mining Engineering and Management</b>
<b>BANNER DEPARTMENT CODE:</b>	<b>MMEM</b>
<b>UNIVERSITY DIVISION:</b>	<b>SDSMT Science and Letters</b>
<b>BANNER DIVISION CODE:</b>	<b>4L</b>

☒ **Please check this box to confirm that:**

- The individual preparing this request has read [AAC Guideline 2.8](#), which pertains to new baccalaureate degree minor requests, and that this request meets the requirements outlined in the guidelines.
- This request will not be posted to the university website for review of the Academic Affairs Committee until it is approved by the Executive Director and Chief Academic Officer.

#### University Approval

*To the Board of Regents and the Executive Director: I certify that I have read this proposal, that I believe it to be accurate, and that it has been evaluated and approved as provided by university policy.*

\_\_\_\_\_

President of the University

Click here to  
enter a date.

\_\_\_\_\_

Date

Note: In the responses below, references to external sources, including data sources, should be documented with a footnote (including web addresses where applicable).

1. Do you have a major in this field (place an "X" in the appropriate box)? ☒ Yes ☐ No

- 2. If you *do not have* a major in this field, explain how the proposed minor relates to your university mission and strategic plan, and to the current Board of Regents Strategic Plan 2014-2020.**

Not applicable.

- 3. What is the nature/purpose of the proposed minor? Please include a brief (1-2 sentence) description of the academic field in this program.**

The Business Management in Technology (BMiT) Minor is designed for students who wish to obtain skills and knowledge in business and management in the context of their engineering and science education. The day-to-day challenges in industry will require the South Dakota Mines graduate to have a blend of skills in STEM **and** business. More specific than a general business minor, the BMiT Minor includes required coursework that purposefully covers science and engineering topics. The STEM context of the business coursework is important, given the unique nature of STEM professionals as employees and the unique operations of science and engineering organizations.

- 4. How will the proposed minor benefit students?**

The proposed BMiT Minor will prepare South Dakota Mines science and engineering graduates for their inevitable role as leaders of people and teams with a skillset in management to complement their technical engineering and science skills. The need for engineers and scientists to have foundational business skills is well documented. Countless sources identify the benefits of business education and training to engineers, scientists, and the organizations where they work. Rosenmeyer (2017), succinctly stated, “regardless of your career, most paths ahead of you involve business” (¶ 6). More specifically, during a long career in engineering, University of Notre Dame faculty Bob Dunn noted that “the most successful employees possessed a good understanding of basic business principles and corporate dynamics” (Crawford, 2012, para. 1).

The BMiT Minor will benefit students by offering a collection of business and technical courses that will:

1. Engage students in foundational business knowledge within the context of STEM fields.
2. Provide a priceless opportunity for the mathematician, scientist, or engineer to gain and apply a broad knowledge of the functional areas of business.

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Crawford, M. (2012, Aug 31). Engineering and Business: A Combination for Success. Retrieved from <https://www.asme.org/topics-resources/content/engineering-and-business-a-combination-for-success>

Rosenmeyer, K.R. (2017, April 27). Why Your Stem Career Requires Business Skills. *HBS Online*. Retrieved from <https://online.hbs.edu/blog/post/why-your-stem-career-requires-business-skills>

3. Produce South Dakota Mines students who demonstrate a combination of technical and managerial skills that lead to new career opportunities.
4. Prepare a career-flexible South Dakota Mines student and employee who will be increasingly eligible for advancement responsibilities like managing teams, projects, and budgets.
5. Cultivate students that are better equipped to interact with their peers and supervisors through an understanding of professional communication and behavioral skills.
6. Supply students with the knowledge and skills to understand global, economical, and legal issues.
7. Assist the STEM student in linking their technical degree with the world of business and industry.
8. Strengthen the South Dakota Mines student's entrepreneurial skills.
9. Enhance campus culture through a value system that encompasses a universal commitment to academic success. The more career tools we give the South Dakota Mines student, the more successful they should be.

**5. Describe the workforce demand for graduates in related fields, including national demand and demand within South Dakota.**

"Evidence suggests that all employers, regardless of size and sector, project increased hiring. Employers seek candidates across all majors though among this sample respondents emphasized their search for business and engineering candidates" (Gardner, 2021, p. 3).

According to the Long-Term Employment Projections for South Dakota (Labor Market Information Center, 2021):

- Business and Financial Operations Occupations will increase by 9.42% between 2018-2028.

The South Dakota Hot Careers, High Demand, High Wage Occupations (Labor Market Information Center, 2021), predicted that the demand for:

- Business Operations Specialists will increase by 4.2%.
- General and Operations Managers demand will increase by 9.3 %.

The Statewide South Dakota Occupational Employment Projections for 2018-2028 (Labor Market Information Centers, 2021) show the following demands:

- Management Occupations show a demand increase of 6.5%.
- Top Executive demand increase of 6.9%.

- General and Operations Managers demand will increase by 9.3%.
- Sales Managers demand will increase by 10.4%.
- Operations Specialties Managers demand will increase by 13.9%.
- Industrial Production Managers predicted increase is 11.5%.
- Business Operations Specialists will increase by 4.2%.

The US Bureau of Labor Statistic's occupational projections for 2020-2030 include (Employment Projections, 2020):

- Management occupations demand increase of 9.3%.
- Sales managers demand increase of 7.0%.
- Operations specialties managers demand increase of 11.6%.
- Industrial production managers demand increase of 5.3%.
- Other management occupations demand increases of 9.2%.
- Transportation, storage, and distribution managers demand increase of 8.3%.

According to the U.S. Bureau of Labor Statistics (BLS), nearly 140,000 new jobs are projected in all engineering disciplines by the year 2026. Couple this with projections of over 906,800 new jobs by 2030 in management occupations, and there is no doubt that a significant number of graduates in these fields will be necessary to fill the growth in industries. These new jobs are opportunities for South Dakota Mines students with a Minor in BMiT in their toolkit.

Employment Projections. (2020). Occupational Projections and Worker Characteristics. *US Bureau of Labor Statistics*. Retrieved from <https://www.bls.gov/emp/tables/occupational-projections-and-characteristics.htm>

Gardner, P. (2021). Recruiting Trends 2021-2022. *Collegiate Employment Research Institute Michigan State University*. Retrieved from <https://ceri.msu.edu/assets/pdfs/Recruiting%20Trends%202021-22/Recruiting-Trends-Report-2021-22.pdf>

Labor Information Center. (2021). Occupational Employment Projections – Long Term. *South Dakota Department of Labor & Regulation*. Retrieved from [Labor Market Information Center - Menu for Occupational Projections \(sd.gov\)](https://labormarketinformationcenter.southdakotadepartmentoflaborandregulation.gov/)

Labor Market Information Center. (2021). Hot Careers Data: South Dakota Hot Careers High Demand, High Wage Occupations. *South Dakota Department of Labor & Regulation*. Retrieved from: [https://dlr.sd.gov/lmic/hot\\_careers\\_data.aspx](https://dlr.sd.gov/lmic/hot_careers_data.aspx)

U.S. Department of Labor Statistics. (2022). Engineers: Employment, Pay, and Outlook. *Bureau of Labor Statistics*. Retrieved from <https://www.bls.gov/careeroutlook/2018/article/engineers.htm>.

U.S. Bureau of Labor Statistics (2022). Management Occupations. *Bureau of Labor Statistics*. Retrieved from <https://www.bls.gov/ooh/management/home.htm>

**6. Provide estimated enrollments and completions in the table below and explain the methodology used in developing the estimates (*replace “XX” in the table with the appropriate year*).**

	Fiscal Years*			
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>
<i>Estimates</i>	FY 22-23	FY 23-24	FY 24-25	FY 25-26
<b>Students enrolled in the minor (fall)</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>40</b>
<b>Completions by graduates</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>30</b>
<b>Multiplier</b> 2000	* ½ %	* 1 %	*1.5 %	* 2 %

\*Do not include current fiscal year.

Conservative estimations are based on 2,000-student enrollment.

The estimates above are provided by Dr. Ivy Allard and are conservatively based on:

1. The number of current South Dakota Mines students who ask when the BMiT Program will start a minor.
2. Discussions with students and parents at Go to Mines events and campus tours. Parents, especially those who have graduated from South Dakota Mines, consistently ask why the university took so long to start the BMiT Program. They then ask when the BMiT Minor will come to fruition. South Dakota Mines Alumni consistently state that South Dakota Mines needed the BMiT, BS as well as the BMiT Minor for years, based on the fact that that they were placed into management roles with little or no experience between 2-3 years after graduating from South Dakota Mines.
3. “Discussions occurring during Career Fairs at South Dakota Mines between the Director of Career Services, Mr. Matthew Hanley, and several large employers of South Dakota Mines graduates, such as Caterpillar, Nucor, and Kiewit, indicate a strong demand for graduates possessing a blend of technical skills and business Management knowledge” (New Undergraduate Degree Program, 2018, p. 4).

**7. What is the rationale for the curriculum? Demonstrate/provide evidence that the curriculum is consistent with current national standards.**

The proposed BMiT Minor curriculum consists entirely of existing courses offered at South Dakota Mines and Black Hills State University. The business and technical curriculum for the BMiT Minor is based on the BMiT, BS degree. The BMiT, BS curriculum was influenced by the 2018 RNL (Ruffalo Noel-Levitz) National Program Demand Research Findings. Those findings showed desired skill areas in project management, sales, finance, accounting, data science, and human resources (New Undergraduate Degree Program, 2018, p. 5).

New Undergraduate Degree Program. (2018). *Business Management in Technology, BS*. South Dakota School of Mines.

Research also revealed that statistics, law, management, economics, and business communication are important competencies that employers seek (Carnevale, Fasules, and Campbell, 2020). Other courses relevant to modern day industry issues include supply chain management, production and operations, quantitative decision analysis, data analytics, and business ethics.

The curriculum offered in the BMiT Minor is rich in aspects of technology and management. The South Dakota Mines student is offered a diverse spectrum of courses that allow them to pursue specific areas of interest(s).

**8. Complete the tables below. Explain any exceptions to Board policy requested.**

**A. Distribution of Credit Hours**

<b>Business Management in Technology Minor</b>	<b>Credit Hours</b>	<b>Percent</b>
Requirements in minor	9	50%
Electives in minor	9	50%
Total	18	100%

**B. Required Courses in the Minor**

<b>Prefix</b>	<b>Number</b>	<b>Course Title</b> <i>(add or delete rows as needed)</i>	<b>Prerequisites for Course</b> <i>Include credits for prerequisites in subtotal below.</i>	<b>Credit Hours</b>	<b>New (yes, no)</b>
BADM	220	Business Statistics	*MATH 123	3	No
IENG	455	Supply Chain & Logistics	BADM 220	3	No
BMIT	446	Human Resource Management for Engineers and Scientists	None	3	No
Subtotal Credits				9	No

Carnevale, A. P., Fasules, M. L., & Campbell, K. P. (2020). Workplace Basics: The Competencies Employers Want. *Georgetown University*. Retrieved from <https://1gyhoq479ufd3yna29x7ubjn-wpengine.netdna-ssl.com/wp-content/uploads/cew-workplace-basics-fr.pdf>

**9. Elective Courses in the Minor: List courses available as electives in the program. Indicate any proposed new courses added specifically for the minor.**

<b>Prefix</b>	<b>Number</b>	<b>Course Title</b> <i>(add or delete rows as needed)</i>	<b>Prerequisites for Course</b> <i>Include credits for prerequisites in subtotal below.</i>	<b>Credit Hours</b>	<b>New (yes, no)</b>
IENG	341	Data Analytics for Engineering and Technology	BADM 220	3	No
IENG	352	Creativity and Innovation	None	1	No
IENG	353	Commercialization of New Technology	None	1	No
IENG	354	Marketing Technology Innovations	None	1	No
IENG	425	Production/Operations Management	*MATH 123 BADM 220	3	No
BMIT	376	Managerial Finance for Engineers and Scientists	None	3	No
BMIT	466	Sales Strategy	None	3	No
BMIT	470	Project Management for Industry	None	3	No
BMIT	476	International Business for Engineers and Scientists	None	3	No
BMIT	486	Technical Sales	None	3	No Course is being updated.
ACCT	201	Financial Accounting	None	3	No
ECON	201	Principles of Microeconomics	None	3	No
MIS	205	Advanced Computer Applications	None	3	No
BADM	320	Quantitative Decision Analysis	*MATH 123	3	No
BADM	321	Business Statistics II	BADM 220	3	No
BADM	336	Entrepreneurship I	None	3	No
BADM	344	Managerial Communications	None	3	No
BADM	350	Legal Environment of Business	None	3	No
BADM	457	Business Ethics	None	3	No
					Choose an item.
Subtotal Credits				9	No

\*MATH 123 Calculus I is a Goal 5 General Education Requirement for every student who graduates with a BS in Mathematics, Science, and Engineering from South Dakota Mines. As such, every student taking the classes that list MATH 123 as a prerequisite will have taken or will take MATH 123 as part of their required coursework to graduate. Since MATH 123 is part of a student's general education coursework it will have no impact on the student's time to complete this degree.

**10. What are the learning outcomes expected for all students who complete the minor? How will students achieve these outcomes?**

The following Individual Student Outcomes are aligned with the Criterion 3 outcomes of ABET, a well-known accreditation available for science and engineering programs. They follow the same seven Criterion as the Business Management in Technology, BS Program and the chart identifies the specific course (required or elective) in the minor to which the Outcome is mapped.

Individual Student Outcome	Program Courses that Address the Outcomes					
	*BADM 220	*IENG 455	*BMIT 446	IENG 341	IENG 352/353/ 354	IENG 425
Graduates of the program will have an ability to identify, formulate, and solve problems by applying principles of engineering, science, mathematics, and business.	√	√		√		√
Graduates of the program will have the ability to apply engineering, science, and business concepts to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	√				√	
Graduates of the program will have the ability to communicate effectively with a wide range of audiences.			√			
Graduates of the program will have an ability to recognize ethical and professional responsibilities in technical situations and make informed judgments, which must consider the impact of solutions in global, economic, environmental, and societal contexts.		√			√	√
Graduates of the program will have the ability to develop and conduct appropriate experimentation, analyze, and interpret data, and use judgment to draw conclusions.			√	√		

Individual Student Outcome	Program Courses that Address the Outcomes					
	BMIT 376	BMIT 466	BMIT 470	BMIT 476	BMIT 486	ACCT 201
Graduates of the program will have the ability to apply engineering, science, and business concepts to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.		√			√	√
Graduates of the program will have the ability to communicate effectively with a wide range of audiences.	√	√	√	√	√	
Graduates of the program will have an ability to recognize ethical and professional responsibilities in technical situations and make informed judgments, which must consider the impact of solutions in global, economic, environmental, and societal contexts.		√		√		
Graduates of the program will acquire and apply the knowledge and skills to work effectively and collaboratively in a team setting.	√		√		√	
Graduates of the program will have the ability to develop and conduct appropriate experimentation, analyze, and interpret data, and use judgment to draw conclusions.	√					√

Individual Student Outcome	Program Courses that Address the Outcomes					
	ECON 201	MIS 205	BADM 320	BADM 321	BADM 336	BADM 344
Graduates of the program will have an ability to identify, formulate, and solve problems by applying principles of engineering, science, mathematics, and business.	√	√	√	√		
Graduates of the program will have the ability to apply engineering, science, and business concepts to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	√		√	√	√	
Graduates of the program will have the ability to communicate effectively with a wide range of audiences.						√
Graduates of the program will have the ability to develop and conduct appropriate experimentation, analyze, and interpret data, and use judgment to draw conclusions.		√	√			

Individual Student Outcome	Program Courses that Address the Outcomes					
	BADM 350	BADM 457				
Graduates of the program will have the ability to apply engineering, science, and business concepts to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	√	√				
Graduates of the program will have an ability to recognize ethical and professional responsibilities in technical situations and make informed judgments, which must consider the impact of solutions in global, economic, environmental, and societal contexts.	√	√				

## 11. What instructional approaches and technologies will instructors use to teach courses in the minor?

Courses will be taught as they currently are, which includes both face-to-face on the South Dakota Mines campus or University Center campus in Rapid City or will be delivered on-line using D2L and other distance course delivery systems (i.e., Adobe Connect, Zoom, or the system LMS).

Courses will be composed of lectures, projects, case studies, videos, discussion boards, graduate papers/replies, electronic grade book, PowerPoints, and current subject matter based on the writing and skills of cutting-edge textbook authors. Courses are taught face-to-face as well as online.

## 12. Delivery Location

- A. Complete the following charts to indicate if the university seeks authorization to deliver the entire program on campus, at any off-campus location (e.g., USD Community Center for Sioux Falls, Black Hills State University-Rapid City, Capital City Campus, etc.) or deliver the entire program through distance technology (e.g., as an online program)?**

	Yes/No	Intended Date	Start
<b>On campus</b>	Yes	Fall 2022	

	Yes/No	If Yes, list location(s)	Intended Date	Start
<b>Off campus</b>	Yes	Black Hills State University – 4300 Cheyenne Boulevard, Rapid City, SD 57709	Fall 2022	

	Yes/No	If Yes, identify delivery methods <i>Delivery methods are defined in <a href="#">AAC Guideline 5.5</a>.</i>	Intended Start Date
Distance Delivery (online/other distance delivery methods)	Yes	015, 018, 030	Fall 2022
Does another BOR institution already have authorization to offer the program online?	No	If yes, identify institutions:	

**B. Complete the following chart to indicate if the university seeks authorization to deliver more than 50% but less than 100% of the minor through distance learning (e.g., as an online program)? This question responds to HLC definitions for distance delivery.**

	Yes/No	If Yes, identify delivery methods	Intended Start Date
Distance Delivery (online/other distance delivery methods)	Yes	015, 018 030 Students have the ability to take face-to-face classes on the South Dakota Mines Campus, Black Hills State University Rapid City Campus, online through the South Dakota Mines Campus and the Black Hills State University Campus.	Fall 2022

**13. Does the University request any exceptions to any Board policy for this minor? Explain any requests for exceptions to Board Policy. If not requesting any exceptions, enter "None."**

None.

**14. Cost, Budget, and Resources: Explain the amount and source(s) of any one-time and continuing investments in personnel, professional development, release time, time redirected from other assignments, instructional technology & software, other operations and maintenance, facilities, etc., needed to implement the proposed minor. Address off-campus or distance delivery separately.**

South Dakota Mines does not request any additional state resources to offer this minor. The curriculum for the BMIT Minor is already in place through the BMIT, BS degree.

**15. New Course Approval: New courses required to implement the new minor may receive approval in conjunction with program approval or receive approval separately. Please check the appropriate statement (place an "X" in the appropriate box).**

☐ YES,

*the university is seeking approval of new courses related to the proposed program in conjunction with program approval. All New Course Request forms are included as Appendix C and match those described in section 7.*

☒ NO,

*the university is not seeking approval of all new courses related to the proposed program in conjunction with program approval; the institution will submit new course approval requests separately or at a later date in accordance with Academic Affairs Guidelines.*

**16. Additional Information:**

The proposed Business Management in Technology Minor and the Business Management in Technology, BS degree are collaborative programs between South Dakota Mines and Black Hills State University.

The following quotes from various sources support the need for people trained for STEM careers to also possess business knowledge:

"As with many professions, there's more that goes into building a successful engineering career than just technical know-how; there's a business side of engineering, as well. As engineers advance to senior positions, they acquire responsibilities like managing teams, projects, and budgets. To reach those positions and perform their duties effectively, they need to have a strong set of business skills" (Landry, 2018, ¶15)

"Business is important to any STEM career. The blend of skills between business and STEM educations are formidable in today's marketplace. Companies need to think differently to solve today's problems, and this requires increased versatility and

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Landry, L. (2018, November 08). Business Insights: 7 Business Skills Every Engineer Needs. *HBS Online*. Retrieved from

<https://online.hbs.edu/blog/post/business-skills-for-engineers>

innovation at the employee level to move the organization, to the next level. Even if you don't want to be CEO or CFO, you will need a business skill set. You must work with money, budgets, and financial teams to be effective and impactful. However, regardless of your career, most paths ahead of you involve business. The higher you work up the org chart, the more business skills you'll need to lead people and teams, and

effectively run organizations” (Rosenmeyer, 2017, ¶ 6).

“Many scientists will have to step into a leadership role at one point in their career. As thorough as in-depth science education is it rarely includes training in leadership and/or management skills. These skills, however, are crucial when it comes to stepping into a senior role” (Dixon, I., 2020, ¶ 1).

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Dixon, I. (2020). The Importance of Leadership Skills for Scientists. *Segmentum Analysis LTD*. Retrieved from The Importance Of Leadership Skills For Scientists — Segmentum Analysis Ltd

Rosenmeyer, K.R. (2017, April 27). Why Your Stem Career Requires Business Skills. *HBS Online*. Retrieved from <https://online.hbs.edu/blog/post/why-your-stem-career-requires-business-skills>