**NEW ACADEMIC DEGREE PROGRAM – FULL PROPOSAL – TDX TEMPLATE**

*The template below is intended to be filled out by academic departments that are proposing a new program. This Word template will not be accepted as the full proposal form. All information below must be entered into TDX and submitted by the campus curricular contact to be considered for BOR office review.*

*Any questions that were previously included in the Intent to Plan form are highlighted in grey.*

# **PROGRAM INFORMATION**

* **University:** South Dakota School of Mines & Technology
* **Degree** *(BS, BA, MA, MS, PhD, etc…)*: Bachelor of Science
* **Name of Major:** X999 New Major Requested
	+ **Name of New Major Re: quested:** Data Science & Engineering
* **Specializations(s) Required (Y/N)?** N
* **College** *(Banner Coding):* 4L SDSMT Science & Letters
* **Department** *(Banner Coding):* MECS Electrical Engineering and Computer Science
* **Intended Date of Full Proposal** *(Semester & Year):* Fall 2025
* **Planned 6-digit CIP Code:** 30.7001
* **WICHE WRRGP Eligibility** *N/A*

# **PROGRAM DESCRIPTION**

1. **Provide the working program description that may appear in the university catalog.**

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.

1. **Does the university request any exceptions to any Board policy for this program?** *Explain any requests for exceptions to Board Policy. If not requesting any exceptions, indicate* ***“None.”***

None

# **STRATEGIC IMPACT**

1. **Describe how the program fits in with the institutional mission, strategic plan, existing institution program array, and academic priorities.**

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, data engineering are exactly part 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 to address 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).
	1. **If the program does not align to the strategic plan, provide a compelling rational for the institution to offer the program.**
1. **How does the program connect to the** [**Board of Regents Strategic Plan**](https://www.sdbor.edu/the-board/StrategicPlan/Documents/StrategicPlan_22_27.pdf)**?**

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 has a focus 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**

1. **If a new degree is proposed, what is the rationale?**

N/A; no new degree is being proposed.

1. **What modality/modalities will be used to offer the new program?** *Note: the accreditation of the Higher Learning Commission (HLC) require Board approval for a university to offer programs off-campus and through distance delivery.*

| **Modality/Modalities** |
| --- |
| **On Campus** | **Yes/No** | **Intended Start Date** |
| Yes | Fall 2025 |  |
| **Off Campus** | **Yes/No** | **Location(s)** | **Intended Start Date** |
| No |  |  |
| **Distance Delivery** | **Yes/No** | **Delivery Method(s)** | **Intended Start Date** |
| Yes | Online | Fall 2025 |

* 1. **Does another BOR institution already have authorization to offer the program line? If so, identify the institution(s).**

No.

1. **If the program will be offered through distance delivery, identify the planned instructional modality.**

Synchronous and Asynchronous

1. **What are the student learning outcomes for this program?**
	1. Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
	2. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline.
	3. Communicate effectively in a variety of professional contexts.
	4. Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
	5. Function effectively as a member or leader of a team engaged in activities appropriate to the program’s discipline.
	6. Apply theory, techniques, and tools throughout the data science lifecycle and employ the resulting knowledge to satisfy stakeholders’ needs.
2. **For associates and bachelor’s degree proposals, identify 3-5 AAC&U Essential Learning Outcomes that have been selected for this program.** *Use the chart below to indicate the student learning outcomes that alight to the selected ELOs (See BOR Policy 2.11 and Guideline 8.5)*

| **Essential Learning Outcomes (AAC&U)** | **Student Learning Outcomes** |
| --- | --- |
| Inquiry and Analysis | Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions. |
| Critical and Creative Thinking | Apply theory, techniques, and tools throughout the data science lifecycle and employ the resulting knowledge to satisfy stakeholders’ needs. |
| Information Literacy | Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline. |
| Teamwork | Function effectively as a member or leader of a team engaged in activities appropriate to the program’s discipline. |
| Problem Solving | Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions |
| Civic Knowledge and Engagement |  |
| Intercultural Knowledge |  |
| Ethical Reasoning |  |
| Foundational Lifelong Learning Skills |  |
| Integrative Learning |  |

1. **Enter the number of credit hours required to graduate.**

120

1. **Complete the following tables to provide a degree program curriculum summary.**
2. **Table 1.**

|  | **Credit Hours in Program** |
| --- | --- |
|  | **Hours Per Requirement** | **% of Total Horus** |
| **System General Education Requirements** |  |  |
| *Subtotal – Gen Ed Requirements* | **32** | **26.6%** |
| **Program Requirements** |  |  |
| Required Support Courses | **20** | **16.6%** |
| Major Requirements | **41** | **34.2%** |
| Major Electives | **18** | **15%** |
| *Subtotal – Program Requirements* | **79** | **65.8%** |
| **Free Electives** |  |  |
| *Subtotal – Free Electives* | **9** | **7.5%** |
| **Degree Total** | **120** | **100%** |

1. **Table 2 – Insert Required Program Support Courses Impacting Other Programs (outside department). Do not include General Education courses.**

*The individual curriculum tables should be included as a word document attached to the TDX ticket. (TDX Attachment)*

1. **Table 3 – Insert Major Requirements (within department)**

*The individual curriculum tables should be included as a word document attached to the TDX ticket. (TDX Attachment)*

1. **Table 4 – Insert Major Electives**

*The individual curriculum tables should be included as a word document attached to the TDX ticket. (TDX Attachment)*

1. **New Course Approval**

**New courses required to implement the new degree program may receive approval in conjunction with program approval or receive approval separately. Please check the appropriate statement:**

New course requests are being submitted in conjunction with this new program proposal.

# **ACADEMIC QUALITY**

1. **What peer institutions and current national standards will be referenced to develop the curriculum for this program? Peer Institution: Regional and Competitive institutions. Include links to at least 3 comparable programs at peer institutions and links to national or accreditation standards, if any.**

The B.S. degree in Data Science & Engineering will seek ABET accreditation as soon as possible after launch. To ensure consistency with national standards, the proposed program will be a unique mix of Computer Science, Data Science, Data Engineering, Mathematics, and Domain Specific Knowledge. Our goal is to bridge the gap between domain scientists/engineers and data/computational science to advance both fields of study. Additionally, we utilized the American Computing Machinery (ACM) standards for determining appropriate curriculum as outlined on their website1.

1 <https://www.acm.org/binaries/content/assets/education/curricula-recommendations/dstf_ccdsc2021.pdf>

Toward this end, we look to the following three institutions as reference to our curricular developments:

1. Colorado State University Data Science: Computer Science Concentration2
2. University of Minnesota Data Science3
3. University of North Dakota Data Science4

2 <https://catalog.colostate.edu/general-catalog/colleges/natural-sciences/data-science-major/computer-science-concentration/#majorcompletionmaptext>

3 <https://cse.umn.edu/datascience/undergraduate-courses>

4 <https://und.edu/programs/data-science-bs/requirements.html>

1. **What program accreditation is available, if any?**

ABET accreditation is available and will be used to ensure the new Data Science and Engineering program has appropriate assessment and meets national needs and standards as outlined in the Program Criteria for Data Science, Data Analytics and similarly named computing programs of the Computing Accreditation Commission.5

5 <https://www.abet.org/accreditation/accreditation-criteria/criteria-for-accrediting-computing-programs-2024-2025/#3>

1. **Will the proposed program pursue accreditation or certifications?**

Yes, we will pursue ABET accreditation.

* 1. **If no, why has the department elected not to pursue accreditation for the program?**
1. **Did the university engage any developmental consultants to assist with the development of the curriculum? Did the university consult any professional or accrediting associations during the development of the curriculum? What were the contributions of consultants and associations to the development of the curriculum?** *Developmental consultants are experts in the discipline hired by the university to assist with the development of a new program, including content, courses, and experiences, etc. Universities are encouraged to discuss the selection of developmental consultants with Board staff.*

This program has been developed following the ABET guidelines for a Data Science degree and it meets all of the assessment criteria for an accreditable Data Science degree program. Additionally, the American Computing Machinery (ACM) standards have also been reviewed and utilized to guide the program and curriculum development.

1. **Inclusion of High Impact Practices (HIP) across all undergraduate programs is a strategic priority of the Board of Regents to enhance academic quality and increase student engagement. For associates and bachelor’s degree proposals, which HIPs will faculty embed into the program?** *Mark all that apply. To be considered as a HIP program, two or more should be selected and required in the program.*

| **High Impact Practices** | **Included (Yes/No)** |
| --- | --- |
| Capstone courses and projects | Yes |
| Collaborative assignments and projects | Yes |
| Common intellectual experiences | No |
| Diversity/global learning | No |
| ePortfolios | No |
| First Year Experiences | No |
| Internships | Yes |
| Learning communities | No |
| Service learning, community-based learning | No |
| Writing intensive courses | No |
| Undergraduate research | Yes |

1. **For associate and bachelor’s degree proposals, discuss how HIPs will be embedded into the program.** *Your discussion should provide examples and include whether the HIP is required or an optional component. It should also indicate at what point the experience is offered or required. (e.g. “students will be required to participate in an internship during their third year of enrollment in order to develop skills in…”).*
	1. Each student will be required to complete two courses (4 total credit hours) of capstone design where they will focus on data-driven projects, technical writing within data science, and technical presentation skills to include data visualization and presentation techniques.
	2. In addition to working in a collaborative team during their capstone experience, students throughout the curriculum will work in teams within DSE 429, DSE 448, DSE 449, and DSE 459 to collaborate on data-driven assignments and projects throughout the courses.
	3. Students will be encouraged to complete a minimum of one internship experience during their degree program with the goal of having students complete one internship each summer (or three total throughout their four-year program of study).
	4. Students will be encouraged to pursue undergraduate research projects (included in the Math, Science, or Engineering elective lists) with existing faculty as well as potential NSF REU summer experiences during their four-year program of study.

# **STUDENT SUCCESS**

*This section outlines the university’s plan to assess student achievement of the program learning outcomes.*

1. **Complete the table below to provide evidence of a preliminary assessment plan. Place an asterisk next to assessments that are national or state -level instruments.** *Note: It is only necessary to indicate the summative assessment for each outcome, not the formative assessments used throughout the program.*

| **Program Learning Outcome** | **Course** | **Summative Assessment** |
| --- | --- | --- |
| Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions. | DSE 459– Introduction to Data ScienceDSE 429 – Data EngineeringDSE 448 – Machine Learning | * Data science projects on different data-driven problem domains
* Data engineering projects on database management, data cubes, and cloud-based solutions.
* Data science and engineering projects on optimization and statistical methods for model development
* Data science and engineering model evaluation and parametric tuning
 |
| Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program’s discipline. | DSE 459– Introduction to Data ScienceDSE 429 – Data EngineeringDSE 463 – Capstone IDSE 467 – Capstone II | * Data science project on regression models
* Data science project on classification models
* Data engineering project on data storage, query, and lifecycle
* Data science and engineering project demonstrating the entire data-driven workflow (from data collection to model deployment)
 |
| Communicate effectively in a variety of professional contexts. | DSE 459– Introduction to Data ScienceDSE 463 – Capstone IDSE 467 – Capstone II | * Final data-science project presentation and written report
* Capstone project presentation, documentation, and demonstration
 |
| Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles. | HUM 375 – Computers in SocietyDSE 463 – Capstone IDSE 467 – Capstone II | * Homework and reports on data/computing culture, ethics, bias, and social responsibility
* Report on ethical AI, understanding model bias, data protection, and sovereignty
 |
| Function effectively as a member or leader of a team engaged in activities appropriate to the program’s discipline. | DSE 459 – Introduction to Data ScienceDSE 429 – Data EngineeringDSE 463 – Capstone IDSE 467 – Capstone II | * Projects throughout both data science and data engineering involving team collaboration at each stage of the data science and engineering workflow
* Final capstone project working in a multidisciplinary team
 |
| Apply theory, techniques, and tools throughout the data science lifecycle and employ the resulting knowledge to satisfy stakeholders’ needs. | DSE 463 – Capstone IDSE 467 – Capstone II | * Final capstone project working in a multidisciplinary team
* Capstone presentation and report generation in weekly stakeholder meetings and final SDM design fair to stakeholders
 |

1. **How will outcomes for graduates of the program be assessed?** *Outcomes may include employment and placement rates, licensure examination pass rates, acceptance rates to graduate school, student or employer surveys, or other assessments of graduate outcomes.*

Assessing the learning outcomes for graduates of the Data Science & Engineering program will involve a combination of direct and indirect methods, aligned with industry advisory boards and ABET accreditation guidelines as outlined below:

**Direct Assessment Methods**

**Course-level assessments:**

* **Exams and quizzes:** Used to evaluate foundational knowledge in mathematics, statistics, and programming
* **Programming projects:** Assess proficiency using different programming languages such as Python, R, and SQL
* **Labs and practical projects:** Assess the ability to collect, clean, process and visualize data, model development, model analysis and validation, model tuning, and model deployment

**Capstone project:**

* **Comprehensive real-world project working in a multidisciplinary team:** Used to evaluate foundational knowledge in mathematics, statistics, programming, and data-driven workflows
* **Deliverables:**
	+ Written report
	+ Presentations to faculty, industry stakeholders, and design fairs
	+ Interactive data visualization/dashboard (e.g., tableau)
* **Assessment rubric:**
	+ Technical depth (e.g., data handling, algorithmic development, model validation, evaluation and assessment)
	+ Clarity of communication to different stakeholder groups (e.g., students, faculty, industry)
	+ Practical application/solution to stakeholder problem.

**Data science & engineering portfolio:**

* **Students will submit a curated portfolio of various data science and engineering projects they’ve completed throughout their coursework**
	+ **Assessment rubric:**
		- Range of modeling methods demonstrated
		- Model evaluation, completeness, and correctness
		- Reflections on problem solving, learning, and implementation of data science workflows

**Indirect Assessment Methods**

**Surveys & feedback:**

* **Student surveys:** Conduct exit surveys to gather student perspective on how well the program prepared them for roles in data science
* **Alumni feedback:** Periodic surveys of graduates to assess how program outcomes translated into career success
* **Employer surveys:** Solicit feedback from employers assessing student preparedness, problem solving skills, and technical expertise

**Graduate placement data:**

* **Track metrics such as:**
	+ Employment rates in data science and engineering (or related fields)
	+ Admission to graduate programs
	+ Roles and responsibilities aligned with program learning outcomes

**ABET Assessment Framework**

ABET’s accreditation standards focus on defining and assessing **Student Outcomes** (SOs). For Data Science & Engineering, the outcomes will be mapped to ABET’s Criteria for Accrediting Computing (CAC) programs and align with program-specific objectives. ABET CAC guidelines were used to drive the student learning outcomes as outlined the table in Section 19 (student success).

**Continuous improvement:**  A core aspect of ABET accreditation is using assessment results to improve the Data Science & Engineering program. Steps include:

* **Annual program review:**
	+ Faculty analyze student outcomes and perform a gap analysis
	+ Curriculum updates are determined to address weaknesses
* **Industrial advisory board inputs:**
	+ Leverage insights from industry professionals to align the program to workforce needs
* **Benchmarking:**
	+ Compare program outcomes with peer institutions

# **DUPLICATION AND COMPETION**

1. **Do any related programs exist at other public universities in South Dakota?** *A list of existing programs is available through the university websites and the RIS Reporting: Academic Reports Database. If there are no related programs within the Regental system, indicate none.*

Yes, South Dakota State University (SDSU) currently offers a Data Science (BS) degree. Additionally, we offer a collaborative Ph.D. in Data Science and Engineering with the University of South Dakota (USD).

* 1. **If yes, defend the need for an additional program within the state. Include IPEDS enrollment data and additional data as needed.**

While a portion of the name of the degree is similar, ‘Data Science’ is a broad term that covers a variety of disciplines and 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 aspect of data science. Additionally, the degree we are 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.

* 1. **If yes, would this program be a candidate for Regental system collaboration?**

With the unique and specialized focus of this proposed degree, and a curriculum designed to meet ACM standards and ABET – CAC accreditation requirements, the B.S. in Data Science & Engineering at SDM will be a stand-alone degree. However, this proposed degree will provide a pipeline of graduates who are capable of pursuing graduate study in the field and will bolster enrollments in the collaborative Ph.D. in Data Science & Engineering we currently offer with USD.

1. **Do any related programs exist at any non-Regental college or university within 100 miles of the university?** *List those programs here.*

There are no other regental or non-regental institutions that offer a B.S. in Data Science & Engineering within a 100-mile radius.

* 1. **If yes, use IPEDS to identify the enrollment in those programs.**
	2. **What evidence suggests there is unmet student demand for the proposed program, or that the proposed program would attract students away from the existing program?**

# **MARKET DEMAND**

*This section establishes the market demand for the proposed program (eg Regental system need, institutional need, workforce need). Use the following sources for your data:*

* [*South Dakota Department of Labor & Regulation*](https://dlr.sd.gov/lmic/menu_projections_occupation_statewide.aspx)
* [*O-Net*](https://www.onetonline.org/find/family?f=25&g=Go)
* [*US Department of Labor Projections Central*](https://projectionscentral.org/Projections/LongTerm)
* *SDBOR Workforce and Degree Gap Analysis Report*
1. **What is the expected growth of the industry or occupation in South Dakota and nationally?** *Include the number of openings, as well as the percentage of growth when possible.*

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.

*5USDoL Job Outlook:* [*https://www.bls.gov/ooh/math/data-scientists.htm?src\_trk=em663ccfe799c3b3.012538641904244899#tab-6*](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=*](https://www.careeronestop.org/Toolkit/StateAndLocal/ProjectedEmployment.aspx?soccode=152051&location=South%20Dakota&dataview=)

1. **What evidence, if any, suggests there are unfilled openings in South Dakota or nationally?**

The data above (#23) were obtained in October 2024 and documents 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 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.

*5USDoL Job Outlook:* [*https://www.bls.gov/ooh/math/data-scientists.htm?src\_trk=em663ccfe799c3b3.012538641904244899#tab-6*](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=*](https://www.careeronestop.org/Toolkit/StateAndLocal/ProjectedEmployment.aspx?soccode=152051&location=South%20Dakota&dataview=)

1. **What salaries can program graduates expect to earn in South Dakota and nationally?**

According to Glassdoor7, the salary range for Data Scientists is between $127k – 206k/year with an 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.

*5USDoL Job Outlook:* [*https://www.bls.gov/ooh/math/data-scientists.htm?src\_trk=em663ccfe799c3b3.012538641904244899#tab-6*](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=*](https://www.careeronestop.org/Toolkit/StateAndLocal/ProjectedEmployment.aspx?soccode=152051&location=South%20Dakota&dataview=)

*7https://www.glassdoor.com/Salaries/data-scientist-salary-SRCH\_KO0,14.htm*

1. **Optional: Provide any additional evidence of regional demand for the program.** *E.g. prospective student interest survey data, letters of support from employers, community needs…*

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 significant presence in Rapid City community and region, demonstrate sufficient industry support to proceed to develop a BS degree.

# **STUDENT DEMAND**

1. **Provide evidence of student enrollment at peer institutions that offer the same/similar program using data obtained from IPEDS.** *Choose programs no already listed in question 11. Use the most recent year available.*

Although Data Science does have an identified CIP code, and ABET accreditation criterion, given the interdisciplinary nature of this field, not all institutions will choose to utilize that CIP code or pursue ABET accreditation. Some may elect to utilize a CIP code associated with the Mathematics/Statistics focus of the degree and other may elect to utilize a CIP code associated with the Computer Science focus of the degree. Because the specific CIP code of the program at the institution is not readily known, the data in the charts is for conferrals of CIP 30.7001, which is the CIP of our proposed program.

| **University Name** | **State** | **Program Name** | **Number of Degrees Conferred in Program** | **Total Number of Conferrals at Level (Undergrad or Grad)** |
| --- | --- | --- | --- | --- |
| **Illinois Institute of Technology** | **IL** | **Artificial Intelligence** | **5** **(40)** | **Undergrad (Grad)** |
| **Colorado State University** | **CO** | **Data Science** | **15** | **Undergrad** |
| **University of Minnesota – Twin Cities** | **MN** | **Data Science** | **12** | **Undergrad** |

1. **What evidence suggests there is interest from prospective students for this program at the university?**

Data science and engineering is an extremely high-demand field of study, both from the perspective of industry needs and student interest1,2,3,4. The National Center for Education Statistics report a 968% increase in Data Science B.S. degrees awarded from 84 in 2020 to 897 in 2022. Moreover, the job market shows an increase as well with the Department of Labor reporting a 36% growth for jobs in Data Science over the next decade4. This, coupled with the recent interest in data science from nearly all science and engineering departments on the SD Mines campus, suggests that a dedicated degree in Data Science & Engineering would resonate well with perspective students across all facets of science and engineering education.

*1Glantz, M., Johnson, J., Macy, M., Nunez, J. J., Saidi, R., & Velez, C. (2023). Students’ Experience and Perspective of a Data Science Program in a Two-Year College. Journal of Statistics and Data Science Education, 31(3), 248–257. https://doi.org/10.1080/26939169.2023.2208185*

*2Data Scientist, U.S. Bureau of Labor and Statistics,* [*https://www.bls.gov/ooh/math/data-scientists.htm*](https://www.bls.gov/ooh/math/data-scientists.htm)

*3Data Science Major Takes off Across College Campuses, Inside Higher Ed.*[*https://www.insidehighered.com/news/tech-innovation/teaching-learning/2024/01/25/data-science-major-takes-across-college-campuses*](https://www.insidehighered.com/news/tech-innovation/teaching-learning/2024/01/25/data-science-major-takes-across-college-campuses)

*4By The Numbers: Data Related Jobs, U.S. Department of Labor,* [*https://blog.dol.gov/2023/01/04/by-the-numbers-projected-growth-in-data-related-jobs*](https://blog.dol.gov/2023/01/04/by-the-numbers-projected-growth-in-data-related-jobs)

# **ENROLLMENT**

*This section will be completed by Enrollment Management.*

1. **Are students enrolling in this program expected to be new to the university or redirected from existing programs at the university?** *Include the number of openings, as well as the percentage of growth when possible.*

We anticipate there will be both new and redirected students. With the extremely high demand of Data Science, and the popularity among younger students, we expect to see a large influx of new students coming into the program. However, because we currently offer a Computer Science B.S. degree in EECS, and specialization in Data Science within the Mathematics department, we anticipate a portion of those students will chose to change their majors and pursue a B.S. in Data Science & Engineering or consider a double-major.

1. **Complete the enrollment worksheet (TDX Attachment) to provide an enrollment project for the next six academic years.**
2. **What is the minimum number of students required in this program to break even with respect to the budget?**

By year three, 35 students are needed in the program to cover the operating expenses and the proposed new full-time Lecturer faculty position.

1. **Discuss the assumptions informing your enrollment estimates.** *(e.g. current enrollment and trends in similar programs, IPEDS data, recruitment strategies, partnerships)*

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). We anticipate 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, we anticipate the enrollment to double at 15 – 20 new incoming freshmen. This growth will be supported by continuous recruitment efforts as outlined above. By year three we project 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 we’ll graduate our first cohort of data scientists and expect to maintain our annual incoming freshman enrollment of 20 – 30 students. Once our first cohort of students enters the job market, we project 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.

1. **If the program enrollment is not realized in year two, what actions is the university prepared to take?**

Program enrollment will be monitored regularly and collaboratively between the academic department and the office of Undergraduate Admissions. Should the projected program enrollment not be realized in year two, marketing and recruiting strategies and initiatives will be evaluated to determine what changes and improvements needs to be made, then those changes will be implemented.

1. **Discuss the marketing and recruitment plan for the program.** *Include information on partnerships and pipelines (e.g. articulation agreements with BOTE, collaboration with partner university, community partnerships).*

***Target Population 1***: traditional-aged students who will attend in-person, on-campus. This program will be appealing to students who are interested in using computers and data to solve real-world problems, enjoy algorithm design and data interpretation, and thrive in an interdisciplinary environment working with domain scientists.

***Target Population 2:*** working professionals wanting to use data-intensive learning to their current domain expertise. Having domain expertise is advantageous for students to provide data-driven insights within their current area of expertise.

* Purchase names from College Board and NRCCUA of prospects that meet SDM admission requirements, have an interest in AI, ML, or Data Science, and live in SD Advantage states.
* Identify keywords for Marketing in SEO and web-based advertising
* Develop directed marketing materials for distribution at college days, high school visits, email and snail mail distributions, and college fairs.

# **FINANCIAL HEALTH**

*This section will be completed by Budget & Finance*

1. **Complete the budget worksheet (TDX Attachment) to provide a budget project for the next six academic years. Complete the summary in TDX.**

| **Financial Health Summary** |
| --- |
|  | **1st FY26** | **2nd FY27** | **3rd FY28** | **4th FY29** | **5th FY30** | **6th FY31** |
| *Tuition & Fee Revenues* |  |  |  |  |  |  |
| *Program Expenses* |  |  |  |  |  |  |
| **NET** |  |  |  |  |  |  |
| *Other Supporting Revenues* |  |  |  |  |  |  |
| **NET (Other)** |  |  |  |  |  |  |

1. **Explain the amount and source(s) of any one-time and continuing investments in personal, professional development, release time, time redirected from other assignments, instructional technology and software, other operation and maintenance expenses, facilities, etc., needed to implement the proposed major.** *Address off-campus or distance delivery separately.*

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.

1. **If new faculty are not requested, describe how existing faculty will be utilized and indicated whether this action will impact other existing programs.**

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.

1. **Is the university requesting or intending to request permission for a new fee, or to attach an existing fee to the program? If so, please provide an explanation for requesting a new fee.**

No new fee is being requested. The existing Computer Science special discipline fee should be attached to all Data Science (DSE prefix) courses.

1. **Use the table below to describe potential risks to the program’s implementation over the next four years.** *For each risk, identify the severity (low, medium, high), probability of occurrence (low, medium higher), and the institution’s mitigation strategy for each risk.*

| **Risk** | **Severity** | **Probability** | **Mitigation Strategy** |
| --- | --- | --- | --- |
| Under-enrollment | Medium | Low | We will evaluate the marketing and recruitment plan components to determine what changes and improvements need to be made, then those changes will be implemented. |
|  |  |  |  |
|  |  |  |  |

# **EXTERNAL REVIEW**

*This section only needs to be completed for proposed graduate programs.*

1. **If this proposal is for a graduate program, provide information below for at least five potential consultants who may be considered to conduct an external review.**

| **Reviewer Name** | **Title** | **Institution/Organization** |
| --- | --- | --- |
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# **ADDITIONAL INFORMATION**

1. **(Optional) Use this space to provide pertinent information note requested above that may assist in the Board in understanding the proposal.**