



SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS
Intent to Plan for a New Program

UNIVERSITY:	University of South Dakota
DEGREE(S) AND TITLE OF PROGRAM:	Master of Science in Business Analytics
INTENDED DATE OF IMPLEMENTATION:	Summer 2018

University Approval

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

_____ Date

President of the University

1. What is the general nature/purpose of the proposed program?

The purpose of the M.S. in Business Analytics is to prepare graduates to implement data science solutions to business problems by using applied mathematics, statistics, computer science, and computing technology. The M.S. in Business Analytics will be a STEM program designed to fill the need for data scientists with a business background in South Dakota. Data related analytics skills are scarce, but essential to extract knowledge from business data. The business analytics orientation of the M.S. in Business Analytics program will provide exposure and experience in data science and business analytics.

Demand for data science skills in South Dakota and the region is strong and expected to grow. The demand for business analytics graduates from USD is shown by the number of firms expressing an interest in graduates as soon as graduates are available. The list of regional firms already expressing interest is given below:

Firm Name	City/State	Firm Name	City/State
3M	Brookings	Raven Industries	Sioux Falls
Daktronics	Brookings	ReliaMax Insurance	Sioux Falls
AaLadin Industries	Elk Point	Sanford	Sioux Falls
Cabela's	Mitchell	Wells Fargo	Sioux Falls
Trail King	Mitchell	Masaba	Vermillion
Black Hills Corporation	Rapid City	Polaris	Vermillion
Avera	Sioux Falls	Vishay	Yankton
Bancorp	Sioux Falls	Wellmark BC/BS	Des Moines, IA
Citibank	Sioux Falls	Wells Enterprises	LeMars, IA
First Premier	Sioux Falls	Tyson	Sioux City, IA
John Morrell	Sioux Falls	First National Bank	Omaha, NE
Metabank	Sioux Falls	BPI	S. Sioux City, NE
Poet	Sioux Falls	Titan Machinery	West Fargo, ND

Inexpensive data storage coupled with powerful computing technology has allowed massive data quantities to be acquired, retained and mined. Decision making in business increasingly relies on data to improve decision making and operational efficiency. South Dakota needs

skilled data and analytics professionals to integrate the knowledge derived from data into business processes to promote effective managerial decision making.

Combining business and analytics not only gives the advantage of both sets of skills, but enhances the value of both when combined. Our program proposal is a response to employer demand for a degree that prepares graduates to be business-oriented, quantitatively-skilled, commercially-savvy professionals knowledgeable in business and analytics. South Dakota needs data-informed decisions across the enterprise spectrum.

The needs for the skill sets provided in the M.S. in Business Analytics are attested to in the following quotes.

“Without big data analytics, companies are blind and deaf, wandering out onto the web like deer on a freeway.” – Geoffrey Moore, author and consultant.

“Most of the world will make decisions by either guessing or using their gut. They will be either lucky or wrong.” – Suhail Doshi, CEO, Mixpanel

“By relying on the statistical information rather than a gut feeling, you allow the data to lead you to be in the right place at the right time. To remain as emotionally free from the hurly burly of the here and now is one of the only ways to succeed.” – James O’Shaughnessy, Investor.

“Information is the oil of the 21st century, and analytics is the combustion engine.” – Peter Sondergaard, Senior Vice President, Gartner Research.

The M.S. in Business Analytics will equip South Dakota graduates to solve business problems needed to make South Dakota companies successful.

2. What is the need for the proposed program (e.g., Regental system need, institutional need, workforce need, etc.)? What is the expected demand for graduates nationally and in South Dakota (provide data and examples; data sources may include but are not limited to the South Dakota Department of Labor, the US Bureau of Labor Statistics, Regental system dashboards, etc.)?

The demand for quantitatively skilled analytics graduates is demonstrated by the South Dakota Department of Labor and Regulation’s Hot Careers (high-demand) projections shown below for the types of jobs our graduates would typically seek¹:

SOC Code	Occupational Title	Average Annual Demand for Workers	2014 Workers	2024 Workers	Percent Change 2014-2024	Average Annual Wage
13-1111	Management Analysts	60	2,662	2,893	8.7%	\$76,190
13-1161	Market Research Analysts and Marketing Specialists	19	576	692	20.1%	\$57,179

Note that it is likely that the actual demand will exceed the projections. Here are the 2010 projections:

SOC Code	Occupational Title	2010 Workers	2020 Workers	Numeric Change	% Change	Ave. Annual Demand
13-1111	Management Analysts	2,010	2,275	265	13.2%	59
13-1161	Market Research Analysts and Marketing Specialists	300	405	105	35.0%	18

¹ South Dakota Department of Labor & regulation, Labor Market Information Center, available from https://dlr.sd.gov/lmic/menu_projections.aspx.

For Management Analysts, the 2010 estimate for 2020 workers was exceeded in 2014 by 17%, and the Market Research Analysts and Marketing Specialists 2010 estimate for 2020 workers was exceeded in 2014 by 42%. Past ten-year projections were exceeded in only four years by wide margins.

Another excellent indicator is jobs advertised on the Internet July 16, 2017 for Sioux Falls:

Employer	Position
Amesbury Truth	Financial Analyst
Aureon IT, Inc	Systems Analyst
Avera	Quality Assurance Analyst
	Principal Clinical Intelligence Analyst
	Systems Analyst
Bancorp	Business Intelligence Analyst
	Sr. Relationship Analyst – Third Party Risk
Citi	Financial Accounting Analyst 3
Citibank	Ops Support Sr. Analyst
	Project Sr Analyst
Esurance	Website Analyst
Great Western Bank	Senior Business Intelligence Analyst
	Senior Credit Analyst
	Treasury Associate Quantitative Analyst
Metabank	Financial Intelligence Unit Analyst
	Statistical Analyst I
	Support Analyst I – Marketing Reviewer
	Support Financial Analyst
	Test Analyst
Norcraft Cabinetry	Financial Analyst
Norcraft Companies	Financial Analyst
Premier	Business Analyst II
	Compliance Analyst
Raven	Senior Financial Analyst
ReliaMax	Senior Financial Analyst
	Credit Risk Analyst/Sr Credit Risk Analyst
Sanford	HRIS-Human Resources Enabling Technologies Analyst – Human Resources
	Financial Analyst – System Finance & Planning
	Applications Support Analyst – HR/Payroll – Information Technology
SGT	Project Analyst
Spherion	Financial Analyst
Starmark Cabinetry	Financial Analyst
The First National Bank in Sioux Falls	Credit Analyst
TriTech & Zuercher Technologies	Business Analyst
	Technical Analyst
U.S. Bank	Credit Analyst
	Credit Analyst 6
	Business Systems Analyst 2
Wells Fargo	Data Warehouse – Systems QA Analyst 4
	Systems Quality Assurance Analyst 3
	Credit Analyst 6
	Teradata Database Analyst 2

The demand for analytically-skilled graduates is strong.

3. How would the proposed program benefit students?

The Master of Science in Business Analytics benefits students by preparing them for high-paying, professional careers in business analytics. The salary data provided by the South Dakota Department of Labor and Regulation's Hot Careers, as indicated above, shows jobs in analytics pay more than the South Dakota median income of \$48,947.²

4. How does the proposed program relate to the university's mission as provided in South Dakota Statute and Board of Regents Policy, and to the current Board of Regents Strategic Plan 2014-2020?³

The University of South Dakota's mission, as provided in BOR Policy 1:10:1, is:

The legislature established The University of South Dakota as the liberal arts university to meet the needs of the State and region by providing undergraduate and graduate programs in the liberal arts and sciences, and professional education in business, education, fine arts, law, and medicine, and other courses or programs as the Board of Regents may determine. (SDCL 13-57-1)

The Board implemented SDCL 13-57-1 by authorizing undergraduate and graduate programs in the liberal arts and sciences and in professional education and by requiring the University to promote excellence in teaching and learning, to support research, scholarly and creative activities, and to provide service to the State of South Dakota, the region, and beyond. The University of South Dakota is the comprehensive university with the South Dakota System of Higher Education.

USD is the only South Dakota regental university with "professional education in business" specifically articulated as a component of its statutory mission. A M.S. in Business Analytics supports USD's statutory mission, falls within the SD Board of Regents approved USD graduate programs, and directly falls within the following Board System Strategic Goals:

- ✓ South Dakota's population will be more highly-educated;
- ✓ South Dakota will have a working-age population with advanced levels of education needed to support our democracy and the modern, knowledge-based economy;
- ✓ South Dakota will be a recognized national leader in the use of information technology to enhance its educational, economic, social, scientific, and political development.

Goal 1: Student Success

Intended Outcomes:

- Grow the number of undergraduate and graduate degrees awarded.

² <http://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2015/3/19/the-shrinking-middle-class-mapped-state-by-state> 2013 data.

³ South Dakota statutes regarding university mission are located in SDCL 13-57 through 13-60; Board of Regents policies regarding university mission are located in Board Policies 1:10:1 through 1:10:6. The Strategic Plan 2014-2020 is available from https://www.sdbor.edu/the-board/agendaitems/Documents/2014/October/16_BOR1014.pdf

Expand educational access

- Encourage campuses to create innovative programs to attract and retain in SD, more non-resident students.

Goal 2 - Academic Quality and Performance

Intended Outcomes:

- Continue to approve new graduate programs

Goal 3 - Research and Economic Development

Intended Outcomes:

- Increase the number of graduates from STEM programs

Action steps

2. STEM Education – Expand educational opportunities in the areas of science, technology, engineering, and mathematics.

- Increase the number of master's and doctoral level STEM programs.

The M.S. in Business Analytics will be a STEM designated program. The CIP Code for the M.S. in Business Analytics will be 52.1302⁴, the CIP Code Title will be Business Statistics; its IPEDS description is:

Definition: A program that focuses on the application of mathematical statistics to the description, analysis, and forecasting of business data. Includes instruction in statistical theory and methods, computer applications, data analysis and display, long- and short-term forecasting methods, and market performance analysis.⁵

The M.S. in Business Analytics will leverage the combined power of mathematical statistics, computing technology, data analysis and visualization to construct business-data-based predictions. Business forecasting and market analysis predictions will be taught and learned through both presentation of statistical-theory-and-methods, and implementation of the theory and methods, in a business setting. In addition, predictions will be coupled with mathematically generated optimal prescriptions to operationalize the analytics, transforming business problems into business solutions.

- 5. Do any related programs exist at other public universities in South Dakota? If a related program already exists, explain the key differences between the existing programs and the proposed program, as well as the perceived need for adding the proposed new program. Would approval of the proposed new program create opportunities to collaborate with other South Dakota public universities?⁶**

There are two related South Dakota public university programs. The Dakota State University's M.S. in Analytics⁷, and South Dakota State University's M.S. in Data Science⁸. USD's M.S. in Business Analytics differs from both because our M.S. in Business Analytics will have a business orientation, with business applications, business problems and business solutions integrated throughout the curriculum.

⁴ <https://www.ice.gov/sites/default/files/documents/Document/2016/stem-list.pdf>

⁵ <https://nces.ed.gov/ipeds/cipcode/cipdetail.aspx?y=55&cipid=88927>

⁶ Lists of existing system programs are available through university websites and the RIS Reporting: Academic Reports database available from <http://apps.sdbor.edu/ris-reporting/AcademicProgramReports.htm>.

⁷ http://catalog.dsu.edu/preview_program.php?catoid=23&poid=1639

⁸ <https://www.sdstate.edu/sites/default/files/2016-09/SDSU%20MS%20Data%20Science%20Information.pdf>

The DSU degree has a general track option where students may choose at most two business-related electives. DSU also has a 12 credit hour Graduate Business Analytics Certificate⁹. However, the certificate program has no business courses; all coursework is in information systems.

The SDSU degree program does not have business coursework requirements.

The fundamental orientation of analytics programs can be divided into three categories: (1) computer science, (2) data science and (3) business analysis and decision making. Dakota State University’s Master of Science in Analytics is an example of (1). South Dakota State University’s Master of Science in Data Science is an example of (2). The University of South Dakota’s Master of Science in Business Analytics degree will be an example of (3).

6. Do related programs exist at public colleges and universities in Minnesota, North Dakota, Montana, and/or Wyoming?

	Institution	Program Title
<i>Minnesota</i>	University of Minnesota Carlson School of Management	Master of Science in Business Analytics ¹⁰
<i>North Dakota</i>	None	
<i>Montana</i>	University of Montana School of Business Administration	Master of Science in Business Analytics ¹¹
<i>Wyoming</i>	None	

7. Are students enrolling in this program expected to be new to the university or redirected from other existing programs at the university?

We expect some students to have completed their baccalaureate degree at USD. Students with degrees in computer science, mathematics, physics, chemistry and economics are natural fits for the M.S. in Business Analytics. But we expect some students to have graduated from quantitative programs at other schools too. Management Information Systems and Engineering students are likely to be well suited to succeed in the M.S. in Business Analytics program. We have heard directly from M.S. in Computer Science students expressing an interest in adding a second master’s degree in business analytics.

We do not expect students seeking an MBA to choose the M.S. in Business Analytics instead of the traditional MBA. The reason is that the programs serve different constituencies. Some MBA students seek non-business analytics specializations; other MBA students pursue the general MBA without a specialization. But even the MBA students that choose the business analytics specialization are unlikely to shift to the M.S. in Business Analytics. The McKinsey Global Institute estimates that by 2018, there will be a deficiency of 140,000 to 190,000 people with analytical expertise and a shortage of about 1.5 million managers and analysts with the analytics knowledge to use data to make effective decisions.¹² The M.S. in Business Analytics targets the former category; the MBA targets the latter category. Moreover, the

⁹ http://catalog.dsu.edu/preview_program.php?catoid=23&pooid=1635&hl=analytics&returnto=search

¹⁰ <https://carlsonschool.umn.edu/degrees/master-science-in-business-analytics>

¹¹ [http://www.business.umn.edu/programs/graduate/Master of Science in Business Analytics-program/default.php](http://www.business.umn.edu/programs/graduate/Master%20of%20Science%20in%20Business%20Analytics-program/default.php)

¹² http://www.mckinsey.com/insights/business_technology/big_data_the_next_frontier_for_innovation

majoring of MBA students are enrolled as online students. The M.S. in Business Analytics is an on-campus program.

Many students are expected to be new to the university. However, we expect to attract students from a variety of backgrounds, including some of our own students.

- 8. What are the university’s expectations/estimates for enrollment in the program through the first five years? What are the university’s expectations/estimates for the annual number of graduates from the program after the first five years? Provide an explanation of the methodology the university used in developing these estimates.**

Year	(1) 2018-2019	(2) 2019-2020	(3) 2020-2021	(4) 2021-2022	(5) 2022-2023
Enrollment	5	8	13	21	34

Our methodology is based on two factors. First, we have had conversations with on-campus MBA students, and master’s degree students in computer science, who have expressed interest in a M.S. in Business Analytics. Second, our experience with our undergraduate program in operational analytics, and with our MBA business analytics specialization, have informed our growth estimates.

- 9. Complete the following charts to indicate if the university intends to seek authorization to deliver the entire program at any off-campus location (e.g., UC Sioux Falls, Capital University Center, Black Hills State University-Rapid City, etc.) or intends to seek authorization to deliver the entire program through distance technology (e.g., as an on-line program)?¹³**

	Yes/No	Intended Start Date
On campus	Yes	Summer 2018

	Yes	No	If Yes, list location(s)	Intended Start Date
Off-campus		X		

	Yes	No	If Yes, identify delivery methods	Intended Start Date
Distance Delivery		X		

- 10. What are the university’s plans for obtaining the resources needed to implement the program?**

	Development/Start-up	Long-term Operation
Reallocate existing resources	yes	yes
Apply for external resources	yes	yes
Ask Board to seek new State resources ¹⁴	no	no
Ask Board to approve a new or increased student fee	no	no

Details for the resources will be finalized at a later stage, prior to seeking approval for program implementation. All of the courses in this program will have the associated Business prefix fees. No new fees will be requested.

- 11. Curriculum Example: Provide (as Appendix A) the curriculum of a similar program at another college or university. Identify the college or university and explain why the selected program is a model for the program under development.**

¹³ The accreditation requirements of the Higher Learning Commission (HLC) require Board approval for a university to offer programs off-campus and through distance delivery.

¹⁴ Note that requesting the Board to seek new State resources may require additional planning and is dependent upon the Board taking action to make the funding request part of their budget priorities. Universities intending to ask the Board for new State resources for a program should contact the Board office prior to submitting the intent to plan.

Appendix A

M.S. in Business Analytics Curriculum Example (30 credit hours):

Business Fundamentals: (6 credit hours: applies to students with STEM Baccalaureates)

DSCI 501 Marketing and Operations Fundamentals (new course)

ACCT 503 Accounting and Finance Fundamentals (new course)

Note: An approved elective may be substituted for DSCI 501 for students who have taken BADM 370 – Marketing and BADM 425 - Production/Operations Management or who can pass the equivalent of the BADM 370 and BADM 425 final exams.

Note: An approved elective may be substituted for ACCT 503 for students who have taken ACCT 210 - Principles of Accounting I, ACCT 211 - Principles of Accounting II, and BADM 310 - Business Finance, or who can pass the equivalent of the final exams of ACCT 210, ACCT 211 and BADM 310.

Programming Fundamentals: (6 credit hours: applies to students with Business and Economics Baccalaureates)

DSCI 505 Analytics Programming Fundamentals (new course)

Note: An approved elective may be substituted for DSCI 505 for students who have taken CSC 150 - Computer Science I and CSC 250 - Computer Science II or equivalent, or who can pass the equivalent of the final exams of CSC 150 and CSC 250.

DSCI 507 Business Analytics Programming (new course)

Note: An approved elective may be substituted for DSCI 505 for students who already have SAS Base Programming certification.

Business Analytics: (18 credit hours)

BADM 720 Quantitative Analysis

DSCI 519 Advanced Business Analytics Programming (new course)

DSCI 723 Data Management & Warehousing

DSCI 724 Data Mining for Managers

DSCI 725 Data Mining for Competitive Advantage

DSCI 726 Operational Analytics

Business Elective: (3 credit hours)

Any approved Beacom School of Business Graduate course

Experiential Learning: (3 credit hours)

DSCI 794 Practicum (new course)

Each of the following programs are well respected programs, are housed within Association to Advance Collegiate Schools of Business (AACSB International) accredited schools of business, and incorporate program elements identified as important by those companies with which we have visited. They will be used as models for program development.

- University of Texas at Austin's McCombs School of Business Master of Science in Business Analytics <https://www.mcombs.utexas.edu/Master-of-Science-in-Business-Analytics>
- University of Minnesota's Carlson School of Management's Master of Science in Business Analytics <https://carlsonschool.umn.edu/degrees/master-science-in-business-analytics>
- Oklahoma State University's Spears School of Business Master of Science in Business Analytics <https://business.okstate.edu/analytics/msban/index.html>
- University of Iowa's Tippie College of Business <http://catalog.registrar.uiowa.edu/tippie-business/management-sciences/business-analytics-ms/#requirementstext>

CURRICULUM EXAMPLE

University of Texas at Austin's McCombs School of Business Master of Science in Business Analytics

<https://www.mcombs.utexas.edu/Master-of-Science-in-Business-Analytics/Academics/Curriculum>

SUMMER TERM 6 credit hours	Statistics I: Intro to Predictive Modeling STA S380.17 3 credits core course	Data Analytics Programming MIS S381N 3 credits core course
FALL 15 credit hours	Advanced Predictive Modeling MIS 382N 3 credits core course	Financial Management BA 385T 3 credits optional
	Supply Chain Analytics OM 380.17 3 credits elective	Marketing Analytics I MIS 382 3 credits elective
	Text Analysis MIS 284N 2 credits core course	Decision Analysis RM 194 1 credit core course
	Database Management MIS 381N.1 3 credits optional	
SPRING 15 credit hours	Learning Structures and Time Series STA 380.18 3 credits core course	Stochastic Control and Optimization MIS 381N 3 credits core course
	Business Analytics Capstone MIS 382N.11 3 credits core course	Marketing Analytics II MKT 382 3 credits elective
	Pricing & Revenue Management MKT 382 3 credits elective	Quantitative Trading RM 294 2 credits elective
	Financial Technology RM 294 2 credits elective	Social Media Analytics RM 294 2 credits elective