



**SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS**

New Undergraduate Degree Program

UNIVERSITY:	University of South Dakota
MAJOR:	Integrated Science
EXISTING OR NEW MAJOR(S):	New
DEGREE:	Associate of Science
EXISTING OR NEW DEGREE(S):	Existing
INTENDED DATE OF IMPLEMENTATION:	Fall 2017
PROPOSED CIP CODE:	41.0301
SPECIALIZATIONS:¹	None
IS A SPECIALIZATION REQUIRED (Y/N):	No
DATE OF INTENT TO PLAN APPROVAL:	June 28-30, 2016
UNIVERSITY DEPARTMENT:	Biomedical Engineering
UNIVERSITY DIVISION:	College of Arts and Sciences

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

Date

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

The University of South Dakota requests approval for an Associate of Science in Integrated Science. The A.S. in Integrated Science will not merely integrate the sciences, but will draw on the research and development capabilities of the University of South Dakota, government, and industry (both regional and national). This program will leverage findings from a 2009 report from the National Research Council of the National Academies entitled “A New Biology for the 21st Century”² to prepare students to solve a wide range of problems. Among other items, the report found:

- “The New Biology Initiative provides an opportunity to attract students to science who want to solve real-world problems.”²
- “Development and implementation of genuinely interdisciplinary undergraduate courses and curricula will both prepare student for careers as New Biology researchers and educate a new generation of science teachers well versed in New Biology

¹ If the proposed new program includes specific specializations within it, complete and submit a New Specialization Form for each proposed specialization and attach it to this form. Since specializations appear on transcripts, they require Board of Regents approval.

² NRC (2009), A New Biology for the 21st Century: Ensuring the United States Leads the Coming Biology Revolution, Washington, DC: National Academies Press. <http://www.nap.edu/catalog/12764/a-new-biology-for-the-21st-century> (accessed 2 September, 2015).

- “The New Biology depends on interdisciplinary collaborations among scientists and engineers who share sufficient common language and understanding to envision and embrace common goals. To expand the pool of such individuals, it will be important to educate students in new ways.”²

The A.S. in Integrated Science intends to capitalize on these findings and create a new curriculum that students will find exciting, energizing, and practical. Courses at the 100-level in the curriculum will blend chemistry, biology, and physics (particularly thermodynamics) and incorporate mathematics, as necessary. Associated laboratories will focus on integrated solutions to problems in biomedicine. At the 200-level, students will learn the fundamentals of current Good Manufacturing, Laboratory, Documentation, and Clinical Practices (individually cGMP, cGLP, cGDP, and cGCP; collectively cGXP) and apply them in an analytical chemistry and/or microbiology environment. At the 300- and 400-level (no more than 16 credit hours) students will gain specialized understanding in Regulatory Affairs, Biomedical Technologies, including the use of animal models in biomedical research, and Medical Device design. Courses from the A.S. degree will transfer into a B.S. degree in Biomedical Engineering. Additionally, this A.S. will prepare students for a B.S. in Medical Laboratory Science and Biology.

2. How does the proposed program relate to the university’s mission and strategic plan, and to the current Board of Regents Strategic Plan 2014-2020?³

University of South Dakota’s Mission and Strategic Plan

USD’s mission as provided in Board Policy 1:10:1 authorizes the institution to provide undergraduate and graduate programs in the liberal arts and sciences and in professional education; degrees are authorized at the associate, baccalaureate, masters, education specialist, and doctoral levels.

The proposed A.S. in Integrated Science is an ideal fit for USD’s liberal arts mission. In order for STEM graduates to ascend their careers from the bench to the boardroom, graduates of this program will have a combination of strong technical education rooted in the essential skills that a liberal arts education at the University of South Dakota provides. Science and technology alone cannot solve all our food, environmental, health and energy problems. Social, economic and political factors play major roles in these settings. The liberal arts foundation provided at USD will enable Integrated Science students to address a broad range of scientific and societal problems because of the scope and expertise that comes along with a liberal arts education.

Board of Regents Strategic Plan 2014-2020

The proposed program supports the Board of Regents Strategic Plan 2014-2020 by growing the number of undergraduate degrees awarded, designing clearer pathways for degree completion, and increasing the number of undergraduate STEM majors.

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/theboard/agenda/2014/October/16_BOR1014.pdf.

In addition, the “2020 Vision: The South Dakota Science and Innovation Strategy”⁴ proposed eight initiatives to build a solid base of STEM knowledge and know-how needed in industry. The success of the 2020 Vision Strategy is founded in the belief that state colleges and universities play a pivotal role in the scientific knowledge, know-how, and innovation, as well as the talent of graduated students. The A.S. in Integrated Science curriculum provides a strong foundation of science and technology knowledge, and the liberal arts education at the University of South Dakota provides the essential know-how required by industry. The 2020 Vision Talent strategy area has an objective to increase the ability of the state to produce talent to fulfill needs in target sectors as a way to develop talent to continue to rebuild and reinvent the economy of South Dakota. The Integrated Science Program aims to enroll talented students who would not traditionally commit to a 4 year degree, and re-invigorate that talent to pursue good careers and/or continue to a bachelor’s and post-graduate programs.

Regarding workforce, the 2020 Vision identifies five industry sectors with the highest potential for economic development within the state:

- *Value Added Agriculture and Agribusiness:* Crop production and/or farm management with significant ties to each of the four other industry sectors.
- *Energy and Environment:* Renewable (solar, wind power, geothermal, biofuels) and non-renewable energy production (coal, and future oil and gas production).
- *Materials and Advanced Manufacturing:* Advanced material development in the area of healthcare and firearms, as well as manufacturing to leverage expansion in renewable and non-renewable energy.
- *Human Health and Nutrition:* Bioscience and biotech firms and the health care industry extending ties into pharmaceutical and medical device/instrument manufacturing.
- *Information Technology/Cyber-Security/Information Assurance:* Security needs of the banking industry and protection of electronic medical records within human health.

With a combination of traditional liberal-arts education and collaborative research, graduates of the Integrated Science Program will deliver a strong foundation for South Dakota’s workforce in all of the above mentioned sectors. The emphasis of the program will prepare students for the “*Materials and Advanced Manufacturing*,” and “*Human Health and Nutrition*” sectors. Data from the Bureau of Labor Statistics Occupational Outlook Handbook for Chemical Technicians and Biological Technicians predicts job growth at 9-10% (which is considered average) and an annual salary for individuals with an associate’s degree at \$42, 920.⁵

3. Describe the workforce demand for graduates of the program, including national demand and demand within 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.

Graduates of the Integrated Science Program will not only master scientific theory, but professional marketability and competency as well. The demand for talented graduates with scientific minds grounded in functional liberal arts is demonstrated by demand in South Dakota

⁴ REACH (2013), 2020 Vision: The South Dakota Science and Innovation Strategy, <http://sdeprior.org/sdepriorHome/wp-content/uploads/2015/07/2020-Vision.pdf> (accessed 2 September, 2015)

⁵ <http://www.bls.gov/ooh/life-physical-and-social-science/biological-technicians.htm>
<http://www.bls.gov/ooh/life-physical-and-social-science/chemical-technicians.htm>

National Demand:

Data from the U.S. Bureau of Labor Statistics (BLS) supports that the future of the economy is in STEM. Employment in occupations related to STEM is anticipated to grow more than 9 million between 2012-2022.⁶ The table below describes the increasing national demand for potential jobs for graduates of the A.S. in Integrated Science.

National Workforce demand for graduates of the program⁷

Occupation	Education Level	On the job Training	Projected Number of New Jobs	Projected Growth Rate	2015 median Pay
Agricultural and food science technicians	Associate's degree	Moderate-term on-the-job training	1,000 to 4,999	0 to 9 percent	\$35,000 to \$54,999
Chemical technicians	Associate's degree	Moderate-term on-the-job training	1,000 to 4,999	0 to 9 percent	\$35,000 to \$54,999
Environmental engineering technicians	Associate's degree	None	1,000 to 4,999	10 to 19 percent	\$35,000 to \$54,999
Environmental science and protection technicians, including health	Associate's degree	None	1,000 to 4,999	0 to 9 percent	\$35,000 to \$54,999
Medical and clinical laboratory technicians	Associate's degree	None	10,000 to 49,999	10 to 19 percent	\$35,000 to \$54,999
Medical equipment repairers	Associate's degree	Moderate-term on-the-job training	1,000 to 4,999	0 to 9 percent	\$35,000 to \$54,999

Demand within South Dakota:

USD's Graduate Education and Applied Research (GEAR) Center and the USD Discovery District at the University Center site in Sioux Falls provide a unique environment in South Dakota for USD to interface with the rapidly expanding biomedical technology industry. This includes companies such as SAB Biotherapeutics, Alumend, Omegaquant, Nanoblood, Aquatech Bioenergy, Immutrix, and Antimicrobial Materials, Inc. All of these companies rely on the New Biology described in the NRC report and need a workforce that understands and can operate in a highly integrated science environment. All of these companies have aggressive growth plans that anticipate needing dozens of A.S. level employees each year.⁸

Firm Name	City/State	Firm Name	City/State
POET	Sioux Falls/SD	Immutrix	Rapid City/SD

⁶ BLS, STEM 101: Intro to tomorrow's jobs <http://www.bls.gov/careeroutlook/2014/spring/art01.pdf> (accessed 17Jul2016)

⁷ BLS, Occupational Outlook Handbook, <http://www.bls.gov/ooh/> (accessed 17Jul2016)

⁸ BLS (2015), Bureau of Labor Statistics, Occupational Outlook Handbook, Life, Physical, and Social Science Occupations, <http://www.bls.gov/ooh/life-physical-and-social-science/home.htm> (accessed 19 November, 2015)

John Morrell Food Group (Smithfield Foods)	Sioux Falls/SD	SAB Biotherapeutics	Sioux Falls/SD
Avera	Sioux Falls/SD	Sanford	Sioux Falls/SD
Sanford Research	Sioux Falls/SD	OmegaQuant	Sioux Falls/SD
Monsanto	South Dakota	Nanoblood	Sioux Falls, SD
Alumend	Sioux Falls/SD	Aquatech Bioenergy	Sioux Falls/SD
Antimicrobial Materials	Sioux Falls/SD	Elanco Animal Health	Larchwood, IA
VanGuard Sciences	North Sioux City, SD	Rembrandt Foods	Thompson, Iowa
Novita Nutrition	Brookings, SD		

4. How will the proposed program benefit students?

The Integrated Science Program will provide students with an opportunity to pursue studies that go beyond the traditional major in a single field of science. Through the curriculum, students will explore the interrelationships among the sciences, the boundaries along which new fields are born, the discoveries made possible by cross-disciplinary research, and the excitement of such research enterprises. The classroom will create a collaborative culture providing students the chance to work together and become more aware of how pioneering technologies can be applied. Not only will students be invigorated by their studies, but employers will value their interdisciplinary approach and liberal arts background. By graduating with a science degree from the University of South Dakota, students of the Integrated Science Program will have a broad scope of knowledge and skills/techniques learned that will differentiate themselves from the pool of candidates. The curriculum will be aimed to re-invigorate talented students to motivate them to pursue good careers and/or continue to a bachelor’s and post-graduate programs, such as Biomedical Engineering or Medical Laboratory Science.

5. Program Proposal Rationale:

A. If a new degree is proposed, what is the rationale?⁹

No new degree is proposed. The major will be offered within the existing Associate of Science program.

B. What is the rationale for the curriculum?

The curriculum was designed to provide the student with a broad-based science curriculum with interdisciplinary components. The motivation for the Integrated Science curriculum is to create courses that allow students to see that there are no boundaries and will give the students freedom and curiosity to explore outside of the traditional framework of science education. Students will see how different fields relate to one another and how they can use information and techniques from one field to study another one. Integrated Science will provide a more inquiry-based curriculum and the labs will provide industry applications and skills. The rationale is to make sure students are on track for success when they graduate from the University of South Dakota and will add value to the workplace.

⁹ This question refers to the type of degree, not the program. For example, if your university has authorization to offer the Bachelor of Science and the program requested is a Bachelor of Science, then the request is not for a new degree.

C. Demonstrate/provide evidence that the curriculum is consistent with current national standards. *Complete the tables below and explain any unusual aspects of the proposed curriculum?*

Integrated Science is a new academic program with an objective to bridge the biological and the physical sciences. There are no certification, licensure or national standards for the proposed curriculum. No other programs offer an A.S. in Integrated Science. As part of the curriculum development process, the following were reviewed to ensure high program standards:

- 1) **Virginia Tech's Academy of Integrated Science:** Virginia Tech has an Academy of Integrated Science, which is a two-year course sequence (no degree is offered). This sequence intimately blends chemistry, biology, physics, and math in order to prepare students to solve real world problems after graduating with a B.S. degree in a traditional science major.
- 2) **Princeton University:** The Integrated Science Sequence at Princeton is offered to undergraduates considering majoring in the sciences or engineering. The Integrated Science curriculum (no degree is offered) is founded on the expectation that the most important science in the future will lie in areas that span more than one classical discipline. Students in the Integrated Science Sequence develop a degree of rigor, crucial to scientific investigation.
- 3) **NRC Report "A New Biology for the 21st Century":** The New Biology Initiative provided examples to develop interdisciplinary undergraduate courses and curricula.
- 4) **ABET accreditation requirements for Applied Science Accreditation Commission (ASAC):** ABET accreditation requirements for ASAC were used to develop the curriculum in order to meet quality standards of the profession and to give the program the ability to be accredited.

D. Summary of the degree program (complete the following tables):

A.S. in Integrated Science	Credit Hours	Credit Hours	Percent
System General Education Requirements*	24 (-6)		
Institutional Graduation Requirements	—	—	—
Subtotal, Degree Requirements		24 (-6)	38.3%
Required Support Courses (not included above)	3		
Major Requirements	27		
Major Electives	7-8		
Subtotal, Program Requirements		37-38	48.3-50%
Free Electives		4-5	11.7-13.3%
Degree Total ¹⁰		60	100%

*Integrated Science 1 & 2(New) will be proposed to fulfill System General Requirements 6, Natural Sciences

Required Support Courses Outside the Major (Not general education or institutional graduation requirements)

Prefix	Number	Course Title	Credit Hours	New (yes, no)
MATH	281	Introduction to Statistics	3	No
Subtotal			3	

Major Requirements

Prefix	Number	Course Title	Credit Hours	New (yes, no)
ISCI	151/L	Integrated Science I/Laboratory	4	No
ISCI	153/L	Integrated Science II/Laboratory	4	Yes
ISCI	215/L	Good Laboratory Practices	4	No
CHEM	326/L	Organic Chemistry I	4	No
CHEM	330	Structure/Function Biomolecules	3	No
ISCI*	225/L	Integrated Science 3 (cell molecular)	4	Yes
MICR	231/L	General Microbiology	4	No
Subtotal			27	

*Integrated Science 1 & 2 will be proposed to fulfill System General Requirements 6, Natural Sciences

Major Electives: List courses available as electives in the program. Indicate any proposed new courses added specifically for the major.

Prefix	Number	Course Title	Credit Hours	New (yes, no)
ISCI	353	Regulatory Affairs	3	No
CHEM	332/L	Analytical Chemistry	4	No
CHEM	434	Instrumental Analysis	4	No
BIOL	245/L	Cell Culture Techniques	4	No
ISCI	335/L	Biomedical Technologies	4	No
Subtotal			7-8	

¹⁰ Board Policy 2:29 requires each baccalaureate level degree program to require 120 credit hours and each associate degree program to require 60 credit hours. Exceptions to this policy require documentation that programs must comply with specific standards established by external accreditation, licensure, or regulatory bodies or for other compelling reasons and must receive approval by the Executive Director in consultation the President of the Board of Regents.

6. Student Outcomes and Demonstration of Individual Achievement

A. What specific knowledge and competencies, including technology competencies, will all students demonstrate before graduation? *The knowledge and competencies should be specific to the program and not routinely expected of all university graduates. Complete Appendix A – Outcomes using the system form. Outcomes discussed below should be the same as those in Appendix A. The knowledge and competencies specific to the program must relate to the proposed assessments in B and C below.*

Appendix A defines the specific knowledge and competencies, including technology competencies that all students will demonstrate before graduation. Below is a list that graduates of this program will be able to demonstrate:

1. An ability to apply knowledge of mathematics, sciences, and other related disciplines
2. An ability to conduct experiments, as well as to analyze and interpret data
3. An ability to identify, formulate, and solve applied science problems
4. An ability to function on teams
5. An understanding of professional and ethical responsibility
6. An ability to communicate effectively
7. A recognition of the need for and an ability to engage in life-long learning
8. A knowledge of contemporary issues
9. An ability to use the techniques, skills, and modern applied science tools necessary for professional practice

B. Are national instruments (i.e., examinations) available to measure individual student achievement in this field? If so, list them.

Yes. The American Chemical Society (ACS) exams are available to measure individual student achievement in this field. Below is a list of ACS exams that may be given at the end of each applicable course to measure student achievement.

- i. American Chemical Society exams:
 1. GC15F – General Chemistry First Term 2015 Exam for First Term General Chemistry
 2. GC17S – 2017 General Chemistry Second Term Test for second semester general chemistry
 3. OR17F – 2017 First Term Organic Exam Test for first-term
 4. IA17 – 2017 Instrumental Analysis Exam for a senior-level instrumental analysis course
 5. Analytical Exam – 2013- Designed for use after the sophomore level Analytical Chemistry course.

C. How will individual students demonstrate mastery? Describe the specific examinations and/or processes used, including any external measures.¹¹ What are the consequences for students who do not demonstrate mastery?

Mastery will be demonstrated through completion of the student learning outcomes described in Appendix A. Completion of curriculum ensures that students will have demonstrated mastery.

Below lists how individuals will demonstrate mastery throughout each Integrated Science course:

- 1) Concept inventories will be used in the Integrated Science Courses for students to demonstrate mastery and evaluate their understanding of concepts. The objective of the concept inventory is to provide data to measure the student's learning over the duration of the courses. As the Integrated Science courses integrate the sciences (physics, biology and chemistry), a written exam will incorporate all three subjects and will be given at the start of the semester. The same written exam will be given at the end of semester. Students will be expected to improve their scores. After program approval, faculty will establish specific expectations for the concept inventories. American Chemical Society Exams will be taken after each applicable course.
- 2) Each Integrated Science Course will use oral presentations, written tests, written reports, laboratory exercises and/or case studies to assess mastery.

Students may not have an Integrated Science Course grade below a "C." Students will be required to repeat classes until this standard is reached. Students failing to reach that standard will not be allowed to continue in the program.

7. What instructional approaches and technologies will instructors use to teach courses in the program? *This refers to the instructional technologies and approaches used to teach courses and NOT the technology applications and approaches expected of students.*

Instructional approaches will explore the inter-relationships of the sciences in ways that extend beyond current disciplinary course structures. Laboratory experiences and case studies will be closely integrated with lecture material, while data collection in the laboratory is paired with statistical and computational methods of data analysis and interpretation. Teamwork, written and oral presentation, and problem-solving are central components throughout the curriculum.

8. Did the University engage any developmental consultants to assist with the development of the curriculum?¹² Did the University consult any professional or accrediting associations during the development of the curriculum? What were the contributions of the consultants and associations to the development of curriculum?

No developmental consultants assisted with the development of the curriculum. The curriculum was developed by Biomedical Engineering faculty with an academic background in chemistry, biology, biomedical engineering, and physics. The ABET accreditation resources available on the ABET website were used to aid in the development of the curriculum.

¹¹ What national examination, externally evaluated portfolio or student activity, etc., will verify that individuals have attained a high level of competence and identify those who need additional work?

¹² Developmental consultants are experts in the discipline hired by the university to assist with the development of a new program (content, courses, experiences, etc.). Universities are encouraged to discuss the selection of developmental consultants with Board staff.

9. Are students enrolling in the program expected to be new to the university or redirected from other existing programs at the university? Complete the table below and explain the methodology used in developing the estimates (replace “XX” in the table with the appropriate year). If question 12 includes a request for authorization for off-campus or distance delivery, add lines to the table for off-campus/distance students, credit hours, and graduates.

We plan to offer this degree at the University Center site in Sioux Falls, therefore, we anticipate that many of the students will be new to the university. Of course, it is likely that some will re-direct from other programs as well. During the first few years of the program we expect to enroll 25 students and that this enrollment will grow to 50 students per year as job opportunities emerge in the market. We expect 20 graduates initially and growth to 40. These estimates are based on conversations with several biomedical device and drug companies that are based in Sioux Falls including SAB Biotherapeutics, Alumend, Immutrix, and Nanoblood. All of these companies have products that are currently in FDA-approved clinical trials or will have products in clinical trials within one year.

<i>Estimates</i>	Fiscal Years*			
	1st	2nd	3rd	4th
	FY 17	FY 18	FY 19	FY 20
Students new to the university**	5	15	20	25
Students from other university programs		5	5	5
Off campus students (Sioux Falls)	**	**	**	**
Continuing students				
=Total students in the program (fall)	5	20	25	30
Program credit hours (major courses)***	50	200	250	300
Graduates			5	20

*Do not include current fiscal year.

** Students new to the university will also be off-campus students

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

10. Is program accreditation available? If so, identify the accrediting organization and explain whether accreditation is required or optional, the resources required, and the University’s plans concerning the accreditation of this program.

Program accreditation is available and optional through ABET. The Integrated Science program’s goal would be to be accredited through the ABET Applied Science Accreditation Commission (ASAC). As a new program, the ASAC accreditation would ensure confidence that the Integrated Science Program meets quality standards and that graduates are prepared to enter a global workforce. Additional resources (that have not been included in the curriculum/budget) required for ABET accreditation are related to institutional support and leadership, which must be adequate to ensure the quality and continuity of the program.

11. 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, enter "None."
 None.

12. 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	If Yes, list location(s)	Intended Start Date
Off-campus	X		UC Sioux Falls	Fall 2017

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

13. 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 major. Address off-campus or distance delivery separately. Complete Appendix B – Budget and briefly summarize to support Board staff analysis.

The University of South Dakota will not request new state resources. The sources and amounts of all funds needed to operate the Integrated Science Program and the impact of reallocations on existing programs has been identified. The Biomedical Engineering Program at USD is based in Sioux Falls at the University Center site. Faculty members from Biomedical Engineering will be assigned to teach the science and engineering courses that will be a part of the A.S. in Integrated Science. All other general education courses are already offered at the University Center site.

14. Is the university requesting or intending to request permission for a new fee or to attach an existing fee to the program (place an "X" in the appropriate box)? If yes, explain.

Yes No

Explanation (if applicable): Not Applicable.

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.

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

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 5D.

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: *Additional information is optional. Use this space to provide pertinent information not requested above. Limit the number and length of additional attachments. Identify all attachments with capital letters. Letters of support are not necessary and are rarely included with Board materials. The University may include responses to questions from the Board or the Executive Director as appendices to the original proposal where applicable. Delete this item if not used.*

Individual Student Outcomes and Program Courses

List specific individual student outcomes—knowledge and competencies—in each row. Label each column with a course prefix and number. Indicate required courses with an asterisk (*). Indicate with an X the courses that will provide the student with an opportunity to acquire the knowledge or competency listed in the row. All students should acquire the program knowledge and competencies regardless of the electives selected. Modify the table as necessary to provide the requested information for the proposed program.

Individual Student Outcome	Program Courses that Address the Outcomes							
	Prefix & Number	Prefix & Number	Prefix & Number	Prefix & Number	Prefix & Number	Prefix & Number	Prefix & Number	Prefix & Number
An ability to apply knowledge of mathematics, sciences, and other related disciplines	*MATH 102	*ISCI 151/L	*ISCI 153/L	*ISCI 215/L	*ISCI 225/L	*ISCI 335/L	*CHEM 326/L	*CHEM 330
An ability to conduct experiments, as well as to analyze and interpret data	*CHEM 332	*ISCI 151/L	*ISCI 153/L	*ISCI 215/L	*ISCI 225/L	*ISCI 335/L	*CHEM 326/L	*CHEM 330
An ability to identify, formulate, and solve applied science problems	*CHEM 326	*CHEM 330	*MICR 231/L	*ISCI 151/L	*ISCI 153/L	*ISCI 215/L	*ISCI 225/L	x ISCI 335/L
An ability to function on teams	x ISCI 353	*ISCI 215/L	*MICR 231/L	*ISCI 151/L	*ISCI 153/L	*ISCI 225/L	*CHEM 326/L	
An understanding of professional and ethical responsibility	x ISCI 353	*ISCI 215/L	*PHIL 101	*POLS 102	x CHEM 434			
An ability to communicate effectively	*ENGL 101	*SPCM 101	*POLS 102	*PHIL 101	*ISCI 215/L	x ISCI 353		
A recognition of the need for and an ability to engage in life-long learning	*POLS 102	x ISCI 353	x BIOL 245	*ISCI 151/L	*ISCI 153/L			
A knowledge of contemporary issues	*POLS 102	*PHIL 101	x ISCI 353/L	*ISCI 215/L	x ISCI 335/L	x CHEM 434		
An ability to use the techniques, skills, and modern applied science tools necessary for professional practice	*ISCI 215/L	x ISCI 353	x BIOL 245	x CHEM 434	*PHIL 101	*CHEM 326/L	*ISCI 215/L	*ISCI 225/L

Expand the table as necessary to include all student outcomes. Outcomes in this table are to be the same ones identified in the text.

Appendix B
Budget & Resources

University of South Dakota, Associate of Science in Integrated Science

1. Assumptions		1st FY17	2nd FY18	3rd FY19	4th FY20
<i>Headcount & hours from proposal</i>					
Fall headcount (see table in proposal)		5	20	25	30
Program FY cr hrs, State-Support		0	0	0	0
Program FY cr hrs, Self-Support		50	200	250	300
Faculty, Regular FTE	See p. 2	0.75	0.75	0.75	0.75
Faculty Salary & Benefits, average	See p. 2	\$94,115	\$94,115	\$94,115	\$94,115
Faculty, Adjunct - number of courses	See p. 2	0	0	0	0
Faculty, Adjunct - per course	See p. 2	\$1,000	\$1,000	\$1,000	\$1,000
Other FTE (see next page)	See p. 2	0.00	0.00	0.00	0.00
Other Salary & Benefits, average	See p. 2	\$0	\$0	\$0	\$0
2. Budget					
<i>Salary & Benefits</i>					
Faculty, Regular		\$70,586	\$70,586	\$70,586	\$70,586
Faculty, Adjunct (rate x number of courses)		\$0	\$0	\$0	\$0
Other FTE		\$0	\$0	\$0	\$0
S&B Subtotal		\$70,586	\$70,586	\$70,586	\$70,586
<i>Operating Expenses</i>					
Travel		\$0	\$0	\$0	\$0
Contractual Services		\$0	\$0	\$0	\$0
Supplies & materials		\$0	\$0	\$0	\$0
Capital equipment		\$0	\$0	\$0	\$0
OE Subtotal		\$0	\$0	\$0	\$0
Total		\$70,586	\$70,586	\$70,586	\$70,586
3. Program Resources					
SELF-support tuition/hr, net of HEF	GR	\$297.45	\$297.45	\$297.45	\$297.45
Self-support tuition revenue	hrs x amt	\$14,873	\$59,490	\$74,363	\$89,235
STATE-support tuition/hr, net of HEFF	GR	\$175.48	\$175.48	\$175.48	\$175.48
State-support tuition revenue	hrs x amt	\$0	\$0	\$0	\$0
Program fee, per cr hr (if any)	\$0.00	\$0	\$0	\$0	\$0
Delivery fee, per cr hr (if any)	\$0.00	\$0	\$0	\$0	\$0
University redirections		\$0	\$0	\$0	\$0
Community/Employers		\$0	\$0	\$0	\$0
Grants/Donations/Other		\$0	\$0	\$0	\$0
Total Resources		\$14,873	\$59,490	\$74,363	\$89,235