

SOUTH DAKOTA BOARD OF REGENTS

Academic and Student Affairs

AGENDA ITEM: 4 – M (1)

DATE: March 30 – April 1, 2016

SUBJECT: Intent to Plan: SDSU BS in Chemistry Education

South Dakota State University (SDSU) has submitted an Intent to Plan requesting approval to develop a Bachelor of Science program in Chemistry Education. Approval or waiver of an Intent to Plan is required prior to submitting a formal program proposal. The program will prepare pre-service high school chemistry teachers to complete a focused disciplinary degree that accommodates the newly required education coursework within the 120 credit limit. The proposed major provides foundational preparation in the chemistry content domain while accommodating the new education requirements. In addition, the program is intended to provide additional avenues for potential science teachers to acquire the needed academic competency as the State faces severe teaching shortages.

University Mission and System Strategic Goals

The proposed major in Chemistry Education is within the statutory mission of SDSU as provided in SDSCL 13-58-1: *Designated as South Dakota’s land grant university, South Dakota State University, formerly the state college of agriculture and mechanical arts, shall be under the control of the Board of Regents and shall provide undergraduate and graduate programs of instruction in the liberal arts and sciences and professional education in agriculture, education, engineering, home economics, nursing and pharmacy, and other courses or programs as the Board of Regents may determine.*

(Continued)

RECOMMENDED ACTION OF THE EXECUTIVE DIRECTOR

I move to authorize SDSU to develop a proposal for a B.S. in Chemistry Education with the following conditions:

1. The university will research existing curricula, consult with experts concerning the curriculum, and provide assurance in the proposal that the program is consistent with current national standards and with the needs of employers.
2. The proposal will define the specific knowledge, skills, and competencies to be acquired through the program, will outline how each will be obtained in the curriculum and will identify the specific measures to be used to determine whether individual students have attained the expected knowledge, skills, and competencies.
3. The university will not request new state resources and the program proposal will identify the sources and amounts of all funds needed to operate the program and the impact of reallocations on existing programs.

The proposed program aligns with Board of Regents' Strategic Plan 2014-2020 to grow the number of undergraduate degrees awarded, expand educational access, and revise teacher preparation and educational leadership programs to better prepare professionals to work in standards-based schools.

Related Programs in the System

Black Hills State University, Northern State University, and University of South Dakota offer programs with tracks in Education and Chemistry.

Workforce Need, Student Demand, Projected Graduates

The National Teachers Shortage Report from the United States Department of Education indicates that science teachers in all disciplines are in short supply in South Dakota. The proposed program provides an additional option for potential teachers and provides science teachers with sufficient chemistry content knowledge to adequately prepare students for university-level chemistry. SDSU expects the program will graduate 1-2 students per year; however, this is a critical needs program for the State.

Board Policy

SDSU is not requesting any exceptions to Board Policy.

Off Campus and Distance Delivery

SDSU is not requesting authorization for off campus or distance delivery of the program.

Budget and Resources

SDSU is not requesting new funds or State resources to offer the program.

South Dakota Board of Regents
Intent to Plan for a B.S. in Chemistry Education

UNIVERSITY:	South Dakota State University
DEGREE(S) AND TITLE OF PROGRAM:	Bachelor of Science in Chemistry Education
INTENDED DATE OF IMPLEMENTATION:	Fall 2016

University Approval

To the Board 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.

David L. Chicoine

 President of the University

February 17, 2016

 Date

After approval by the President, a signed copy of the proposal should be transmitted to the Executive Director. Only after Executive Director review should the proposal be posted on the university web site and the Board staff and the other universities notified of the URL.

1. What is the general nature of the proposed program? What is the expected demand for graduates in South Dakota? What is the need for the proposed program?

South Dakota State University (SDSU) requests authorization to plan a Bachelor of Science in Chemistry Education. To accommodate changes in both required credit hours for completion of the baccalaureate degree (120 minimum credits) and in secondary teacher education requirements (a year-long teaching residency), the Chemistry Education major will prepare pre-service high school chemistry teachers to complete a focused disciplinary degree that accommodates the newly required education coursework, and to do so within the 120 credit limit. The proposed major provides a solid foundational preparation in the chemistry content domain while accommodating the new education requirements.

Expected Workforce Demand for Graduates

The Department of Labor and Regulation reports a projected need for approximately 100 secondary teachers per year through 2022¹ to maintain current employment rates in this occupation. The need for well-prepared STEM teachers, and chemistry teachers in particular, at the secondary level is critical.

Moreover, there is a continuing high demand for qualified chemistry teachers in high schools throughout South Dakota; the National Teachers Shortage Report from the United States Department of Education² asserts that science teachers in all disciplines are already in short supply in the state of South Dakota. Based on these data, the Department has developed a program to ensure that the state's high school science teachers have sufficient chemistry content knowledge to adequately prepare students for university-level chemistry.

¹ http://www.sdjobs.org/lmic/occupation_projections_high_demand_bachelors_2012_2022.aspx

² <http://www2.ed.gov/about/offices/list/ope/pol/tsa.html>

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Need for the Proposed Program

The Department's chemistry major is certified by the American Chemical Society (ACS). The requirements of the new year-long in-service residency for all candidates for teaching certification cannot be accommodated within 120 credit hours and still meet the ACS requirements for degree certification. Thus, currently, any student interested in teaching chemistry must complete more than 120 credits. The approval of this program will allow students to earn teacher certification in chemistry to complete all required coursework in chemistry and teacher education within the 120 credit limit.

2. What is the relationship of the proposed program to the University's mission as provided in South Dakota statute and Board of Regents Policy?

The proposed major in Chemistry Education is within the statutory mission of SDSU as provided in SDCL 13-58-1: *Designated as South Dakota's land grant university, South Dakota State University, formerly the state college of agriculture and mechanical arts, shall be under the control of the Board of Regents and shall provide undergraduate and graduate programs of instruction in the liberal arts and sciences and professional education in agriculture, education, engineering, home economics, nursing and pharmacy, and other courses or programs as the Board of Regents may determine.*

Board Policy 1:10:2 South Dakota State University Mission Statement provides: *The legislature established South Dakota State University as the Comprehensive Land Grant University to meet the needs of the State and region by providing undergraduate and graduate programs of instruction in the liberal arts and sciences and professional education in agriculture, education, engineering, human sciences, nursing, pharmacy, and other courses or programs as the Board of Regents may determine (SDCL 13-58-1).*

The proposed major contributes to the expectation that the University's land-grant mission is to serve the people of South Dakota. The state's need for highly qualified secondary physical science teachers is growing, has been identified as a critical need in the state's science and technology plan (The 2020 Vision: The South Dakota Science and Innovation Strategy³), and the University's land-grant mission positions it to meet this need.

The proposed program supports the goals stated in the South Dakota Board of Regents Strategic Plan 2014-2020:

Goal 1 – Student Success

- Increase total undergraduate degrees awarded
- Improve retention and graduation rates

Goal 2 – Academic Quality and Performance

- Grow the number of students participating in experiential learning through undergraduate research experiences and/or industry internships

Goal 3 – Research and Economic Development

- STEM Education
- Economic Development

³ <http://sdepscor.org/2020vision/>

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A major in Chemistry Education also supports South Dakota State University's strategic plan, IMPACT 2018⁴, specifically:

Goal 1 – Academic Excellence

- Promote academic excellence through quality programs, engaged learners and an innovative teaching and learning environment.

Goal 2 – Research and Innovation

- Generate new knowledge, encourage innovations and promote artistic and creative works that contribute to the public good and result in social, cultural or economic development for South Dakota, the region, the nation and the world.

3. Are there any related programs in the regental system? If there are related programs, why should the proposed program be added? If there are no related programs within the system, enter "None."

Yes. Black Hills State University (Chemistry – Teaching B.BSED.CHET) Northern State University (Chemistry – BSEd) and University of South Dakota (Chemistry Coordinate with School of Education Certification OR B.S. Chemistry, ACS certification, with School of Education Certification) offer chemistry majors with specializations or coursework identified to complete appropriate teaching certification courses.

4. Are there related programs at public colleges and universities in Minnesota, North Dakota, Montana, and Wyoming? If there are related programs in these states list below under each state and explain why the proposed program is needed in South Dakota. If there are no related programs in a state, enter "None" for that state.

A major in Chemistry Education is found at institutions in the region because of the importance of sufficient chemistry content knowledge in the preparation of high school chemistry teachers.

Minnesota

Southwest Minnesota State University – B.S. in Chemistry Education
St. Cloud State University – B.S. in Chemistry Education 9-12
Minnesota State University Moorhead – B.S. in Chemistry Education

North Dakota

North Dakota State University – specialization via B.S. in Chemistry

Montana

Montana State University – specialization via B.S. in Chemistry
University of Montana – specialization via B.S. in Chemistry

Wyoming

None

⁴ <http://www.sdstate.edu/impact2018>

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5. Are students expected to be new to the university or redirected from other programs? How many majors are expected in the first years of the program? How many graduates are expected?

Students may enter the program new to the university or be redirected from other majors once admitted to SDSU. The Chemistry Education major is not anticipated to lower the number of Chemistry or Biochemistry majors at SDSU, but instead will serve as a degree path for students with interests in secondary chemistry teaching. For the first five years of the program, 1-3 students are expected, with a graduation rate of approximately 1-2 Chemistry Education majors per year. Given the relatively small number of chemistry majors credentialed as high school teachers each year, this program will likely always be in low enrollment status.

6. Does the university intend to seek authorization to deliver this entire program at any off-campus locations? If yes, enter location(s) and intended start date(s). Does the university intend to seek authorization to deliver this entire program by distance technology? If yes, identify delivery method(s) and intended start date(s).

Off-campus	No
Distance delivery	No

7. What are the University's plans for obtaining the resources needed to implement the program? Indicate "yes" or "no" in the columns below.

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

8. Curriculum Example: Provide (as Appendix A) the curriculum of a similar program at another college or university. The Appendix should provide the required and elective courses in the program. Catalog pages or web materials may be used. Identify the college or university and explain why the program may be used as one model when the proposed program is developed.

Appendix A outlines the proposed curriculum for the B.S. in Chemistry Education. The Department of Chemistry & Biochemistry at SDSU already offers the curriculum as a specialization in conjunction with the faculty of the Teaching, Learning, and Leadership Department at SDSU to accommodate the changes in student teaching in-service requirements (e.g., the year-long residency). For comparison purposes, Appendix B provides the curricula of degrees similar to the one proposed here that are offered at Minnesota State University and St. Cloud State University.

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Appendix A
Proposed Curriculum: B. S. in Chemistry Education

Semester 1	Notes	Semester 2	Notes
CHEM 109 - 2cr	IGR 1	CHEM 127/127L - 4cr	SGR 6
CHEM 115/115L - 4cr	SGR 6	MATH 125 - 4cr	SGR 5
ENGL 101 - 3cr	SGR 1	ENGL 201 - 3cr	SGR 1
PSYC 101 - 3cr	SGR 3	SPAN 101 - 4cr	SGR 4
MATH 123 - 4cr	SGR 5		
Total: 16 credits		Total: 15 credits	
Semester 3		Semester 4	
CHEM 229/229L - 4cr		CHEM 237 - 2 cr	
SPCM 101 - 3cr	SGR 2	EDFN 101 – 1cr	
PHYS 211/211L - 4cr		CHEM 242/242L - 4cr	
CHEM 332/332L - 4cr		HIST 368 - 3cr	IGR 2
		SPAN 102 - 4cr	SGR 4
Total: 15 credits		Total: 14 credits	
Semester 5		Semester 6	
CHEM 452/452L - 4cr		CHEM 466 - 1cr	
CHEM 482 - 3cr		Pre-Residency II - 5cr (EDFN 352/252L)	
CHEM 464 – 3cr		PHYS 213/213L - 4 cr	
Pre-Residency I - 5cr (EDFN 351 & 475)		CHEM xxx – 3 cr	New Capstone – “Action Research”
		Elective – 3 cr	
Total: 15 credits		Total: 16 credits	
Semester 7		Semester 8	
Residency I - 12cr (EDFN 453/453L, SEED 450)		Residency II - 12cr (EDFN 454, SEED 456)	
HDFS 210 - 3cr	SGR 3	Elective - 2cr	
Total: 15 credits		Total: 14 credits	

Total Credits: 120

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Appendix B Curriculum Examples

Minnesota State University offers a stand-alone B.S. in Chemistry Education from the Department of Chemistry. Additional information regarding the B.S. in Chemistry Education may be found at: <https://www.mnstate.edu/chemistry/bsdegreeinchemistryeducation.aspx>

Liberal Arts and Sciences Core	42 credits	Notes
Core Requirements	70 credits	
CHEM 150/150L – 4cr		General Chemistry I and Lab
CHEM 210/210L – 4cr		General Chemistry II and Lab
CHEM 297 – 1cr		Introduction to Research
CHEM 300 – 3cr		Inorganic Chemistry
CHEM 350 – 3cr		Organic Chemistry I
CHEM 355 – 1cr		Organic Chemistry I Lab
CHEM 380 – 4cr		Analytical Chemistry
CHEM 397 – 1-3cr		Undergraduate Research
CHEM 400 – 3cr		Biochemistry I
CHEM 440 – 3cr		Sec. Science Teaching Methods
CHEM 450 – 3cr		Physical Chemistry I
CHEM 455 – 1cr		Physical Chemistry I Lab
PHIL 318 – 3cr		Professional Ethics
Secondary Ed Licensure Requirements	36 credits	
AMCS 233 – 3cr		Education and Multicultural America
ED 205 – 3cr		Introduction to Education
ED 294 – 3cr		Educational Psychology
ED 310 – 3cr		Social Foundations of Education
ED 398 – 2cr		Field Experience in Sec. Education
ED 443S – 3cr		Classroom Management/Consultation
ED 448 – 3cr		Reading Study Skills in Content Area
SPED 223 – 3cr		Individuals with Exceptionalities
ED 46X – 10cr		Student Teaching: Secondary
COMM 100 – 3cr		Speech Communication
Related Requirements	25 credits	
BIOL 111 – 4cr		Cell Biology
BIOL 115 – 4cr		Organismal Biology
GEOS 115 – 4cr		Physical Geology
GEOS 116 – 3cr		Historical Geology
GEOS 360 – 3cr		Planetary Science
MATH 261 – 4cr		Calculus I
MATH 262 (4cr) or MATH 234 (3cr)		Calculus II or Intro. to Prob/Stats.
Restricted Electives	8 credits	
PHYS 160 – 4cr		College Physics I

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PHYS 161 – 4cr		College Physics II
Total Credits	120 credits	

St. Cloud State University offers a stand-alone B.S. in Chemistry Education from the Department of Chemistry and Biochemistry. Additional information regarding the B.S. in Chemistry Education may be found at: <http://www.stcloudstate.edu/academics/programs/cose-chem-ed.aspx>

General Education Requirements	14 credits	Notes
Core Requirements	70 credits	
CHEM 210 – 4cr		General Chemistry I and Lab
CHEM 211 – 4cr		General Chemistry II and Lab
CHEM 310 – 5cr		Organic Chemistry I
CHEM 311 – 4cr		Organic Chemistry II
CHEM 350 – 4cr		Quantitative Analysis
CHEM 420 – 4cr		Physical Chemistry I
CHEM 480 – 4cr		Biochemistry I
CHEM 489 – 1cr		Undergraduate Research
MATH 211 – 3cr		Survey of Calculus I
MATH 212 – 3cr		Survey of Calculus II
PHYS 231 – 4cr		General Physics I
PHYS 232 – 4cr		General Physics II
SCI 420 – 4cr		Teaching Science in a Social Context
SCI 430 – 4cr		Sec. Science Teaching Methods
SCI 440 – 3cr		Seminar in Science Teaching
Electives – 12cr		
Secondary Ed Licensure Requirements	36 credits	
ED 300 – 3cr		Education and Multicultural America
CEEP 262 – 3cr		Human Growth and Development
CEEP 361 – 3cr		Intro. to Educational Psychology
IM 422 – 2cr		Info, Tech., and Learning for K-12 Teachers
HLTH 301 – 2cr		Health Issues and Strategies for Teachers
HURL 497 – 3cr		Human Relations for Teachers I
ENGL 460 or ED 460 – 2cr		Teaching English Language Learners in K-12
SPED 203 – 3cr		Exceptionalities and Human Diversity
ED 421 – 2cr		Foundations in Education
ED 431 – 2cr		Curriculum, Instruction, and Assessment
ED 466 or 476 – 3-11cr		Student Teaching
Total Credits	120 credits	