

**SOUTH DAKOTA BOARD OF REGENTS**

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

**AGENDA ITEM: 5 – E (3)**  
**DATE: May 13-15, 2024**

\*\*\*\*\*

**SUBJECT**

**New Specialization Requests – SDSMT – Molecular Biology Specialization and Environmental Biological Sciences Specialization – BS in Biology**

**CONTROLLING STATUTE, RULE, OR POLICY**

[BOR Policy 2.3.2](#) – New Programs, Program Modifications, and Inactivation/Termination

**BACKGROUND / DISCUSSION**

South Dakota School of Mines & Technology (SDSMT) requests authorization to offer both a Molecular Biology specialization and an Environmental Biological Sciences specialization within the BS in Biology. Both specializations will provide students with a more specialized curriculum within the Biology degree at the undergraduate level. The Molecular Biology specialization will focus on organic chemistry, biochemistry, and molecular biology. The Environmental Biological Sciences specialization will focus on ecology, plant biology, microbiology, and other environmental related courses.

**IMPACT AND RECOMMENDATION**

SDSMT requests authorization to offer the specializations on campus. SDSMT does not request additional state resources. No new courses will be required for the Molecular Biology specialization, while four new courses will be required for the Environmental Biological Sciences specialization.

Board office staff recommends approval of the specializations.

**ATTACHMENTS**

Attachment I – New Specialization Request Form: SDSMT – Molecular Biology Specialization – BS in Biology

Attachment II – New Specialization Request Form: SDSMT – Environmental Biological Sciences Specialization – BS in Biology

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**DRAFT MOTION 20240513\_5-E(3):**

I move to authorize SDSMT to offer a Molecular Biology specialization and an Environmental Biological Sciences specialization within the BS in Biology program, as presented.



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

## New Specialization

Use this form to propose a new specialization within an existing degree program. Specializations provide students with an alternative to the primary format of the major or it may be one of several tracks within a broad major. Specializations contain courses within the discipline(s) of the existing program. Specializations appear in the institutional catalog and on the transcript. Majors that offer specializations typically have one-third to two-thirds of the credits in common with the remaining course work fulfilling the requirements of the specialization(s) offered. The Board of Regents, Executive Director, and/or their designees may request additional information about the proposal. After the university President approves the proposal, submit a signed copy to the Executive Director through the system Chief Academic Officer. Only post the New Specialization Form to the university website for review by other universities after approval by the Executive Director and Chief Academic Officer.

<b>UNIVERSITY:</b>	SDSM&T
<b>TITLE OF PROPOSED SPECIALIZATION:</b>	<b>Molecular Biology Specialization</b>
<b>NAME OF DEGREE PROGRAM IN WHICH SPECIALIZATION IS OFFERED:</b>	<b>BS in Biology</b>
<b>BANNER PROGRAM CODE:</b>	<b>MBS.BIO</b>
<b>INTENDED DATE OF IMPLEMENTATION:</b>	<b>8/22/2024</b>
<b>PROPOSED CIP CODE:</b>	<b>26.0101</b>
<b>UNIVERSITY DEPARTMENT:</b>	<b>Chemistry, Biology, and Health Sciences</b>
<b>BANNER DEPARTMENT CODE:</b>	<b>MCBH</b>
<b>UNIVERSITY DIVISION:</b>	<b>4L</b>
<b>BANNER DIVISION CODE:</b>	<b>4L</b>

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

- The individual preparing this request has read [AAC Guideline 2.6](#), which pertains to new specialization requests, and that this request meets the requirements outlined in the guidelines.
- This request will not be posted to the university website for review of the Academic Affairs Committee until it is approved by the Executive Director and Chief Academic Officer.

### University Approval

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

Click here to enter a  
date.

\_\_\_\_\_  
Institutional Approval Signature  
*President or Chief Academic Officer of the University*

\_\_\_\_\_  
Date

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

**1. Level of the Specialization (place an “X” in the appropriate box):**

Baccalaureate       Master’s       Doctoral

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

The purpose of the proposed specialization is to provide students with a more specialized curriculum for a Biology Degree focused on Molecular Biology and/or the medical field at the undergraduate level. The ***Molecular Biology Specialization*** is designed for the Biology majors who are interested in understanding the structure, function, and interactions of biological systems at the molecular and cellular levels. The ***Specialization*** will require the students to take the 300- and 400-level courses in organic chemistry, biochemistry, and molecular biology. The students who earn the ***Molecular Biology Specialization*** with the Biology B.S. degree master deep and broad knowledge in molecular biology and biochemistry.

**3. Provide a justification for the specialization, including the potential benefits to students and potential workforce demand for those who graduate with the credential. For workforce related information, please provide data and examples. Data may include, but are not limited to the South Dakota Department of Labor, the US Bureau of Labor Statistics, Regental system dashboards, etc. Please cite any sources in a footnote.**

The specialization is justified as it will provide students focused on molecular biology and/or the medical field to be prepared and highly qualified for their next step, e.g., graduate school, professional school (medical school), or the workforce, due to the high quality of their combined academic degree and specialization.

The proposed ***Molecular Biology Specialization*** is designed for students planning to start a career in a health field (medical, dental, pharmacy, etc.) or continue their education in a graduate program that focuses on molecular biology/biochemistry and related areas such as medicinal chemistry, molecular biotech, etc. The ***Specialization*** will provide the students opportunities to gain knowledge and skills in molecular biology and add value to their B.S. degree in Biology. The department of Chemistry, Biology, and Health Sciences is the appropriate place to offer this ***Specialization***. The department offers B.S. degree in Chemistry, B.S. degree in Biology, and B.S. degree in pre-Professional Health Sciences. All the courses listed in the ***Specialization*** are existing courses, so no new courses will be required.

The proposed addition of ***Molecular Biology Specialization*** to the curriculum of the B.S. degree in Biology is consistent with the board-designated mission of the SDSM&T to promote student success and to contribute to the state’s workforce and economic development. The proposed ***Specialization*** will formalize the Molecular Biology curriculum currently offered in the department, which will help the recruitment of biology majors as well as the career development of biology graduates. The curriculum requirements of the ***Molecular***

*Specialization* will prepare students for success in high-demanding jobs and advanced programs related to health science and healthcare field. The U.S. Bureau of Labor Statistics predicts that “employment of healthcare occupations is projected to grow 14 percent from 2018 to 2028, much faster than the average for all occupations, adding about 1.9 million new jobs.”<sup>1</sup>

4. List the proposed curriculum for the specialization (including the requirements for completing the major – **highlight courses in the specialization**):

Prefix	Number	Course Title (add or delete rows as needed)	Credit Hours	New (yes, no)
<b>Goal 1 and Goal 2 Requirements (9 credits)</b>				
ENGL	101	Composition I	3	no
ENGL	279	Communication in the STEM Workplace	3	no
ENGL	289	Explorations in STEM Communications	3	no
<b>Goal 3 and Goal 4 (12 credits)</b>			12	no
<b>Math Requirements (11 credits)</b>				
MATH	123	Calculus I	4	no
MATH	125	Calculus II	4	no
MATH 321 Differential Equations or MATH 381 Introduction to Probability and Statistics			3	no
<b>Physic Requirements (7 credits)</b>				
PHYS 111 Introduction to Physics I <b>and</b> PHYS 113 Introduction to Physics II <b>and</b> (PHYS 111L Introduction to Physics I Lab <b>or</b> PHYS 113 L Introduction to Physics II L) <b>or</b> PHYS 207 Fundamentals of Physics I <b>and</b> PHYS 209 Fundamentals of Physics II <b>and</b> (PHYS 207L Fundamentals of Physics I Lab <b>or</b> PHYS 209L Fundamentals of Physics II Lab) <b>or</b> PHYS 211 University Physics I <b>and</b> 213 University Physics II <b>and</b> (PHYS 211L University Physics I Lab <b>or</b> 213L University Physics II Lab)			7	no
<b>Chemistry Requirements (13 credits)</b>				
CHEM	112	General Chemistry I	3	no
CHEM	112L	General Chemistry I Lab	1	no
CHEM	114	General Chemistry II	3	no
CHEM	114L	General Chemistry II Lab	1	no
CHEM	326	Organic Chemistry I	3	no
CHEM	326L	Organic Chemistry I Lab	2	no
<b>Biology Core Requirements (31 credits)</b>				

<sup>1</sup> <https://www.bls.gov/ooh/healthcare/home.htm>

BIOL	111	Introduction to Chemistry, Biology, and Health Sciences	1	no
BIOL	151	General Biology I	3	no
BIOL	151L	General Biology I Lab	1	no
BIOL	153	General Biology II	3	no
BIOL	153L	General Biology II Lab	1	no
BIOL	311	Principles of Ecology	3	no
BIOL	311L	Principles of Ecology Lab	1	no
BIOL	331	Microbiology	3	no
BIOL	331L	Microbiology Lab	1	no
BIOL	371	Genetics	3	no
BIOL	371L	Genetics Lab	1	no
BIOL	375	Current Bioethical Issues	3	no
BIOL	446/546	Molecular Cell Biology	3	no
BIOL	480/580	Bioinformatics	3	no
BIOL	490	Seminar	1-3	no
<b>Molecular Biology Specialization Required Courses (12 credits)</b>				
CHEM	328	Organic Chemistry II	3	no
CHEM	328L	Organic Chemistry II Lab	2	no
CHEM	464	Biochemistry I	3	no
CHEM	464L	Biochemistry I Lab	1	no
CHEM	465	Biochemistry II	3	no
<b>Molecular Biology Specialization Elective Courses (12 credits from the courses listed below)</b>				
BIOL	221	Human Anatomy	3	no
BIOL	221L	Human Anatomy Lab	1	No
BIOL	326	Biomedical Physiology	3	no
BIOL	326L	Biomedical Physiology Lab	1	no
BIOL	423	Pathogenesis	3	no
BIOL	438/538	BIOL 438/538 Industrial Microbiology	3	no
BIOL	444/544	Emerging and Re-emerging Infectious Diseases	3	no
BIOL	455/555	DNA Structure and Function	3	no
BIOL	470/570	Cancer Biology	3	no
BIOL	478/578	Microbial Genetics	3	no
BIOL	487/587	Diagnostic Parasitology	3	no
BIOL	488/588	Molecular Immunobiology	3	no
BIOL	492	Topics**	1-5	no
BIOL	498	Undergraduate Research/Scholarship	1-3*	no
CP	497	Cooperative Education**	1-3*	no
MICRO	433/533	Medical Microbiology	3	no
<b>Free Electives (13 credits)</b>			<b>13</b>	

\*Up to 3 credit hours will count toward specialization and the BS degree, any alterations will need Department Head approval.

\*\* Departmental approval is required toward specialization.

Total number of hours required for completion of specialization

24
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Total number of hours required for completion of major

88
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Total number of hours required for completion of degree

120
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**5. Delivery Location**

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

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

	Yes/No	Intended Start Date
<b>On campus</b>	Yes	<b>Fall 2024</b> Choose an item.

	Yes/No	If Yes, list location(s)	Intended Start Date
<b>Off campus</b>	No		Choose an item. Choose an item.

	Yes/No	If Yes, identify delivery methods <i>Delivery methods are defined in <a href="#">AAC Guideline 5.5</a>.</i>	Intended Start Date
<b>Distance Delivery (online/other distance delivery methods)</b>	No		Choose an item. Choose an item.

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

	Yes/No	If Yes, identify delivery methods	Intended Start Date
<b>Distance Delivery (online/other distance delivery methods)</b>	No		Choose an item. Choose an item.



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<b>UNIVERSITY:</b>	SDSM&T
<b>TITLE OF PROPOSED SPECIALIZATION:</b>	<b>Environmental Biological Sciences Specialization</b>
<b>NAME OF DEGREE PROGRAM IN WHICH SPECIALIZATION IS OFFERED:</b>	<b>BS in Biology</b>
<b>BANNER PROGRAM CODE:</b>	<b>MBS.BIO</b>
<b>INTENDED DATE OF IMPLEMENTATION:</b>	<b>8/22/2024</b>
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Institutional Approval Signature  
*President or Chief Academic Officer of the University*

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Date

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

**1. Level of the Specialization (place an "X" in the appropriate box):**

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

The purpose of the proposed specialization is to provide students with a more specialized curriculum for a Biology Degree focused on Environmental Biological Sciences at the undergraduate level. The ***Environmental Biological Sciences Specialization*** is designed for the Biology majors who are interested in using biological sciences to address environmental challenges. This specialization requires students to take the 400-level courses in ecology, plant biology, microbiology, and other environmental related courses. The students who earn the ***Environmental Biological Sciences Specialization*** with the Biology B.S. degree are equipped with in-depth knowledge to effectively apply biological sciences in addressing environmental challenges.

**3. Provide a justification for the specialization, including the potential benefits to students and potential workforce demand for those who graduate with the credential. For workforce related information, please provide data and examples. Data may include, but are not limited to the South Dakota Department of Labor, the US Bureau of Labor Statistics, Regental system dashboards, etc. Please cite any sources in a footnote.**

The specialization is justified as it will provide students focused on environmental biological sciences to be prepared and highly qualified for their next step, e.g., graduate school or the workforce, due to the high quality of their combined academic degree and specialization.

The proposed ***Environmental Biological Sciences Specialization*** is designed for students who are interested in using biology to address environmental challenges. The ***Specialization*** offers opportunities for students to gain knowledge and skills in biological processes that address environmental problems, enhancing the value of their B.S. degree in Biology. The department of Chemistry, Biology, and Health Sciences is the appropriate place to offer this ***Specialization***. The department offers B.S. degree in Chemistry, B.S. degree in Biology, and B.S. degree in Pre-Professional Health Sciences. The ***Specialization*** expands the current biology curriculum by offering one new course and two existing courses in the SDBoR system. These courses cover the in-depth knowledge of ecology, plant biology, and microbiology to address environmental issues. The ***Specialization*** aims to recruit biology majors with more diverse interests and foster the professional growth of biology graduates.

The proposed ***Environmental Biological Sciences Specialization*** aligns with the board-designated mission of the SDSM&T to foster student success and contribute to the state's workforce and economic development. The ***Specialization*** prepares student for workforce or graduate programs in biology-centric environmental remediation, protection, and technologies.

The program opens doors to occupations such as Agricultural Scientists, Biological Technicians, Conservation Scientists and Foresters, Environmental Science and Protection Technicians, Microbiologists, Environmental Scientists and Specialists, and Zoologists and Wildlife Biologists. According to the U.S. Bureau of Labor Statistics, these occupations are projected to experience a 5-6% growth from 2022 to 2032.<sup>1</sup>

4. List the proposed curriculum for the specialization (including the requirements for completing the major – **highlight courses in the specialization**):

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ENGL	289	Explorations in STEM Communications	3	no
<b>Goal 3 and Goal 4 (12 credits)</b>			12	no
<b>Goal 5 Math Requirements (11 credits)</b>				
MATH	123	Calculus I	4	no
MATH	125	Calculus II	4	no
MATH 321 Differential Equations or MATH 381 Introduction to Probability and Statistics			3	no
<b>Physic Requirements (7 credits)</b>				
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Prefix	Number	Course Title (add or delete rows as needed)	Credit Hours	New (yes, no)
<b>Chemistry Requirements (13 credits)</b>				
CHEM	112	General Chemistry I	3	no
CHEM	112L	General Chemistry I Lab	1	no
CHEM	114	General Chemistry II	3	no

<sup>1</sup> <https://www.bls.gov/ooh/life-physical-and-social-science/home.htm>

CHEM	114L	General Chemistry II Lab	1	no
CHEM	326	Organic Chemistry I	3	no
CHEM	326L	Organic Chemistry I Lab	2	no
<b>Biology Core Requirements (31 credits)</b>				
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BIOL	375	Current Bioethical Issues	3	no
BIOL	446	Molecular Cell Biology	3	no
BIOL	480/580	Bioinformatics	3	no
BIOL	490	Seminar	1-3	no
<b>Environmental Biology Specialization Required Courses (12 credits)</b>				
BIOL	427/527	Plant Physiology	3	yes
BIOL/AES	406/506	Global and Environmental Change	3	no
BIOL	451/551	Applications of Environmental Microbiology	3	yes
BIOL	412/512	Freshwater Ecology	2	yes
BIOL	412L/512L	Freshwater Ecology Lab	1	yes
<b>Environmental Biology Specialization Elective Courses (12 credits from the courses listed below)</b>			<b>Credit Hours</b>	<b>New (yes, no)</b>
BIOL	438/538	Industrial Microbiology	3	no
BIOL/AES	403/503	Biogeochemistry	3	no
BIOL	444/544	Emerging and Re-emerging Infectious Diseases	3	no
BIOL	487/587	Diagnostic Parasitology	3	no
BIOL	492/592	Topics	1-5	no
BIOL	498	Undergraduate Research/Scholarship	1-3*	no
CHEM	332	Analytical Chemistry	3	no
CHEM	434	Instrumental Analysis	3	no
CHEM	434L	Instrumental Analysis Lab	2	no
CHEM	462/562	Green Chemistry and Processes	3	no
CHEM	482/582	Environmental Chemistry	3	no
CHEM	483/583	Toxicology	3	no
CP	497	Cooperative Education	1-3*	no

GEOE	475/L/575/L	Groundwater/Lab	3	no
GEOL	416/L/516/L	Introduction to GIS/L	3	no
GEOL	419/519	Advanced Geospatial Analysis	3	no
GEOL	435/535	Geomicrobiology	3	no
POLS	407	Env Law & Policy	3	no
<b>Free Electives (13 credits)</b>			13	

\*Up to 3 credit hours will count toward specialization, any alterations will need Department Head approval.

Total number of hours required for completion of specialization	24
Total number of hours required for completion of major	88
Total number of hours required for completion of degree	120

**5. Delivery Location**

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

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

	Yes/No	Intended Start Date
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	Yes/No	If Yes, list location(s)	Intended Start Date
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	Yes/No	If Yes, identify delivery methods <i>Delivery methods are defined in AAC Guideline 5.5.</i>	Intended Start Date
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<b>Distance Delivery (online/other distance delivery methods)</b>	No		Choose an item. Choose an item.