SOUTH DAKOTA BOARD OF REGENTS

Academic and Student Affairs
Consent

AGENDA ITEM: 5 – D (2)
DATE: May 9, 2023

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SUBJECT

New Specialization Request – SDSMT – Specialization in Environmental Sciences – BS in Atmospheric and Environmental Sciences

CONTROLLING STATUTE, RULE, OR POLICY

BOR Policy 2:23 – New Programs, Program Modifications, Curricular Requests and Inactivation/Termination

BACKGROUND / DISCUSSION

South Dakota School of Mines & Technology (SDSMT) requests authorization to offer a specialization in Environmental Sciences within the BS in Atmospheric and Environmental Sciences (AES) program. The proposed specialization emphasizes a range of skills and knowledge more focused on laboratory and fieldwork. This specialization will create a new curriculum to better serve the growing number of students interested in environmental science-related careers that do not require the specific meteorology coursework currently required of all AES majors.

IMPACT AND RECOMMENDATION

SDSMT requests authorization to offer the specialization on campus. SDSMT is not requesting additional state resources to offer the program. One new course will be required.

Board office staff recommends approval of the program.

ATTACHMENTS

Attachment I – New Specialization Request Form: SDSMT – Environmental Sciences – BS in Atmospheric and Environmental Sciences

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DRAFT MOTION 20230509_5-D(2):

I move to authorize SDSMT to offer a specialization in Environmental Sciences within the BS in Atmospheric and Environmental Sciences, 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.

UNIVERSITY:	SDSM&T
TITLE OF PROPOSED SPECIALIZATION:	**Environmental Sciences**
NAME OF DEGREE PROGRAM IN WHICH SPECIALIZATION IS OFFERED:	**Atmospheric and Environmental Sciences (AES)**
BANNER PROGRAM CODE:	**AES**
INTENDED DATE OF IMPLEMENTATION:	**Fall 2023**
PROPOSED CIP CODE:	**40.0401 Atmos. Sci. & Meteo, General**
UNIVERSITY DEPARTMENT:	**CEE (Host Department)**
BANNER DEPARTMENT CODE:	**MCEE**
UNIVERSITY DIVISION:	**4L**
BANNER DIVISION CODE:	**4L**

☒ **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.

Institutional Approval Signature
President or Chief Academic Officer of the University

Click here to enter a date.
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 proposed specialization is a new course series focusing on environmental sciences. A second "Meteorology" specialization is also being presented.

3. **Provide a justification for the specialization, including the potential benefits to students and potential workforce demand for those who graduate with the credential.**

Traditional baccalaureate majors in "Meteorology" or "Atmospheric Sciences" have targeted federal service, public-sector weather forecasting, and broadcasting as the primary graduate market. To this end, the AES B.S. program has historically been built around coursework necessary to satisfy the federal government requirements to qualify as a Meteorologist (GS-1340 series), as this represents the de facto qualification for most meteorologist positions. However, the job market for such degrees and expectations of their graduates are changing nationwide and within South Dakota. This is reflected in changes in US Bureau of Labor Statistics data and with the current placements of our graduates. While alumni from SDSM&T's Atmospheric and Environmental Sciences programs (the AES B.S., AES M.S., and AES Ph.D. degrees) continue to be hired by traditional employers such as the National Weather Service (including all three offices in South Dakota), others have found degree-related employment in South Dakota at the USGS Dakota Water Science Center, State Department of Agriculture and Natural Resources, county emergency management, USGS EROS Data Center, Department of Natural Resources, and private companies, such as ReSpec, Inc., and Pete Lien and Sons, Inc. Graduates leaving South Dakota, likewise, are now working in a broad range of fields that no longer reflect "traditional" destinations from the previous generation of Meteorology and Atmospheric Science graduates. Placement in these positions relied on coursework provided at SDSM&T from multiple programs that went beyond earlier expectations of a meteorology degree and reflected the growing need in the country for specialized weather, climate, and environmental services from a new generation of science professionals.

These new opportunities for our graduates point to the primary reason for this request:

- These jobs encompass problem domains not just limited to weather forecasting and similar areas, but include adjacent interests such as air quality, environmental assessment, hydrology, and incident response.
- In addition, our newer inbound students to the program have expressed an interest in more environmental programs of study that retain rigorous coursework and preparation of a broad range of relevant and adjacent topics to meteorology and atmospheric science.

In response to this, we are proposing to split our current baccalaureate degree into two specializations:

- One specialization in *Environmental Science,* emphasizing a range of skills and knowledge more focused on laboratory and fieldwork. This specialization will create a new curriculum to better serve the growing number of students interested in the environmental science-related careers noted above that do not require the GS-1340-specific meteorology coursework currently required of all AES majors.
- A second specialization (proposed in a separate request) focuses on *Meteorology* to meet course requirements for graduates to qualify as a meteorologist in federal government positions, emphasizing decision support services. This specialization will closely follow the current AES B.S. degree program to continue serving those students interested in traditional atmospheric science careers such as weather forecasting, applied meteorology, and atmospheric science research.

As with SDSM&T's existing baccalaureate Atmospheric and Environmental Science curriculum, there is latitude for students to explore many of the minors in fields adjacent to Atmospheric & Environmental Sciences so that we may continue to produce competitive graduates for a changing world and workforce.

Employment statistics for Environmental Scientists are aggregated nationally, and state level statistics are less common. Nationally, the US Bureau of Labor Statistics expects jobs that explicitly call for *Environmental Scientists and Specialists* are expected to increase 8% between 2020 and 2030[1], which is on par with the national average across professions, and above the 7% expected growth across all physical science categories.

Because of this shift, we are also placing a higher emphasis on decision support in cooperation with state emergency management and private industry for both the proposed environmental and meteorology specializations to further distinguish SD Mines AES graduates from those from other institutions. This includes a new course in decision support leveraging our program's niche in wildland fire meteorology and established course in air quality, the latter of which has allowed AES and IS-ATM alums to secure employment and post-baccalaureate education opportunities upon graduation.

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)
General Education Requirements (21 CREDITS)				
ENGL	101	Composition 1 (BOR1)	3	No
ENGL	279	Communication in the STEM Workplace (BOR1)	3	No
ENGL	289	Explorations in STEM Communications (BOR2)	3	No

[1] The US Bureau of Labor Statistics for Environmental Scientists and Specialists, Occupational Outlooks ,can be found at https://www.bls.gov/ooh/life-physical-and-social-science/environmental-scientists-and-specialists.htm

		SD BOR Goal 3 (BOR3)	3	No
		SD BOR Goal 3 (BOR3)	3	No
		SD BOR Goal 4 Elective (BOR4)	3	No
		SD BOR Goal 4 Elective (BOR4)	3	No
Support Courses (11 CREDITS)				
MATH	123	Calculus 1 (BOR 5)	4	No
BIOL	151	General Biology 1 (BOR6)	3	No
CHEM	112	General Chemistry 1 (BOR6)	3	No
CHEM	112L	General Chemistry 1 Lab (BOR6)	1	No
Atmospheric & Environmental Sciences Degree General Program Requirements (53 CREDITS)				
AES	110	Orientation in Atmos & Env Sci	1	No
AES	201	Introduction to Atmospheric Sciences	3	No
AES	330	Impact-based Decision Support Services	3	Yes
CEE	326	Environmental Engineering & Science 1	3	No
AES	406	Global Environmental Change	3	No
BIOL	311	Principles of Ecology	3	No
CSC	170/170L	Programming for Engineers and Scientists	3	No
MATH	125	Calculus 2	4	No
MATH	381	Introduction to Probability & Statistics	3	No
STS	201	Introduction to Sci. Technology & Society	3	No
STS	401	Writing & Research in Sci. Technology & Society	3	No
STS	498	Undergraduate Research/Scholarship	3	No
		Free Electives	6	
		Program-approved Electives	12	
Environmental Science Specialization Requirements (35 CREDITS)				
AES	403	Biogeochemistry	3	No
AES	405	Air Quality	3	No
BIOL	151L	General Biology 1 Lab	1	No
BIOL	153	General Biology 2	3	No
BIOL	153L	General Biology 2 Lab	1	No
BIOL	331	Microbiology	3	No
BIOL	333/333L	Aquatic Ecology & Watershed Management/Lab	4	No
CHEM	114	General Chemistry 2	3	No
CHEM	114L	General Chemistry 2 Lab	1	No
GEOL	416/416L	Introduction to GIS/Lab	3	No
POLS	407	Environmental Law & Policy	3	No
PHYS	111 or 207	Intro to Physics 1 or Fundamentals of Physics 1	3	Yes
PHYS	111L or 207L	Intro to Physics 1 Lab or Funds. of Physics 1 Lab	1	Yes
		Environmental Electives	3	

Total number of hours required for completion of specialization	35
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***
On campus	Yes	**Fall 2023**

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

	Yes/No	***If Yes, identify delivery methods*** *Delivery methods are defined in AAC Guideline 5.5.*	***Intended Start Date***
Distance Delivery (online/other distance delivery methods)	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***
Distance Delivery (online/other distance delivery methods)	No		Choose an item. Choose an item.

6. Additional Information:.

Program Change Represents Splitting the Existing AES Program into two Specializations:

- AES "Meteorology" which satisfies restrictive federal requirements to qualify as a government meteorologist, and AES "Environmental Sciences" which presents a more general environmental emphasis
- Program Change includes anticipated changes to SDSM&T Physics curriculum in which the existing offerings of PHYS 211 & PHYS 211L, and PHYS 213 & PHYS 213L will be delivered as PHYS 207 & PHYS 207L, and PHYS 209 & PHYS 209L