SOUTH DAKOTA BOARD OF REGENTS
ACADEMIC AFFAIRS FORMS

Substantive Program Modification Form

UNIVERSITY:	**SDSU**
CURRENT PROGRAM DEGREE:	**Certificate**
CURRENT PROGRAM MAJOR/MINOR:	**Bioprocessing Sciences**
CURRENT SPECIALIZATION:	**N/A**
CIP CODE:	**14.4501**
UNIVERSITY DEPARTMENT:	**Agriculture, Food & Environmental Sciences**
BANNER DEPARTMENT CODE:	**SCAF**
UNIVERSITY COLLEGE:	**Agriculture, Food & Environmental Sciences**
BANNER COLLEGE CODE:	**3F**

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.

Dennis D. Hedge — Vice President of Academic Affairs or President of the University

3/26/2025 — Date

1. This modification addresses a change in:

☒	Total credits required within the discipline	☐	Total credits of supportive course work
☒	Total credits of elective course work	☐	Total credits required for program
☐	Program name	☐	Existing specialization
☐	CIP Code	☐	Other

☐ Modification requiring Board of Regents approval
Must have prior approval from Executive Director or designee

2. Effective date of change: 2025-2026 Academic Year

3. Program Degree Level:
Associate ☐ Bachelor's ☒ Master's ☐ Doctoral ☐

4. Category:
Certificate ☒ Specialization ☐ Minor ☐ Major ☐

5. If a name change is proposed, the change will occur:
☐ On the effective date for all students
☐ On the effective date for students new to the program (enrolled students will graduate from existing program)
Proposed new name:

6. Is the program being modified associated with a current articulation agreement?
Yes ☐ No ☒

a. If yes, will the articulation agreement need to be updated with the partner institution

following the approve of the program change? Please explain:

7. Primary Aspects of the Modification:

Existing Curriculum				*Proposed Curriculum (highlight changes)*			
Pre	Num	Title	Cr Hrs	Pre	Num	Title	Cr Hrs
MICR OR MICR	231-231L 233-233L	General Microbiology and Lab (4,0) Introductory Microbiology and Lab (4,0)	4	~~MICR OR MICR~~	~~231-231L 233-233L~~	~~General Microbiology and Lab (4,0) Introductory Microbiology and Lab (4,0)~~	~~4~~
				BIOL	235	Introduction to Biotechnology	2
				BIOL	235L	Introduction to Biotechnology Lab	1
		Select two or more of the following:	6-7			~~Select two or more of the following:~~	~~6-7~~
						Select from the following:	9
ABE	343	Engineering Properties of Biological Materials	2	ABE	343	Engineering Properties of Biological Materials	2
ABE	343L	Engineering Properties of Biological Materials Lab	1	ABE	343L	Engineering Properties of Biological Materials Lab	1
ABE	444	Unit Operations of Biological Materials Processing	3	ABE	444	Unit Operations of Biological Materials Processing	3
ABE	444L	Unit Operations of Biological Materials Processing Lab	1	ABE	444L	Unit Operations of Biological Materials Processing Lab	1
AST	443	Food Processing and Engineering Fundamentals	2	AST	443	Food Processing and Engineering Fundamentals	2
AST	443L	Food Processing and Engineering Fundamentals Lab	1	AST	443L	Food Processing and Engineering Fundamentals Lab	1
				BIOL	341	Microbial Processes in Engineering and Natural Sciences (SDSMT)	3
				CBE	410	Brewing Science and Engineering (SDSMT)	3
				CBE	410L	Brewing Science and Engineering Lab (SDSMT)	1
				CBE	484	Fundamentals of Biochemical Engineering (SDSMT)	3
				CBE	484L	Biochemical Engineering Laboratory (SDSMT)	1
				CBE	485	Renewable and Sustainable Energy (SDSMT)	3
				CBE	485L	Renewable and Sustainable Energy Lab (SDSMT)	1
				CBE	467	Process/Product Design for CBE (SDSMT)	2
				CBE	490	Seminar (SDSMT)	1
ME OR ME	311 314	Thermodynamics I (3) Thermodynamics (3)	3	ME OR ME	311 314	Thermodynamics I (3) Thermodynamics (3)	3
ME	416	Renewable Energy Systems	3	ME	416	Renewable Energy Systems	3
MICR	450	Applications of Microbiology and Biotechnology	3	MICR	450	Applications of Microbiology and Biotechnology	3
OM	240	Decision Making Processes in Management	3	OM	240	Decision Making Processes in Management	3
		Select from the following to total 12 credits.	2-3			~~Select from the following to total 12 credits.~~	~~2-3~~
ABE	411*	Design Project III	2	ABE	411*	Design Project III	2
GE	425	Occupational Safety and Health Management	3	GE	425	Occupational Safety and Health Management	3
MICR	311	Food Microbiology	2	MICR	311	Food Microbiology	2
MICR	311L	Food Microbiology Lab	2	MICR	311L	Food Microbiology Lab	2
MICR	332	Microbial Physiology	2	MICR	332	Microbial Physiology	2
MICR	332L	Microbial Physiology Lab	2	MICR	332L	Microbial Physiology Lab	2

Existing Curriculum				*Proposed Curriculum (highlight changes)*			
Pre	Num	Title	Cr Hrs	Pre	Num	Title	Cr Hrs
MNET	231	Manufacturing Processes I	2	MNET	231	Manufacturing Processes I	2
MNET	231L	Manufacturing Processes I Lab	1	MNET	231L	Manufacturing Processes I Lab	1
NUTR	426	Production of Wine, Beer and Spirits	2	NUTR	426	Production of Wine, Beer and Spirits	2
NUTR	426L	Production of Wine, Beer and Spirits Lab	1	NUTR	426L	Production of Wine, Beer and Spirits Lab	1
OM	425	Production Operations and Management	3	OM	425	Production Operations and Management	3
XXX	494*	Internship	1-2	XXX	494*	Internship	1-2
XXX	498*	Undergraduate Research	1-2	XXX	498*	Undergraduate Research	1-2
		*Must be relevant to bioprocessing and approved by program coordinator.				*Must be relevant to bioprocessing and approved by program coordinator.	
Total number of hours required for certificate			12	Total number of hours required for certificate			12

8. Explanation of the Change:

Changes to the Bioprocessing certificate were made to better align with the needs of South Dakota's biotechnology and bioprocessing industries, ensuring students are better prepared for industry demands. BIOL 235-235L Introduction to Biotechnology and Lab has replaced the student's choice to complete either MICR 231-231L General Microbiology and Lab or MICR 233-233L Introductory Microbiology and Lab in the certificates core requirements. The addition of BIOL 235-235L provides students with didactic and hands-on experience in technologies and applications relevant to South Dakota companies. This course will prepare future operators for common equipment in bioprocessing companies, while giving them the fundamental knowledge to manage processes. BIOL 235-235L is more relevant to the stakeholders and the lab components provide skills training desired by our partners than the microbiology courses.

In addition, the list of electives has been expanded to provide students with access to specialized expertise from both South Dakota State University and the South Dakota School of Mines and Technology. This collaboration will give students access to a broader range of courses, offering a blend of bioproduct and chemical engineering courses to enhance bioprocess training. The program will be able to reach more students statewide and offer specialized knowledge in agricultural bioprocessing, bioprospecting, and biochemical engineering. The following electives that will be offered by SDSMT include:

- BIOL 341 Microbial Processes in Engineering and Natural Sciences
- CBE 410-410L Brewing Science and Engineering and Lab
- CBE 467 Process/Product Design for CBE
- CBE 484-484L Fundamentals of Biochemical Engineering and Lab
- CBE 485-485L Renewable and Sustainable Energy and Lab
- CBE 490 Seminar

The global biotechnology market size is estimated to grow 12.5% (or from $1,224.31 billion to $3,995.22 billion) between FY2023 and FY2032 (Biotechnology Market Report | 12.5% - CAGR by 2032). To meet this demand, employers such Pfizer, AstraZeneca, Novartis, and many others, will need an adaptable and competent workforce to meet the changing portfolios of the next decade. Additionally, South Dakota biotech companies are set to be part of this growth. By implementing these changes to the certificate program, SDSU will better prepare students for these jobs by offering a well-rounded experience that combines hands-on vocational practice with classroom instruction on processes, helping to create adaptable and skilled entry-level employees to meet workforce demands.