



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

Substantive Program Modification Form

UNIVERSITY:	SDSU
CURRENT PROGRAM DEGREE:	Bachelor of Science (B.S.)
CURRENT PROGRAM MAJOR/MINOR:	Physics
CURRENT SPECIALIZATION	N/A
CIP CODE:	40.0801
UNIVERSITY DEPARTMENT:	Physics
BANNER DEPARTMENT CODE:	SPHY
UNIVERSITY COLLEGE:	Natural Science
BANNER COLLEGE CODE:	3T

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

4/28/2023

Date

1. This modification addresses a change in:

- | | |
|--|---|
| <input checked="" type="checkbox"/> Total credits required within the discipline | <input checked="" type="checkbox"/> Total credits of supportive course work |
| <input checked="" type="checkbox"/> Total credits of elective course work | <input type="checkbox"/> Total credits required for program |
| <input type="checkbox"/> Program name | <input type="checkbox"/> Existing specialization |
| <input type="checkbox"/> CIP Code | <input type="checkbox"/> Other (explain below) |

2. Effective date of change: 2023-2024 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)

Pref.	Num.	Title	Cr. Hrs.	Pref.	Num.	Title	Cr. Hrs.
		Systems General Education Requirements	33			Systems General Education Requirements	25
		Systems General Education Requirements – Electives	12			Systems General Education Requirements – Electives	21

Existing Curriculum				Proposed Curriculum (<i>highlight changes</i>)			
Pref.	Num.	Title	Cr. Hrs.	Pref.	Num.	Title	Cr. Hrs.
						SGR #1	3
						SGR #1	3
						SGR #2	3
		SGR #3	3			SGR #3	3
		SGR #3	3			SGR #3	3
		SGR #4	3			SGR #4	3
		SGR #4	3			SGR #4	3
Systems General Education Requirements – Required			21	Systems General Education Requirements – Required			4
ENGL	101	Composition I (SGR #1)	3	ENGL	101	Composition I (SGR #1)	3
ENGL OR ENGL	201	Composition II (3) (SGR #1)	3	ENGL OR ENGL	201	Composition II (3) (SGR #1)	3
	277	Technical Writing in Engineering (3) (SGR #1)			277	Technical Writing in Engineering (3) (SGR #1)	
CMST	101	Fundamentals of Speech (SGR #2)	3	CMST	101	Fundamentals of Speech (SGR #2)	3
MATH	123	Calculus (SGR #5)	4	MATH	123	Calculus (SGR #5)	4
PHYS AND PHYS OR PHYS AND PHYS	111-111L	Introduction to Physics I & Lab (4,0) (SGR #6)	8	PHYS AND PHYS OR PHYS AND PHYS	111-111L	Introduction to Physics I & Lab (3,1) (SGR #6)	-
	113-113L	Introduction to Physics II & Lab (4,0) (SGR #6)			113-113L	Introduction to Physics II & Lab (3,1) (SGR #6)	
	211-211L	University Physics I & Lab (4,0) (SGR #6)			211-211L	University Physics I & Lab (4,1) (SGR #6) (Major Requirement)	
	213-213L	University Physics II & Lab (4,0) (SGR #6)			213-213L	University Physics II & Lab (4,1) (SGR #6) (Major Requirement)	
Department Requirements <i>Additional required credits of coursework beyond SGRs, Major, and Support Courses</i>			3	Department Requirements <i>Additional required credits of coursework beyond SGRs, Major, and Support Courses</i>			-
		Natural Sciences (10+) Satisfying coursework must include - at least two classes with laboratory components - at least two different prefixes (MATH and STAT courses do not count toward the Science requirement.) (6 credits of SGR #6 are counted toward this goal and 4 credits of major coursework)	0			Natural Sciences (10+) Satisfying coursework must include - at least two classes with laboratory components - at least two different prefixes (MATH and STAT courses do not count toward the Science requirement.) (6 credits of SGR #6 are counted toward this goal and 4 credits of major coursework)	0
AHSS	111	Introduction to Global Citizenship and Diversity	3	AHSS	111	Introduction to Global Citizenship and Diversity	3
		One declared minor outside of the major prefix OR a second major OR a teaching specialization. The minor may be a traditional minor within one department or it may be interdisciplinary involving more than one department. The minor can be in a different college. The minor must be declared no later than the student's third semester of enrollment.	-			One declared minor outside of the major prefix OR a second major OR a teaching specialization. The minor may be a traditional minor within one department or it may be interdisciplinary involving more than one department. The minor can be in a different college. The minor must be declared no later than the student's third semester of enrollment.	-
		Capstone course within major PHYS 490 Seminar	-			Capstone course within major PHYS 490 Seminar	-
		33 Upper Division Credits (300-400 level coursework inside and outside of the major)	-			33 Upper Division Credits (300-400 level coursework inside and outside of the major)	-
Major Requirements			84	Major Requirements			94
Major Core			43	Major Core			53
CHEM	112	General Chemistry I	3	CHEM	112	General Chemistry I	3

Existing Curriculum

Proposed Curriculum (highlight changes)

Pref.	Num.	Title	Cr. Hrs.	Pref.	Num.	Title	Cr. Hrs.
CHEM	112L	General Chemistry I Lab	1	CHEM	112L	General Chemistry I Lab	1
CHEM	114	General Chemistry II	3	CHEM	114	General Chemistry II	3
CHEM	114L	General Chemistry II Lab	1	CHEM	114L	General Chemistry II Lab	1
EE	216	Linear Circuits I & Lab	3	EE	216	Linear Circuits I & Lab	3
EE	216L	Linear Circuits I Lab	1	EE	216L	Linear Circuits I Lab	1
MATH	125	Calculus II	4	MATH	125	Calculus II	4
MATH	225	Calculus III	4	MATH	225	Calculus III	4
MATH	321	Differential Equations	3	MATH	321	Differential Equations	3
PHYS AND PHYS OR PHYS AND PHYS	111-111L 113-113L 211-211L 213-213L	Introduction to Physics I & Lab (4,0) (SGR #6) Introduction to Physics II & Lab (4,0) (SGR #6) University Physics I & Lab (4,0) (SGR #6) University Physics II & Lab (4,0) (SGR #6)	--	PHYS AND PHYS OR PHYS AND PHYS	111-111L 113-113L 211-211L 213-213L	Introduction to Physics I & Lab (4,0) (SGR #6) Introduction to Physics II & Lab (4,0) (SGR #6) University Physics I & Lab (4,0) (SGR #6) University Physics II & Lab (4,0) (SGR #6)	--
PHYS	119	First Year Seminar in Physics	1	PHYS	119	First Year Seminar in Physics	1
				PHYS	211	University Physics I (SGR #6)	4
				PHYS	211L	University Physics I Lab (SGR #6)	1
				PHYS	213	University Physics II (SGR #6)	4
				PHYS	213L	University Physics II Lab (SGR #6)	1
PHYS	316	Measurement Theory and Experiment Design	2	PHYS	316	Measurement Theory and Experiment Design	1
PHYS	316L	Measurement Theory and Experiment Design Lab	0	PHYS	316L	Measurement Theory and Experiment Design Lab	1
PHYS	331	Introduction to Modern Physics	3	PHYS	331	Introduction to Modern Physics	3
PHYS	341	Thermodynamics	2	PHYS	341	Thermodynamics	2
PHYS	343	Statistical Physics	2	PHYS	343	Statistical Physics	2
PHYS	421	Electromagnetism	4	PHYS	421	Electromagnetism	4
PHYS	451	Classical Mechanics	4	PHYS	451	Classical Mechanics	4
PHYS	490	Seminar (Capstone)	2	PHYS	490	Seminar (Capstone)	2
Physics Requirements			5	Physics Requirements			5
CSC	150	Computer Science I	3	CSC	150	Computer Science I	3
PHYS	318	Advanced Laboratory I	2	PHYS	318	Advanced Laboratory I	2
Physics Technical Electives			36	Physics Technical Electives			36
Select <u>one</u> elective group based on career objectives.			36	Select <u>one</u> elective group based on career objectives.			36
Group 1: Professional and Applied Physics				Group 1: Professional and Applied Physics			
MATH OR PHYS OR STAT	331 481 381	Advanced Engineering Math (3) Mathematical Physics (4) Intro to Probability & Statistics (3)	3-4	MATH OR PHYS OR STAT	331 481 381	Advanced Engineering Math (3) Mathematical Physics (4) Intro to Probability & Statistics (3)	3-4
PHYS	418	Advanced Lab II	1	PHYS	418	Advanced Lab II	1
PHYS	471	Quantum Mechanics	4	PHYS	471	Quantum Mechanics	4
		Free Electives	8-9			Free Electives	8-9
		Technical Electives • Up to a total of 3 credits may be NE/PHYS x94, x96, x98 total • Technical electives will be selected from the following list of approved courses. Any departures from this list must be approved by the Head of the Physics Department. One may not count a specific course required for an elective group as also counting towards elective credit requirements of the elective group.	19			Technical Electives • Up to a total of 3 credits may be NE/PHYS x94, x96, x98 total • Technical electives will be selected from the following list of approved courses. Any departures from this list must be approved by the Head of the Physics Department. One may not count a specific course required for an elective group as also counting towards elective credit requirements of the elective group.	19

Existing Curriculum

Proposed Curriculum (highlight changes)

Pref.	Num.	Title	Cr. Hrs.	Pref.	Num.	Title	Cr. Hrs.
		<ul style="list-style-type: none"> o CHEM 332 - Analytical Chemistry (COM) Credits: 3 o CHEM 332L - Analytical Chemistry Lab (COM) Credits: 1 o EE 218 - Linear Circuits II Credits: 3 o EE 218L - Linear Circuits II Lab Credits: 1 o EE 222 - Energy Conversion Credits: 3 o EE 222L - Energy Conversion Lab Credits: 1 o EE 320 - Electronics I (COM) Credits: 3 o EE 320L - Electronics I Lab (COM) Credits: 1 o EM 321 - Mechanics of Materials (COM) Credits: 3 o EM 331 - Fluid Mechanics (COM) Credits: 3 o GE 121 - Engineering Design Graphics I Credits: 1 o GE 123 - Computer Aided Drawing Credits: 1 o MATH 315 - Linear Algebra (COM) Credits: 3 o MATH 331 - Advanced Engineering Mathematics (COM) Credits: 3 o MATH 374 - Scientific Computation I Credits: 3 o ME 415 - Heat Transfer Credits: 3 o NE/PHYS 437 - Foundations of Health Physics Credits: 3 o NE 435 - Introduction to Nuclear Engineering Credits: 3 o NE 494 - Internship (COM) Credits: 1-3 o NE 498 - Undergraduate Research/Scholarship (COM) Credits: 1-3 o PHIL 200 - Introduction to Logic (COM) [SGR #4] Credits: 3 o PHYS 185 - Solar System Astronomy (COM) [SGR #6] Credits: 3 o PHYS 185L - Solar System Astronomy Lab (COM) [SGR #6] Credits: 0 o PHYS 187 - Stars, Galaxies, and Cosmology (COM) [SGR #6] Credits: 3 o PHYS 187L - Stars, Galaxies, and Cosmology Lab (COM) [SGR #6] Credits: 0 o PHYS 361 - Optics (COM) Credits: 3 				<ul style="list-style-type: none"> o CHEM 332 - Analytical Chemistry (COM) Credits: 3 o CHEM 332L - Analytical Chemistry Lab (COM) Credits: 1 o EE 218 - Linear Circuits II Credits: 3 o EE 218L - Linear Circuits II Lab Credits: 1 o EE 222 - Energy Conversion Credits: 3 o EE 222L - Energy Conversion Lab Credits: 1 o EE 320 - Electronics I (COM) Credits: 3 o EE 320L - Electronics I Lab (COM) Credits: 1 o EM 321 - Mechanics of Materials (COM) Credits: 3 o EM 331 - Fluid Mechanics (COM) Credits: 3 o GE 121 - Engineering Design Graphics I Credits: 1 o GE 123 - Computer Aided Drawing Credits: 1 o MATH 315 - Linear Algebra (COM) Credits: 3 o MATH 331 - Advanced Engineering Mathematics (COM) Credits: 3 o MATH 374 - Scientific Computation I Credits: 3 o MATH 412 - Linear Algebra (COM) Credits: 3 o ME 415 - Heat Transfer Credits: 3 o NE/PHYS 437 - Foundations of Health Physics Credits: 3 o NE 435 - Introduction to Nuclear Engineering Credits: 3 o NE 494 - Internship (COM) Credits: 1-3 o NE 498 - Undergraduate Research/Scholarship (COM) Credits: 1-3 o PHIL 200 - Introduction to Logic (COM) [SGR #4] Credits: 3 o PHYS 185 - Solar System Astronomy (COM) [SGR #6] Credits: 2 o PHYS 185L - Solar System Astronomy Lab (COM) [SGR #6] Credits: 1 o PHYS 187 - Stars, Galaxies, and Cosmology (COM) [SGR #6] Credits: 2 o PHYS 187L - Stars, Galaxies, and Cosmology Lab (COM) [SGR #6] Credits: 1 o PHYS 361 - Optics (COM) Credits: 3 	

Existing Curriculum

Proposed Curriculum (highlight changes)

Pref.	Num.	Title	Cr. Hrs.	Pref.	Num.	Title	Cr. Hrs.
		<ul style="list-style-type: none"> ○ PHYS 418 - Advanced Lab II Credits: 1 ○ PHYS 433 - Nuclear and Elementary Particle Physics (COM) Credits: 3 ○ PHYS 439 - Condensed Matter Physics (COM) Credits: 3-4 (4 credits required) ○ PHYS 471 - Quantum Mechanics (COM) Credits: 4 ○ PHYS 481 - Mathematical Physics (COM) Credits: 4 ○ PHYS 494 - Internship (COM) Credits: 1-4 ○ PHYS 498 - Undergraduate Research/Scholarship (COM) Credits: 1-12 ○ STAT 381 - Introduction to Probability and Statistics (COM) Credits: 3 				<ul style="list-style-type: none"> ○ PHYS 418 - Advanced Lab II Credits: 1 ○ PHYS 433 - Nuclear and Elementary Particle Physics (COM) Credits: 3 ○ PHYS 439 - Condensed Matter Physics (COM) Credits: 3-4 (4 credits required) ○ PHYS 471 - Quantum Mechanics (COM) Credits: 4 ○ PHYS 481 - Mathematical Physics (COM) Credits: 4 ○ PHYS 494 - Internship (COM) Credits: 1-4 ○ PHYS 498 - Undergraduate Research/Scholarship (COM) Credits: 1-12 ○ STAT 381 - Introduction to Probability and Statistics (COM) Credits: 3 	
<i>Group 2: Health/Medical Physics</i>				<i>Group 2: Health/Medical Physics</i>			
CHEM	326	Organic Chemistry I	3	CHEM	326	Organic Chemistry I	3
CHEM	326L	Organic Chemistry I Lab	1	CHEM	326L	Organic Chemistry I Lab	1
CHEM OR CHEM OR PHYS	328-328L 332-332L 471	Organic Chemistry II & Lab (3,1) Analytical Chemistry & Lab (3,1) Quantum Mechanics (4)	4	CHEM OR CHEM OR PHYS	328-328L 332-332L 471	Organic Chemistry II & Lab (3,1) Analytical Chemistry & Lab (3,1) Quantum Mechanics (4)	4
NE	337	Foundations of Health Physics	3	NE	337	Foundations of Health Physics	3
PHYS OR NE	433 435	Nuclear & Elementary Particle Physics (3) Intro to Nuclear Engineering (3)	3	PHYS OR NE	433 435	Nuclear & Elementary Particle Physics (3) Intro to Nuclear Engineering (3)	3
PHYS	418	Advanced Laboratory II	1	PHYS	418	Advanced Laboratory II	1
STAT	381	Introduction to Probability and Statistics	3	STAT	381	Introduction to Probability and Statistics	3
<i>Group 3: Flexible Emphasis</i>				<i>Group 3: Flexible Emphasis</i>			
		Directed Electives	20			Directed Electives	20
		Electives	9			Electives	9
		Technical Electives • Up to a total of 3 credits may be NE/PHYS x94, x96, x98 total • Technical electives will be selected from the following list of approved courses. Any departures from this list must be approved by the Head of the Physics Department. One may not count a specific course required for an elective group as also counting towards elective credit requirements of the elective group. ○ CHEM 332 - Analytical Chemistry (COM) Credits: 3 ○ CHEM 332L - Analytical Chemistry Lab (COM) Credits: 1 ○ EE 218 - Linear Circuits II Credits: 3	7			Technical Electives ○ Up to a total of 3 credits may be NE/PHYS x94, x96, x98 total ○ Technical electives will be selected from the following list of approved courses. Any departures from this list must be approved by the Head of the Physics Department. One may not count a specific course required for an elective group as also counting towards elective credit requirements of the elective group. ○ CHEM 332 - Analytical Chemistry (COM) Credits: 3 ○ CHEM 332L - Analytical Chemistry Lab (COM) Credits: 1	

Existing Curriculum

Proposed Curriculum (highlight changes)

Pref.	Num.	Title	Cr. Hrs.	Pref.	Num.	Title	Cr. Hrs.
		<ul style="list-style-type: none"> EE 218L - Linear Circuits II Lab Credits: 1 EE 222 - Energy Conversion Credits: 3 EE 222L - Energy Conversion Lab Credits: 1 EE 320 - Electronics I (COM) Credits: 3 EE 320L - Electronics I Lab (COM) Credits: 1 EM 321 - Mechanics of Materials (COM) Credits: 3 EM 331 - Fluid Mechanics (COM) Credits: 3 GE 121 - Engineering Design Graphics I Credits: 1 GE 123 - Computer Aided Drawing Credits: 1 MATH 315 - Linear Algebra (COM) Credits: 3 MATH 331 - Advanced Engineering Mathematics (COM) Credits: 3 MATH 374 - Scientific Computation I Credits: 3 ME 415 - Heat Transfer Credits: 3 NE/PHYS 437 - Foundations of Health Physics Credits: 3 NE 435 - Introduction to Nuclear Engineering Credits: 3 NE 494 - Internship (COM) Credits: 1-3 NE 498 - Undergraduate Research/Scholarship (COM) Credits: 1-3 PHIL 200 - Introduction to Logic (COM) [SGR #4] Credits: 3 PHYS 185 - Solar System Astronomy (COM) [SGR #6] Credits: 3 PHYS 185L - Solar System Astronomy Lab (COM) [SGR #6] Credits: 0 PHYS 187 - Stars, Galaxies, and Cosmology (COM) [SGR #6] Credits: 3 PHYS 187L - Stars, Galaxies, and Cosmology Lab (COM) [SGR #6] Credits: 0 PHYS 361 - Optics (COM) Credits: 3 PHYS 418 - Advanced Lab II Credits: 1 PHYS 433 - Nuclear and Elementary Particle Physics (COM) Credits: 3 PHYS 439 - Condensed Matter Physics (COM) Credits: 3-4 (4 credits required) 				<ul style="list-style-type: none"> EE 218 - Linear Circuits II Credits: 3 EE 218L - Linear Circuits II Lab Credits: 1 EE 222 - Energy Conversion Credits: 3 EE 222L - Energy Conversion Lab Credits: 1 EE 320 - Electronics I (COM) Credits: 3 EE 320L - Electronics I Lab (COM) Credits: 1 EM 321 - Mechanics of Materials (COM) Credits: 3 EM 331 - Fluid Mechanics (COM) Credits: 3 GE 121 - Engineering Design Graphics I Credits: 1 GE 123 - Computer Aided Drawing Credits: 1 MATH 315 - Linear Algebra (COM) Credits: 3 MATH 331 - Advanced Engineering Mathematics (COM) Credits: 3 MATH 374 - Scientific Computation I Credits: 3 MATH 412 - Linear Algebra (COM) Credits: 3 ME 415 - Heat Transfer Credits: 3 NE/PHYS 437 - Foundations of Health Physics Credits: 3 NE 435 - Introduction to Nuclear Engineering Credits: 3 NE 494 - Internship (COM) Credits: 1-3 NE 498 - Undergraduate Research/Scholarship (COM) Credits: 1-3 PHIL 200 - Introduction to Logic (COM) [SGR #4] Credits: 3 PHYS 185 - Solar System Astronomy (COM) [SGR #6] Credits: 2 PHYS 185L - Solar System Astronomy Lab (COM) [SGR #6] Credits: 1 PHYS 187 - Stars, Galaxies, and Cosmology (COM) [SGR #6] Credits: 2 PHYS 187L - Stars, Galaxies, and Cosmology Lab (COM) [SGR #6] Credits: 1 PHYS 361 - Optics (COM) Credits: 3 PHYS 418 - Advanced Lab II Credits: 1 	

Existing Curriculum				Proposed Curriculum (highlight changes)			
Pref.	Num.	Title	Cr. Hrs.	Pref.	Num.	Title	Cr. Hrs.
		<ul style="list-style-type: none">○ PHYS 471 - Quantum Mechanics (COM) Credits: 4○ PHYS 481 - Mathematical Physics (COM) Credits: 4○ PHYS 494 - Internship (COM) Credits: 1-4○ PHYS 498 - Undergraduate Research/Scholarship (COM) Credits: 1-12○ STAT 381 - Introduction to Probability and Statistics (COM) Credits: 3				<ul style="list-style-type: none">○ PHYS 433 - Nuclear and Elementary Particle Physics (COM) Credits: 3○ PHYS 439 - Condensed Matter Physics (COM) Credits: 3-4 (4 credits required)○ PHYS 471 - Quantum Mechanics (COM) Credits: 4○ PHYS 481 - Mathematical Physics (COM) Credits: 4○ PHYS 494 - Internship (COM) Credits: 1-4○ PHYS 498 - Undergraduate Research/Scholarship (COM) Credits: 1-12○ STAT 381 - Introduction to Probability and Statistics (COM) Credits: 3	
Electives (Taken as needed to complete any additional degree requirements)			0	Electives (Taken as needed to complete any additional degree requirements)			1
Summary of Credits Physics (B.S.)							
System General Education Requirements			33	System General Education Requirements			25
Department Requirements Additional required credits of coursework beyond SGRs, Major, and Support Courses			3	Department Requirements Additional required credits of coursework beyond SGRs, Major, and Support Courses			0
Majors Requirements			84	Majors Requirements			94
Electives (Taken as needed to complete any additional degree requirements)			0	Electives (Taken as needed to complete any additional degree requirements)			1
Total number of hours required for major			108	Total number of hours required for major			98
Total number of hours required for degree			120	Total number of hours required for degree			120

8. Explanation of the Change:

The Department of Physics identified the following changes to the Physics major:

- Removed a specific course selection from SGR #1 and SGR #2 to allow students more flexibility in meeting their System General Education requirements.
- Departments updated zero credit lab courses and adjusted the credits between the lecture and labs to accurately reflect contact time.
- PHYS 211-211L University Physics I & Lab and PHYS 213-213L University Physics I & Lab increased from 4+0 to 4+1 credit courses.
- AHSS 111 Introduction to Global Citizenship and Diversity (3 cr.) and the minor requirement were eliminated to allow students to more clearly focus on the major requirements.
- Removed the department requirement to complete 10+ credits of Natural Science coursework. This language is redundant to current program requirements. The requirement was carried over when the department transitioned from the College of Arts and Sciences to the College of Natural Sciences.