



**SOUTH DAKOTA BOARD OF REGENTS**  
**ACADEMIC AFFAIRS FORMS**  
**Substantive Program Modification Program**

<b>UNIVERSITY:</b>	<b>University of South Dakota</b>
<b>CURRENT PROGRAM TITLE:</b>	<b>Physics, B.S. (No Specialization and Applied Physics Specialization)</b>
<b>CIP CODE:</b>	<b>40.0801</b>
<b>UNIVERSITY DEPARTMENT:</b>	<b>Physics</b>
<b>UNIVERSITY DIVISION:</b>	<b>College of Arts &amp; Sciences</b>

**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.*

*Elizabeth M. Freeburg*

*8/28/2017*

Vice President of Academic Affairs or  
President of the University

Date

**1. This modification addresses a change in (place an "X" in the appropriate box):**

<input type="checkbox"/> Total credits required within the discipline	<input checked="" type="checkbox"/> Total credits of supportive course work
<input type="checkbox"/> Total credits of elective course work	<input checked="" 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: Fall 2017**

**3. Program Degree Level (place an "X" in the appropriate box):**

Associate  Bachelor's  Master's  Doctoral

**4. Category (place an "X" in the appropriate box):**

Certificate  Specialization  Minor  Major

**5. If a name change is proposed, the change will occur (place an "X" in the appropriate box):**

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:**

*Reminder: Name changes impact require updating any related articulation agreements, site approvals, etc.*

## 6. Primary Aspects of the Modification (*add lines as needed*):

Existing Curriculum

Physics, B.S. (No Specialization and Applied Physics Specialization)

Proposed Curriculum (*highlight changes*)

Physics, B.S. (No Specialization and Applied Physics Specialization)

Pref.	Num.	Title	Cr. Hrs.	Pref.	Num.	Title	Cr. Hrs.
<b>System General Education Requirements</b>				<b>System General Education Requirements</b>			
SGR 1: Written Communication				SGR 1: Written Communication			
ENGL	101	Composition I	3	ENGL	101	Composition I	3
OR				OR			
UHON	110	Honors English		UHON	110	Honors English	
<b>SGR 2: Oral Communication</b>				<b>SGR 2: Oral Communication</b>			
3				3			
SGR 3: Social & Behavioral Sciences				SGR 3: Social & Behavioral Sciences			
<b>BOR approved Course</b>				<b>BOR approved Course</b>			
3				3			
SGR 4: Arts and Humanities				SGR 4: Arts and Humanities			
<b>Humanities Course/Fine Arts Course</b>				<b>Humanities Course/Fine Arts Course</b>			
3				3			
<b>SGR 5: Quantitative Literacy</b> CALC 123				<b>SGR 5: Quantitative Literacy</b> CALC 123			
3 (-3)				3 (-3)			
SGR 6: Sciences				SGR 6: Sciences			
<b>BOR approved lab science course</b> PHYS 211/L				<b>BOR approved lab science course</b> PHYS 211/L			
3 (-3)				3 (-3)			
<b>Subtotal:</b>			<b>18 (-6)</b>	<b>Subtotal:</b>			<b>18 (-6)</b>
<b>Institution designated general education requirements</b>				<b>Institution designated general education requirements</b>			
Advanced composition course (in addition to SGR #1)			3*	Advanced composition course (in addition to SGR #1)			3*
Additional 100/200 course in another discipline from SGR #3			3*	Additional 100/200 course in another discipline from SGR #3			3*
Course from category in Fine Arts or Humanities not selected for SGR #4 above			3*	Course from category in Fine Arts or Humanities not selected for SGR #4 above			3*
Additional 100/200 lab science course for SGR #6 PHYS 213/L			3*(-3)	Additional 100/200 lab science course for SGR #6 PHYS 213/L			3*(-3)
<b>Subtotal:</b>			<b>12 (-3)</b>	<b>Subtotal:</b>			<b>12 (-3)</b>
<b>General Education credits minus double count reduction:</b>			<b>30 (-9)</b>	<b>General Education credits minus double count reduction:</b>			<b>30 (-9)</b>
*University specific requirements				*University specific requirements			
<b>Arts &amp; Sciences-College Degree Requirements:</b>				<b>Arts &amp; Sciences-College Degree Requirements:</b>			
<b>Bachelor of Science</b>				<b>Bachelor of Science</b>			
<b>ENGL 210: Introduction to Literature</b>			3	<b>ENGL 210: Introduction to Literature</b>			3
This course may not be used to fulfill SGR 4 Arts and Humanities or the Humanities and Social Sciences Distribution Requirement for the College of Arts & Sciences.				This course may not be used to fulfill SGR 4 Arts and Humanities or the Humanities and Social Sciences Distribution Requirement for the College of Arts & Sciences.			
<b>Minor or second major</b>			18(-18)	<b>Minor or second major</b>			18(-18)
<b>Humanities and Social Sciences Distribution Requirement</b>			6	<b>Humanities and Social Sciences Distribution Requirement</b>			6
B.S. students must take two humanities or social science courses (minimum six credit hours) in addition to the BOR general education requirements from among the following prefixes: ANTH, CJUS, CLHU, DCOM, ENGL, FREN, GEOG, GER, GREE, HIST, INTS, LAKL, LATI, LDR, LING, MCOM, MFL, MSL, NATV, PHIL, POLS, selected PSYC (per Psychology section of the catalog), REL, RUSS, SOC, SPAN, SPCM, selected SUST (per Sustainability section of the catalog), and WMST.				B.S. students must take two humanities or social science courses (minimum six credit hours) in addition to the BOR general education requirements from among the following prefixes: ANTH, CJUS, CLHU, DCOM, ENGL, FREN, GEOG, GER, GREE, HIST, INTS, LAKL, LATI, LDR, LING, MCOM, MFL, MSL, NATV, PHIL, POLS, selected PSYC (per Psychology section of the catalog), REL, RUSS, SOC, SPAN, SPCM, selected SUST (per Sustainability section of the catalog), and WMST.			
<b>Mathematics</b>			5-12 (-5)	<b>Mathematics</b>			5-12 (-5)
Choose either Option A or B as listed below				Choose either Option A or B as listed below			
Option A:				Option A:			
MATH	123	Calculus I	4	MATH	123	Calculus I	4
MATH	123L	Calculus I Laboratory	1	MATH	123L	Calculus I Laboratory	1
Option B:				Option B:			
And one statistics or programming course (minimum three credit hours) from the list below:				And one statistics or programming course (minimum three credit hours) from the list below:			
BADM	220	Business Statistics	3	BADM	220	Business Statistics	3
BADM	321	Business Statistics II	3	BADM	321	Business Statistics II	3
BIOL	420	Introduction to Biostatistics & Computational Biology	3	BIOL	420	Introduction to Biostatistics & Computational Biology	3

CSC	120	Fundamentals of Programming	3
CSC	155	Introduction to Computer Science & Programming	4
CSC	155L	Introduction to Computer Science & Programming Laboratory	0
CSC	180	Introductory Programming for IT Consulting	3
PSYC	371	Statistics in Psychological Research	3
SOC	309	Statistical Research Methods	3
STAT	281	Introduction to Statistics [SGR #5]	3
Complete one of the following options listed below:			
OPTION 1:			
MATH	121	Survey of Calculus [SGR #5]	4
OPTION 2:			
MATH	102	College Algebra [SGR #5]	3
MATH	104	Finite Mathematics [SGR #5]	4
OPTION 3:			
MATH	103	Quantitative Literacy [SGR #5]	3
MATH	103	Quantitative Literacy Lab	0-1
MATH	104	Finite Mathematics [SGR #5]	4
OPTION 4:			
MATH	104	Finite Mathematics [SGR #5]	4
MATH	115	Precalculus [SGR #5]	5
OPTION 5:			
MATH	104	Finite Mathematics [SGR #5]	4
MATH	120	Trigonometry [SGR #5]	3
<b>Natural Sciences</b>			6 (-6)
Two courses must be taken in addition to laboratory courses meeting the BOR SGR #6 requirement; total of BS and BOR SGR natural science courses must be at least 12 cr. and at least two prefixes must be included. Additional courses must be chosen from the following prefixes: ANAT, BIOC, BIOL, CHEM, ESCI, MICR, MTRO, OCEN, PHGY, PHYS, selected PSYC (per Psychology section of the catalog), and selected SUST (per Sustainability section of the catalog). <u>PHYS courses</u>			
<b>Bachelor of Science Additional Requirements Subtotal:</b>			<b>38-45 (-29)</b>
<b>Physics (B.S.) Program Requirements (no specialization)</b>			
<b>Departmental Requirements</b>			
PHYS	211	University Physics I [SGR #6]	4
PHYS	211L	University Physics I Laboratory	1
PHYS	213	University Physics II [SGR #6]	4
PHYS	213L	University Physics II Laboratory	1
PHYS	332	Experimental Modern Physics I	2
PHYS	421	Electromagnetism	4
PHYS	431	Introduction to Modern Physics	3
PHYS	441	Thermodynamics	2
PHYS	451	Classical Mechanics	4
PHYS	471	Quantum Mechanics	4
PHYS	498	Undergraduate Research/Scholarship	1
PHYS	Upper division electives		6
<b>Subtotal</b>			<b>36</b>
<b>Physics (B.S.) Program Requirements (Applied Physics specialization)</b>			
<b>Departmental Requirements</b>			
PHYS	211	University Physics I	4
PHYS	211L	University Physics I Laboratory	1
PHYS	213	University Physics II	4

CSC	120	Fundamentals of Programming	3
CSC	155	Introduction to Computer Science & Programming	4
CSC	155L	Introduction to Computer Science & Programming Laboratory	0
CSC	180	Introductory Programming for IT Consulting	3
PSYC	371	Statistics in Psychological Research	3
SOC	309	Statistical Research Methods	3
STAT	281	Introduction to Statistics [SGR #5]	3
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OPTION 2:			
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OPTION 3:			
MATH	103	Quantitative Literacy [SGR #5]	3
MATH	103	Quantitative Literacy Lab	0-1
MATH	104	Finite Mathematics [SGR #5]	4
OPTION 4:			
MATH	104	Finite Mathematics [SGR #5]	4
MATH	115	Precalculus [SGR #5]	5
OPTION 5:			
MATH	104	Finite Mathematics [SGR #5]	4
MATH	120	Trigonometry [SGR #5]	3
<b>Natural Sciences</b>			6 (-6)
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<b>Bachelor of Science Additional Requirements Subtotal:</b>			<b>38-45 (-29)</b>
<b>Physics (B.S.) Program Requirements</b>			
<b>Departmental Requirements</b>			
PHYS	211	University Physics I [SGR #6]	4
PHYS	211L	University Physics I Laboratory	1
PHYS	213	University Physics II [SGR #6]	4
PHYS	213L	University Physics II Laboratory	1
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PHYS	471	Quantum Mechanics	4
PHYS	498	Undergraduate Research/Scholarship	1
PHYS	Upper division electives		6
<b>Subtotal</b>			<b>36</b>
<b>Physics (B.S.) Program Requirements (Applied Physics specialization)</b>			
<b>Departmental Requirements</b>			
PHYS	211	University Physics I	4
PHYS	211L	University Physics I Laboratory	1
PHYS	213	University Physics II	4

PHYS	213L	University Physics II Laboratory	1
PHYS	332	Experimental Modern Physics I	2
PHYS	421	Electromagnetism	4
PHYS	431	Introduction to Modern Physics	3
PHYS	441	Thermodynamics	2
PHYS	451	Classical Mechanics	4
PHYS	471	Quantum Mechanics	4
PHYS	439	Solid State Physics	3
<b>Take a grouping from below:</b>			
PHYS	454	Semiconductor materials	3
PHYS	454L	Electronics and Device Fabrication	1
<b>OR</b>			
PHYS	456	Radiation Detection & Gamma Ray Spectroscopy	3
PHYS	456L	Lab. for Radiation Measurements	1
<b>Subtotal</b>			<b>36</b>
<b>Non-Departmental Requirements:</b>			
Students who complete the Physics major will have fulfilled the requirements for the Mathematics Minor and are not required to complete an additional minor, although they are welcome to add another minor.			
Non-Departmental Requirements in Chemistry and Computer Science may be applied to an additional minor.			
CHEM	112	General Chemistry I	3
CHEM	112L	General Chemistry I laboratory	1
CHEM	114	General Chemistry II	3
CHEM	114L	General Chemistry II laboratory	1
CSC	155	Intro to Computer Science & Programming	4
CSC	155L	Intro to Computer Science & Programming Lab	0
MATH	123	Calculus I	4
MATH	123L	Calculus I Lab	1
MATH	125	Calculus II	4
MATH	125L	Calculus II Lab	1
MATH	225	Calculus III	4
MATH	321	Differential Equations	3
Additional MATH course above MATH 102			3
<b>Subtotal, Non-Departmental Requirements:</b>			<b>32</b>
<b>Subtotal, Physics (B.S.)</b>			<b>68</b>
<b>Free Electives:</b>			<b>22</b>
Cross-curricular skills:			
<ul style="list-style-type: none"> <li>inquiry and analysis</li> <li>critical and creative thinking</li> <li>information literacy</li> <li>teamwork</li> <li>problem solving</li> </ul>			
<b>General Education courses required [30 (-9)]</b>			<b>21</b>
<b>Arts &amp; Sciences-College Degree Requirements B.S. [38-45 (-29)]</b>			<b>9-16</b>
<b>Total number of hours required for major</b>			<b>68</b>
<b>Total number of hours required for major with Applied Physics specialization</b>			<b>68</b>
<b>Free Electives beyond major hours to reach 120</b>			<b>15-22</b>
<b>Total number of hours required for degree</b>			<b>120</b>

PHYS	213L	University Physics II Laboratory	1
PHYS	332	Experimental Modern Physics I	2
PHYS	421	Electromagnetism	4
PHYS	431	Introduction to Modern Physics	3
PHYS	441	Thermodynamics	2
PHYS	451	Classical Mechanics	4
PHYS	471	Quantum Mechanics	4
PHYS	439	Solid State Physics	3
<b>Take a grouping from below:</b>			
PHYS	454	Semiconductor materials	3
PHYS	454L	Electronics and Device Fabrication	1
<b>OR</b>			
PHYS	456	Radiation Detection & Gamma Ray Spectroscopy	3
PHYS	456L	Lab. for Radiation Measurements	1
<b>Subtotal</b>			<b>36</b>
<b>Non-Departmental Requirements:</b>			
Students who complete the Physics major will have fulfilled the requirements for the Mathematics Minor and are not required to complete an additional minor, although they are welcome to add another minor.			
Non-Departmental Requirements in Chemistry and Computer Science may be applied to an additional minor.			
CHEM	112	General Chemistry I	3
CHEM	112L	General Chemistry I laboratory	1
CHEM	114	General Chemistry II	3
CHEM	114L	General Chemistry II laboratory	1
CSC	155	Intro to Computer Science & Programming	4
CSC	155L	Intro to Computer Science & Programming Lab	0
MATH	123	Calculus I	4
MATH	123L	Calculus I Lab	1
MATH	125	Calculus II	4
MATH	125L	Calculus II Lab	1
MATH	225	Calculus III	4
MATH	321	Differential Equations	3
Additional MATH course above MATH 102			1
<b>Subtotal, Non-Departmental Requirements:</b>			<b>30</b>
<b>Subtotal, Physics (B.S.)</b>			<b>66</b>
<b>Free Electives:</b>			<b>24</b>
Cross-curricular skills:			
<ul style="list-style-type: none"> <li>inquiry and analysis</li> <li>critical and creative thinking</li> <li>information literacy</li> <li>teamwork</li> <li>problem solving</li> </ul>			
<b>General Education courses required [30 (-9)]</b>			<b>21</b>
<b>Arts &amp; Sciences-College Degree Requirements B.S. [38-45 (-29)]</b>			<b>9-16</b>
<b>Total number of hours required for major</b>			<b>66</b>
<b>Total number of hours required for major with Applied Physics specialization</b>			<b>66</b>
<b>Free Electives beyond major hours to reach 120</b>			<b>17-24</b>
<b>Total number of hours required for degree</b>			<b>120</b>

## 7. Explanation of the Change:

These changes correct a miscalculation in the number of credits required for a minor in Mathematics.