

**ACADEMIC AFFAIRS COUNCIL**

**AGENDA ITEM: 6 – I**

**DATE: March 31, 2016**

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**SUBJECT: Physics/Nuclear Dual Program Agreement – SDSU**

South Dakota State University are requesting approval to enter into an agreement with the Idaho State University to establish an articulated dual program that upon a student's successful completion in its entirety will result in a B.S. in Physics from SDSU and a M.S. in Nuclear Science and Engineering from ISU (see Attachment I).

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**RECOMMENDED ACTION**

Approve the Dual Program Agreement between South Dakota State University and Idaho State University. Forward to BOR.

## Agreement

### For An Articulated Physics/Nuclear Engineering Dual Program Between South Dakota State University and Idaho State University

#### I. INTRODUCTION

Based upon a mutual respect for the integrity of dual academic programs and in an effort to better serve students desiring fundamental knowledge in physics as well as pursuing careers in Nuclear Engineering; South Dakota State University (SDSU) and Idaho State University (ISU) hereby enter into an agreement for an articulated Dual program that upon a student's successful completion in its entirety will result in a BS in Physics from SDSU and a MS in Nuclear Science and Engineering from ISU. Efficient completion of the program by students will encompass 3 years of attendance at SDSU followed by 2 years of attendance at ISU.

#### Objectives of the Agreement:

1. To attract qualified students to South Dakota State University and to Idaho State University for the purpose of providing enhanced STEM training in furtherance of student goals and for the purpose of developing the national workforce of qualified Nuclear Engineers and Nuclear Scientists which will benefit the nation and the sovereign states of Idaho and South Dakota.
2. To facilitate the transition of students from SDSU to ISU.
3. To provide specific advisement for students of SDSU who intend to pursue the study of Nuclear Science and Engineering at ISU.
4. To encourage academic and administrative coordination between institutions, and the exchange of evaluative information on the outcomes of the program with the goal of continual improvement.
5. To provide qualified students the opportunity to complete the BS degree in Physics from SDSU and to complete the MS in Nuclear Science and Engineering in a total of five years (three at SDSU, two at ISU).

#### PROCEDURES

1. Under the provisions of this agreement, students will matriculate at SDSU for a minimum of 99 semester credits of course work leading toward the BS in Physics – Elective Group 3 (Flexible Emphasis). The student then matriculates to ISU for a minimum of 47 semester credits of course work leading toward the MS in Nuclear Science and Engineering. See Attachments I, II, and III for a detailed listing.
2. While enrolled at SDSU or ISU, students will complete all required course work as outlined in article (1) above and described in the pertinent sections of the matriculation year catalogs of SDSU and ISU; excepting requirements stipulated in article (11).

3. Upon completion of the first year of studies at ISU a maximum of 21 ISU semester credits (12 graduate credits and 9 undergraduate credits) may be transferred for completion of the B.S. in Physics at SDSU. An official transcript must be sent from ISU to the registrar of SDSU, and the student must request and submit application materials for graduation from SDSU. The courses that can serve as transferred credits from ISU are indicated in Attachment III.
4. The Physics Department at SDSU and the Department of Nuclear Engineering and Health Physics at ISU will each appoint a liaison to facilitate communication between the institutions and the smooth operation and implementation of the dual program. The liaison is indicated in the attachments to the agreement and may be changed by updating the pertinent attachment.
5. Idaho State University shall accept, for fall semester admission, at least one student in the program who has successfully completed the course work and any pertinent stipulations outlined in articles (1) and (11) with a cumulative GPA of 3.0 or higher and meets all other criteria for admission. If more than one student in the program meets these criteria and if ISU desires to admit fewer than the totality of qualified candidates; ISU may choose which students to admit based upon appropriate academic criteria of their own choosing. Such decisions would ideally be made in consultation with the SDSU liaison.
6. SDSU may recommend students with GPAs between 2.6 and 3.0 for admission to ISU. ISU is under no obligation to admit such students.
7. In order to be eligible for this program, students must provide all necessary application materials required by ISU no later than May 15<sup>th</sup> of the year they plan to matriculate to ISU.
8. The SDSU Department of Physics will provide necessary assistance and documentation that is required by the ISU Department of Nuclear Engineering and Health Physics for admission and degree accreditation requirements.
9. Students shall pay the appropriate tuition and fees to each institution for all course work taken at that institution. Residents of WICHE (Western Interstate Commission for Higher Education) states are eligible for WUE (Western Undergraduate Exchange) tuition rates during their first year at ISU. The WUE reduced tuition is not automatic and application must be submitted to be considered. Similarly, during the fifth year at ISU, students may be eligible for resident tuition rates through the WICHE WRGP (Western Regional Graduate Program).
10. During their study at ISU, in order to facilitate the transfer of ISU credits to SDSU, the student's status with SDSU shall be maintained with the use of the hiatus code.
11. Stipulations:
  - a. All South Dakota Regental System Graduation Requirements and SDSU Institutional Graduation requirements as outlined by the SDSU Matriculation Year catalog will be satisfied by the student either through coursework completed at SDSU, including transferred credits, or through transferred credits from ISU with the following clarifications/stipulations for students enrolled in this dual program:
    - i. Upper division and/or graduate transferred credits from ISU will be viewed by SDSU as satisfying the "15 of the last 30 credits" institution requirement. These courses are considered as having "institutional credit" in a similar manner to how courses are treated in collaborative agreements between South Dakota Regental Institutions.
    - ii. Due to scheduling constraints, SDSU physics majors in this program are exempted from the requirement that system general education requirements be completed in the first 64 hours.

- The majority of the requirement, 80%, will be satisfied in the first 64 credits and all system general education requirements must be completed prior to matriculation at ISU.
- iii. Students matriculated at ISU under this program are deemed as having received all necessary permissions from SDSU to enroll and transfer a maximum of 12 ISU graduate credits towards their undergraduate degree requirements. This implies exemption from the SDSU policy requiring submission of a “Request to Use Graduate Credit to Fulfill Undergraduate Degree Requirements” Form or similar such forms to accomplish the transfer of said ISU graduate credits towards their undergraduate transcript under the auspices of this agreement<sup>1</sup>.
  - b. The BS in Physics at SDSU is conferred through the College of Arts and Sciences. The nature of this dual degree program is multidisciplinary and integrative; the College of Arts and Sciences (CAS) at SDSU will consider the transferred credits from ISU as equivalent to a Minor and therefore as satisfying the graduation requirement of a Minor which is necessary for degree completion of the BS in Physics at SDSU. Courses used to fulfill the Minor requirement must be from disciplines other than Physics. See attachment III for an explicit listing of courses allowed for transfer.
  - c. During the first year at ISU, ISU semesters I and II, students will be considered as undergraduates at ISU with permission to take graduate level (5000 and 6000) courses. During the second year at ISU, ISU semesters III and IV, students in this program will have graduate status at ISU upon conferral of the BS in Physics from SDSU.

### III. MUTUAL PROMOTION OF THE PROGRAM

South Dakota State University and Idaho State University both agree to encourage qualified students to participate in this dual degree program through advisement and dissemination of information. The Coordinator of Nuclear Education at SDSU will make every effort to maintain a list of students actively pursuing the program with the intent to enroll at ISU and will periodically inform appropriate liaison within the Department of Nuclear Engineering and Health Physics at ISU who will facilitate necessary communication with the ISU admissions office.

### IV. STUDENT ADVISEMENT

The SDSU program liaison is responsible for advising students regarding their academic preparation for admission to ISU while in attendance at SDSU; paying particular attention to the special requirements and needs of the MS in Nuclear Science and Engineering at ISU. Similarly the ISU liaison will be responsible for facilitating the advisement of students during their first year at ISU to ensure that the necessary transferrable courses are completed.

### V. CONTINUATION AND TERMINATION OF THE AGREEMENT

This agreement shall be in force until either institution makes a decision in writing to terminate the agreement. It is agreed that if terminated, both institutions will honor the terms of the agreement until all

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<sup>1</sup> The SDSU signatures to this agreement already constitute permission from all pertinent academic levels at SDSU for the credits to be transferred to student’s Undergraduate Transcript.

students already matriculated at ISU are given the opportunity to complete the program in a timely manner. Termination becomes effective on the first day of July following the written notice of termination; this will enable any qualified SDSU student who completes the SDSU portion of the requirements of this agreement prior to the effective date of termination, July 1, to be admitted into the ISU program in the fall semester immediately following the effective termination date.

VI. PROGRAM CHANGES

As program graduation requirements change at either institution, this agreement will be updated by communicating the changes in the form of revision of the attachments to this agreement and will not, in and of itself, require revision of the agreement. The communication of curricular changes will occur in a timely fashion to enable either institution a chance to review the changes and decide if they are significant enough to warrant revising or terminating the agreement.

South Dakota State University

Idaho State University

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Joel Rauber, PhD  
Head, Department of Physics

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Associate Head, Department of Nuclear Engineering and Health Physics

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Dennis Papini, PhD  
Dean, College of Arts and Sciences

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Richard Brey, PhD  
Interim Dean, College of Science and Engineering

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Dean, Graduate School

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Laura Woodworth-Ney, PhD  
Provost and Vice-President for Academic Affairs

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Laurie Stenberg Nichols, PhD  
Provost and Executive Vice-President for Academic Affairs

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Dr. xxxx  
xxxxx

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Dr. xxxx  
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Attachment I: General Education Requirements<sup>2</sup> completed at SDSU prior to the MS in Nuclear Science and Engineering at ISU.

*SGR #1: Written Communication*

ENGL 101 – Composition I	3 credits
ENGL 201 OR 277 – Composition II OR Technical Writing	3 credits

*SGR #2: Oral Communication*

SPCM 101 – Fundamentals of Speech	3 credits
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*SGR #3: Social Sciences / Diversity  
(6 hours in 2 disciplines)*

6 credits

*SGR #4: Humanities and Arts / Diversity  
(6 hours in 2 disciplines OR a foreign language sequence)*

6 credits

*SGR #5: Mathematics*

MATH 123 – Calculus I	4 credits
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*SGR #6: Natural Sciences*

PHYS 211 and 211L – University Physics I and Laboratory	4 credits
PHYS 213 and 213L – University Physics II and Laboratory	4 credits

*IGR #1: First Year Seminar*

UC 109 – First Year Seminar	2 credits
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*IGR #2: Cultural Awareness and Social and Environmental Responsibility*

3 credits

**Total**

**38 credits**

SDSU Department of Physics Liaison:

Dr. Robert McTaggart – Coordinator for Nuclear Education  
robert.mctaggart@sdstate.edu

<sup>2</sup> Consult the SDSU Undergraduate Catalog for all courses that satisfy SGR or IGR requirements. Students in this program will be exempted from the requirement that all 30 credits of the System General Education Requirements must be completed within the first 64 hours. SDSU general education requirements must be completed prior to matriculation to ISU.

Attachment II: Requirements for the BS in Physics at SDSU completed prior to the MS in Nuclear Science and Engineering at ISU.

<b>General Education Requirements</b> ( <i>See Attachment I</i> )	<b>38 credits</b>
 <i>Major Requirements (47 credit hours)</i>	
CHEM 112 and 112L – General Chemistry I and Laboratory	4 credits
CHEM 114 and 114L – General Chemistry II and Laboratory	4 credits
MATH 125 – Calculus II	4 credits
MATH 225 – Calculus III	4 credits
MATH 321 – Differential Equations	3 credits
CSC 150 – Computer Science I	3 credits
PHYS 316 and 316L – Measurement Theory and Experiment Design and Laboratory	2 credits
PHYS 318 – Advanced Laboratory I	2 credit
PHYS 331 – Introduction to Modern Physics	3 credits
PHYS 421 – Electromagnetism	4 credits
PHYS 451 – Classical Mechanics	4 credits
PHYS 490 – Seminar (Capstone)	2 credits
EE 220 and 220L – Circuits I and Laboratory	4 credits
PHYS 341 – Thermodynamics	2 credits
PHYS 343 – Statistical Mechanics	2 credits
 <i>Electives (36 credit hours):</i>	
<i>Technical Electives (7 credit hours)</i>	
NE 435 – Introduction to Nuclear Engineering	3 credits
PHYS 471 – Quantum Mechanics	4 credits
<i>Free Electives (9 credit hours)</i>	
EM 331 – Fluid Mechanics	3 credits
PHYS 418 – Advanced Laboratory II	1 credit
Electives	5 credits
<i>Directed Electives (19 credit hours)</i>	
<b>Total</b> -----	<b>120 credits</b>
<b>Coursework transferred to SDSU from Idaho State University<sup>3</sup></b>	<b>21 credits</b>

<sup>3</sup> A maximum of 12 ISU graduate credits may be used as directed electives; the other **nine** will be ISU UG credits. Nineteen of the transferred credits will satisfy the directive elective requirement and 2 of the transferred credits will count towards the free electives.

## Attachment III: Plan of Study for the MS in Nuclear Science and Engineering at Idaho State University under this agreement.

At ISU, During Year 1 (Semesters 1 and 2), the 3-2 student will be considered an undergraduate with permission to take graduate level (5000 and 6000) courses. Undergraduates must maintain a minimum 12-credit load to be considered full time. A maximum of 12 graduate credits may be transferred to SDSU for completion of the BS in Physics at SDSU. The remainder of the 21 transferred credits must be undergraduate credits. ISU prefixes MATH, CE, NE, and NSEN will be transferred as SDSU prefixes MATH, CEE, NE, and GEN respectively.

Required courses for 3-2 BS/MS program<sup>4</sup>:

\*2000, 3000, and 4000 level courses are undergraduate; 5000 and 6000 level courses are graduate

## Semester 1 (Fall)

MATH 2240 – Linear Algebra	3 credits* <sup>†</sup>
CE 3361 - Engineering Economics and Management	3 credits* <sup>†</sup>
NSEN 6684 – Nuclear Engineering Basics I (F)	3 credits** <sup>†</sup>
MATH 5521 – Advanced Engineering Math I (F)	3 credits <sup>†</sup>
NE 5551 – Seminar (F/S)	1 credit**
	13 credits total

## Semester 2 (Spring)

NSEN 6685 – Nuclear Engineering Basics II (S)	3 credits** <sup>†</sup>
HPHY 5516 – Radiation Detection and Measurement (S)	3 credits** <sup>†</sup>
MATH 5522 – Advanced Engineering Math II (S)	3 credits
NE 5519 – Energy Systems and Nuclear Power (S)	3 credits**
ME 4476 – Heat Transfer	3 credits** <sup>†</sup>
NE 5551 – Seminar (F/S)	1 credit**
	16 credits total

During Year 2 (Semesters 3 and 4) the 3-2 student will be considered a graduate student and therefore must maintain a minimum 9-credit load of 5000 and 6000 level courses to be considered full time.

## Semester 3 (Fall)

NE 5546 – Reactor Physics	3 credits**
NSEN 6601 – Nuclear Engineering Experiments (F)	3 credits**

<sup>4</sup> It is expected that students will work on their research during the summer between Years 1 and 2 and, if necessary for completion, the summer after Year 2.



Course choice from optional list or 3 research credits (ENGR 6650)	3 credits
	9 credits total

## Semester 4 (Spring)

NE 5546 – Nuclear Fuel Cycle (S)	3 credits**
ENGR 6650 – Thesis Research (F/S/Su)	3 credits**
Course choice from optional list or add 3 research credits (ENGR 6650)	3 credits
	9 credits total

## Summer Semester

ENGR 6650 – Thesis Research (F/S/Su)	at least 1 credit**
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Total credits = at least 48

\* These courses will not count toward the MS degree but will be transferrable to SDSU.

† Courses to be transferred to SDSU to complete the BS in Physics degree at SDSU

\*\* These courses are required for MS NSEN students with undergraduate degree not in nuclear engineering. A total of 6 research credits is required; however, more may be taken to meet the requirements for full time credit load and for continuous enrollment (including summer semesters) until completion of thesis.

**All required 3-credit and lab courses are offered once a year, in the semesters indicated in parentheses (F=Fall, S=Spring).**

## Optional courses (not necessarily offered every year)

NE 5558- Monte Carlo Methods	3 credits
NE 5578 – Reliability and Risk Assessment	3 credits
NE 5588 - Nonproliferation and Nuclear Safeguards	3 credits
NE 5599 - Methods and Practice in Criticality Safety	3 credits
NE 5599 – Introduction to Nuclear Security	3 credits
NE 5599 – Introduction to Plasma Physics	3 credits
NSEN 6603 – Thermal Hydraulics	3 credits
NSEN 6604 – Dynamic Behavior of Nuclear Systems	3 credits
NSEN 6608 – Radiation Transport	3 credits
NSEN 6618 – Radioactive Waste Management	3 credits
NSEN 6631 – Advanced Reactor Physics	3 credits