

TO: The Engineering Faculty

FROM: The Faculty of the School of Nuclear Engineering

RE: New Engineering Dual Degree Program BS-MS Major

The Faculty of the School of Nuclear Engineering has approved the following new Major from the College of Engineering. This action is now submitted to the Engineering Faculty with a recommendation for approval.

TITLE:

BS/MS Nuclear Engineering 4+1 Program

DESCRIPTION:

This approval is for a dual BS/MS degree. Students who successfully complete this dual degree program will receive a Master of Science in Nuclear Engineering (without thesis) and a Bachelor of Science in Nuclear Engineering from the School of Nuclear Engineering in five years by streamlining requirements between the BS and MS degrees. A student must have a minimum GPA of 3.5/4.0 to qualify for this program and select before the end of their fifth. Three courses specifically required for the MS (NUCL 510, NUCL 520, and NUCL 551) may be taken during the MS portion or as excess credit during the BS. During the BS program, students take six credits of NUCL 500/600 level courses and six credits of additional 500 level Engineering or Science courses as tech electives, counted toward the BS requirement. These 12 credits are double-counted toward both the BS and MS, such that when the BS is completed, 12 credits are accumulated toward the MS. The remaining 18 credits (or 6 courses) can be taken during the Fall and Spring semesters of the 5th year. Should the 4+1 track students opt to earn BS degree only, they can do so at the beginning of their 4th year (or 7th semester) of the BS program at the latest, provided that all the requirements for BS degree are met.

RATIONALE:

The mission of the Purdue University accelerated 5-Year BS-MS program is to provide an opportunity to gain early admission to the MS degree program to junior undergraduate students and allow students to earn both BS and MS in nuclear engineering in five years. In addition to saving a year, it also saves one-year tuition for MS degree, which generally takes two years to complete. Students earning their MS degree will gain additional knowledge in fundamental aspects of nuclear engineering, particularly reactor physics, nuclear materials, and thermal-hydraulics, while additionally having the opportunity to take electives in these areas for breadth or other areas of growing importance in nuclear engineering, such as nuclear fusion, artificial intelligence, and plasma physics. Employers recognize the value of the MS NE and students who complete 5-year BS-MS will have

broadened career and professional options or can continue to earn PhD. A recent survey conducted with undergraduate nuclear engineering students indicated an overwhelming interest in enrolling in 5-Year BS-MS degree program should it be available. A recent study on Market Demand for Master's-Level Nuclear Engineering Program was carried out by EAB 2016 (MARKETRESEARCH BRIEF Market Demand for an Online Master's-Level Nuclear Engineering Program, Analysis of National Employer Demand and Peer Institution Offerings, April 2018). This study concluded that there is an opportunity for an MS level nuclear engineering program because demand for such expertise exists in the market and the recent history of enrollment in existing MS level programs in nuclear engineering indicate healthy growth.

A handwritten signature in dark ink, appearing to read "Sanjin Kim". The signature is fluid and cursive, with the first name "Sanjin" and the last name "Kim" clearly distinguishable.

Head/Director of the School of Nuclear Engineering

Link to Curriculog entry:

[Paste link to Curriculog entry.]

4+1 BS-MS Program in NE

Graduate Multiple Degree Program (Combined, Dual, or Joint) (New, Revision, or Expiration)

MULTIPLE DEGREE PROGRAM

BEFORE MAKING YOUR CHOICE OF THE TYPE OF PROGRAM, PLEASE REVIEW OUR POLICY AND GUIDELINES FOR MULTIPLE DEGREE PROGRAMS - <https://catalog.purdue.edu/content.php?catoid=14&navoid=16508#establishing-new-graduate-programs>

Program Type (Always select "Program")*

- ☒ Program
- ☐ Shared Core

Type of Multiple Degree Program: *

- ☒ Combined Degree
- ☐ Dual Degree (includes Concurrent)
- ☐ Joint Degree

Proposal Type: *

- ☒ New Multiple Degree Program
- ☐ Revision (Explain in Summary text box)
- ☐ Expiration

TITLE (Example: Combined B.S./M.S. in ECE)* 4+1 BS-MS Program in NE

Campus*

- ☒ West Lafayette
- ☐ Fort Wayne
- ☐ Northwest
- ☐ IUPUI

College*

College of Engineering - WL

2nd College (if more than one involved)

Department*

School of Nuclear Engineering - WL

2nd Department (if more than one involved)

International University (if applicable)

Effective Term*

Fall 2023

- Method(s) of Delivery:** ☒ RESIDENTIAL (up to 75% on campus)
☐ ONLINE (more than 75% online-per ICHE)
☐ HYBRID (25-75% online)

If Hybrid, explain:

COMBINED DEGREE PROGRAM

1. SUMMARY (describe program)

Summary: (if this is for a Revision or Expiration, use this area to describe action needed)

Purdue University School of Nuclear Engineering (SNE) proposes to offer 5-Year BS-MS in Nuclear Engineering degree program which is designed for accelerated completion of MS degree in nuclear engineering. The degree program offers plans of study with a format that allows one to study BS and MS in 5 years.

2. DEGREES TO BE CONFERRED

List specific degrees to be conferred

Bachelors of Science - Nuclear Engineering

Masters of Science - Nuclear Engineering

3. RATIONALE AND NEED Include a description of the impact and benefits of the proposed program and the relationships of the proposed program to the mission and scope of the campus, to already existing campus programs, and to human resource supply and demand.

Rationale and Need:

Purdue University School of Nuclear Engineering (SNE) proposes to offer 5-Year BS-MS in Nuclear Engineering degree program which is designed for accelerated completion of MS degree in nuclear engineering. The degree program offers plans of study with a format that allows one to study BS and MS in 5 years.

A recent survey conducted with the undergraduate nuclear engineering students indicated that over 80% students are interested in 5 year combine BS MS degree program and would take this degree program if it is available today (Results of Survey of Undergraduate Nuclear Engineering Students, Purdue University, Fall 2021). In addition, a study carried on Market Demand for a Master's-Level Nuclear Engineering Program (MARKET RESEARCH BRIEF Market Demand for an on Master's-Level Nuclear Engineering Program, Analysis of National Employer Demand and Peer Institution Offerings, April 2018) involved data and input from 6 institutions offering master's degree in nuclear engineering, and over 15 companies and national labs that hires nuclear engineers at master's level.

4. OBJECTIVES

Objectives:

The objective of the 5BS-MS degree program is to provide an opportunity to high performing and interested nuclear engineering undergraduate students to complete combined BS-MS degree in 5 years. The program goals are to train student with graduate level courses in nuclear engineering and develop pool of nuclear engineering professionals in reduced time period.

5. PROPOSED PROGRAM STRUCTURE

a. admission requirements and process

b. degree requirements

c. scope, size of the program

d. administrative structure -- Include a description of the curriculum for the program, including plans of study for each of the separate programs, with specific notations of courses (numbers and titles) to be used to fulfill requirements for each program in the combined plan.

e. Example plans of study showing overlap (this can be listed or attached as a separate file)

**a. Admission
requirements and
process**

The Requirement for the 5Y BS-MS program, :

Minimum GPA of 3.5/4.0 and students enrolled in the school of nuclear engineering (NE) and at 5th semester.

Students must select this degree option before the end of the 5th semester

Process: The student apply to the graduate school seeking 5Y BS-MS program, with the following documents

statement of purpose, transcript and letter of recommendations similar to the graduate admission.

A committee (consisting of NE faculty) will make selection of the student for admission based on the application review.

b. Degree requirements**5 Year BS-MS Nuclear Engineering Program**

- Terminal Course based MS Degree Without Thesis
- Requirement: The BS degree in SNE with Minimum GPA of 3.5/4.0
- MS Degree Requirement: Total 30 Credits as outlined in the Table below.
- Students must select this option before the end of the 5th semester.

<i>Required Courses</i>	<i>Credit</i>	<i>Credit Plan</i>
NUCL 510, NUCL 520, NUCL 551	9	• Required for the MS • Can be taken during MS or as excess credit in the BS
Two (2) NUCL 500 Level Courses	6	• Counted as technical electives in the BS • Double counted as technical electives toward the MS
Two (2) 500/600 Level NUCL or Any Engineering or Science Courses	6	• Counted as technical electives in the BS • Double Counted as technical electives toward the MS
Two (2) 500/600 Level MATH Courses	6	• Required • Can be taken During MS or as excess credit in the BS
One (1) 500/600 NUCL course	3	• Required • Can be taken During MS or as excess credit in the BS

- During the BS program, take two (2) NUCL 500/600 level courses and two (2) additional 500 level Engineering or Science courses as tech electives, counted toward the BS requirement. These four (4) courses are double-counted toward both the BS and MS, such that when the BS is completed 12 credits are accumulated toward the MS
- The remaining 18 credits (or 6 courses) can be taken during the Fall and Spring semesters of the 5th year.

- Should the 4+1 track students opt to earn BS degree only, they can do at the beginning of their 4th year (or 7th semester) of BS program at the latest, provided that all the requirements for BS degree are met.

c. Scope/Size of the program

Documentation on the scope and size of the program can be found on document "Support Data for Checklist of Criteria" included in this proposal.

d. Administrative structure

The 5YBSMS curriculum is very similar to the existing course based BS degree and MS degree in Nuclear Engineering at West Lafayette campus which is in existence over 40 years. The instructor currently associated with on campus will participate in offering 5YBSMS program. The courses use the Purdue existing tools for student and faculty interaction in class room, laboratory and media such as email.. The teaching and assessment tools include Brightspace, which provides instructors with the ability to provide students with communication by faculty and students' responses, course documents, assignments and assessments, individual grades, and other learning materials in a multiple environment.

The 5YBSMS program follows the accreditation requirements of ABET and the Indiana Commission for Higher Education accreditation program. The program assessment that include institutional learning outcomes, program learning outcomes and student learning outcomes will be performed.

e. Example plans of study showing overlap (listed or attached)

Degree Objective: BS-MS course based

Degree: BS-MS Nuclear Engineering

Undergraduate Courses: Existing required course plan for BS NE

Graduate Courses

Plan of Study Courses			
Course	Title	Credits	Semester
NUCL 51000	NUCLEAR REACTOR THEORY I	3	Spring
NUCL 52000	NUCLEAR MATERAILS	3	Spring
NUCL 55100	MASS, MOMENTUM AND ENERGY TRANSFER IN ENERGY SYSTEMS	3	Fall
NUCL 51100	REACTOR THEORY AND KINETICS	3	Fall
MA 52700	ADVANCED MATHEMATICS FOR ENGINEERS AND PHYSICISTS	3	Fall
MA 52800	Advanced Mathematics For Engineers And Physicists	3	Fall
NUCL 55200	THERMAL-HYDRAULICS AND REACTOR SAFETY	3	Spring
NUCL 57000	FUZZY APPROACHES IN ENGINEERING	3	Fall
NUCL 55300	BIG DATA AND MACHINE LEARNING IN ENGINEERING	3	Fall
NUCL 62000	ADVANCED TOPICS IN RADIATION DAMAGE	3	Spring

6. SUSTAINABILITY AND IMPACT ON THE STATE AND REGION

Sustainability and Impact

A recent study on Market Demand for Master's-Level Nuclear Engineering Program was carried out by EAB 2016 (MARKETRESEARCH BRIEF Market Demand for an Online Master's-Level Nuclear Engineering Program, Analysis of National Employer Demand and Peer Institution Offerings, April 2018). The study involved data and input from 6 institutions currently offering master's degree in nuclear engineering, and over 15 companies and national labs that hire nuclear engineers at MS level. This study summary is as follows: "A master of nuclear engineering presents an opportunity for Purdue University. All profiled institutions offer both online and face-to-face programs, and administrators report the same curricula for both as well as identical admissions requirements. At Worcester Polytechnic Institute, for example, administrators began offering the master's-level nuclear engineering program online when administrators of nearby power systems and nuclear engineering companies asked the Institute to train its engineers from a master level program". This study concluded that there is opportunity for a master level nuclear engineering program as demand for such expertise exists in the market and the recent history of enrollment in existing masters level programs in nuclear engineering indicate healthy growth.

The Bureau of Labor Statistics (BSL) projects Nuclear Engineers, Consulting and Management Nuclear Engineering Jobs will grow by 4 percent from 2016 to 2026. Employment is projected to increase in research and development in engineering, and in management, scientific, and technical consulting services.

7. STAFFING AND INFRASTRUCTURE -- Describe the resources over and above present levels required to initiate the program (space and other physical needs, faculty and staff, fiscal needs, other).

Staffing and Infrastructure

This 5YBSMS curriculum is very similar to the existing course based on BS degree and MS degree in Nuclear Engineering at West Lafayette campus which has been in existence over 40 years. The instructor currently associated with the NE department on campus will participate in offerings for the 5YBSMS program. The courses use the Purdue existing tools for student and faculty interaction in class room, laboratory and media such as email. The teaching and assessment tools include Brightspace, which provides instructors with the ability to provide students with communication by faculty and students' responses, course documents, assignments and assessments, individual grades, and other learning materials in a multiple environment.

Additional Requirements (list requirements or state NONE)*

CONTACT

Contact for this proposal in case questions arise: (include name, email, and phone)*

Shripad Revankar (shripad@purdue.edu) - 765-496-1782