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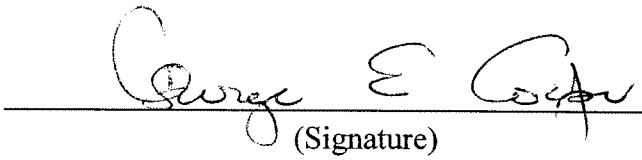
|---|---|
| Proposing Institution: | South Carolina State University |
| Program Title: | Modification of the Nuclear Engineering Program |
| Date: | October 19, 2009 |
| Submitted by: | Joyce Blackwell, Ph.D.<br>Vice President for Academic Affairs |
| Contact Name and Information: | Kenneth Lewis, Ph.D., P.E.<br>Dean, College of Science, Mathematics, Engineering and Technology<br>300 College Road, NE<br>Orangeburg, Sc 29117<br>(803) 536-7132 |
| Chief Executive Officer: | George Cooper, Ph.D.<br>President |



(Signature)

## 1.0 Classification

Program Title (options, concentrations, tracks): Nuclear Engineering Program (NEP)

Academic Unit: Department of Civil & Mechanical Engineering Technology in the College of Science, Mathematics, Engineering and Technology

Designation (type and level of degree): Baccalaureate, 4-years

Proposed Date of Implementation: Fall 2010

CIP Code: 141301

Identification of Program: Modification

Site: South Carolina State University, Orangeburg, SC; main campus; CHE Site # 50602

Does the Program qualify for supplemental Palmetto Fellows Scholarship and LIFE scholarship awards?
Yes : x No:

Delivery Mode: Traditional Instruction

## 2.0 Justification

The Bachelor of Science in Nuclear Engineering Program (NEP) at South Carolina State University (SC State), which is offered in conjunction with the University of Wisconsin, Madison (UW-Madison), is an existing program. The program was approved by the South Carolina Commission on Higher Education (CHE) based on a previous application package to the CHE. In that application package, which was submitted in 2000, the purposes and objectives of the program were articulated. The application materials also discussed the need of the program in the state, the centrality of the program to the mission of the institution, the relationship of the program to other related programs within the institution and a description of the similarities or differences between the program and those with similar objectives at other institutions as outlined in the CHE document, "*Policies and Procedures for New Academic Program Approval and Program Termination.*" The current program was approved with an articulation agreement between SC STATE and UW-Madison. This articulation agreement provided for a total of 23 hours of technical courses to be delivered by UW-Madison to SC STATE students in the NE program, with the remaining 116 hours taught by SC STATE faculty. This arrangement was critical to the initial development of what was at the time a new program in such a highly technical field.

With this present program modification submission, South Carolina State University is now seeking CHE approval for the Bachelor of Science in Nuclear Engineering program to become independent of the articulation agreement with UW-Madison or any other institution. This program modification request is based upon a number of significant positive developments that have occurred over the past seven years with the Bachelor of Science in Nuclear Engineering program at SC State. These developments justify removing the 23 hours of technical course delivery by UW-Madison as a "requirement" for the program, and, hence, removing the requirement for a "joint" degree program.

It is important to note that the University of Wisconsin at Madison never intended for the current "joint" degree program relationship to continue indefinitely; neither was this the intention of South Carolina State University when the program was initiated. The "joint" relationship was intended to last only until such time as the South Carolina State University Nuclear Engineering program matured to the point where it could function as an independent program. That time has now arrived.

During the past seven years the growth and maturity of South Carolina State University Nuclear Engineering program has been evidenced as follows:

**1) Demonstrated ability to stand as an independent Nuclear Engineering Program**

a. The SC State Nuclear Engineering Program achieved ABET-EAC accreditation in 2008 (retroactive to 2005) *independent of UW-Madison.* ABET awarded accreditation was to South Carolina State based on ac

b. The SC State Nuclear Engineering Program has attracted and retains a permanent and highly qualified faculty capable of teaching *all* of the Nuclear Engineering courses offered at *both* universities (Wisconsin and SC State). The Program has a permanent core faculty consisting of three Ph.D.s, all of which are in Nuclear Engineering, and a retired U.S. Navy Commander who served with the Nuclear submarine force. It is the largest non-matrixed, permanent Nuclear Engineering faculty in the state of South Carolina.

c. The permanent faculty brings over 40 years of combined teaching and training experience, over 40 combined years of industrial experience, and over 28 years of military experience. It is therefore the *most balanced* Nuclear Engineering faculty in the state of South Carolina.

d. The SC State Nuclear Engineering program has also enlisted a department manager at Savannah River National Laboratory with a Ph.D. in Nuclear Engineering who serves as adjunct faculty. This relationship has been ongoing for the past few years. Finally, the program also has a grant-funded *Visiting Professorship*, currently filled by a doctorate of Engineering in Nuclear Engineering.

e. The SC State Nuclear Engineering Program constructed and operates a highly acclaimed, state-of-the-art Radiation Science teaching laboratory.

f. The SC State Nuclear Engineering Program is in the process of constructing a state-of-the-art Environmental Radiochemistry laboratory (to be completed in 2010).

g. The SC State Nuclear Engineering Program has formed partnerships with industry and federal agencies for scholarships and research support.

h. The SC State Nuclear Engineering Program has established recognized outreach programs for high school students and guidance counselors in the Southeast region.

i. The Nuclear Engineering Program attracts distinguished and prominent guest nuclear engineers, including two presidents of the American Nuclear Society and an Under-secretary of the Department of Energy.

2) **Produced eight (8) successful Nuclear Engineering graduates to date. Of those eight students,**

   a. Four graduates are currently in Engineering M.S. programs in Nuclear Engineering graduate schools and one is in a Ph.D. program

   b. One graduate is employed with a federal agency (USNRC)

   c. One graduate is employed at a national laboratory (SRNL)

   d. Two graduates are employed with private nuclear or non-nuclear engineering firms

3) **Demonstrated the ability to raise funds for scholarships, training, and research**

   a. Over the last three years, scholarship and research funds have totaled approximately $ 1.8 million.

4) **Achieved national recognition throughout the Nuclear Engineering community**

   a. Appeared on the front cover of *Nuclear News* Magazine on two occasions

   b. Appeared in the American Nuclear Society Newsletter recently

   c. Invited paper and panel participation at National American Nuclear Society meetings

   d. Invited to appear before the four Commissioners of the Nuclear Regulatory Commission (March 2009) for a televised testimony in Washington D.C.

Because of the exposure and benefits gained by our students (e.g. learning to function in a new environment and learning to function independently far away from home), SC State desires to continue its collaborative relationship with UW-Madison in a ***non-binding*** manner, while fostering the same type of relationships with other majority institutions that have expressed interest in having our students spend some part of their training at their institutions. These institutions include the University of Florida, North Carolina State University and, more recently, Texas A & M University at College Station. This flexibility will allow for greater growth and expansion of the SC State Bachelor of Science in Nuclear Engineering (B.S.N.E.) program. We will be able to provide greater educational diversity through the normal process of transferring credit hours from a variety of qualified institutions both within and outside of the state of South Carolina.

## 3.0 Enrollment

Students will officially enter the program at the end of the sophomore year and must have a minimum overall grade point average (GPA) of 3.0/4.0 as well as at least a 3.0 in the mathematics, science and engineering composite of all such courses that are taken in their freshman and sophomore years.

The enrollment estimates are based on the growth rate demonstrated by this program since its approval by SC-CHE. Now that the program has Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET-EAC) accreditation, the growth rate can logically be expected to increase. As of fall 2009 there are 41 students officially registered in the program. If on average we have 6 graduates per year and lose 4 students per year due to attrition, we are able to maintain a total enrollment of 39 students by recruiting 10 new students per year. This is a minimum number projection. We have an aggressive recruiting effort that attracts high achieving, highly motivated students primarily from South Carolina and North Carolina. However, a significant number of students from Georgia, Florida, Maryland, and Arkansas are also in the program. With renewed national emphasis on nuclear energy as a key component to energy independence, we can realistically expect the projections below to double within the next few years.

**Table 3.1:**

| PROJECTED TOTAL ENROLLMENT | | | | | | |
|---|---|---|---|---|---|---|
| YEAR | FALL | | SPRING | | SUMMER | |
| | Headcount | Credit Hours | Headcount | Credit Hours | Headcount | Credit Hours |
| 2009– 10 | 41 | 339 | 41 | 328 | 31 | 0 |
| 2010 – 11 | 39 | 288 | 39 | 290 | 29 | 0 |
| 2011 – 12 | 39 | 288 | 39 | 290 | 29 | 0 |
| 2012 – 13 | 39 | 288 | 39 | 290 | 29 | 0 |
| 2013 – 14 | 39 | 288 | 39 | 290 | 29 | 0 |

**Table 3.2:**

| ESTIMATED NEW ENROLLMENT | | | | | | |
|---|---|---|---|---|---|---|
| YEAR | FALL | | SPRING | | SUMMER | |
| | Headcount | Credit Hours | Headcount | Credit Hours | Headcount | Credit Hours |
| 2009– 10 | 12 | 204 | | | | |
| 2010 – 11 | 10 | 170 | | | | |
| 2011 – 12 | 10 | 170 | | | | |
| 2012 – 13 | 10 | 170 | | | | |
| 2013 – 14 | 10 | 170 | | | | |

## 4.0 Curriculum

Figure 1 below shows a sample curriculum for a Bachelors degree in Nuclear Engineering at SC State.

**Figure 1: Nuclear Engineering Curriculum**

### Freshman

| First Semester - SC STATE | | Second Semester - SC STATE | |
|---|---|---|---|
| E 150 English I | 3 | | |
| M 153 Calculus I | 3 | E 151 English II | 3 |
| UNIV 101 Intro to Comm | 2 | M 163 Calculus II | 3 |
| C 150/151 General Chemistry I | 4 | P 254/251 General Physics I | 4 |
| ENGR/ET 170 Intro to Engineering | 3 | ET 150 Mech Draw & Basic CAD | 3 |
| PE 150 or HED 150 or MS 150 | 2 | C 152/153 General Chemistry II | 4 |
| | 17 | | 17 |

### Sophomore

| First Semester - SC STATE | | Second Semester - SC STATE | |
|---|---|---|---|
| M 237 Calculus III | 3 | M 238 Calculus IV | 3 |
| ENGR 212 Statics | 3 | EET 230 Circuit Analysis | 3 |
| M 208 Introduction to Statistics | 3 | M 403 Differential Equations | 3 |
| NE 305 Intro to Nuclear Engr | 3 | ENGR 213 Strength of Materials | 3 |
| NEEP 271 Engr Prob. Solving I | 3 | P 406 Intro to Modern Physics | 3 |
| P 255/253 General Physics II | 4 | NE 397 Nuclear Energy | 3 |
| | 19 | | 18 |

### Junior

| First Semester - SC STATE | | Second Semester - SC STATE | |
|---|---|---|---|
| ENGR 313 Dynamics | 3 | ENGR 425 Fluid Dynamics | 3 |
| ENGR 417 Mech of Materials Lab | 3 | P 313 Radioisotope Laboratory | 3 |
| M 350 Applied Mathematics | 3 | ENGR 435 Heat Transfer | 3 |
| ENGR 421 Thermodynamics | 3 | ET 250 Technical Communication | 3 |
| Liberal Studies Elective | 3 | H 250 or H 251 History | 3 |
| Computing Elective | 3 | NEEP 405 Nuclear Reactor Theory | 3 |
| | 18 | | 18 |

### Senior

| First Semester - SC STATE | | Second Semester - UW | |
|---|---|---|---|
| NE 408 Ionizing Radiation | 3 | | |
| NE 411 Nuclear Reactor Engr | 3 | NEEP 428 Nuclear Reactor Lab | 2 |
| ENGR 450 Engineering Materials | 3 | NEEP 571 Env & Econ Analysis | 3 |
| E 250 or E 251Literature | 3 | NEEP 565 Power Plant Technology | 3 |
| Liberal Studies Elective | 3 | NEEP 412 Reactor Design | 5 |
| NE 499 Special Topics in NE | 1/2 | Liberal Studies Elective | 3 |
| | 16/17 | | 16 |

**Total credits required for graduation 139/140**

The learning outcomes of the Nuclear Engineering program reflect Criterion 3 outcomes a-k as the cornerstone of ABET's assessment initiative as well as those of the American Nuclear Society. Criterion 3 and the American Nuclear Policy guidelines state that engineering graduates should possess:

a. An ability to apply knowledge of advance mathematics, science, and engineering science, including atomic and nuclear physics, and the transport and interaction of radiation with matter, to nuclear and radiological systems and processes.

b. An ability to design and conduct experiments, as well as to analyze and interpret data.

c. An ability to design a system, including nuclear engineering design, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

d. An ability to function on multi-disciplinary teams.

e. An ability to identify, formulate, and solve engineering problems.

f. An understanding of professional and ethical responsibility.

g. An ability to communicate effectively.

h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

i. Recognition of the need for, and an ability to engage in life-long learning.

j. Knowledge of contemporary issues.

k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

The ABET a-k criteria describe the major learning objectives of all relevant courses. We will link course objectives directly to ABET accreditation requirements.

More specifically, we will use the following criterion/reference chart:

Course _____Prepared by_____Date_____

| **Course Learning Objective** | **Overall Educational Objective** (Enter level number defined below) |
|---|---|
| 1. What will be measured to demonstrate that this learning objective has been achieved? | A B C D E F G H I J K |
| 2. What will be measured to demonstrate That this learning objective has been achieved? | A B C D E F G H I J K |

3. What will be measured to demonstrate that this learning objective has been achieved? A B C D E F G H I J K

4. What will be measured to demonstrate that this learning objective has been achieved? A B C D E F G H I J K

**Overall Educational Objectives**

A. To develop the ability to apply knowledge of advance mathematics, science, and engineering science, including atomic and nuclear physics, and the transport and interaction of radiation with matter, to nuclear and radiological systems and processes.

B. To develop the ability to design and conduct experiments, as well as to analyze and interpret data.

C. To develop the ability to design a system, including nuclear engineering design, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

D. To develop the ability to function on multi-disciplinary teams.

E. To develop the ability to identify, formulate, and solve engineering problems.

F. To provide an education on professional and ethical responsibility.

G. To develop the ability to communicate effectively.

H. To provide an education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.

I. To develop the ability to engage in life-long learning.

J. To provide an education on contemporary issues.

K. To develop the ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Level**

1. Major emphasis of the course
2. Discussed in the course and covered in homework or quiz
3. Mentioned in the course but not covered in homework or quiz
4. Not mentioned in the course

This approach enables a department or the college to identify gaps in the curriculum as well as providing an overview of what each course is attempting to accomplish.

There are no new courses anticipated for this modification.

## 5.0 Faculty

Table 5.1 shows the details of the rank and academic qualifications of each faculty member who will be involved in the Nuclear Engineering Program.

**Table 5.1: The rank and academic qualifications of staff members involved in the NEP.**

| List staff by Rank (e.g. Professor #1, Professor #2, Associate Professor #1, etc) | Highest Degree Earned | Field of study | Teaching in Field (Yes/ No) |
|---|---|---|---|
| Professor 1 | Ph.D. | Nuclear Engineering | Yes |
| Associate Professor 1 | Ph.D. | Nuclear Engineering | Yes |
| Associate Professor 2 | Ph.D. | Nuclear Engineering | Yes |
| Associate Professor 3 | Ph.D. | Civil Engineering | Yes |
| Associate Professor 4 | Ph.D. | Mechanical Engineering | Yes |
| Assistant Professor 1 | Ph.D. | Mechanical Engineering | Yes |
| Associate Professor | Ph.D. | Physics | Yes |
| Assistant Professor | M.S. | Mechanical Engineering | Yes |
| Associate Professor * | D. Eng. | Nuclear Engineering/ Radiochemistry | Yes |

* Visiting Professor

For the currently employed faculty there are no anticipated changes in their current assignments. Also, there is no anticipated addition of new faculty or staff in the program.

Currently, the faculty is expected to attend at least one professional meeting per year. They also participate in research, writing scholarly papers and curriculum modification or development by way of release-time from the teaching loads. The plan of the program for the faculty is to continue these scholarly activities in the future.

The institutional definition of the full-time equivalent (FTE) for a faculty member per semester is as follows:

4 – Course -load = 1 FTE

3 – Course -load = 0.75 FTE

2 – Course -load = 0.50 FTE

1 – Course -load = 0.25 FTE

Table 5.2 shows the number and full time equivalent of faculty, administrators and/or staff in the Nuclear Engineering Program.

**Table 5.2:**

| UNIT ADMINISTRATION/FACULTY/STAFF SUPPORT | | | | | | |
|---|---|---|---|---|---|---|
| **YEAR** | **NEW** | | **EXISTING** | | **TOTAL** | |
| | Headcount | FTE | Headcount | FTE | Headcount | FTE |
| **Administration** | | | | | | |
| 2009-10 | | | 3 | 6 | 3 | 6 |
| 2010-11 | | | 3 | 6 | 3 | 6 |
| 2011-12 | | | 3 | 6 | 3 | 6 |
| 2012-13 | | | 3 | 6 | 3 | 6 |
| 2013-14 | | | 3 | 6 | 3 | 6 |
| **Faculty** | | | | | | |
| 2009-10 | | | 6 | 5.25 | 6 | 5.25 |
| 2010-11 | | | 6 | 5.25 | 6 | 5.25 |
| 2011-12 | | | 6 | 5.25 | 6 | 5.25 |
| 2012-13 | | | 6 | 5.25 | 6 | 5.25 |
| 2013-14 | | | 6 | 5.25 | 6 | 5.25 |
| **Staff** | | | | | | |
| 2009-10 | | | 4 | 3 | 4 | 3 |
| 2010-11 | | | 4 | 3 | 4 | 3 |
| 2011-12 | | | 4 | 3 | 4 | 3 |
| 2012-13 | | | 4 | 3 | 4 | 3 |
| 2013-14 | | | 4 | 3 | 4 | 3 |

## 6.0 Physical Plant

The physical facilities of the College of Science, Mathematics, Engineering and Technology (CSMET) are divided among several structures of varying sizes and types. They are designated as follows: The Harold W. Crawford Technology Hall, Lewis Laboratory Annex, Machine Tool Laboratory, Comprehensive Industrial Arts Laboratory, Nance Hall, and Hodge Hall.

The Harold W. Crawford Engineering Technology Hall was built in 1940, and houses the Offices of the Dean of the College of Science, Mathematics and Engineering Technology, Coordinator of Civil Engineering Technology program, Chair of Civil and Mechanical Engineering Technology, Chair of Industrial and Electrical Engineering Technology, Coordinator of Electrical Engineering Technology, and Director of the Off-campus Engineering Technology program.

Moreover, the Harold W. Crawford Engineering Technology Building is a two-story steel and brick structure, which contains the following offices, classrooms, and laboratories.

**First Floor**

- Dean's office
- Chairs' offices
- Faculty offices
- Student Organization Chapter offices
- Woodwork laboratory
- Conference room
- Automotive laboratory
- Classrooms

**Second Floor**

- Technical drafting laboratory
- Faculty offices
- Staff offices
- CAD laboratory
- Auditorium
- Word processing laboratory
- Electronics laboratory

The Lewis Laboratory was renovated several years ago at a cost of over $1,000,000. The renovation provided additional classroom and laboratory spaces as well as faculty and staff offices as listed below:

**First Floor**

- Faculty offices
- Computer laboratory
- Heat transfer and Hydraulics laboratory

- Materials Testing laboratory
- Graphics Communications laboratory
- Applied Radiation Sciences Laboratory
- Nuclear Computations Laboratory
- Reactor Simulation/NC State Tie-in Laboratory
- Modern Manufacturing Laboratory

**Second Floor**

- Learning Resource Center/Computer laboratory
- Classrooms
- Nuclear Engineering Library
- Nuclear Engineering Program's faculty and staff offices

The Lewis Laboratory Annex is dedicated to the Nuclear Engineering Program's Applied Radiation Sciences Laboratory and the Composite Materials Fabrication and Testing Laboratory.

A new engineering building is in the process of being built and will have modern facilities including offices, computer simulation lab, conference centers and a library that will augment, enhance or replace those listed above.

Most Nuclear Engineering lectures are held in classrooms in both the Lewis Laboratory Annex and the Crawford Engineering Technology building.

## 7.0 Equipment

The Applied Radiation Sciences Laboratory is equipped with nine sets of Sain-Gobain Crystals N210/NBC Geiger-Muller tubes coupled with spectrum ST360 radiation counters and nine sets of Canberra NaI(Tl) detectors operated with Genie 2000 spectrum analysis software. These detectors are connected to nine PC computers, providing each student in every training course with sufficient opportunity to operate the instruments and obtain his/her own experimental data.

In addition, the Applied Radiation Sciences Lab has one Canberra high-purity germanium detector for gamma-spectrometry with a higher energy resolution than that provided by the NaI(Tl) detectors; one Canberra alpha analyzer for alpha-spectrometry; two triathler 425-034 liquid scintillation counters that are small in size and are suitable for field investigations of environmental radioactivity and one PerkinElmer Tri-Carb 2900TR Liquid Scintillation Analyzer (LSA) that can conduct more precise liquid scintillation analysis and can automatically analyze a hundred samples at one time. These advanced instruments provide the lab with the capability of carrying out scientific investigations in the fields such as radiochemistry, environmental chemistry, biology and medical sciences.

Furthermore, the lab is also equipped with various health physics instruments, such as 9 Eberline and Ludlum pancake-style radiation monitors for radiation contamination survey; five Canberra Radiagem 400 portable dose rate meters for alpha, beta and gamma survey, and one Eberline personal contamination

monitor for whole-body radiation survey. The health physics instruments are required tools for teaching the safety policy and practices in the radiation sciences. By learning and operating these instruments, the students gain an understanding of how nuclear workers maintain a safe work environment while working with radioisotopes and nuclear radiation, and how the nuclear sciences are applied to protect the natural environment from being contaminated by radioactive materials.

Most of the instruments in the Applied Radiation Sciences Laboratory are recently installed and are in excellent working conditions. Table 7.1 shows the inventory of the instruments in this lab.

**Table 7.1: Radiation and Health Physics Instruments**

| Type of instrument | QTY | Brand | Comments |
|---|---|---|---|
| G-M Counters | 9 | Sain Gobain Crystal | Coupled with ST360 radiation counters |
| NaI(TI) detectors | 9 | Canberra | Use Genie 2000 spectrum analysis software |
| HPGe detector | 1 | Canberra | Has high energy resolution NaI(TI) detectors |
| Alpha analyzer | 1 | Canberra | |
| Liquid scintillation Counters | 2 | Triathler 425-034 | Small an suitable for field Investigation |
| Liquid Scintillation Analyzer (LSA) | 1 | PerkinElmer Tri-Carb 2900TR | can conduct more precise analysis and automatically analyze hundred samples at one time |
| Radiation monitors | 9 | Eberline and Ludium | They are pancake-style |
| Radiagem 400 portable dose rate Meters | 5 | Canberra | |
| Personal contamination monitor | 1 | Eberline | For whole-body radiation survey |

The Department of Engineering Technology maintains a computer laboratory in Room 209, of the Crawford Engineering Technology building which is accessible to Nuclear Engineering Program students. The laboratory currently has 12 Dell computers with the associated hardware. The computers have standard software packages needed for word processing, spreadsheet and database manipulation. In

addition, ten computers are located in the Lewis Laboratory and Lewis Laboratory Annex. These contain specialized engineering and mathematics packages that the students use in their coursework and research. Packages available to students include MAPLE, MATLAB, MCNP, SCALE, MICRO-SHIELD and MICRO-SKYSHINE. The Lewis Laboratory building also serves as a work/study area for the students. The Miller Whittaker Library has a state-of-the-art facility which is always accessible to the NE students.

Currently, some of the codes (MCNP, SCALE, MICRO-SHIELD & MICRO-SKYSHINE) are used primarily in the Special Topics course (NE 499). This course exposes students at the junior and senior levels to current industry-based computer codes. The version of MCNP at South Carolina State University is a PC-based version which can be loaded onto multiple PCs. In the near future, the codes will be made accessible through a network of PCs connected to a dedicated workstation, which is already in place. Other nuclear engineering application codes include MICRO-SHIELD for design analyses in radiation shielding and RASCEL for emergency planning. The SCALE, MICR-SKYSHINE AND MICRO-SHIELD codes are also PC based versions.

SC State NEP students currently fulfill part of their graduation requirement by taking some courses at the University of Wisconsin at Madison, Wisconsin. However increased in-house faculty capability and modern laboratory and computer facilities have diminished the need for using the nuclear facilities at the University of Wisconsin.

## 8.0 Library Resources

The Miller F. Whittaker Library is the main library at SC STATE. It is designed to accommodate the research and academic resource needs for both on-site and off-site students. Users have access to: 1) MIL-LINE, the online catalog for books, serials, government documents and selected microforms; 2) electronic resources on the Library's web site; and 3) other microform collections.

The library provides Bibliographic Instruction Program tailored to meet the needs of students, faculty and staff. Three levels of instruction assist undergraduates, graduates, specialists and doctoral students in identifying, interpreting and using a variety of reference and information resources.

Information retrieval systems provide users access to more than 50,000 libraries of all types in 94 countries and territories for inter-library loans. Thousands of databases provide access to subjects for current and retrospective information using the Internet. The systems include: 1) SOLINET – The Southeastern Library Network, along with other regional networks in the United States has access to many cooperative library activities through one major system, the Online Computer Library center, Inc. (OCLC, Inc) for interlibrary loan and other activities; 2) Dialog – the largest and most comprehensive collection of web databases that covers a wide range of subject areas; 3) First Search – provides articles from databases and electronic journals; and 4) DISCUS Digital Information for South Carolina Users) – provides access to an electronic library of full-text resources on the Web.

## 9.0 Accreditation, Approval, Licensure, or certification

The Nuclear Engineering Program at the South Carolina State University, as mentioned in Section 2, is an ABET-EAC accredited program in nuclear engineering. This accreditation was granted in August 2008 for six years (until 2014), and was made retroactive to October 1, 2005.

The process for the ABET-EAC accreditation of the program was started in 2006 following the graduation of two of SC State's B.S.N.E. students. One of the major requirements of the ABET accreditation process is the completion of a "Self-Study Report" detailing the Program Learning Objectives, Program Learning Outcomes, the curriculum of the program and the facilities to support the program. Also included in the report is the description of the composition, size, credentials, experience and workload of the faculty and the competencies of the faculty and how they are adequate to cover all of the curricular areas of the program.

The other major step in the process is the visit of the Program Evaluators from ABET. The evaluator's mission is to evaluate the program with reference to the data in the "Self-Study Report" and determine if the program meets the requirements for accreditation.

The Accreditation Board for Engineering and Technology (ABET) through the Engineering Accreditation Commission (EAC) is the recognized accreditation organization for college and university programs in applied science, computing, engineering, and technology. It is a federation of more than 30 professional and technical societies representing these fields.

The ABET, Inc. is among the most respected accreditation organizations in the U. S. and has provided leadership and quality assurance in higher education for over 75 years.

## 10.0 Articulation

The NEP has no articulation agreements with any other institution in the state of South Carolina since it is the only such program in the state. However, the NEP, as stated in Section 2, has an articulation agreement with the University of Wisconsin (UW), Madison that allows our students to take certain classes at the Madison campus which initially could not possibly be taught at SC State. The current agreement is such that SC State can only confer the Bachelor's degree in Nuclear Engineering in conjunction with the University of Wisconsin, Madison. Thus, SC State is seeking to modify the articulation agreement such that the SC State NEP can *independently* confer the bachelor's degree in Nuclear Engineering to its graduates.

## 11.0 Estimated New Costs

There are no new costs associated with this modification.

## 12.0 Sources of Financing

Since the inception of the program, the NEP has been financed through grants from state and federal government agencies and industry partners. The major contributors are the Department of Energy (DOE), Shaw/AREVA, Duke Energy, Exelon, SCANA and the American Nuclear Society. Recently, major scholarship and research awards have come from the Nuclear Regulatory Commission (NRC) and the MOX facility at the Savannah River Site (SRS).
Table 12.1 shows a distribution of the sources of financing by year.

**Table 12.1: Sources of Financing by Year**

| SOURCES OF FINANCING BY YEAR | | | | | | |
|---|---|---|---|---|---|---|
| | 2005 | 2006 | 2007 | 2008 | 2009 | TOTAL |
| Estimated FTE Revenue Generated from the State (See note on page 25.) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Tuition Funding (New students only) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Other State Funding (Legislative Approp.) | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Reallocation of Existing Funds | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Federal Funding ($) | 912,112 | 778,967 | 2,002,176 | 508,000 | 659,000 | 4,860,255 |
| Other Funding (Industry Partners) ($) | 35,000 | 2,200 | 5,500 | 0.0 | 0.0 | 42,700 |
| **TOTALS ($)** | 947,112 | 781,167 | 2,007,676 | 508,000 | 659,000 | 4,902,955 |

## 13.0 Institutional Approval

This proposal has gone through the appropriate institutional bodies for approval. The following institutional bodies have approved this proposal and their dates of approval are also indicated.

1) Educational Policies Council: Approved 08/14/2008

2) The Vice President for Academic Affairs: Approved 08/28/2008

3) The President: Approved 09/03/2008

4) The Board of Trustees: Approved 10/01/2009