

**U.S. NUCLEAR REGULATORY COMMISSION
NOTICE OF GRANT/ASSISTANCE AWARD**

1. GRANT/AGREEMENT NO. NRC-38-09-895		2. MODIFICATION NO. M003		3. PERIOD OF PERFORMANCE FROM: 08/17/2009 TO: 08/16/2011		4. AUTHORITY Pursuant to Section 31b and 141b of the Atomic Energy Act of 1954, as amended	
5. TYPE OF AWARD <input checked="" type="checkbox"/> GRANT <input type="checkbox"/> COOPERATIVE AGREEMENT		6. ORGANIZATION TYPE Public State-Controlled Institution of Higher ED DUNS: 075050765		7. RECIPIENT NAME, ADDRESS, and EMAIL ADDRESS Louisiana State University 202 Himes Hall Baton Rouge, Louisiana 70803			
8. PROJECT TITLE: Curriculum Development in Health Physics and Nuclear Engineering							
9. PROJECT WILL BE CONDUCTED PER GOVERNMENT'S/RECIPIENT'S PROPOSAL(S) DATED See Program Description AND APPENDIX A-PROJECT GRANT PROVISIONS		10. TECHNICAL REPORTS ARE REQUIRED <input checked="" type="checkbox"/> PROGRESS AND FINAL <input type="checkbox"/> FINAL ONLY <input type="checkbox"/> OTHER (Conference Proceedings)		11. PRINCIPAL INVESTIGATOR(S) NAME, ADDRESS and EMAIL ADDRESS Louisiana State University Attn: Mike Cherry Email: Cherry@lsu.edu 225-892-2762			
12. NRC PROGRAM OFFICE (NAME and ADDRESS) NRC Attn: Randi Neff Office of Human Resources MS: GW5A6 (301) 492-2301 11545 Rockville Pike Rockville, Maryland 20852		13. ACCOUNTING and APPROPRIATION DATA APPN. NO: 31X0200 B&R NO: 0-8415-5C1116 JOB CODE: T8453 BOC NO: 4110 OFFICE ID NO: RFPA: HR-09-895		14. METHOD OF PAYMENT <input type="checkbox"/> ADVANCE BY TREASURY CHECK <input type="checkbox"/> REIMBURSEMENT BY TREASURY CHECK <input type="checkbox"/> LETTER OF CREDIT <input checked="" type="checkbox"/> OTHER (SPECIFY) Electronic ASAP.gov (See Remarks in Item #20 "Payment Information")			
15. NRC OBLIGATION FUNDS THIS ACTION \$150,000 PREVIOUS OBLIGATION \$150,000 TOTAL \$300,000		16. TOTAL FUNDING AGREEMENT NRC \$300,000 RECIPIENT \$122,780 TOTAL \$422,780		This action provides funds for Fiscal Year in the amount of See page two			
17. NRC ISSUING OFFICE (NAME, ADDRESS and EMAIL ADDRESS) U.S. Nuclear Regulatory Commission Div. of Contracts Attn: M'Lita Carr Mail Stop: TWB-01-B10M Rockville MD 20852 MLita.Carr@nrc.gov							
18. Signature Not Required				19. NRC CONTRACTING OFFICER <u>Sheila Bumpass</u> <u>8/23/2010</u> (Signature) (Date) NAME (TYPED) Sheila Bumpass TITLE Contracting Officer TELEPHONE NO. 301-492-3484 Sheila.Bumpass@nrc.gov			
20. PAYMENT INFORMATION Payment will be made through the Automated Standard Application for Payment (ASAP.gov) unless the recipient has failed to comply with the program objectives, award conditions, Federal reporting requirements or other conditions specified in 2 CFR 215 (OMB Circular A110).							
21. Attached is a copy of the "NRC General Provisions for Grants and Cooperative Agreements Awarded to Non-Government Recipients. Acceptance of these terms and conditions is acknowledged when Federal funds are used on this project.							
22. ORDER OF PRECEDENCE In the event of a conflict between the recipient's proposal and this award, the terms of the Award shall prevail.							
23. By this award, the Recipient certifies that payment of any audit-related debt will not reduce the level of performance of any Federal Program.							

TEMPLATE - ADMIN

SUNSI REVIEW COMPLETE

ADMIN

DESCRIPTION OF MODIFICATION:

The purpose for modification number 003 is to:

1. Correct the period of performance as indicated in Box 3 on modification 2;
2. Correct the obligation funds indicated in Box 15 on modification 2;
3. Correct the total funding agreement as indicated in Box 16 on modification 2;
4. Correct "Attachment A-Schedule" and "Attachment B-Program Description" on modification 2.

As a result of this modification:

1. Delete all references to the period of performance "7/01/2010 – 06/30/2011" and replace it with "08/17/2009 – 08/16/2011".
2. Box 15 – "NRC Obligation Funds" on modification 2 is changed to read:

NRC Obligation Funds

This Action:	\$150,000
Previous Obligation:	\$150,000
Total:	\$300,000

3. Box 16 – "Total Funding Agreement" on modification 2 is changed to read:

NRC Funding Amount

NRC:	\$300,000
Recipient:	\$122,780
Total:	\$422,780

4. Delete the "Attachment A-Schedule" and "Attachment B-Program Description" attached to modification 2 and replace it with the "Attachment A-Schedule" and "Attachment B-Program Description" attached to this modification.

Base Period: August 17, 2009 – August 16, 2011

Assistance Award Ceiling: \$300,000.00

NRC Total Obligated Amount: \$300,000.00

All other terms and conditions remain the same.

ATTACHMENT A - SCHEDULE

A.1 PURPOSE OF GRANT

The purpose of this Grant is to provide support to the "Curriculum Development in Health Physics and Nuclear Engineering" as described in Attachment B entitled "Program Description."

A.2 PERIOD OF GRANT

1. The effective date of this Grant is August 17, 2009. The estimated completion date of this Grant is August 16, 2011.
2. Funds obligated hereunder are available for program expenditures for the estimated period: August 17, 2010 – August 16, 2011.

A. GENERAL

1. Total Estimated NRC Amount For Year 2: \$150,000
2. Total Obligated Amount For Year 2: \$150,000
3. Total Obligated Amount: \$300,000
4. Cost-Sharing Amount For the Grant Period: \$122,780
5. Activity Title: Curriculum Development in Health Physics and Nuclear Engineering
6. NRC Project Officer: Randi Neff
7. DUNS No.: 075050765

B. SPECIFIC

- RFP No.: HR-09-895-002
- FFS: N/A
- Job Code: T8453
- BOC: 4110
- B&R Number: 0-8415-5C1116
- Appropriation #: 31X0200
- Amount Obligated: \$150,000

A.3 BUDGET

Revisions to the budget shall be made in accordance with Revision of Grant Budget in accordance with 2 CFR 215.25.

	Year 2
Direct Participant Cost	\$100,671.00
Indirect Cost	<u>\$49,329.00</u>
Yearly Total	\$150,000.00

All travel must be in accordance with the Louisiana State University Travel Regulations or the US Government Travel Policy absent Grantee's travel regulation.

A.4 AMOUNT OF MODIFICATION AND PAYMENT PROCEDURES

1. The total estimated amount of this Modification is \$150,000 for a one year period.

2. NRC hereby obligates the amount of \$150,000 for program expenditures during the period set forth above and in support of the Budget above. The Grantee will be given written notice by the Contracting Officer when additional funds will be added. NRC is not obligated to reimburse the Grantee for the expenditure of amounts in excess of the total obligated amount.

3. Payment shall be made to the Grantee in accordance with procedures set forth in the Automated Standard Application For Payments (ASAP).

Attachment B – Program Description

Curriculum Development in Health Physics and Nuclear Engineering

Curriculum Development in Health Physics and Nuclear Engineering

Submitted to US Nuclear Regulatory Commission Nuclear Education Grant Program
Aug. 20, 2010

Principal Investigator: Michael L. Cherry
Department of Physics & Astronomy, Louisiana State University, Baton Rouge, LA 70803.

This summary outlines the revision of the project scope due to the reduction of available funding and focuses on the second year of a planned multi-year project in which a comprehensive curriculum is established in both Nuclear Power Health Physics and Nuclear Engineering through the departments of Physics and Astronomy and Mechanical Engineering, respectively. The only significant difference between the updated scope and the original scope is that for the academic year 2010 – 2011 the focus will turn to the undergraduate nuclear education component while further development in subsequent years will be contingent upon obtaining funding from other sources.

Louisiana State University, in partnership with The Shaw Group and Entergy Corporation, intends to implement a workforce development program to train students to work in the nuclear power industry. With an emphasis in undergraduate nuclear education in Health Physics (HP) and Nuclear Engineering (NE), the program will involve collaboration between LSU's Departments of Physics & Astronomy and Mechanical Engineering. The goal in the 2010 – 2011 academic year will be to begin designing and implementing the undergraduate curriculum, establishing new courses, student laboratories, and updating/enhancing existing related courses, as detailed in the undergraduate section of the original proposal. In this sense, there will be no substantial departure from the original proposal. The industry partners will contribute technical expertise and advice, internships for students and jobs for the program's graduates, and funding. In both HP and NE, undergraduate concentrations within the Department of Physics and Department of Mechanical Engineering, respectively, will be developed. Because all the courses planned to be developed in this academic year are already in the LSU General Catalog, no new course approvals are required. The initial goal is to train 10 undergraduates a year per discipline, with initial classes started in January 2010. Specifically, the following courses will be developed:

HP course NS-3411 Fundamentals of Nuclear Radiation Science. This course may be offered at the 4000 level, as determined by programmatic needs, and offered starting in Spring 2011. This is a core course, which is newly developed, to be taken by both HP and NE students.

New HP laboratory experiments for the existing medical physics course MEDP-4332. The existing course already has a substantial HP content. New experiments will be offered with content relevant to the nuclear power industry. Core experiments that are identical to HP and MEDP will be done together. For the HP section, labs which now focus on medical physics (e.g., film dosimetry) will be replaced by nuclear power related HP experiments. This is a core course in the HP curriculum, and an ancillary course for the NE undergraduate curriculum. A separate new experiment, offered for NE students within the frame of the existing lab ME3603 (see below), will leverage the equipment purchased using NRC funds for this course.

HP & NE course NS-4570 Nuclear Facility Safety will be a core course, newly developed for both NE and HP undergraduates. Course content will be ready by the Fall 2010.

ME laboratory course ME3603 will be updated with a new experiment focusing on radiation detection as related to NE. This experiment will partially rely on equipment used in MEDP4331, but will add new content relevant to equipment design and electronic control of detectors, and thus will also use additional equipment purchased from NRC funds, as needed.

NE course NS-4527 Reactor Theory and Design is a core course for the NE concentration. This was offered initially in Spring 2010 by an instructor in ME with industry ties. It will be offered again in Spring 2011.

NE course ME4663 Nuclear Power Plant Engineering retains its original intent as a dual level course -- a technical elective for the undergraduate NE concentration, and a core course for the graduate level. This course was offered in Spring 2010 and is receiving substantial updating and redesign for Spring 2011.

NE course ME4933 Welding and Joint Technology has been newly developed as an elective for the NE concentration. It will focus on these technologies with special emphasis on components and techniques used in the nuclear power industry. The plan is to offer it for the Fall 2010.

The detailed descriptions of the above courses, their scope and interdependence will not change relative to the original proposal. The only significant difference between the updated scope and the original scope is that for the academic year 2010 – 2011 the focus will be on undergraduate nuclear education. An advisory panel consisting of industry and outside academic representatives will also be established according to the original plans.

Prof. Michael Cherry, Principal Investigator and chair of the LSU Dept. of Physics & Astronomy, will oversee and coordinate the overall program. He will lead the effort to revise the Physics & Astronomy Department's undergraduate Health Physics curriculum to reflect the needs of the nuclear power industry. An expert in radiation detectors, Prof. Cherry will take responsibility for designing and setting up the student laboratories in Physics and Astronomy. He will receive one month of summer salary from this project. Research Professor T. Gregory Guzik, an expert in radiation and radiation detector physics, will receive half salary each semester (4.5 months); he will teach the fundamental nuclear physics/radiation course taken by both Physics and Mechanical Engineering students until new faculty are hired, proposed in a separate funding request.

Prof. Charalampopoulos (Thermal Engineering, Combustion and Radiation Heat Transfer) teaches the ME elective course on Thermal System Design (ME4383) as well as an occasional technical elective course on Power Plant Design (ME4663). He will re-orient this last course to focus on nuclear power plant design and operations, including operating and emergency operating procedures. ME4663 was being offered this past Spring semester and Prof. Charalampopoulos has already started the transition towards nuclear power plant design aided by ME alumni from Entergy. Because this course will be developed from an existing one with some components that are common to Nuclear and non-Nuclear plants, he will receive only 0.3 months salary from this project from funds provided by the LSU Vice Chancellor for Research and Economic Development, while we request no salary from NRC.

Prof. Moldovan, with a background in Engineering Physics (in particular Materials) oriented towards the nuclear industry, will redevelop a dual-level ME4933 ("Nuclear Reactor Materials") course, which will provide as a technical elective a firm basis on the subject and add the appropriate materials component to the Nuclear Power Engineering minor. The development will be done with the intent of making this course accessible to interested Physics students as well. He will receive 0.5 months of salary from LSU's Office of Research and Economic Development (ORED).

Prof. Gonthier is the Chair of the ME Dept. Undergraduate Studies Committee, the UG Student Advisor, and a member of the Thermal Science Group. He routinely teaches Fluid Mechanics and Thermodynamics, both of which are fundamental to the proposed Nuclear Concentration in ME. He will be in charge of all ME curricular modifications and development, will represent and advance the program in the College of Engineering and University curriculum committees, and will advise the BSME Nuclear Concentration students. These activities are part of his normal duties. In addition, he will be the industry liaison for the program and will spearhead the recruitment of students into the NE concentration until it is well established. As part of this function he will organize and supervise annual field trips of ME and HP students to the

nuclear installations of our industrial partner Entergy, and he will supervise/evaluate students during summer internships with our industrial partners Entergy and Shaw in order for them to receive credit through the ME3249 and ME3250 Engineering Practice courses. As industrial liaison he will also advise those non-thesis MSME in Nuclear Engineering students who will be enrolled in the program from industry. For all these activities he will receive 0.5 months summer salary support from LSU ORED.

Prof. Nikitopoulos, Chair of Mechanical Engineering and expert in two-phase flow, will be in charge of introducing a new radiation instrumentation experiment into the ME3603 laboratory course. The experiment will be designed, implemented and demonstrated by a group of ME and, if possible, Physics students, and it will leverage equipment used in MEDP-4332 as well as use dedicated instrumentation. Prof. Nikitopoulos will receive 0.5 months of salary from LSU ORED.

NRC funds are budgeted for a portion of an instructor's salary in Mechanical Engineering. In addition, this position receives matching support from LSU ORED. Dr. Wes Williams has been hired into this position and began teaching NS 4527 (Nuclear Reactor Theory and Design) in Spring 2010.