

**U.S. DEPARTMENT OF HOMELAND SECURITY**  
DOMESTIC NUCLEAR DETECTION OFFICE

**NUCLEAR FORENSICS**  
**UNDERGRADUATE SCHOLARSHIP PROGRAM**



**Student Application Deadline**  
**February 1, 2013**

**Awards Announced March 2013**

**ACADEMIC YEAR: 2013-2014**

**Administered by the South Carolina Universities Research and Education Foundation**

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# **NUCLEAR FORENSICS UNDERGRADUATE SCHOLARSHIP PROGRAM**

## **PROGRAM DESCRIPTION**

Sponsored by the U.S. Department of Homeland Security (DHS) Domestic Nuclear Detection Office (DNDO), the Nuclear Forensics Undergraduate Scholarship Program (NFUSP) provides scholarships to qualified undergraduate students pursuing degrees in disciplines relevant to technical nuclear forensics including physics, chemistry, nuclear engineering, and material science. Scholars gain hands-on experience through summer research opportunities at the Department of Energy national laboratories, including close interaction with technical experts throughout the national nuclear forensics community. The NFUSP aims to build a viable student career path in nuclear forensics in order to cultivate the next generation of highly qualified scientists in this critically important field.

Nuclear forensics is a top U.S. national security priority. Congress recognized the critical need for first-rate nuclear forensics experts to support this mission in the *Nuclear Forensics and Attribution Act* (P.L. 111-140), which the President signed on February 16, 2010. In addition, world leaders highlighted the importance of international nuclear forensics cooperation during both the 2010 and 2012 Nuclear Security Summits. Restoring and sustaining an enduring expertise pipeline is one of the most significant challenges facing the U.S. nuclear forensics capability today. The U.S. nuclear stockpile and weapons complex has been shrinking since the end of the Cold War, and nuclear scientists have left the field for other pursuits. The majority of those remaining are retired or nearing retirement. Moreover, the number of students graduating with radiochemistry and related degrees has declined significantly in the past several decades.

As a key component of the broader National Nuclear Forensics Expertise Development Program (NNFEDP), the NFUSP aims to confront this challenge head-on. The Scholarship gives highly motivated students an exceptional opportunity to apply their knowledge to enhance U.S. national security. The program aims to facilitate experiential learning in a nuclear forensics-related research area and to encourage talented students to seek advanced education. An ancillary benefit of the NFUSP is that undergraduate students are exposed to other NNFEDP opportunities, such as the Nuclear Forensics Graduate Fellowship Program, sponsored by DHS and the U.S. Department of Defense.

## **RELATED TECHNICAL AREAS**

The purpose of the NFUSP is to introduce outstanding undergraduate students to ongoing federal research and development work related to technical nuclear forensics, focused in the following areas:

1. Technical Mission Area 1 (TMA 1): In general, the NTNF community is interested in advancements in the analysis and characterization of nuclear and other radioactive materials. Of particular importance are innovations in the speed, accuracy, and precision of determining the physical, chemical, isotopic, micro-structural, and/or morphological properties of materials. Specifically in FY2013, the USG is primarily seeking significant developments in the quantification of micro-structural and morphological measurements of bulk uranium and plutonium materials in both oxide and metal forms.
2. Technical Mission Area 2 (TMA 2): Following the detonation of a nuclear device, solid debris samples to be analyzed are expected to contain trace-level quantities of nuclear materials combined with material from the immediate environment around the detonation site, which may have been activated and is assumed to have been vaporized and recondensed. As such, debris for dissolution is expected to have formed at high temperatures and contain silicates and other hard-to-dissolve materials. Solid fallout debris is typically in a glassy matrix containing parts per million (ppm) quantities of plutonium or uranium with radioactive fission products. Improvements are sought in the characterization and analysis of nuclear and non-nuclear constituents within these nuclear and post-detonation debris materials, including those present in trace quantities.
3. Technical Mission Area 3 (TMA 3): General studies that improve our understanding of how relevant stages of the nuclear fuel cycle create, persist, or modify discriminating material characteristics in the metal or oxide forms of uranium or plutonium. FY2013 activities should focus on identifying discriminating characteristics that help assess the process history and provenance of bulk uranium and plutonium materials produced in the enrichment, conversion to oxides, and conversion to metal stages of the fuel cycle, and developing simulations that predict material characteristics from parameterized processes.

## **APPLICATION PROCEDURES**

### **ELIGIBILITY**

Students pursuing undergraduate degrees in nuclear and geochemical sciences, including but not limited to physics, chemistry, engineering, and material science, are eligible to apply.

Applicants must be U.S. citizens. It is the policy of DHS and its program administrator, the South Carolina Universities Research and Education Foundation (SCUREF), to recruit and nominate participants without regard to race, age, gender, religion, color, national origin, physical or mental disability, or special disabled or veteran status.

### **APPLICATION DEADLINE**

The current competition cycle for this program is from November 2012 to February 1, 2013. SCUREF must receive all parts of the application by February 1, 2013. ACT/SAT scores are required for a complete application. Scores earned before 2003 will not be accepted. SCUREF will not process late and/or incomplete applications. Please include the Scholarship Program name on all correspondence.

### A complete application includes the following components:

Application Form  
Three (3) References  
Official Transcripts  
ACT/SAT scores  
Proof of U.S. Citizenship (copy of birth certificate or U.S. passport)

Completed application materials should be submitted electronically through the SCUREF website ([www.scuref.org](http://www.scuref.org)). If you are unable to submit the application electronically, completed application materials can be mailed to the address below.

South Carolina Universities Research and Education Foundation  
Nuclear Forensics Undergraduate Scholarship Program  
1204 Whiskey Road, Suite F  
Aiken, South Carolina 29803-4322

For additional information or assistance, please contact Kaye Gmitter at (803) 642-4187, [scurefaiken@bellsouth.net](mailto:scurefaiken@bellsouth.net) or Craig Williamson at (803) 439-3192, [rcraigwilliamson@scuref.org](mailto:rcraigwilliamson@scuref.org).

## **SCHOLARSHIP OBLIGATIONS**

### **COLLEGE OR UNIVERSITY ENROLLMENT**

Throughout the period of appointment, Scholarship recipients must be enrolled full-time at a U.S. college or university. Scholars shall participate in a nine-to-12-week summer appointment at a national laboratory, performing study and research within the objectives of the DHS/DNDO nuclear forensics mission. The Scholars will enroll in a “research credit” course during the fall term, during which time the Scholars will write and present a technical report detailing their research.

### **LABORATORY ASSIGNMENT**

During the summer laboratory assignment, the Scholar will develop a clear statement of a problem, conduct a review of literature related to this problem, and perform research utilizing laboratory methodology and protocol. The Scholar, with the assistance of a laboratory mentor, will also begin drafting a technical report within the summer work period. Under the tutelage of a university faculty advisor, the Scholar will revise the draft scientific report into final form for submission to SCUREF. By the end of the fall term, the Scholar will deliver an oral presentation of the research to the university and laboratory staff. The Scholar may be asked to attend the annual NNFEDP Academic-Laboratory Collaboration Meeting the following spring to present the final project to the broader nuclear forensics community, including technical and policy experts from academia, the national laboratories, and the federal government. In addition, the NFUSP encourages Scholars to present the results of their research at events hosted by the American Chemical Society, the American Nuclear Society, and other relevant professional organizations.

### **PUBLICATIONS**

Scholars must provide copies of their research and a written evaluation of their experience to SCUREF. SCUREF will provide this information to the participating laboratories for review and comment, and the final version will be submitted to DHS.

### **SCHOLARSHIP BENEFITS**

The Scholar will receive a stipend of \$10,000 to support his or her summer research appointment at a national laboratory and project completion during the fall term. The NFUSP may provide additional funding to the Scholar for travel costs associated with performing laboratory work and participating in technical meetings. SCUREF will allocate stipend and travel payments directly to the Scholar. All awards and travel support are subject to the continuing availability of funds.

If funding exists, faculty mentors may be eligible for a \$2,000 allowance to cover partial salary or other expenses associated with this Scholarship. NFUSP faculty mentors can contact the SCUREF office to request an eligibility form.

## **TERMS OF APPOINTMENT**

NFUSP appointments are part of the NNFEDP, codified in the Nuclear Forensics and Attribution Act (P.L. 111-140). Scholars are required to acknowledge specific terms of appointment in accordance with this law.

A Scholarship recipient must agree to maintain a high level of academic standing, complete the nine-to-12-week research practicum at a DHS/DNDO-sponsored laboratory, and deliver a written and oral presentation of the research results. DHS/DNDO will work closely with the Scholars, the laboratory staff, and SCUREF throughout the appointment to foster lasting professional relationships. SCUREF staff will identify faculty and laboratory mentors to work directly with the Scholars, and SCUREF will lead the coordination of ongoing NFUSP activities. Applicants may request the full terms and conditions of this agreement by contacting SCUREF, and these terms will be included for review and signature in successful applicants' official appointment documents.

Scholars who have finished the program are required to complete annual surveys for SCUREF to enable the federal sponsor to continually assess and evaluate the NFUSP.

## **EVALUATION OF APPLICATIONS**

Applications are reviewed to ensure all requested information is included. It is the applicant's responsibility to ensure that his or her application is complete. After the application deadline, SCUREF will distribute the 2013-2014 NFUSP applications to an independent panel for review. Panel members are technical experts from national laboratories who are intimately involved in the USG nuclear forensics program.

Applications are evaluated based on academic performance, relevant coursework, ACT/SAT scores, career and goals statements, and references. Other factors, including geographical criteria and professional personnel needs of the DHS nuclear forensics research program, are also considered. The number of scholarships awarded annually is contingent on the availability of funding.

The panel of experts reviews each application and provides award recommendations to SCUREF. SCUREF then submits the panel's recommendations to the program sponsor for consideration. DHS/DNDO conducts a final review of the applications and the panel's recommendations and selects the official NFUSP award recipients. SCUREF will announce award recipients and notify all applicants in March 2013.

SCUREF is responsible for the daily administration of the NFUSP on behalf of the program sponsors; as such, SCUREF assists the Scholars, laboratories, and universities with questions regarding stipends, laboratory assignments, travel, and other related issues.

**NUCLEAR FORENSICS UNIVERSITY SCHOLARSHIP PROGRAM**

**PARTICIPATING LABORATORIES**

ARGONNE NATIONAL LABORATORY <a href="http://www.anl.gov">WWW.ANL.GOV</a>	IDAHO NATIONAL LABORATORY <a href="http://www.inl.gov">WWW.INL.GOV</a>
LAWRENCE LIVERMORE NATIONAL LABORATORY <a href="http://www.llnl.gov">WWW.LLNL.GOV</a>	LOS ALAMOS NATIONAL LABORATORY <a href="http://www.lanl.gov">WWW.LANL.GOV</a>
OAK RIDGE NATIONAL LABORATORY <a href="http://www.ornl.gov">WWW.ORNL.GOV</a>	PACIFIC NORTHWEST NATIONAL LABORATORY <a href="http://www.pnnl.gov">WWW.PNNL.GOV</a>
SANDIA NATIONAL LABORATORIES <a href="http://www.sandia.gov">WWW.SANDIA.GOV</a>	SAVANNAH RIVER NATIONAL LABORATORY <a href="http://srnl.doe.gov">SRNL.DOE.GOV</a>
Y-12 NATIONAL SECURITY COMPLEX <a href="http://www.y12.doe.gov">WWW.Y12.DOE.GOV</a>	



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**2013-2014**

**APPLICATION CRITERIA**

A complete application consists of:

1. Application Form (Hand written applications will not be accepted)
2. Current Official Transcript of Grades (all undergraduate transcripts are required)
3. Three (3) Reference Forms (enclosed)
4. ACT/SAT scores
5. Proof of U.S. Citizenship (copy of birth certificate or U.S. passport)

Please ensure all parts of the application are complete and proper signatures have been obtained. Keep a copy of this application and supporting materials for your files.

All applicants must submit the required information to SCUREF by February 1, 2013. It is the applicant's responsibility to check with SCUREF regarding the completeness of the application file. Incomplete applications will not be reviewed.

Completed application materials should be submitted electronically through the SCUREF website ([www.scuref.org](http://www.scuref.org)). If you are unable to submit the application electronically, completed application materials can be mailed to the address below.

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Nuclear Forensics Undergraduate Scholarship Program  
1204 Whiskey Road, Suite F  
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\*Application information will be used solely for the purpose of selecting participants and administering the program. Disclosure of this information is made subject to Public Law 93-579 (the Privacy Act of 1974).