

## FY 2018 Faculty Development Grant Awards

Institution	Amount	Title
City University of New York	\$449,999	Faculty Development Program: Expanding the Scope of Nuclear Engineering Research and Education at The City College of New York
Clemson University	\$450,000	Nuclear Faculty Development at Clemson University
Massachusetts Institute of Technology	\$449,999.92	MIT Nuclear Education Faculty Development Program
Pennsylvania State University	\$450,000	Pennsylvania State University's Faculty Development Grant for Multiscale Materials Modeling and Experimentation
University of Florida	\$449,998	2018 Nuclear Engineering Faculty Development Program
University of Iowa	\$450,000	Continued Advancement of the Radiochemistry Program at the University of Iowa
University of Missouri S&T	\$450,000	Missouri S&T Nuclear Engineering Faculty Development Program (2018-2021)
University of Texas San Antonio	\$450,000	Nuclear Fuels Research and Development Faculty Development Program at the University of Texas at San Antonio
University of Maryland	\$450,000	Faculty Development Program for Cross-Disciplinary Research in Probabilistic Risk Assessment for Nuclear Facilities
University of Nebraska - Lincoln	\$450,000	Faculty Development Program in Nuclear Engineering at the University of Nebraska-Lincoln
Virginia Commonwealth University	\$450,000	Faculty Development Program in Nuclear Engineering at VCU

## **Faculty Development Program: Expanding the Scope of Nuclear Engineering Research and Education at The City College of New York**

### **Executive Summary:**

The “*Faculty Development Program: Expanding the Scope of Nuclear Engineering Research and Education at The City College of New York*” aims to significantly expand the scope of nuclear engineering research and education programs within The City College of New York’s (CCNY) Grove School of Engineering and The City University of New York’s (CUNY) Energy Institute. Specifically, CCNY will add new research directions and teaching competencies regarding next-generation nuclear safety systems, including emergency power systems. A total amount of \$599,998 (~~\$449,998~~ requested from the NRC, additional \$150,000 directly matched by CCNY) will be used to support the program, including Faculty Development Candidate Dr. Robert J. Messinger, a tenure-track Assistant Professor of Chemical Engineering. Dr. Messinger will establish a new nuclear safety research program at CCNY aimed at significantly improving the emergency electrical systems at nuclear power plants, with the overarching research objective of mitigating core damage frequency and core meltdown risks during station blackout (SBO) and extended-loss-of-alternating-current-power (ELAP) events. Such risks were recently highlighted in Fukushima, Japan, in March 2011, where sequential earthquake and tsunami events resulted in prolonged ELAP and subsequent reactor meltdown. Advanced rechargeable zinc and aluminum batteries will be developed as advanced back-up power systems that exhibit significantly improved energy densities, power densities, maintenance testing protocols, and safety compared to the vented lead-acid batteries currently used in nuclear power plants across the USA. Dr. Messinger will also teach modules in nuclear reactor design and operation courses at CCNY that are focused on reactor safety systems, including state-of-the-art and next generation emergency power systems. This program will synergistically leverage and expand the scope of existing nuclear engineering and energy programs at CCNY and CUNY.

**Principal Investigator:** Dr. Gilda A. Barabino, [gbarabino@ccny.cuny.edu](mailto:gbarabino@ccny.cuny.edu)

## **Nuclear Faculty Development at Clemson University**

### **Executive Summary:**

This proposal seeks start-up package funds for a new tenure-track faculty position that can contribute to the academic and research goals of the Center for Nuclear Environmental Engineering Sciences and Radioactive Waste Management (NEESRWM) at Clemson University. This faculty member will develop a unique research program that complements existing expertise within NEESRWM. During a recent self-assessment of NEESRWM, five teaching/research areas were identified which are independent but complimentary to our current teams expertise. Filling these gaps will enable our team to develop a wider range of larger, multidisciplinary projects. Given the wide range of educational and research needs of the nuclear community, it is critical to produce graduates who can understand and address the multifaceted problems that arise from nuclear power production. We desire a faculty candidate will have expertise in materials in extreme environments, nuclear separations, actinide chemistry, nuclear imaging, medical physics or a closely related field. The faculty candidate could have an earned degree in nuclear, mechanical or chemical engineering, or in material science, physics or chemistry. The goal is to hire the best candidate to complement the research expertise in the NEESRWM Center while contributing to the academic program of their home department as well as the Nuclear Engineering and Radiological Sciences minor. Considering the range of potential research areas described above, the home department of the successful candidate would be in the College of Engineering, Computing and Applied Sciences or in the College of Science. The Deans of these respective colleges have agreed to this cross college search to find the top candidate and the Provost has approved the position with the search to begin next year. Thus, this proposal seeks supplementary funds for the start-up package for the approved junior faculty position. The successful candidate is expected to teach undergraduate and graduate-level nuclear engineering and radiological science courses as well as advise MS and PhD students. Additionally, the successful candidate is expected to develop high-quality, well-funded sponsored research program, and be recognized within their respective professional society.

**Principal Investigator:** Timothy A. DeVol, [devol@clemson.edu](mailto:devol@clemson.edu)

## **MIT Nuclear Education Faculty Development Program**

### **Executive Summary:**

Over the past five years the MIT Department of Nuclear Science and Engineering has hired seven new faculty members. The Department's strategic plan calls for continued faculty hiring at a rate of approximately one per year for the next several years. The renewal of our faculty, particularly through support of our junior faculty, remains the most important task for the Department. The proposed MIT Nuclear Education Faculty Development Program is designed to support each stage of the faculty development/support process, including searching, recruiting, startup, mentoring, promotion, and retention. As part of this Program, we are specifically requesting NRC resources to support the career development of the two most recent junior faculty members to have been hired into the Department: Assistant Professor Matteo Bucci, whose work is focused on advanced heat transfer materials and diagnostics; and Assistant Professor Koroush Shirvan, whose research is concerned with advanced nuclear fuel and safety. The NRC support, which will augment resources provided by the Department and other units at MIT, will help these junior faculty members to establish a strong foundation in research, teaching, and service. The NRC funds will be used for summer salary support, new course development, the development of research proposals, travelling and conference attendance, and other startup activities. The Department will also provide a range of other services in support of these young faculty members, including mentoring, performance assessments, administrative support, laboratory space and general support for their teaching and research activities. The MIT Nuclear Education Faculty Development will thus benefit the junior faculty members themselves, the students in the Department, the Department's ability to continue to recruit and retain outstanding young faculty members, and the country's ability to educate a new generation of nuclear engineering leaders who will shape and implement the future national nuclear agenda.

**Principal Investigator:** Dennis Whyte, [whyte@mit.edu](mailto:whyte@mit.edu)

## **PENNSYLVANIA STATE UNIVERSITY'S FACULTY DEVELOPMENT GRANT FOR MULTISCALE MATERIALS MODELING AND EXPERIMENTATION**

### **Executive Summary:**

Nuclear energy continues to be a clean, safe, reliable and cost effective source of electricity, which should be increasingly relied upon to fulfill the country's energy needs, while reducing greenhouse emissions<sup>1</sup>. Materials behavior under extreme conditions of dose and temperature is in many cases the limiting factor in reactor operation and new reactor design. To effectively understand and predict the behavior of materials in nuclear power reactors it is necessary to understand and appropriately model the multiple temporal and spatial scales of these phenomena. This proposal aims to hire a faculty member who will work in this very important area of nuclear power. The Nuclear Engineering Program at Penn State is an independent academic program offering the full range of degrees including Bachelors of Science, Masters of Science, Masters of Engineering, and Doctor of Philosophy. The Pennsylvania State University is committed to having a prominent Nuclear Engineering Program with a strong nuclear power component, through strong support from the Department, the College of Engineering and the Provost Office.

This proposal seeks start-up funds for a new, junior level, tenure-track faculty member in the Department of Mechanical and Nuclear Engineering (MNE) with expertise in the field of multiscale materials modeling and experimentation relevant to understanding the behavior of materials in a nuclear reactor. The proposal is timely to fulfill the country's current research needs and well suited to the existing capabilities at Penn State which will help and complement the new faculty member's research and professional development. The support from the United States Nuclear Regulatory Commission (NRC), partially matched by Penn State, will provide the funds to assist the new faculty member in having a productive career at Penn State.

**Principal Investigator:** Karen Thole, [kthole@psu.edu](mailto:kthole@psu.edu)

## **2018 Nuclear Engineering Faculty Development Program**

### **Executive Summary:**

The objective of the 2018 NRC Nuclear Engineering Faculty Development Program at the University of Florida is to produce a new high quality faculty member that will produce new research, education, and train new students that will benefit the nuclear industry. The goal of this proposal is to augment the startup package for a new junior faculty member in the Nuclear Engineering Program. The Faculty Development Program will be administered and managed by the Director of the Nuclear Engineering Program. He will coordinate the different functions for the program, including providing mentoring of the new faculty member, assist in management of the research funds, and promote the new faculty member through an aggressive marketing campaign to attract additional research funding for the new faculty member. The PI will monitor the progress of the new faculty member to ensure they are progressing towards tenure and promotion, and will prepare and submit an annual report and a final report to the NRC Project Manager electronically detailing the progress of the new faculty member.

**Principal Investigator:** James Baciak, [jebaciak@mse.ufl.edu](mailto:jebaciak@mse.ufl.edu)

## **Continued Advancement of the Radiochemistry Program at the University of Iowa**

### **Executive Summary:**

The proposed faculty development award will build upon the early success of the new radiochemistry program at the University of Iowa (UI) and enhance the academic portfolio of early-career tenure-track faculty within this area to further develop this strength. This proposal is inspired by the success of two previous awardees of the NRC faculty development program (Professors Michael Schultz and Tori Forbes) and our current NRC graduate fellowship award. The UI Department of Chemistry has hired three new faculty members with interests in radiochemistry and a portion of the requested funds will go toward strengthening their efforts in this area. The remainder of the funds will be used to hire a new tenure-track faculty member in the field of radioanalytical chemistry to complement the current strengths in the department. The UI College of Liberal Arts and Sciences has committed a faculty line in this area with strong support from the Department and the University to continue to build and diversify our institutional strength in radiochemistry. The mentorship and development of new and existing tenure-track faculty in this area will enhance our efforts in radiochemistry education. Each of the participating faculty will commit to continued development of related curriculum content within our undergraduate and graduate degree programs.

**Principal Investigator:** James Gloer, [james-gloer@uiowa.edu](mailto:james-gloer@uiowa.edu)

## **Missouri S&T Nuclear Engineering Faculty Development Program (2018-2021)**

### **Executive Summary:**

Missouri University of Science & Technology (Missouri S&T) is pleased to submit this Faculty Development proposal for a new probationary tenure-track faculty member hired in Fall 2017. The primary objective of the Missouri S&T Nuclear Engineering Faculty Development Program is to mentor and retain a tenure-track assistant professor in the area of nuclear materials hired in Fall 2017. The hired faculty member is strategic to Missouri S&T's Best-in-Class initiative in Materials for Extreme Environments signature area. The NE program expects to benefit from the hiring of this faculty considering the annual growth the program has experienced in recent times. The NE program has seen 24% increase in enrollment over the last decade. The increase in graduate students within the same period is 180%. The grant will help in the retention of the new faculty member by providing him with resources to build his research program, including graduate student support, laboratory equipment, travel to professional meetings, and to publish in refereed journals. The realization of the research development will enhance S&T's mission in the signature area. In addition, it will positively shape the quality, productivity, and performance of the NE program and the University as a whole.

**Principal Investigator:** Hyoung K. Lee, [leehk@mst.edu](mailto:leehk@mst.edu)

## **Nuclear Fuels Research and Development Faculty Development Program at the University of Texas at San Antonio**

### **Executive Summary:**

A faculty development program is proposed to foster the development of a state of the art nuclear fuels research capability within the College of Sciences at UTSA. The program will build upon the competencies of a recently hired tenure-track, assistant professor in the Department of Physics and Astronomy. The research portfolio of the program will include fundamental experimental materials investigations of the challenges facing the implementation and licensing criteria of new fuel forms. These areas of interest include, but will not be limited to, fuel synthesis, thermal properties investigation, pellet-clad interaction, corrosion and thermodynamic stability in reactor relevant atmospheres. The proposed program will support each of the three objectives stated in the FOA. First, it will meet the primary objective of faculty development in nuclear science and technology by supporting an early-career faculty member specializing in nuclear fuels research. Second, it will promote growth and retention by enriching the tenure track portfolio of a highly qualified assistant professor who is just entering the teaching profession. Third, it will expand the capabilities of UTSA, support new and continuing research, and enhance career progression of a faculty member who is striving to be a leading independent academic contributor in novel nuclear fuels research. Consistent with achieving these NRC objectives, the proposed program also is designed to build upon the three areas the university considers when reviewing a tenure candidate: research, teaching, and service.

**Principal Investigator:** Miguel José Yacamán, [miguel.yacaman@utsa.edu](mailto:miguel.yacaman@utsa.edu)

## **Faculty Development Program for Cross-Disciplinary Research in Probabilistic Risk Assessment for Nuclear Facilities**

### **Executive Summary:**

The Department of Civil and Environmental Engineering (CEE) and Department of Mechanical Engineering (ME) at the University of Maryland, College Park (UMD) propose to create an inter-department Faculty Development Program (FDP). The UMD A. James Clark College of Engineering has a strong history of education and engagement in nuclear engineering. Consistent with this legacy, the goal of the proposed FDP is to support two tenure-track junior faculty members that are committed to collaborating across departments and developing multidisciplinary solutions to challenges associated with probabilistic risk assessment (PRA) and risk-informed decision making for nuclear facilities. Two junior faculty members have been selected for support under this program. While this is the first academic appointment for both, they each bring several years of experience working in the nuclear field. As a result, this FDP provides a unique opportunity to support development and retention of new junior faculty that are particularly well-suited to addressing important research challenges identified by the U.S. Nuclear Regulatory Commission (NRC). A total of \$450,000 is requested from the NRC to support this program. In addition, UMD has committed to providing an additional \$150,000 of matching funds. The program funds will support the junior faculty members in the development of their research on topics involving the interface between civil and mechanical engineering in PRA applications. This includes topics such as external hazard PRA, assessment of the reliability and fragility of structures, systems, and components, as well as development of novel PRA computational methods and tools that leverage innovations in artificial intelligence, machine learning, and computational modeling. Funds will support development and dissemination of the junior faculty members' research by supporting their summary salary, benefits, supplies, publication fees, and travel to professional society and related meetings to keep them connected to the state of practice. In addition, the funds will be used to support graduate student or postdoctoral researchers, which will serve a dual purpose of allowing the junior faculty to develop skills as mentors and to directly support their research activities. Senior faculty members in both departments will serve as grant principal investigators and support the development of the junior faculty through mentoring, performance evaluation, as well as teaching and research support. Progress metrics of relevance will include: scholarly contribution and output, graduation and placement of students, research funding, as well as reputation, recognition, and prominence.

**Principal Investigator:** Gregory B. Baecher, [gbaecher@mac.com](mailto:gbaecher@mac.com)

## **Faculty Development Program in Nuclear Engineering at the University of Nebraska-Lincoln**

### **Executive Summary:**

While nuclear energy generates approximately thirty percent of Nebraska's electricity, there are no established nuclear engineering programs at any institutions of higher education within the state, resulting in challenges related to the development of a workforce with appropriate design, construction, operation, and regulation expertise. In addition, this lack of academic infrastructure has resulted in a significant gap in nuclear-oriented research projects and activities in the state. The goal of this faculty development program is to address these challenges by strategically supporting the career of a junior faculty member in nuclear engineering education and research at the University of Nebraska-Lincoln (UNL). To do so, the program objectives will seek to develop and establish a preliminary research program, new undergraduate course, professional society activities, mentoring program, and strategies for equipment procurement. In doing so, this program will establish a foundation for future institutional support to explore research and education opportunities in nuclear engineering, recruit new faculty members specializing in nuclear-related fields, and create a sustainable education program to train the next generation of nuclear engineering professionals in Nebraska.

**Principal Investigator:** Jeffrey E. Shield, [jshield@unl.edu](mailto:jshield@unl.edu)

## **Faculty Development Program in Nuclear Engineering at VCU**

### **Executive Summary:**

The primary objective of VCU's Nuclear Engineering Faculty Development Program is to attract, retain and successfully mentor a new highly-qualified tenure track Nuclear Engineering Faculty member and to facilitate their continued success in research, teaching and service at VCU. The program seeks to continuously enhance the qualifications and the expertise of our recently hired tenure-track faculty so that they can pursue innovative and multidisciplinary research and develop new course offerings in related areas of nuclear science and technology currently unavailable in VCU's curriculum. VCU offers an ABET accredited BS in Mechanical Engineering with a separately ABET accredited Major Concentration in Nuclear Engineering, and MS and PhD degrees in Mechanical and Nuclear Engineering. VCU is currently the only university in Virginia offering a full suite of undergraduate and graduate degrees in nuclear engineering. Approximately 100 students (sophomores and above) are enrolled in the undergraduate nuclear engineering major concentration and approximately 115 graduate students are enrolled in the mechanical and nuclear engineering MS and PhD programs. VCU's nuclear engineering program celebrates 10 years in fall 2017, and although we have acquired relative success and name recognition, we still have difficulties to compete with more established nuclear engineering programs when trying to recruit nuclear engineering faculty. NRC Faculty Development support is vital for new nuclear engineering programs such as VCU's to help create attractive offer packages to attract top tenure-track faculty members.

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